## Phase 1 Site Investigation Report

# San Mateo Creek Legacy Uranium Sites

**CERCLIS ID NMN00060684**
**McKinley and Cibola counties, New Mexico**

**June 2010**

New Mexico Environment Department
Ground Water Quality Bureau
Superfund Oversight Section

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## 1.0 Introduction

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), as amended, 42 United States Code ("U.S.C.") §§ 9601 to 9675, the New Mexico Environment Department ("NMED") Superfund Oversight Section ("SOS") has conducted a Site Investigation ("SI") of the San Mateo Creek basin legacy uranium mine and millsites (Site), which is located in Cibola and McKinley counties, New Mexico (CERCLIS ID NMN00060684; Figure 1).

The objective of the SI is to evaluate the Site using the Hazard Ranking System (Ref. 1) and the Superfund Chemical Data Matrix (Ref. 2) to determine if a threat to human health and the environment exists such that further action under CERCLA is warranted. This phase of the SI focuses on evaluating ground water quality in comparison to federal (Ref. 3, 4 and 5) and state (Ref. 6) drinking water standards as well as state ground water standards (Ref. 7) in existing private wells, and identifying receptors to ground water contamination. Subsequent phases may specifically target alluvial and bedrock aquifers through installation of monitor wells in order to identify areas, and possibly specific legacy uranium sites within the San Mateo Creek basin from which ground water contamination most likely originates. Additional SI phases may target characterization of sediments throughout the basin for the same objectives. Results from these SI phases are expected to provide information necessary to prioritize individual legacy uranium sites within the San Mateo Creek basin for further detailed investigation.

## 2.0 Site information

### 2.1 Location and description

The San Mateo Creek basin (Hydrologic Unit Code ["HUC"] 1302020703), by which the boundary of the Site is defined, comprises approximately 321 square miles within the Rio San Jose drainage basin (Ref. 8, 9) in McKinley and Cibola counties, New Mexico (Ref. 10; see Figure 1). This basin is located within the Grants Mining District ("GMD"), which is an area of uranium mineralization occurrence approximately 100 miles long and 25 miles wide encompassing portions of McKinley, Cibola, Sandoval and Bernalillo counties (Ref. 11, p. 8), and includes the Ambrosia Lake mining district (Ref. 11, p. 17). Main access into the Site is provided by New Mexico State Roads 605 and 509.

The 85 legacy uranium mines with recorded production and 4 legacy uranium millsites comprising the Site (Ref. 12) may have contributed to degradation of ground water quality within this basin. Some background ground water contaminant concentrations associated with remediation of the Homestake Mining Company ("HMC") Superfund Site ("HMC Site;" NMD007860935; Ref. 13) exceed federal (Ref. 3, 4, and 5) and state (Ref. 6) drinking water standards as well as state ground water standards (Ref. 7).

## 2.2 Geologic setting

The southern end of the San Mateo Alluvial system has been impacted by contamination from the HMC Site. This alluvial system extends from the northeast to the south of the HMC site, following the San Mateo Creek drainage (Ref. 14, p. 2-1). Underlying the Alluvial aquifer in this vicinity is the Upper Triassic (Ref. 11, p. 12) Chinle Formation, which is a predominantly shale formation 800 feet in thickness. Three aquifer units are present within this formation in the southern part of the basin. The highest two aquifers are the Upper and Middle Chinle sandstones. The lowest aquifer, the Lower Chinle, is a fractured shale with variable hydrologic yield of generally poor quality water. All three of these aquifers subcrop with the Alluvial aquifer, connecting the Alluvial aquifer and each of the Chinle aquifers hydrologically in the vicinity of the Homestake site. The San Andres regional aquifer underlies the Chinle Formation in this area (Ref. 14, p. 2-1—2-2).

Most uranium production in New Mexico has come from the Upper Jurassic Westwater Canyon member of the Morrison Formation north of the HMC site in McKinley and Cibola counties (Ref. 11, p. 9; Ref. 15, p. 1, 6). This unit consists of interbedded fluvial arkosic sandstone, claystone, and mudstone with an average thickness of 250 feet, thinning to 100 feet southward and eastward, and is a major aquifer within the GMD (Ref. 11, p. 9). Three types of uranium deposits that are found in the Westwater Canyon member are primary (trend or tabular; average ore grade greater than 0.20% uranium oxide ["$U_3O_8$"]), redistributed (stack; average grade 0.16% $U_3O_8$), and remnant-primary (average grade 0.20% $U_3O_8$; Ref. 15, p. 6, 8). The overlying Brushy Basin member of the Westwater Canyon member includes the Poison Canyon Sandstone, from which uranium also has been mined (Ref. 11, p. 9, 13).

Additionally uranium deposits were discovered at Haystack Butte in 1950 within the Upper Jurassic Todilto Limestone, which occurs within the San Raphael Group underlying the Morrison Formation (Ref. 11, p. 12, 13; Ref. 15, p. 4); these accounted for approximately 2% of production from the "Grants uranium district" between 1950 and 1981 (Ref. 15, p. 11). More than 100 uranium mines and occurrences in the Todilto Limestone are documented in New Mexico, with production reported from 42 of these mines—mostly located within the "Grants uranium district" (Ref. 15, p. 12).

Thin zones of minor uranium mineralization have been produced from shale and lignite within the Lower Cretaceous Dakota Sandstone, which overlies the Morrison Formation (Ref. 11, p. 13; Ref. 15, p. 12). Uraniferous collapse-breccia pipe deposits, which are vertical or steeply-dipping cylindrical features bounded by ring fractures and faults filled with heterogeneous brecciated "country" rock, also are found in the Grants area (Ref. 15, p. 12).

Quaternary-age unconsolidated to semi-consolidated alluvial, eolian, and terrace deposits overlie bedrock in valley bottoms; these deposits are generally less than 200 feet in thickness (Ref. 11, p. 13).

## 2.3 Demographics

Average household size within McKinley County is 3.44 people (Ref. 16); average population density is 13 people/square mile (Ref. 17, p. 1). Within Cibola County, the average household size is 2.95 people (Ref. 18, p. 1); the average population density in Cibola County is 6 persons/square mile (Ref. 17, p. 2).

The community of San Mateo, which is located within the San Mateo Creek basin, has a municipal water supply that serves 192 residents (Ref. 19, p. 1). No demographic data for the community of Haystack were found.

The communities of Grants, Milan, and Bluewater are located just outside of the boundaries of the proposed Site. In 2000, Grants had a population of 8,806 people with average household size of 2.61 people (Ref. 20). Milan in 2000 had a population of 1,891 with an average household size of 2.81 people (Ref. 21). No population data were found for Bluewater.

## 2.4 Climate

The average annual maximum temperature at the Grants Airport is 67.8° F; the highest maximum temperature of 88.4° F occurs in July. The average annual minimum temperature is 33.0° F; the lowest minimum temperature of 14.4° F occurs in December. The average annual total precipitation is 10.40 inches (in.). The maximum average precipitation of 2.03 in. occurs in August; the minimum average precipitation of 0.44 in. occurs in February. Average annual snowfall is 12.3 in., with the maximum snowfall of 4.1 in. occurring in December (Ref. 22).

The average annual maximum temperature at the weather station in San Mateo, New Mexico is 61.7° F; the highest maximum temperature of 83.1° F occurs in July. The average annual minimum temperature is 34.6° F; the lowest minimum temperature of 16.0° F occurs in January. The average annual total precipitation is 8.66 in. The maximum average precipitation of 2.11 in. occurs in August; the minimum average precipitation of 0.28 in. occurs in February and December. Average annual snowfall is 9.7 in., with the maximum snowfall of 3.1 in. occurring in December (Ref. 23).

The prevailing wind direction (i.e., the direction from which the wind blows) at the Grants airport is northwesterly (Ref. 24, p. 10); however this may not be entirely representative of wind direction within the San Mateo Creek basin (Ref. 25).

At a monitoring location within Bluewater Creek (elevation 7,624 feet), the prevailing wind direction was west-southwesterly during 2007, at an average speed of 9.0 miles per hour (mph) (Ref. 26, p. 2). At a nearby monitoring location on Bluewater Ridge, the prevailing wind direction is south-southwesterly at an average speed of 4.3 mph (Ref. 27, p. 2).

## 2.5 Operational history and ownership

Land ownership within the area is a complex of Indian, Federal, State, and private (Ref. 28; see Figure 3).

Uranium ore was discovered in the Todilto Limestone at Haystack Butte in 1950, and production began prior to mill construction in the area by open-pit mining. Uranium was discovered at Ambrosia Lake in 1955 (Ref. 15, p. 4). Downdip drilling from the initial surface discoveries delineated ore bodies within the Poison Canyon and Westwater Canyon members of the Morrison Formation. The discovery of large subsurface uranium deposits within the Westwater Canyon member resulted in establishment of two-thirds of the active uranium mines in New Mexico within the Ambrosia Lake district by 1980; most of these mines were underground room-and-pillar operations at depths averaging 900 feet (Ref. 11, p. 17).

The Anaconda Copper Company built the Bluewater mill in 1953 to process ore from the Jackpile mine (Ref. 15, p. 4; Ref. 29, p. 1). This mill used a carbonate-leach process with a capacity of 300 tons per day and operated until 1959. An acid-leach mill was operated from 1957 through 1982, reaching a production capacity of 6,000 tons per day in 1978 (Ref. 29, p. 1). ARCO Coal Company reclaimed the site between 1991 and 1995 for long-term DOE stewardship under the Legacy Management program (Ref. 15, p. 5; Ref. 29, p. 1-2).

Two mills were built in 1957 at the present Homestake millsite. The first closed in 1962. Homestake originally owned the second larger mill in a partnership; when that partnership was dissolved in 1981, Homestake became the sole owner. Mill production ceased in 1981, but resumed in 1988 to process ore from the Section 23 mine and Chevron's Mount Taylor mine. The mill was demolished in 1990 (Ref. 15, p. 5), and the site ground water restoration is ongoing (Ref. 30). In 2001, Homestake merged with Barrick Gold Corporation (Ref. 15, p. 5).

Kermac Nuclear Fuels Corp., which was a partnership of Kerr-McGee Oil Industries, Inc., Anderson Development Corp., and Pacific Uranium Mines Co., built the Kerr-McGee uranium mill at Ambrosia Lake in 1957-58. Quivira Mining Co., a subsidiary of Kerr-McGee Corp. (later Rio Algom Mining LLC, currently BHP-Billiton) became the operator of the mill in 1983. Operation began in 1958; from 1985 through 2002 the mill produced only from mine waters from the Ambrosia Lake underground mines. (Ref. 15, p. 5). The tailing impoundment at the site contains 33 million tons of uranium ore (*sic*) within an area of 370 acres (Ref. 31).

Phillips Petroleum Co. built a mill at Ambrosia Lake in 1957-58, and began to process ore from the Ann Lee, Sandstone, and Cliffside mines in 1958. United Nuclear Corporation acquired the property in 1963 when the mill closed (Ref. 15, p. 5). United Nuclear Corporation operated an ion exchange system to extract uranium from mine water in the late 1970s to early 1980s. All operations ended in 1982 (Ref. 32, p. 1).

### 2.6 Regulatory history

Some mines are inventoried by the New Mexico Bureau of Geology and Mineral Resources, the Navajo Nation Abandoned Uranium Mine (AUM) program, and/or the U.S. Bureau of Land Management; some minesites also have been reclaimed under Federal or State jurisdiction (Ref. 12).

In 1978, the U.S. Environmental Protection Agency ("EPA") proposed to regulate minewater discharge under the National Pollutant Discharge Elimination System ("NPDES") permit program. The permit for the Kerr-McGee Section 35 and 36 mines was terminated when Kerr-McGee undertook controlled spreading and irrigation with mine dewatering effluent. Kerr-McGee obtained a State ground water discharge permit for IX ion exchange ("IX") facilities associated with the Section 35 and 36 mines in 1979-1980; this permit currently is in stand-by status (Ref. 33, p. 2).

The Bluewater Mill site was remediated by the Atlantic Richfield Company ("ARCO") under the U.S. Nuclear Regulatory Commission ("NRC") operational license, and was subsequently transferred to DOE custody and long-term care in 1997 (Ref. 34) under the jurisdiction of Title II of the Uranium Mill Tailings Radiation Control Act ("UMTRCA;" Ref. 29, p. 1). Prior to this transfer, the NRC amended the operational license to include alternate concentration limits ("ACLs") for the Alluvial and San Andres aquifers, which were impacted by the site, at established point of compliance wells (Ref. 29, p. 2; Ref. 35, p. 1, 3, and 4).

Homestake Mining Company is currently remediating the Homestake uranium millsite under the regulation of NRC license SUA-1471 and NMED discharge permit DP-200 (Ref. 30, p. 1.1-1). This site also is on the National Priorities List ("NPL") as well (CERCLIS ID NMD007860935; Ref. 36, p. 17).

The site status of the Ambrosia Lake/Rio Algom mill was changed to reclamation in August 2003. NRC issued a license amendment for ACLs in February 2006, after which all ground water corrective actions were discontinued (Ref. 31).

The DOE remediated the Ambrosia Lake/Phillips mill site between 1987 and 1995 as part of the 1978 UMTRCA Title I program, and currently monitors the site as part of the Legacy Management program (Ref. 15, p. 5; Ref. 32, p. 1-2; Ref. 37).

### 2.7 Previous environmental investigations

Numerous environmental investigations associated with remediation of the 4 millsites within the Site have been conducted under the regulatory authority of the NRC; documents from these investigations are not detailed herein, but many are available through the ADAMS website interface (http://adamswebsearch.nrc.gov/scripts/securelogin.pl). NMED has conducted a Preliminary Reassessment (Ref. 38) and a Site Investigation (Ref. 39) of the Anaconda Bluewater millsite, and a Preliminary Assessment of the Ambrosia Lake—Phillips millsite (Ref. 40).

The New Mexico Health and Environment Department ("EID") documented a study of the uranium mining impacts on surface and ground water within the Grants mineral belt in 1986 (Ref. 11).

The New Mexico Energy, Minerals and Natural Resources Department ("NMEMNRD") has compiled a database of uranium legacy mine and mill site information from multiple sources (Ref. 12), which forms the basis of this investigation. The locations of the mines with reported production and mills from this database are shown on Figure 1. Other minesites without reported production in this database are not addressed herein.

NMED sent letters to the Rio Algom Mining Company in 2005 and 2006, requiring compliance with 20.6.2.1203 NMAC for reporting soil contamination related to mine dewatering activities for the Section 35 and 36 mines (Ref. 33, p. 1).

Individual mine- and millsites within the Site boundary that have been investigated under CERCLA are summarized in Table 1. Previous to this SI, NMED conducted and documented a pre-CERCLIS screen (Ref. 41) and Preliminary Assessment (Ref. 42) of the San Mateo Creek basin legacy uranium sites.

The U.S. Forest Service proposed CERCLA investigation of the San Mateo mine in 2008 (Ref. 43, p. 21).

Strathmore Resources currently is conducting baseline studies within the San Mateo Creek basin for proposed uranium exploration and development activities (Ref. 44).

## 3.0 Site investigation

### 3.1 Source/waste characteristics

Both surface and underground mining methods contributed waste to natural surface drainage systems. Liquid wastes were almost exclusively derived from underground operations, while both operational methods contributed solid wastes. Underground mines generally produce less waste rock than surface mines, but contaminant concentrations can be higher (Ref. 11, p. 19). Mine waste piles may include barren overburden, low-grade ore (i.e., below economic value), and/or ore stockpiled for later milling (Ref. 11, p. 54). The spoils areas in which this waste rock is stored usually were not bermed to control runoff (Ref. 11, p. 19). EID sampled mine wastes from minesites within the Site to test contaminant leachability (Ref. 11, p. 32-33). Leaching testing from 37 composite samples of uranium mine waste that were designed to simulate the leaching effects of natural rainfall both before and after contacting alkaline rich soils indicated that contaminants have a relatively low potential for leaching or for significantly degrading ground water quality (Ref. 11, p. 57).

A 1985 survey of 14 uranium mines located within the GMD, which includes individual minesites located within the Site, on Federally-owned surface and mineral lands showed gamma radiation levels between 6 and 888 microroentgens per hour, with the highest reading taken from mine waste and openings (Ref. 45, p. 2-4).

Sampling results of waste rock materials from the Poison Canyon Mining District are summarized in Table 2. Nearly all contaminant concentrations in the waste materials are higher than in the background samples by one to two orders of magnitude (Ref. 46). Waste material from the Navajo-Brown Vandever uranium mine (CERCLIS ID NMD986669117) was used to pave the road to this site, and approximately 75 people were identified to live with one-quarter mile of this site in 1990 (Ref. 47).

EID investigators concluded that 10 to 20 percent of all abandoned mines in the GMD had waste piles that are directly eroding into local drainage channels (Ref. 11, p. 55). EID collected runoff samples from several sites to assess contaminant input from mine waste piles within the Ambrosia Lake mining sub-district (Ref. 11, p. 54); observations from this program indicated that runoff contaminant concentrations exceeded natural concentrations by up to several hundred times. Samples collected within the Ambrosia Lake mining sub-district indicated that uranium and molybdenum maxima concentrations in waste pile runoff exceed natural runoff concentrations by over 2 orders of magnitude. Maximum arsenic, selenium, and vanadium concentrations exceed maximum natural runoff concentrations by 6 to 8 times (Ref. 11, p. 54-55). Runoff sampling in the vicinity of a large waste pile associated with the Old San Mateo mine showed elevated levels of gross alpha and gross beta particle activities, $^{226}$radium, natural uranium, arsenic, lead, molybdenum, selenium, and vanadium, in comparison to natural sediments, to persist at least 550 meters downstream from the waste pile (Ref. 11, p. 57).

Water produced from mine dewatering and aquifer depressuring operations was discharged to settling ponds and drainage channels (Ref. 11, p. 20-21). Mine water production within the Ambrosia Lake mining district was continuous after 1956, with peak production in the early 1960s (Ref. 11, p. 66). During the period 1979-1981, mine discharges of 1,500 gallons per minute ("gpm") to San Mateo Creek sustained approximately 3 miles of perennial flow; 2,300 gpm discharge to Arroyo del Puerto sustained perennial flow of approximately 5 miles (Ref. 11, p. 66, 68). In 1977, approximately 2,900 gpm were being discharged to San Mateo Creek from mine dewatering; by spring of 1978, most of this water was diverted for irrigation and to an adjacent drainage basin (Ref. 11, p. 72).

Raw minewaters from the GMD had elevated concentrations of gross alpha and beta particle activities, $^{226}$radium, $^{210}$lead, natural uranium, molybdenum, selenium, and dissolved solids—particularly sulfate; elevated concentrations barium, arsenic, and vanadium also were observed. Total dissolved solid ("TDS") concentrations in minewaters from the western part of the Ambrosia Lake mining district were 1,200 to 1,800 milligrams per liter ("mg/L"). Minewater in eastern part of the Ambrosia Lake mining district usually had a few hundred mg/L TDS (Ref. 11, p. 80).

For compliance with federal NPDES permits, produced waters were treated with the additions of a flocculent and barium chloride to reduce suspended solid concentrations and to co-precipitate radium (Ref. 11, p. 20-21). Effluent discharged to San Mateo Creek contained 300 to 600 mg/L TDS. Out of nine trace elements for which treated minewaters were analyzed, molybdenum, selenium, and uranium concentrations were consistently higher than in natural runoff. Median total uranium concentration in mine effluents from the Ambrosia Lake mining district was 1.6 mg/L, which was over 16 times greater than the corresponding median concentration in natural runoff. Median total molybdenum concentration in minewater from the Ambrosia Lake mining district was 0.80 mg/L, which compares to the few samples of natural runoff in which total molybdenum concentration exceeded 0.01 mg/L. Total median selenium concentrations in treated minewater generally are less than 0.04 to 0.09 mg/L; however some treated effluents within the district approach 1.0 mg/L. Median total selenium concentration in natural runoff within the Ambrosia Lake mining district is 0.03 mg/L. Arsenic, vanadium, and barium, the latter of which is added in the treatment process, are occasionally detected in significant concentrations in minewaters; cadmium, lead, and zinc are usually below detectable concentrations (Ref. 11, p. 87). Median total barium concentration in treated minewater was 0.212 mg/L, which was lower than the 7.7 mg/L concentration in natural runoff (Ref. 11, p. 90). Elevated concentrations of arsenic and vanadium in treated effluent (0.05 and 0.17 mg/L respectively) were only observed in association with the Homestake ion exchange facility, which was located within the Ambrosia Lake area (Ref. 11, p. 87, 97).

With the exception of natural uranium, total concentrations of radionuclides in treated minewaters are less than those in natural runoff. Most mines discharged minewaters with total concentrations of $^{226}$radium of 6 picocuries per liter ("pCi/L") or less; about 30 percent of this may have been in the dissolved form. However, EID collected effluent samples with total $^{226}$radium concentrations up to 200 pCi/L; these higher concentrations were attributed to the existence of "upset" conditions in the treatment process. Neither thorium isotopes nor $^{228}$radium were generally present in detectable concentrations. Total $^{210}$lead concentrations up to 33 pCi/L and total $^{210}$polonium concentrations up to 15 pCi/L were detected from treated minewaters; higher concentrations—up to several hundred pCi/L—may have occurred during periods of ineffective minewater treatment (Ref. 11, p. 90).

Generally treated minewaters contained trace elements and radionuclides in dissolved form; typically, these dissolved contaminant concentrations comprised more than 50% of the total. More than 85% of the total concentration of gross alpha activity, molybdenum, selenium and natural uranium occurred in the dissolved fraction, while $^{226}$radium concentrations averaged about 30% of the total (Ref. 11, p. 87). With the exception of natural uranium, radionuclide concentrations in minewaters in the dissolved phase were higher in comparison to concentrations in natural runoff (Ref. 11, p. 90). Dissolved gross alpha levels were several hundred to over 1,000 pCi/L in dewatering effluents (Ref. 11, p. 90). Only $^{226}$radium and $^{210}$lead, among trace elements and radionuclides identified to have had elevated concentrations in effluent, underwent significant partitioning changes between dissolved and suspended phases with distance traveled; these constituents were usually became bound to precipitates and sediments and were lost from solution shortly after release. Once precipitated or bound to stream sediments, minewater contaminants could be moved downstream during natural or artificially-induced flow events. (Ref. 11, p. 90, 92). Within relatively sediment-free stream channels, these contaminants would stay in solution; dissolved $^{226}$radium concentrations along the Arroyo del Puerto ranged between 3 and 6 pCi/L. Dissolved $^{226}$radium concentrations also were attenuated by the alkaline and oxidizing conditions that are found in the GMD (Ref. 11, p. 109). Concentrations of uranium, molybdenum, and major dissolved solids generally were not rapidly attenuated in the receiving stream channels (Ref. 11, p. 92).

Mechanisms that were inferred to reduce contaminant concentrations most effectively in alluvial ground water impacted by minewater effluents include dilution, surface adsorption, cation exchange, precipitation, hydrodynamic dispersion, and molecular diffusion.

Sludges in treatment ponds that are created from settling, flocculation, and precipitation have elevated concentrations of $^{226}$radium and other radionuclides, with concentrations of the former exceeding 200 pCi/gram (Ref. 11, p. 82). Separate ion-exchange treatment reduced elevated concentrations of dissolved uranium (Ref. 11, p. 20-21). Although treatment reduced concentrations of $^{226}$radium, $^{210}$lead, $^{210}$polonium, natural uranium, and gross alpha activity, other constituent concentrations were not affected (Ref. 11, p. 80).

## 3.2 Ground water pathway

The ground water pathway assesses the threat to human health and the environment by determining whether hazardous substances are likely to have been released to ground water; and whether any receptors are likely to be exposed to hazardous substances as a result of a release.

### 3.2.1 Hydrogeology

Alluvial aquifers along San Mateo Creek generally yield less than 50 gpm, where water occurs from a few feet to 100 feet below the surface (Ref. 11, p. 14). Available data indicate the presence of little alluvial ground water along the Arroyo del Puerto under pre-mining conditions (Ref. 11, p. 95). Near Ambrosia Lake, the Alluvial aquifer presently yields less than 150 gpd, and is expected to return to pre-mining/pre-milling conditions of little to no saturation (Ref. 32, p. 2). Alluvial ground water flows generally correspond to the slope of the land along San Mateo Creek (Ref. 11, p. 14). Depths to ground water in 1981 along San Mateo Creek were generally near 60 ft near its intersection with the tributary Arroyo del Puerto. Along the latter watercourse, 1981 depths to water were approximately 24 ft (Ref. 11, p. 16). Measurements conducted near the San Mateo Creek gaging station in 1980 showed little effect on alluvial ground water levels from intense summer thunderstorms, but did demonstrate a hydraulic response to late winter and spring stream flow (Ref. 11, p. 74).

Bedrock aquifers are recharged where streamflows or minewater discharge intersect bedrock subcrops and outcrops (Ref. 11, p. 13, 77). Additional bedrock aquifer recharge occurs where saturated valley fill overlie permeable bedrock with a downward hydraulic gradient (Ref. 11, p. 77). Mine dewatering has decreased aquifer water levels significantly, especially in the Morrison Formation (Ref. 11, p. 13). The Westwater Canyon member of the Morrison Formation is a principal bedrock aquifer in the area, yielding up to several hundred gpm (Ref. 11, p. 13). Mine dewatering drained virtually all of this formation and altered its flow system. Prior to dewatering, ground water generally flowed to the northeast and east in the direction of the dip of the strata (Ref. 48, p. 3). Other reliable aquifers include the Dakota Sandstone, the Glorieta Sandstone, and the San Andres Limestone.

### 3.2.2 Ground water use

Ground water uses in the area include domestic, limited agricultural, and livestock watering, with the latter primarily derived from alluvial wells (Ref. 11, p. 14). Within the boundaries of the proposed Site, drinking water systems for the community of San Mateo (Water system no. NM3525733; Ref. 19), Tri-State Generating Station (Water system no. NM3595017; Ref. 49), ARCO (Anaconda) Coal Company—Bluewater Mill (Water system no. NM3591033; Ref. 50), and Homestake Mill (Water system no. NM3598133; Ref. 51) are listed with the NMED Drinking Water Bureau.

The water supply system for the community of San Mateo has two wells, of which only one is currently active. The system serves 192 people through 61 service connections (Ref. 19, p. 1). The supply wells of this system are completed in the Point Lookout Sandstone (Ref. 48, p. 2). NMED queried for non-coliform sample results available on-line; no occurrences of analyte concentrations that exceed Federal (Ref. 3, 4, and 5) or State (Ref. 6) drinking water standards were noted among the data available (Ref. 19).

The Tri-State Generating Station system is an industrial/agricultural system that serves a population of 125 from 10 wells and a reservoir; 2 of the wells are shown to be inactive (Ref. 49, p. 1). NMED queried for non-coliform sample results available on-line; one sample collected between 2004 and 2007 exceeded the MCL for gross beta particle activity (Ref. 3; Ref. 49, p. 2).

The Bluewater Mill system served a population of 60 from 5 service connections that were sourced from 4 wells. The wells are currently shown to be inactive, and no analytical data for this system were available on-line (Ref. 50).

The Homestake Mill system served a population of 24 through 17 connections, and was sourced by one well. This well currently is shown to be inactive, and no analytical data for this system were available on-line (Ref. 51).

Three wells and a spring within a 4-mile radius of the Navajo-Brown Vandever Mine (see Table 1) were noted during an inspection, with ground water levels in 1990 in two wells within 100 feet of an adit depth. At that time, these wells were a portion of the water supply to 430 people (Ref. 47).

Due to the complexity of the Site comprising numerous potential contaminant sources, ground water usage and potential impacts to wells located within Site target distance limits was not analyzed in accordance with Ref. 52, p. 61 (Ref. 53, p. 8). Figure 4 shows details of wells registered with the New Mexico Office of the State Engineer, and Table 3 summarizes well usage, within the San Mateo Creek basin.

Just outside of the Site boundaries, the communities of Grants (Water system no. NM3526133; Ref. 54) and Milan (Water system no. NM3525533; Ref. 55), and the Golden Acres Trailer Park (Water system no. NM3525133; Ref. 56) maintain regulated water supply systems. The Grants system serves a population of 8,892 through 3,211 service connections that are sourced from three wells, one of which is shown to be inactive (Ref. 54, p. 1). The wells are completed into basalt, alluvium, the San Andres Limestone, and the Glorieta Sandstone (Ref. 11, p. 14).

The Milan water system serves a population of 1,911 through 1,043 service connections that are sourced from 4 wells, one of which is shown to be inactive (Ref. 55, p. 1); these wells are completed into the San Andres Limestone (Ref. 11, p. 14).

The Golden Acres Trailer Park system serves a population of 81 through 23 service connections that is sourced from one well, which currently is shown to be inactive (Ref. 56).

The Mount Taylor Millworks water system is an industrial/agricultural system that is sourced from one well. The system serves a population of 65 (Ref. 57). NMED queried for non-coliform sample results available on-line; no occurrences of analyte concentrations that exceed Federal (Ref. 3, 4, 5) or State (Ref. 6) drinking water standards were noted among the data available (Ref. 57).

### 3.2.3 Ground water investigation

During the week of March 30, 2009, NMED SOS personnel collected ground water samples from 28 residential and livestock wells (Ref. 58) within the San Mateo Creek basin north of the HMC Site; one additional well sampled for this investigation yielded only enough water for isotopic analysis. The primary objective of this sampling task was to determine the quality of ground water, in comparison to federal (Ref. 3, 4, 5) and state (Ref. 6) drinking water standards, and state ground water standards (Ref. 7), to which receptors might be exposed. Other objectives of this sampling program were to collect hydrochemical data that could assist with the determination of whether contaminant releases from legacy uranium sites occurred from past site operations or are still occurring from wastes left on-site, and from what site(s) such releases may have originated. Figure 5 and Table 4 show the locations and available data for wells that were sampled.

#### 3.2.3.1 Methodology

In addition to samples from 29 wells, NMED also collected two field blanks (*e.g.*, SMC-00 and -06), one equipment blank (*e.g.*, SMC-15), and two duplicate samples (*e.g.*, SMC-35 duplicating SMC-11, and SMC-36 duplicating SMC-26). All but 5 wells (*e.g.*, SMC-10, SMC-13, SMC-14, SMC-18 and SMC-39) that were sampled for this investigation had installed operational pumps. When sufficient water was available, wells were purged for up to 15 minutes or until field parameters stabilized before a sample was collected (Ref. 58; Ref. 59, p. 3). Samples from 28 wells were analyzed by EPA Region 6 laboratory for concentrations of total and dissolved metals, anions, total dissolved solids ("TDS"), and nitrate plus nitrite (Ref. 60); and for radionuclide activity by the State of New Mexico Scientific Laboratory Division ("SLD;" Ref. 61). Samples also were collected from 13 of these wells for isotopic analyses through a University of New Mexico laboratory; this subset included one well (*e.g.*, SMC-39) in which there was insufficient water for other chemical analyses. A preliminary analysis of geochemical results, which includes the earlier NMED Site Investigation of the Anaconda Company Bluewater uranium millsite (Ref. 39) within the SMC basin are discussed in another report from NMED (Ref. 62).

#### 3.2.3.2 Results compared to regulatory standards

Analytical results were compared to federal (Ref. 3, 4, 5) and state (Ref. 6, p. 2) drinking water standards (*a.k.a.* Maximum Contaminant Level or "MCL;" see Table 5). Two samples, (e.g., sample SMC-26 and duplicate SMC-36) exceed the MCL for alpha particle activity (*e.g.*, 15 picocuries/liter ["pCi/L"] [Ref. 3, p. 431]). Analytical results for total arsenic concentrations from nine samples (*e.g.*, SMC-11, -12, -13, -17, -22, -25, -33, -34, and -35) exceed the arsenic MCL (*e.g.*, 10 micrograms/liter ["µg/L"; Ref. 3, p. 428]). The concentration of total barium in sample SMC-30 exceeds the barium MCL (*e.g.*, 200 µg/L [Ref. 3, p. 428]). The concentration of total lead in sample SMC-12 exceeds the lead treatment action level of 15 µg/L (Ref. 5, p. 1). The concentrations of total selenium in nine samples (*e.g.*, SMC-11, 12, -13 , -14, -20, -24, -33, -34, and -35) exceed the selenium MCL of 50 µg/L (Ref. 3, p. 428). Samples from 16 wells (*e.g.*, SMC-01, -09, -10, -11, -12, -13, -17, -20, -22, -26, -28, -32, -33, -34, -35, and -36) exceed the uranium MCL of 30 µg/L (Ref. 3, p. 431). The analytical method used for NMED's samples did not discriminate between nitrate and nitrite concentrations; 21 samples (*e.g.*, SMC-01, -03, -09, -10, -12, -13, -14, -15, -17, -20, -21, -22, -23, -24, -25, -26, -28, -33, -34, -35, and -36) have nitrate + nitrite concentrations exceeding 1 milligrams/liter ("mg/L"), and thus may exceed the nitrite MCL of 1 mg/L (Ref. 3, p. 428). Of these samples, 6 have values of nitrate + nitrite greater than 10 mg/L (*e.g.*, SMC-09, -10, -12, -13, -24, and -35), and thus may also exceed the nitrate MCL of 10 mg/L (Ref. 3, p. 428). Possible exceedances of the nitrate, nitrite, and/or nitrate + nitrite MCLs (Ref. 3, p. 428) are inferred in samples from 16 wells, while samples from 13 wells exceed the uranium MCL (Ref. 3, p. 431). In summary, 21 samples from a sampled population of 28 unique wells had one or more exceedances of primary MCLs.

In a comparison of analytical results to secondary MCLs, 6 wells exceed the total iron MCL of 300 µg/L (*e.g.*, SMC-08, -09, -12, -14, -17, and -32; Ref. 4, p. 614). Seven wells (*e.g.*, SMC-08, -16, -18, -20, -21, -31, and -32) exceed the total manganese MCL of 50 µg/L (Ref. 4, p. 614). Values of pH for samples SMC-05, -14, and -22 all are higher than the MCL range of 6.5 to 8.5 (Ref. 4 p. 614). Eighteen samples (*e.g.*, SMC-01, -03, -08, -09, -10, -11, -12, -13, -14, -16, -17, -18, -21, -24, -32,-33, -34, and -35) exceed the sulfate MCL of 250 mg/L (Ref. 4, p. 614). Twenty-seven samples (*e.g.*, SMC-01, -03, -04, -05, -07, -08, -09, -10, -11, -12, -13, -14, -16, -17, -18, -20, -21, -22, -24, -25, -26, -31, -32, -33, -34, -35, and -36) equal or exceed the MCL for TDS of 500 mg/L (Ref. 4, p. 614). Twenty-five samples from a sampled population of 29 unique wells had exceedances of one or more secondary MCLs.

All field samples had at least one contaminant concentration in excess of its respective MCL of analytes for which samples were analyzed. Sample SMC-12 had the most drinking water standard exceedances among the collected samples, with up to 10 exceedances including possible exceedances of the nitrate and/or nitrite standards.

Analytical results were compared to New Mexico Water Quality Control Commission ("NMWQCC") ground water standards (*e.g.*, 20.6.2.3103 NMAC; Ref. 7; see Table 6). Five samples with reported concentrations of nitrate + nitrite greater than 10 mg/L (*e.g.*, SMC-09, -10, -12, -13, and -24) may exceed the 10 mg/L NMWQCC standard for nitrate (Ref. 7, p. 12); however, the analytical methodology used for this analysis does not distinguish between these two analytes. Six samples (*e.g.*, SMC-11, -12, -13, -14, -20, and -24) exceed the NMWQCC dissolved selenium concentration standard of 50 µg/L (Ref. 7, p. 12). Seven samples (*e.g.,* SMC-01, -09, -10, -11, -12, -13, and -22) exceed the 30 µg/L NMWQCC standard for dissolved uranium (Ref. 7, p. 12). Dissolved iron concentrations in two samples (*e.g.,* SMC-08 and -32) exceed the NMWQCC iron concentration standard of 1,000 µg/L (Ref. 7, p. 13). The dissolved manganese concentration reported for sample SMC-32 exceeds the NMWQCC manganese standard of 200 µg/L (Ref. 7, p. 13). Sulfate concentrations in 11 samples (*e.g.,* SMC-08, -09, -10, -11, -12, -13, -17, -24, -32, -33, and -35) exceed the NMWQCC sulfate concentration of 600 mg/L (Ref. 7, p. 13). Twelve samples (*e.g.*, SMC-09, -10, -11, -12, -13, -14, -17, -21, -32, -33, -34, and -35) exceed the NMWQCC TDS standard of 1,000 mg/L (Ref. 7, p. 13). Sample SMC-22 exceeds the NMWQCC pH standard range of 6 to 9 standard units ("S.U.;" Ref. 7, p. 13).

Samples from 17 unique wells had exceedances of one or more NMWQCC human health standards (Ref. 7, p. 12), while samples from 14 unique wells had one or more exceedances of other standards for domestic water supply (Ref. 7, p. 13). Uranium was the most prevalent exceedance among those NMWQCC ground water standards for human health (Ref. 7, p. 12), with exceedances detected in 13 wells. Samples from both SMC-12 and -13 had the most exceedances, with up to 5 possible exceedances each, including possible exceedances of the nitrate standard.

Wells in which primary MCLs or NMWQCC standards were exceeded are shown in Figure 5.

#### 3.2.3.3 Discussion

With few exceptions, the total and dissolved concentrations of metals for which standards have been established generally are within the same order of magnitude, indicating that metal analytes occur mostly in dissolved form. One exception is uranium concentrations in sample SMC-32, for which the total uranium concentration is reported as 133 µg/L (Ref. 60, p. 98), while the dissolved uranium concentration is below the reporting limit of 2 µg/L (Ref. 60, p.

100), suggesting that uranium in this sample is present predominantly in particulate form. Total barium concentration in sample SMC-12 was not detected at a reporting limit of 10 µg/L (Ref. 60, p. 38), while the dissolved barium concentration is reported to be 11.3 µg/L (Ref. 60, p. 39). These results would indicate an unresolved laboratory issue with the analysis for this sample.

EPA Region 6 laboratory reports that field blank SMC-00, which was comprised of commercially-procured deionized water, contains a total sodium concentration of 825 µg/L (Ref. 60, p. 20); additionally total copper was detected in the laboratory blank for this sample (Ref. 60, p. 20, 165). The dissolved form of these analytes is below the respective analytical detection limits (Ref. 60, p. 21). In field blank SMC-06, total copper concentration is reported as 22.5 µg/L, and copper was detected in the laboratory blank as well (Ref. 60, p. 59, 165). No dissolved analytes are reported for this sample (Ref. 60, p. 59).

Both total and dissolved concentrations of the following analytes were reported for equipment blank SMC-15: calcium, magnesium, sodium, zinc, selenium, uranium (Ref. 60, p. 86-87), bicarbonate (Ref. 60, p. 169), carbonate (Ref. 60, p. 173), chloride (Ref. 60, p. 174), nitrate + nitrite (Ref. 60, p. 177), sulfate (Ref. 60, p. 178), and TDS (Ref. 60, p. 179).

NMED conducted a preliminary analysis of hydrochemical results from ground water sampling conducted for this Site Investigation, and for the earlier Anaconda Company Bluewater uranium mill Site Investigation (Ref. 39). Important observations from this analysis that are relevant to the current investigation are summarized below (Ref. 62):

- TDS concentrations increase generally from north to south within the sample set. Alluvial ground water samples typically had higher TDS concentrations than samples from bedrock aquifers. Areas of relatively elevated nitrate + nitrite concentrations were identified above the HMC Site and near the junction of state highways 605 and 509 (p. 53).
- Dissolved uranium concentrations average approximately 58 µg/l for the entire SI sample set.
- Analysis of the hydrochemical data indicates a positive correlation between dissolved uranium and selenium concentrations. The highest concentrations of uranium and selenium was found in presumed alluvial well located in the southern part of the area sampled for this SI, north (upgradient) of the HMC Site. Qualitative analysis suggests that the average concentrations of these analytes is higher than background concentrations (p. 54).
- The highest activity values for $^{226}$radium (2.90 pCi/l) and $^{228}$radium (3.91 pCi/l) came from SMC-32, which is inferred to be completed in the Morrison Formation and was the closest well sampled downgradient in the alluvial aquifer below numerous legacy uranium mines and 2 uranium mills. In general, elevated radium concentrations occur in SI samples from inferred bedrock-completed wells. However radium is generally considered to be an unreliable indicator of contamination originating from legacy uranium sites because it is relatively insoluble and has a strong tendency to adsorb onto mineral surfaces (p. 54).

- Some alluvial ground water samples are preliminarily inferred to reflect impacts from mill raffinate, based upon observations of low uranium activity ratio ("AR") and high dissolved uranium concentration values, as well as comparison to a southwestern Colorado millsite investigation. Historically recharge to the alluvial aquifer within the San Mateo Creek basin included discharge from uranium mines and mills. Additional work is recommended to refine this analysis (p. 50, 55).

### 3.2.4 Historical ground water data

Ground water data from the period preceding the inception of mining were limited to single-event sampling of isolated windmills for general chemical characteristics, such as sulfate and TDS, and no trace element or radionuclide data are available in the San Mateo Creek (Ref. 11, p. 94) and the Arroyo del Puerto (Ref. 11, p. 95) drainages. Pre-mining alluvial ground water quality was assessed by data obtained from wells located upstream of uranium industry activities, including the Lee wells along San Mateo Creek. These data indicate that natural alluvial ground waters along San Mateo Creek trend from sodium bicarbonate water at the Lee Ranch to sodium-sulfate-bicarbonate water downstream at the Sandoval Ranch windmill. TDS concentrations increase from 540 to 650 mg/L within this 6-mile distance (Ref. 11, p. 95). Molybdenum concentrations in water from the Lee wells were consistently less than 0.010 mg/L (Ref. 11, p. 95). Uranium concentrations also were consistently less than 0.010 mg/L in these alluvial wells. At the Sandoval Ranch, pre-mining uranium concentrations were estimated to have been less than 0.030 mg/L. The EPA estimated that overall natural uranium concentrations within the Ambrosia Lake mining district approached 0.1 mg/L (Ref. 11, p. 100). Selenium concentrations were generally less than 0.005 mg/L in the Lee wells; at the downstream Sandoval Ranch windmill, EID measured a selenium concentration of 0.018 mg/L in 1980 sample, which is thought to represent an upper limit estimate of pre-mining ground water selenium concentration. Natural ground water selenium concentrations may increase downstream from the Sandoval Ranch due to contribution from selenium-enriched sediments in Poison Canyon (Ref. 11, p. 100-101).

Ground water monitoring was conducted by EID between 1977 and 1982 from stations established in San Mateo Creek and Arroyo del Puerco to characterize the quality of natural ground waters and the impacts of uranium mining to these waters—specifically to characterize hydraulic and contaminant migration relationships between surface water and shallow ground water using monitor well clusters (Ref. 11, p. 21, 26). Available data indicate the presence of little alluvial ground water along the Arroyo del Puerto under pre-mining conditions (Ref. 11, p. 95). Mine dewatering throughout the GMD transformed ephemeral streams into perennial streams, increasing recharge to underlying alluvial aquifers, which raised water levels and shallow well yields up to 50 feet between the onset of dewatering in the 1950s and the late 1970s (Ref. 11, p. 66, 77). In March and early April 1980, when mine dewatering discharge to San Mateo Creek was insignificant, occasional flows of less than 1 cubic foot per second (cfs) caused the alluvial water table to rise slowly. In contrast, streamflow increase to 3 cfs in late April, which lasted nearly two weeks, caused the water table to rise within one week, peaking in mid-May more than one foot higher than the level in mid-April (Ref. 11, p. 74). When minewater discharges were reduced, alluvial water levels monitored below the confluence of Arroyo del Puerto and San Mateo Creek declined eight feet between March 1978 and March 1982 (Ref. 11, p. 77).

Investigation of the impacts to ground water in the vicinity of the Section 35 and 36 mines indicate that alluvial ground water in this area was sourced principally from the dewatering activities (Ref. 33, p. 23). At certain locations along San Mateo Creek, alluvial ground water chemistry more chemically resembled minewaters than natural waters. Minewater constituents that adsorb to sediments or that formed insoluble precipitates, such as $radium_{226}$, were not found in alluvial ground water in significant concentrations (Ref. 11, p. 94; Ref. 33, p. 23). Other constituents that either do not interact with stream sediments or that form insoluble precipitates, such as uranium, selenium, or molybdenum, were found in ground waters in concentrations approaching those in undiluted minewaters (Ref. 11, p. 94).

As previously noted, streamflows recharge bedrock aquifers at subcrop and outcrop areas, or where the saturated alluvium overlies permeable bedrock with downward hydraulic gradient (Section 3.2.1). At these localities, dewatering effluents also were introduced into these bedrock aquifers (Ref. 11, p. 77). Although minewater discharge to Arroyo del Puerto and San Mateo Creek are significant recharge sources to the Dakota and Morrison formations, local water level declines greater than 500 feet resulted from mine dewatering (Ref. 11, p. 77).

In general, test wells that have been affected by minewaters show concentrations of uranium, molybdenum, selenium, and gross alpha particle activity to be elevated above natural levels by 10 to 40 times (Ref. 11, p. 102). Chemical indicators in alluvial ground water to impacts from mine dewatering are inferred to include molybdenum concentrations greater than 0.03 mg/L, uranium concentrations greater than 0.03 mg/L upstream and 0.1 mg/L downstream of the confluence of San Mateo Creek with Arroyo del Puerto, selenium concentrations greater than 0.15 mg/L along San Mateo Creek upstream of the confluence, major changes in TDS concentrations and general chemistry with a distance of less than 3 miles, and significant declines in molybdenum, uranium, or selenium concentrations with increasing depth in the upper portion of the alluvial aquifer (Ref. 11, p.101). The presence of elevated selenium concentrations alone are not sufficient to demonstrate minewater effluent impacts (Ref. 11, p. 107).

Shallow ground water quality in the San Mateo Creek—Arroyo del Puerto drainage was transformed by dewatering effluents. One mile above the confluence of these watercourses, alluvial ground water at the Sandoval monitoring well cluster is indicative of sodium-sulfate-bicarbonate water chemistry, with a TDS concentration of about 650 mg/L. Downstream from the confluence, test wells produce ground water that ionically resembled Ambrosia Lake mining district minewaters (i.e., calcium-magnesium-sulfate type), with TDS over 2,100 mg/L (Ref. 11, p. 102). Mean uranium, molybdenum, and selenium concentrations at the Lee wells are below detectable concentrations of 0.005 to

0.01 mg/L; at the Sandoval well cluster, uranium and molybdenum concentrations are 10 to 20 times detectable limits, which was attributed to the effect of effluent infiltration. Below the confluence with the Arroyo del Puerto, uranium, molybdenum, and selenium concentrations were approximately 3 times higher than at the Sandoval well cluster. Uranium and molybdenum concentrations in the Otero wells are as much 7 times greater than projected natural levels in this portion of the San Mateo Creek drainage, indicating water quality degradation from minewater. Both uranium and molybdenum concentrations decrease with depth (Ref. 11, p. 105). Gross alpha particle activity also was significantly elevated along San Mateo Creek below the Lee wells, which reflects uranium concentrations almost exclusively (Ref. 11, p. 105).

Ground water restoration for the HMC Site has been ongoing in 4 aquifers (i.e., Alluvial, Upper Chinle, Middle Chinle, and Lower Chinle) since 1977 (Ref. 30, p. 1.1-1). Monitoring data from 2008 indicates that concentrations of one or more site contaminants of concern exceed site ground water standards (Ref. 13) within each of the impacted aquifers (Ref. 30, p. 1.1-3—1.1-7). One monitor well completed within the underlying San Andres aquifer upgradient of the HMC Site (Ref. 30, p. 8.0-4), which is not addressed by the HMC restoration (see Ref. 30, p. 1.1-1) has uranium concentrations exceeding federal (Ref. 3) and state (Ref. 6) drinking water standards.

## 3.3 Soil exposure pathway

The soil exposure pathway assesses the threat to human health and the environment by direct contact with hazardous substances and areas of suspected contamination. This pathway addresses any material containing hazardous substances that is on or within 2 feet of the surface and not capped by an impermeable cover.

### 3.3.1 Soil exposure pathway description

An ongoing EPA risk assessment for the Homestake site will investigate the potential for contaminated soil source to impact human health through media including plant and animal uptake, as well as by direct contact (Ref. 63). The need to further characterize this pathway will be dependent upon waste characteristics at individual mine and mill sites within the Site.

### 3.3.2 Soil investigation results

Pond and stream sediment analytical and soils analytical data collected from the Poison Canyon Mining District are shown in Table 2. These data, in comparison to background samples collected within the same area, indicate elevated concentrations of $^{238}$uranium, $^{234}$uranium, $^{230}$thorium, $^{226}$radium, lead$^{210}$, vanadium, lead, and copper in one or more of these samples in comparison to concentrations determined in samples that were collected to characterize background (Ref. 46). Selenium is locally enriched in soils and plants in the Poison Canyon area (cited in Ref. 11, p. 100).

The investigation of soil impacts from dewatering activities associated with the Section 35 and 36 mines indicate that $^{226}$radium and uranium concentrations in soil, while decreasing with increasing depth, exceed assumed background concentrations. Exclusive of arsenic, total metals concentrations are below New Mexico Environment Department (NMED) Soil Screening Levels, and leachable metals concentrations, excluding selenium, and leachable major ions and TDS are below New Mexico Water Quality Control Commission (WQCC) standards (Ref. 33, p. 7-8).

## 3.4 Surface water pathway

The surface water pathway assesses the threat to human health and the environment by determining whether hazardous substances are likely to have been released to surface water; and whether any receptors (intakes supplying drinking water, fisheries, sensitive environments) are likely to be exposed to a hazardous substance as a result of a release.

### 3.4.1 Hydrology

Most streams are ephemeral within the GMD. Peak runoff from heavy late-summer thunderstorms and lesser flows from snow melt in late winter and early spring carry high sediment loads (Ref. 11, p. 13). San Mateo Creek has flowed continuously since construction of San Mateo Reservoir near the community of San Mateo; however this flow usually is ephemeral within 1 mile below San Mateo (Ref. 11, p. 13). Average stream bed loss along San Mateo Creek is approximately 0.72 cubic meters per minute per kilometer (Ref. 11, p. 72). Infiltration rate in the Ambrosia Lake mining district was calculated to be 7.54 cubic meters per minute (Ref. 11, p. 74).

### 3.4.2 Surface water use

Ephemeral perennial streamflows that were created from mine dewatering were important livestock water supplies (Ref. 11, p. 14). Surface water in the GMD, both from natural or mining-impacted sources, was used for livestock watering. Only artificially-maintained perennial streams were used for irrigation. No domestic use of surface water has been documented (Ref. 11, p. 111).

### 3.4.3 Surface water investigation

Natural runoff has average suspended sediment concentrations greater than 30,000 mg/L. Flow within San Mateo Creek typically has suspended sediment concentrations less than 400 mg/L. TDS concentrations in flow within Arroyo del Puerto that was influenced by mine discharge were 1,500 to 2,000 mg/L; occasionally natural waters diluted these concentrations to less than 1,000 mg/L (Ref. 11, p. 84).

In natural runoff, contaminants are generally associated with suspended sediment and precipitates (Ref. 11, p. 87). Natural runoff has median concentrations of total molybdenum and selenium of less than 0.01 and 0.03 mg/L respectively (Ref. 11, p. 87). Median total barium concentrations in natural runoff is 7.7 mg/L (Ref. 11, p. 88). As much of 99% of the gross alpha and gross beta particle activities in natural runoff are associated with precipitates and suspended sediment. Dissolved gross alpha levels are generally less than 20 picocuries per liter ("pCi/L"), with dissolved uranium accounting for more than 80 percent. Total $^{226}$radium concentration in natural runoff often exceeds 15 pCi/L, but usually has less than 2 pCi/L of dissolved $^{226}$radium. Natural runoff typically has concentrations of total $^{210}$lead and $^{210}$polonium between 40 and 90 pCi/L respectively (Ref. 11, p. 90).

Surface water monitoring was conducted by EID between 1977 and 1982 from stations established in San Mateo Creek and Arroyo del Puerto to characterize the quality of natural surface waters and the impacts of uranium mining to these waters—specifically to characterize hydraulic and contaminant migration relationships between surface water and shallow ground water. Monitoring locations included flow from both uranium mine dewatering effluents and natural perennial flow (Ref. 11, p. 21). Additionally, single-stage samplers were installed within ephemeral watercourses above and below mine waste piles to characterize runoff; additionally grab samples collected during runoff events above and below waste piles (Ref. 11, p. 32).

EID investigators concluded that TDS concentrations in perennial stream flows throughout the GMD varied between less than 200 to greater than 1,500 mg/L, with the lowest TDS values found in the perennial flow of San Mateo Creek (Ref. 11, p. 43-44). Dissolved trace element and radionuclide concentrations in both perennial and ephemeral flows throughout the GMD are very low, due to the low solubility of these materials and the prevailing neutral to slightly alkaline nature of the flows (Ref. 11, p. 45). Suspended sediment concentration in the San Mateo perennial flow had a log mean concentration of 10 mg/L, while ephemeral flow in the same streamcourse had a log mean concentration of 8,100 mg/L (Ref. 11, p. 47). Total trace element and radionuclide concentrations in natural runoff generally were dependent upon sample sediment amounts. Molybdenum was virtually absent from runoff (Ref. 11, p. 48). In turbid waters, gross alpha particle activity among 5 samples ranged from 33 pCi/L to 2,100 pCi/L, with a median concentration of 1,200 pCi/L. Gross beta particle activity among 4 samples ranged from 546 pCi/L to 2,000 pCi/L, with a median concentration of 1,060 pCi/L (Ref. 11, p. 48). The majority of $^{226}$radium and $^{210}$lead concentrations found in turbid water samples were bound to sediments (Ref. 11, p. 51). Maximum gross alpha particle activity exceeded maximum natural runoff activity by 200 times. Maximum levels of natural uranium and $^{226}$radium, which are 2 major alpha particle emitters, exceed natural maximum runoff levels by over 100 times. Gross beta particle activity, especially from $^{210}$lead, also far exceed natural runoff levels (Ref. 11, p. 57).

As noted previously (Section 3.1), runoff sampling below uranium mine waste piles indicated that sediment concentrations were comparable to natural sediment concentrations.

### 3.5 Air pathway

The air pathway assesses the threat to human health and the environment by determining whether hazardous substances are likely to have been released to the air; and whether any receptors (human population and sensitive environments) are likely to be exposed to hazardous substances as a result of a release. The need to characterize this pathway will be dependent upon waste characteristics at, and population densities near, individual mine and mill sites within the Site.

## 4.0 Summary and conclusions

NMED has identified 85 formerly-producing uranium minesites and 4 uranium millsites (Ref. 12) within the approximately 321 square mile (Ref. 8) San Mateo Creek basin (Ref. 8, 9) for investigation of potential sources of background ground water contaminant concentrations that exceed federal (Ref. 3, 4, and 5) and state (Ref. 6) drinking water standards. Population density within the area of the Site is between 6 (Ref. 18, p. 2) and 13 people (Ref. 17, p. 1) people per square mile. The communities of Grants and Milan, which are located just outside of the boundaries of the Site, have populations of 8,806 (Ref. 20) and 1,891 (Ref. 21) people respectively. Therefore, the total potentially-impacted population within a 4-mile radius of the Site boundaries is inferred to be between 10,000 and 30,000 people.

Within the Site boundary, ground water supplies water systems for the community of San Mateo (Ref. 19), and the Tri-State Generating Station (Ref. 49). The community of Haystack also uses ground water (Ref. 47). Immediately outside of the Site boundary are water systems for the communities of Grants (Ref. 54) and Milan (Ref. 55), as well as the Golden Acres Trailer Park (Ref. 56). Another water system in the area is registered to the Mount Taylor Millworks (Ref. 58). Available ground water usage is summarized in Table 5.

NMED collected ground water samples from 28 private wells during the week of March 30, 2009 (Ref. 58) for analyses of concentrations of total and dissolved metals, anions, TDS, nitrate plus nitrite (Ref. 60), and radionuclide activity (Ref. 61); additional samples were collected from selected wells for isotopic analyses, the results for which will be discussed in forthcoming document. Analytical results were compared to federal (Ref. 3, 4, and 5) and state (Ref. 6) drinking water standards, and to NMWQCC ground water standards (Ref. 7). All samples had at least one contaminant concentration exceeding a respective MCL. Twenty-four samples from 19 wells, including relevant duplicate samples, had one or more possible exceedances of primary MCLs (see Table 5); these include possible exceedances of the nitrate, nitrite, or the nitrate + nitrite standard (Ref. 3, p. 428) as indicated by reported concentration values of nitrate plus nitrite for which individual speciation was not reported (SMC-01, -03, -09, -10, -12, -13, -17, -20, -21, -22, -23, -24, -25, -26, -33, -34, -35 [this exceedance was not observed in duplicate sample SMC-11], -36 [Ref. 60, p. 176], -14, and -28 [Ref. 60, p. 177]). The reported nitrate + nitrite concentration of 1.02 mg/L in equipment blank SMC-15 (Ref. 60, p. 177) also may exceed the nitrite MCL (Ref. 3, p. 428). Primary MCL exceedances also include concentrations of gross alpha (SMC-26 [Ref. 61, p. 24], and -36 [Ref. 61, p. 31]), arsenic (SMC-11 [Ref. 60, p. 35], -12 [Ref. 60, p. 38], -13 [Ref. 60, p. 80], -17 [Ref. 60, p. 68], -22 [Ref. 60, p. 47], -25 [Ref. 60, p. 5], -33 [Ref. 60, p. 74], -34 [Ref. 60, p. 77], and -35 [Ref. 60, p. 53]), barium (SMC-30 [Ref. 60, p. 92]), lead (SMC-12 [Ref. 60, p. 38]), selenium (SMC-11 [Ref. 60, p. 35], -12 [Ref. 60, p. 38], -13 [Ref. 60, p. 80], -14 [Ref. 60, p. 83], -20 [Ref. 60, p. 41], -24 [Ref. 60, p.11], -33 [Ref. 60, p. 74], -34 [Ref. 60, p.77], and -35 [Ref. 60, p.53]), and uranium (SMC-01 [Ref. 60, p. 176], -09 [Ref. 60, p. 14], -10 [Ref. 60, p. 17], C-11 [Ref. 60, p. 35], -12 [Ref. 60, p. 38], -13 [Ref. 60, p. 80], -17 [Ref. 60, p. 68], -20 [Ref. 60, p. 41], -22 [Ref. 60, p. 47], -26 [Ref. 60, p. 50], -28 [Ref. 60, p. 89], -32 [Ref. 60, p. 98], -33 [Ref. 60, p. 74], -

34 [Ref. 60, p. 77], -35 [Ref. 60, p. 53], and -36 [Ref. 60, p. 56]) in addition to the nitrate and nitrite exceedances. All but 4 samples (SMC-15, -23, -28, and -30) had exceedances of secondary MCLs (see Table 5). Samples from 16 wells (and respective duplicate samples) had exceedances of NMWQCC ground water standards (Ref. 7, p. 12-13; see Table 6), including selenium (SMC-12 [Ref. 60, p. 40]; SMC-13 [Ref. 60, p. 82]; SMC-14 [Ref. 60, p. 85]; SMC-20 [Ref. 60, p. 43]; SMC-24 [Ref. 60, p. 13]; SMC-33 [Ref. 60, p. 76]; SMC-34 [Ref. 60, p. 79]; SMC-35 [Ref. 60, p. 55]), uranium (SMC-01 [Ref. 60, p. 25]; SMC-12 [Ref. 60, p. 40]; SMC-10 [Ref. 60, p. 19]; SMC-13 [Ref. 60, p. 82]; SMC-17 [Ref. 60, p. 70]; SMC-20 [Ref. 60, p. 43]; SMC-22 [Ref. 60, p. 49]; SMC-26 [Ref. 60, p. 52]; SMC-28 [Ref. 60, p. 91]; SMC-33 [Ref. 60, p. 76]; SMC-34 [Ref. 60, p. 79]; SMC-35 [Ref. 60, p. 55]; and SMC-36 [Ref. 60, p. 58]), iron (SMC-08 [Ref. 60, p. 9]; SMC-32 [Ref. 60, p. 99]; manganese (SMC-32 [Ref. 60, p.99]; , sulfate (SMC-08 [Ref. 60, p. 177]; SMC-10 [Ref. 60, p. 177]; SMC-12 [Ref. 60, p. 177]; SMC-13 [Ref. 60, p. 178]; SMC-17 [Ref. 60, p. 178]; SMC-24 [Ref. 60, p. 13]; SMC-24 [Ref. 60, p. 177]; SMC-32 [Ref. 60, p. 178]; SMC-33 [Ref. 60, p. 179]; SMC-34 [Ref. 60, p. 178]; TDS (SMC-08 [Ref. 60, p. 179]; SMC-12 [Ref. 60, p. 179]; SMC-13 [Ref. 60, p. 179]; SMC-14 [Ref. 60, p. 179]; SMC-17 [Ref. 60, p. 179]; SMC-21 [Ref. 60, p. 179]; SMC-32 [Ref. 60, p. 179]; SMC-34 [Ref. 60, p. 179]; SMC-35 [Ref. 60, p. 179]), pH (SMC-22 [Ref. 60, p. 49]), and possibly nitrate subject to the same analytical data limitations as above for nitrate, nitrite, and nitrate + nitrite MCLs (SMC-09, -10, -12, -13, and -24 [Ref. 60, p. 176]).

Analyses of waste rock samples from the Poison Canyon Mining District showed that contaminant concentrations are elevated relative to background (Ref. 46). EID analyzed composite minewaste samples from within the Site to determine contaminant leachability (Ref. 11, p. 34-35); these tests indicated that these materials had relatively low potential for leaching and ground water degradation (Ref. 11, p. 57). Nevertheless, the EID investigation also noted that the contaminant concentrations in runoff from mine waste exceeded natural concentrations (Ref. 11, p. 54, 55, 57).

Water produced from mine dewatering contained elevated contaminant concentrations (Ref. 11, p. 80, 84), and produced perennial flows in San Mateo Creek and Arroyo del Puerto (Ref. 11, p. 66, 68, 72, 77). These flows increased recharge to alluvial aquifers in the Ambrosia Lake mining district. Mine discharge elevated TDS concentrations in Arroyo del Puerto surface water flows (Ref. 11, p. 84). Maximum levels of natural uranium and $^{226}$radium, as well as gross alpha and beta particle activity, exceeded natural runoff levels within the GMD (Ref. 11, p. 57). Although the effluents were treated to reduce solids and radium concentrations (Ref. 11, p. 20-21), some contaminant concentrations were found to be higher than was found in natural runoff (Ref. 11, p. 87, 88, 90). EID collected effluent samples with elevated concentrations of radium$_{266}$, lead$_{210}$, and $^{210}$polonium that were attributed to episodes of ineffective minewater treatment (Ref. 11, p. 90). Some contaminants were observed to precipitate or bind to stream sediments where available, but would move downstream during flow events; in relatively sediment-free stream channels, contaminant concentrations were not readily attenuated (Ref. 11, p. 90, 92).

Little data are available to determine ground water quality before the inception of mining (Ref. 11, p. 94, 95). Mine dewatering increased recharge to, and water levels in, alluvial aquifers (Ref. 11, p. 21, 26, 66, 74, 77; Ref. 33, p. 23). Mine dewatering changed hydrologic conditions throughout the Site (Ref. 11, p. 13; Ref. 48, p. 3). Alluvial ground water was found to have some geochemical similarities to minewaters (Ref. 11, p. 94, 101, 102, 105, 107); natural attenuation was found to moderate some geochemical effects (Ref. 11, p. 94; Ref. 33, p. 23).

Bedrock ground water levels were greatly reduced from the dewatering activities (Ref. 11, p. 13; Ref. 48, p. 3). However, where bedrock aquifers subcrop alluvial aquifers or outcrop in streamcourses, the dewatering effluents recharged these aquifers (Ref. 11, p. 77).

Sludges produced in ponds, in which mine effluents were treated, had some elevated contaminant concentrations (Ref. 11, p. 20-21, 80, 82).

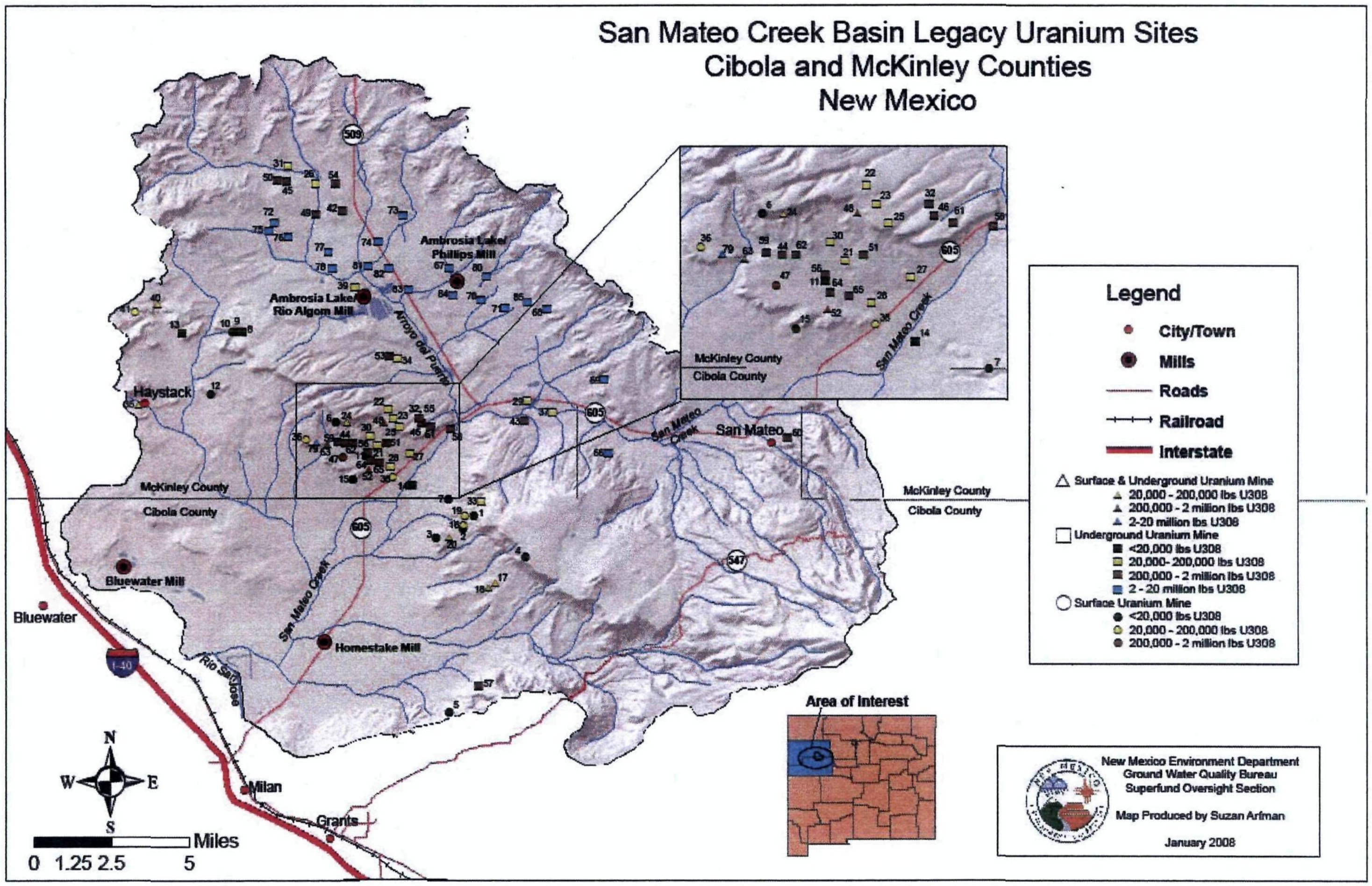
Soil samples from the Poison Canyon Mining District show elevated contaminant concentrations (Ref. 46), as do samples taken from soils impacted by Section 35 and 36 mine dewatering (Ref. 33, p. 7-8). Soil samples from areas impacted by dewatering of the Section 35 and 36 mines indicate $radium_{226}$ and uranium concentrations in soil exceed assumed background concentrations. Exclusive of arsenic, total metals concentrations are below New Mexico Environment Department (NMED) Soil Screening Levels, and leachable metals concentrations, excluding selenium, and leachable major ions and TDS are below New Mexico Water Quality Control Commission (WQCC) standards (Ref. 33, p. 7-8).

The air pathway was not evaluated for this study, but should be studied during recommended further CERCLA investigation of this Site.

## 5.0 Figures

## Figure 1: Mines and mill locations

Ref. 8, 9, 10, 12, 64, 65



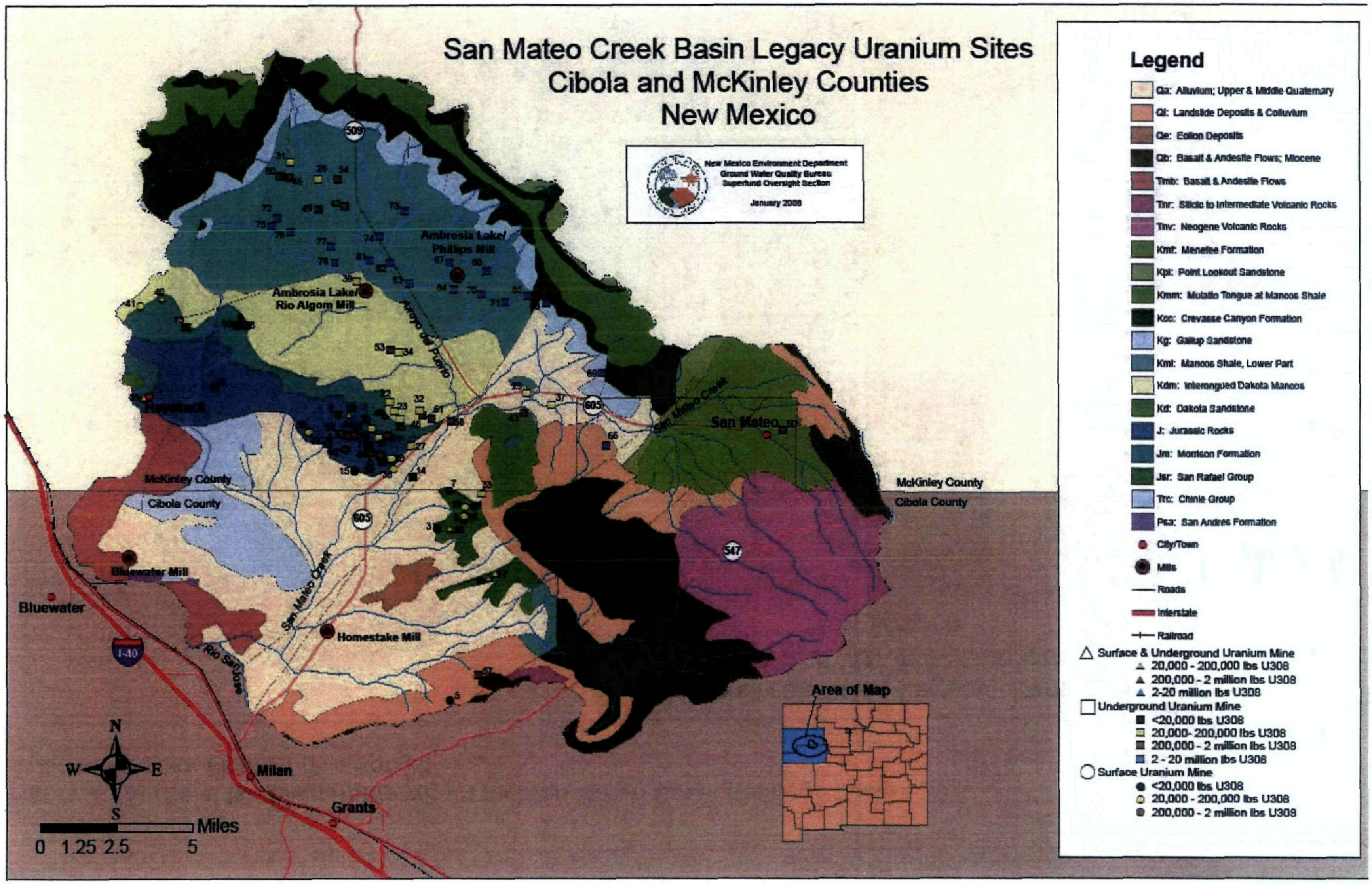

**Notes:**

Symbology for mines is derived from Ref. 12 according to the following schema:

- Surface and underground, underground, and surface uranium mine categorization (Ref. 66).
- Production categorization (Ref. 67).

See Table 1 for mine information.

**Figure 2: Bedrock geology of the San Mateo Creek drainage**
References as for Figure 1 plus Ref. 68



## Figure 3: Surficial landownership within the San Mateo Creek drainage basin

References as for Figure 1 plus Ref. 28

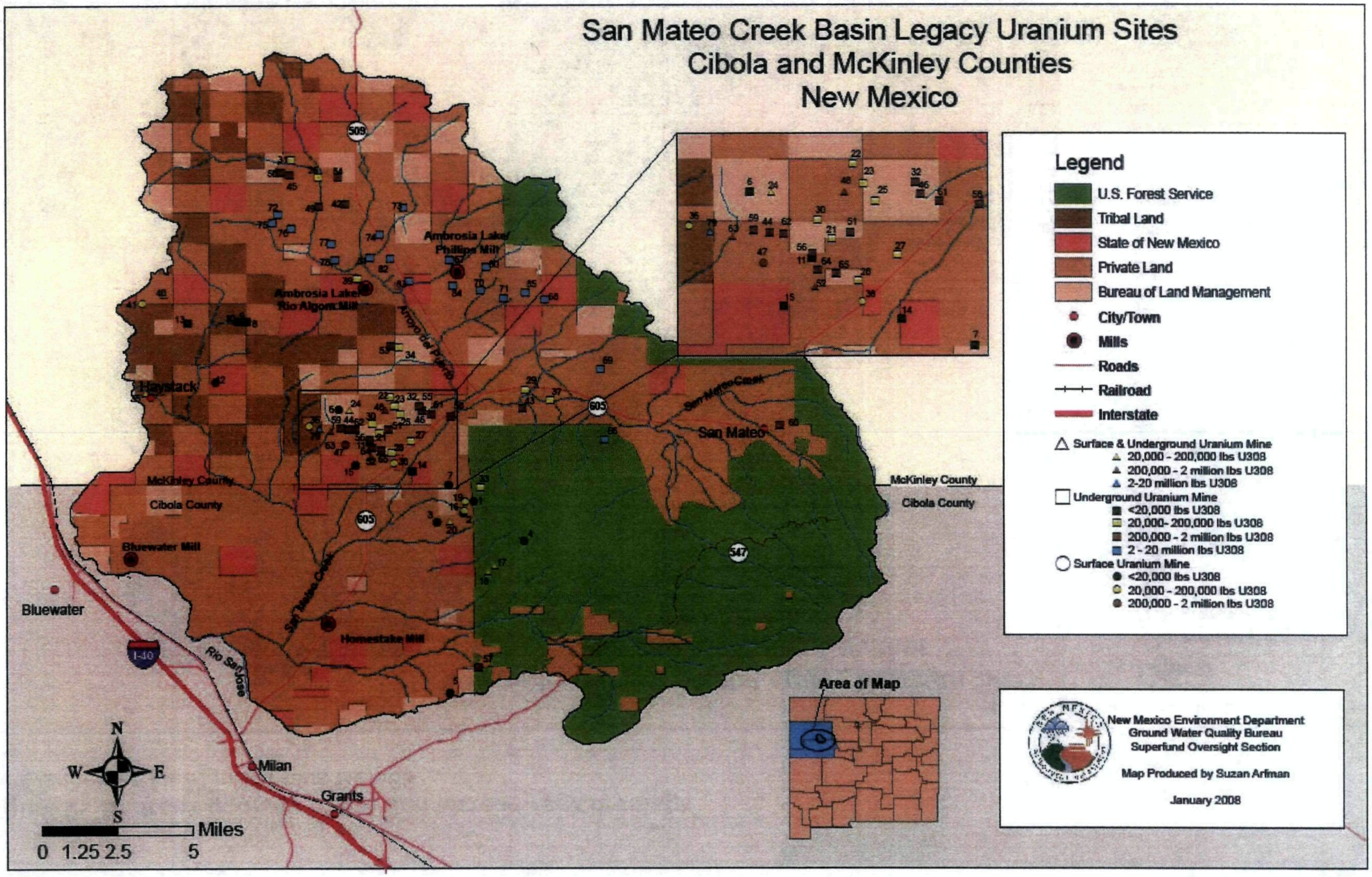
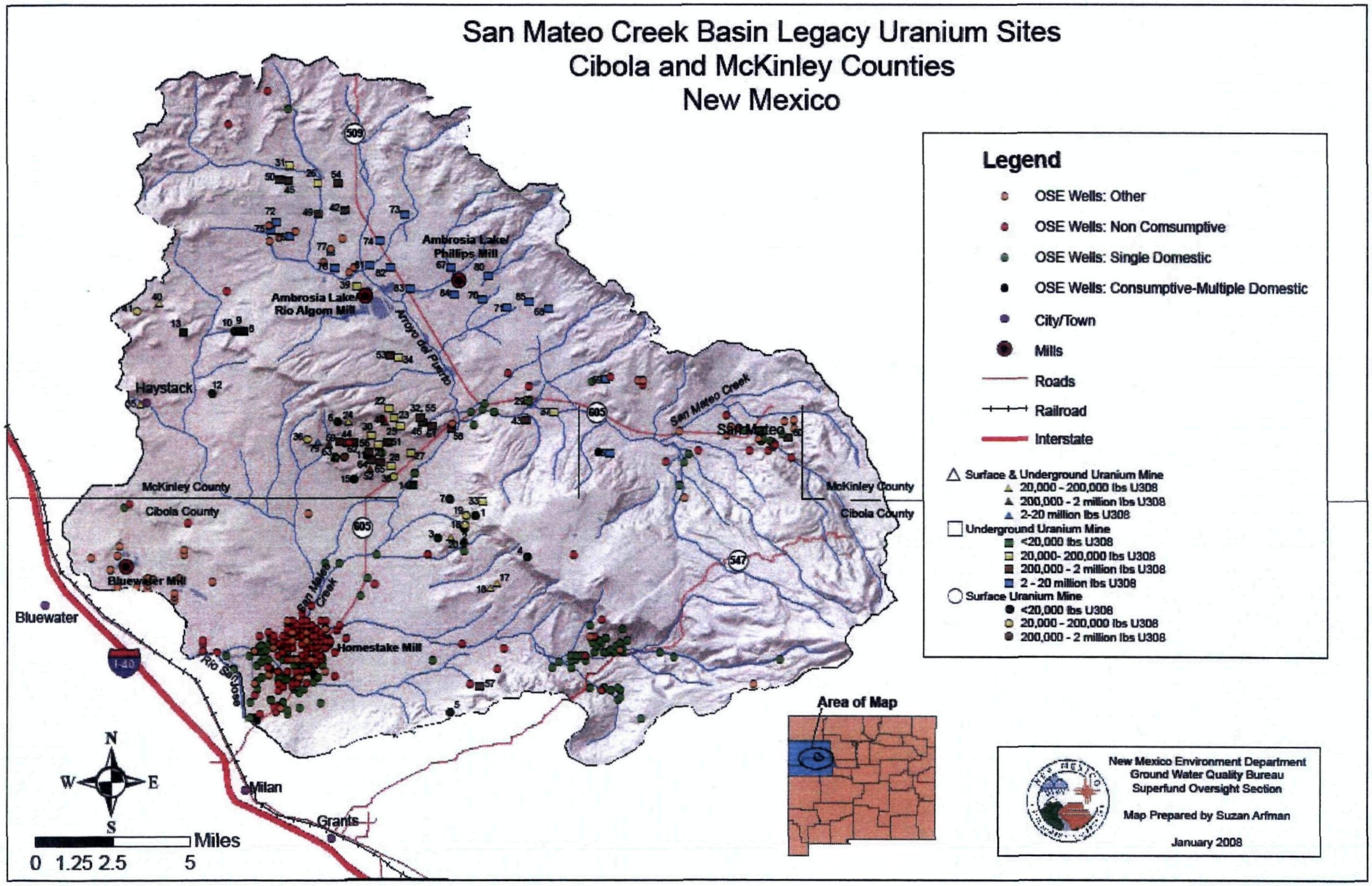


**Figure 4: Wells within the San Mateo Creek basin that are registered with the New Mexico Office of the State Engineer**

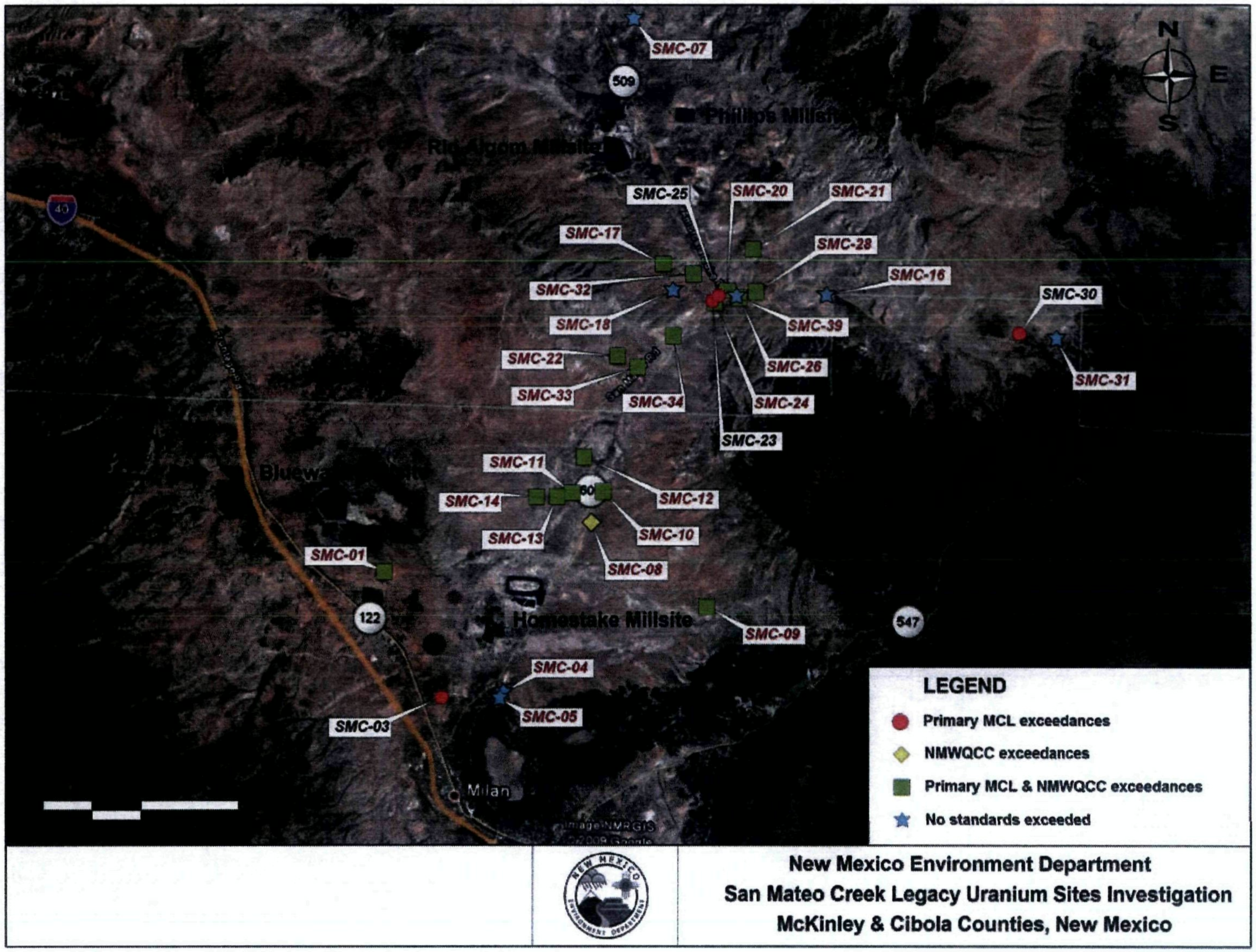
References as for Figure 1 plus Ref. 69 (see notes)



**Notes to Figure 4:**
Wells data from Ref. 69, and are summarized by use categories (Ref. 70, 71) in this figure as follows:

- OSE wells: Other = includes DEW, EXP, MIN, MON, NOT, OBS, PRO, and PUB categories and entries with no category (i.e., blanks)
- OSE wells: Non consumptive = includes IND, IRR, SAN, STK categories
- OSE wells: Single domestic = includes DOM category
- OSE wells: Consumptive—multiple domestic = includes MUL, MOB, MDW categories

## Figure 5: SI sampling task locations and regulatory exceedances



## 6.0 Tables

### Table 1: Summary of investigations performed under CERCLA within the overall Site boundary

| Site name | CERCLIS ID | Reference no. | Reference page | Actions | Date completed | Reference no. | Reference page |
|---|---|---|---|---|---|---|---|
| Brown Vandever Mine | NND986669117 | 36 | 1 | Discovery<br>Preliminary Assessment<br>Archive site<br>Site inspection | 03/01/1990<br>07/17/1990<br>12/10/1992<br>12/10/1992 | 36 | 2 |
| Anaconda Company Bluewater Uranium Mill | NMD007106891 | 36 | 3 | Discovery<br>Archive site<br>Preliminary Assessment | 04/01/1980<br>04/01/1980<br>04/01/1980 | 36 | 4 |
| | | | | Preliminary Reassessment | July 1980 | 38 | NA |
| | | | | Site Investigation | August 2009 | 39 | NA |
| Haystack Butte Mining District | NMD980878771 | 36 | 5 | Discovery<br>Preliminary Assessment<br>Archive site<br>Site inspection | 09/01/1984<br>11/01/1984<br>12/01/1985<br>12/01/1985 | 36 | 6 |
| Kerr-McGee Nuclear Corp | NMD005570015 | 36 | 7 | Discovery<br>Archive site<br>Preliminary Assessment | 02/01/1980<br>02/01/1981<br>02/01/1981 | 36 | 8 |
| Mt. Taylor Uranium Mine | NMD000778605 | 36 | 9 | Preliminary Assessment<br>Discovery<br>Site inspection<br>Archive Site | 04/01/1981<br>05/01/1981<br>04/01/1986<br>09/26/1994 | 36 | 10 |
| Poison Canyon Mining District | NMD981600489 | 36 | 11 | Discovery<br>Preliminary Assessment<br>Archive site<br>Site inspection | 12/01/1986<br>08/01/1987<br>10/01/1989<br>10/01/1989 | 36 | 12 |

**Table 1 continued**

| Site name | CERCLIS ID | Reference no. | Reference page | Actions | Date completed | Reference no. | Reference page |
|---|---|---|---|---|---|---|---|
| UNC San Mateo Mine | NM1223075515 | 36 | 13 | Discovery<br>Preliminary Assessment<br>Archive Site<br>Site inspection | 06/30/1988<br>01/20/1989<br>12/07/1995<br>12/07/1995 | 36 | 14 |
| | | | | Engineering Evaluation/Cost Analysis report | 08/19/2009 | 72 | |
| Febco Uranium Mine | NND986669166 | 36 | 15 | Discovery<br>Preliminary Assessment | 07/16/1991<br>06/11/2001 | 36 | 16 |
| Homestake Mining Company mill | NMD007860935 | 36 | 17 | NPL listing<br>ROD<br>Five year review<br>Five year review | 09/08/1983<br>09/27/1989<br>09/27/2001<br>09/26/2006 | 36 | 18<br>18<br>17<br>17 |
| Ambrosia Lake Disposal Site (*a.k.a.* Phillips mill) | NMN000606875 | 36 | 19 | Discovery | 12/19/2007 | 36 | 20 |
| | | | | Preliminary Assessment | March 2009 | 40 | NA |
| Poison Canyon mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 73 | NA |
| Red Bluff #1 mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 74 | NA |
| Piedra Trieste mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 75 | NA |
| Roundy Manol strip mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 76 | NA |
| Mesa Top mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 77 | NA |
| Malpais mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 78 | NA |
| Hope mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 79 | NA |
| Isabella mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 80 | NA |
| Haystack Section 31 mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 81 | NA |
| Flat Top mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 82 | NA |

**Table 1 continued**

| Site name | CERCLIS ID | Reference no. | Reference page | Actions | Date completed | Reference no. | Reference page |
|---|---|---|---|---|---|---|---|
| Beacon Hill Gossett mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 83 | NA |
| Spencer mine | NA | | | Pre-CERCLIS screen | 09/01/2009 | 84 | NA |
| T-20 mine | NA | | | Pre-CERCLIS screen | 09/01/2009 | 85 | NA |
| Flea mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 86 | NA |
| Doris mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 87 | NA |
| Faith mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 88 | NA |
| Dog mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 89 | NA |
| Blue Peak mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 90 | NA |
| Davenport mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 91 | NA |
| Barbara J #3 mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 92 | NA |
| Barbara J #2 mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 93 | NA |
| Barbara J #1 mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 94 | NA |
| Section 25 SEQ mine | NA | | | Pre-CERCLIS screen | 09/01/2009 | 95 | NA |
| Section 25 open pits mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 96 | NA |
| Roundy shaft mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 97 | NA |
| Schmitt decline mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 98 | NA |
| Beacon Hill mine | NA | | | Pre-CERCLIS screen | 09/10/2009 | 99 | NA |

**Table 2: Analytical data from the Poison Canyon Mining District (July 1989 sampling)**
Ref. 46, p. 2

| Location | $^{238}U$ | $^{234}U$ | $^{232}Th$ | $^{230}Th$ | $^{226}Ra$ | $^{210}Pb$ | Vanadium | Lead | Copper |
|---|---|---|---|---|---|---|---|---|---|
| | pCi/g | | | | | | µg/g | | |
| Background | | | | | | | | | |
| A | 5.53 | 6.80 | 0.50 | 6.86 | 6.30 | 6.60 | 6 | <5 | 5 |
| B | 4.24 | 4.43 | 0.81 | 4.88 | 4.50 | 2.20 | 6 | 7 | 8 |
| BJ #3A | 1.29 | 1.22 | 0.40 | 3.23 | 3.92 | 2.00 | 12 | 6 | 9 |
| Stream/pond sediments | | | | | | | | | |
| BJ Stream A | 4.64 | 4.92 | 1.07 | 5.95 | 9.30 | 5.50 | 15 | 9 | 9 |
| "Stock pond" | 61.50 | 65.50 | 1.75 | 34.50 | 38.20 | 33.60 | 88 | 63 | 11 |
| Waste rock/soils | | | | | | | | | |
| BJ #1 | 890.00 | 910 | | 1150 | 1060 | 860 | 830 | 74 | 9 |
| BJ #3B | 140 | 142 | | 175 | 72 | 93 | 66 | 5 | <5 |
| BJ #3C | 5840 | 5730 | | 5990 | 5600 | 4320 | 260 | 310 | <5 |

**Notes:**
$^{238}U$ = uranium 238
$^{234}U$ = uranium 234
$^{232}Th$ = thorium 232
$^{230}Th$ = thorium 230
$^{226}Ra$ = radium 226
$^{210}Pb$ = lead 210
pCi/g = picocuries per gram
µg/g = micrograms per gram

## Table 3: Ground water usage from wells within the Site boundary
Ref. 69

| GROUND WATER USAGE | | | TOTALS |
|---|---|---|---|
| **Consumptive** | | | 213 |
| | Single domestic wells | 203 | |
| | Multiple domestic and community wells | 10 | |
| **Irrigation, sanitary, industrial, and stock wells** | | | 241 |
| **Other well usages** | Including dewatering, exploration, mining, milling, oil, monitoring, no recorded use of right, observation, prospecting, construction, and no documented usage category | | 79 |

## Table 4: Available well completion data for SI sampling event

| Sample ID | Alternative well IDs | Latitude (NAD83) | Longitude (NAD83) | Reference/ page | Water Level (ft-BGS) | Reference/ page | Well Depth (ft) | Reference/ page | Screened interval | Reference/ page | Lithology/stratigraphic unit opposite screened interval | Reference/ page | Notes | Inferred completion aquifer (Ref. 62, p. 15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMC-00 | **Field Blank** collected at SMC-01 well location | | | | | | | | | | | | | |
| SMC-01 | BWSI-34 | | | | 150 | 30/8.0-6 | | | | | | | | |
| | HMC-951 | 35.24748 | -107.92398 | 39/19 | | | | | | | | | | |
| | B28-S-247 | | | 101 | 152 | 100/20 | 275 | 30/8.0-6, 101/20 | 241-275 | 30/8.0-6 | limestone/dolomite/chalk | 101/20 | | |
| SMC-03 | B00686* | 35.20425 | -107.89780 | | 81 | 101/21 | 138 | 101/21 | 120-134 | 101/21 | sandstone/gravel/ conglomerate | 101/21 | | Bedrock? |
| SMC-04 | | 35.20645 | -107.87140 | | | | 340 | 101/1 | | | | | | Bedrock? |
| SMC-05 | | | | | | | 280 | 102/2 | | | | | | |
| | B-01072* | 35.20420 | -107.87292 | | 180 | 101/22 | 510 | 101/22 | 484-510 | 101/22 | sandstone/gravel/ conglomerate | 101/22 | | Bedrock? |
| SMC-06 | **Field Blank** collected at SMC-07 well location | | | | | | | | | | | | | |
| SMC-07 | | | | | | | 1200 | 102/2 | | | | | | |
| | 14.9.18.243** | 35.44246 | -107.82333 | 103/99 | 744 | 104/99 | 800 | 104/99 | | | Westwater Canyon | 104/99 | | Bedrock |
| SMC-08 | | 35.26671 | -107.83545 | | ~28 | 104/1 | ~200 | 105/1 | | | | | | Alluvial |
| SMC-09 | | 35.23852 | -107.78490 | | - | | | | | | | | | Alluvial |
| SMC-10 | HMC-914 | | | | 42 | 30/4.1-20 | 93 | 30/4.1-20 | | | alluvium | 30/4.1-20 | | |
| | 12.9.7.343** | 35.27774 | -107.83082 | 104/96 105/91 | 58 (11/30/1955) | 104/96 106/91 | 98 | 104/96 106/9 | | | sand and gravel (alluvium) | 104/96 106/91 | | Alluvial |
| SMC-11 | HMC-920 | | | | 33 | 30/4.1-20 | | | | | alluvium | 30/4.1-20 | | |
| | 12.10.12.433** | | | 104/96 106/92 | 58.1 (11/30/1955) | 104/96 | | | | | | 104/96 106/92 | | Alluvial |
| | | | | | 58.1 (7/25/56) | 106/92 | 100 | 104/96 106/92 | | | alluvium | | | |
| SMC-12 | HMC-950 | | | | 26 | 30/4.1-21 | 81 | 30/4.1-21 | | | alluvium | 30/4.1-21 | | |
| | 12.10.12.221** | | | 104/96 106/91 | 67.7 (07/26/1956) | 104/96 106/91 | 81 | 104/96 106/91 | | | alluvium | 104/96 106/91 | | Alluvial |
| SMC-13 | HMC-921 | | | | 39 | 30/4.1-21 | 73 | 30/4.1-21 | | | | | | Alluvial |
| | B00415 O-13* | | | | 50 | 10123 | 74 | 101/23 | | | alluvium | 30/4.1-21 | | |

## Table 4 continued

| Sample ID | Alternative well IDs | Latitude (NAD83) | Longitude (NAD83) | Reference/ page | Water Level (ft-BGS) | Reference/ page | Well Depth (ft) | Reference/ page | Screened interval | Reference/ page | Lithology/stratigraphic unit opposite screened interval | Reference/ page | Notes | Inferred completion aquifer (Ref. 62, p. 15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMC-14 | 121.10.14.212** | 35.27519 | -107.85929 | 104/96 | 50.1 (07/1956) | 104/96 | | | | | alluvium | 104/96 | | Alluvial |
| | | | | | 51 | 30/4.1-21 | 96 | 30/4.1-21 | | | | | | |
| | HMC-922 | | | | 59 | 30/34 | 101 | 53/34 | | | alluvium | 30/4.1-20 | | |
| SMC-15 | Equipment blank post SMC-13 | | | | | | | | | | | | | |
| SMC-16 | | 35.34801 | -107.73715 | | | | | | | | | | pump set at ~200' (Ref. 53, p. 46) | Bedrock? |
| SMC-17 | | 35.35756 | -107.80773 | | 65.5 | 53/46 | >400 | 53/46 | | | | | | Alluvial |
| SMC-18 | | 35.34829 | -107.80320 | | 82.3 | 58/15 | 102 | 58/15 | | | | | | Bedrock? |
| SMC-20 | B-01115 | 35.34903 | -107.77978 | 44/11 | | | 478 | 58/16. /25 | | | | | | Bedrock |
| | Strathmore-111 | | | 44/5 | 204 | 101/25 | 478 | 44/5 | 458-478 | 101/25 | sandstone/gravel/conglom -erate | 101/25 | | |
| SMC-21 | | 35.36355 | -107.76920 | | | | | | | | | | | Alluvial? |
| SMC-22 | | 35.32519 | -107.82638 | | | | 580 | 101/4 | | | | | Former supply to mine camp (Ref. 53, p. 44) | Bedrock? |
| | B-01485* | | | | 280 | 101/4 | ~500 | 105/3 | 500-560 | 101/4 | red coarse sandstone, red sandstone | 101/5 | | |
| SMC-23 | Strathmore-116 | 35.34515 | -107.78606 | 44/5 | | | | | | | Jmw | 44/5 | | Bedrock |
| | B-1636 | | | 53/31 | 80 | 101/1 | 260 | 101/1 | 220-260 | 101/2 | white sand | 101/3 | | |
| | B-0659* | | | | 190 | 101/6 | 220 | 101/6 | | | sandstone/Dakota | 101/6-7 | | |
| SMC-24 | Strathmore-138 | 35.34459 | -107.78514 | 44/5 | 86 | 44/12 | 170 | 44/12 | | | Jmw | 44/9 | | Bedrock |
| | B-0659* | | | | 190 | 101/6 | 220 | 101/6 | | | sandstone/Dakota | 101/6-7 | | |
| SMC-25 | B-1636* | 35.34713 | -107.78334 | | 80 | 101/1 | 260 | 101/1 | 220-260 | 101/2 | white sand | 101/3 | | Bedrock? |
| | 13.9.22.111** | | | 104/99 | 220 | 104/99 | | | | | Westwater Canyon | 104/99 | | |
| SMC-26 | | 35.34658 | -107.77467 | | | | 88 | 44/5 | | | | | | Alluvial |
| | Strathmore-115 | | | 44/5 | 88 | 44/12 | 130 | 44/12 | | | | | | |
| | B-00415-O5* | | | | 72 | 101/26 | 95 | 101/26 | | | Qal | 44/9, 12 | | |
| | B-00415-O6* | | | | 73 | 101/27 | 90 | 101/27 | | | | | | |
| | B-00415-O7* | | | | 74 | 101/28 | 80 | 101/28 | | | Shallow alluvium/basin fill | 101/26, 28 | | |

**Table 4 continued**

| Sample ID | Alternative well IDs | Latitude (NAD83) | Longitude (NAD83) | Reference/ page | Water Level (ft-BGS) | Reference/ page | Well Depth (ft) | Reference/ page | Screened interval | Reference/ page | Lithology/stratigraphic unit opposite screened interval | Reference/ page | Notes | Inferred completion aquifer (Ref. 62, p. 15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SMC-28** | | 35.34879 | -107.76743 | | 520 | 103/4 | 590 | 103/4 | | | | | | Bedrock |
| **SMC-30** | B-00815* | 35.33671 | -107.65423 | | 260 | 101/29 | 300 | 101/29 | 270-290 | 101/29 | white sandstone | 101/29 | | Bedrock? |
| **SMC-31** | B-00524* | 35.33506 | -107.63823 | | 260 | 101/30 | 520 | 101/30 | 400-480 | 101/30 | gray coarse sand | 101/30 | | |
| | 13.8.24.341** | | | 104/97 | | | 250 | 104/97 | | | Kmf | 104/97 | | |
| | 13.8.24.341** | | | 104/97 | 139 (3/1978) | 104/97 | 500 | 104/97 | | | Kmf | 104/97 | | |
| **SMC-32** | 13.9.16.411** | 35.35452 | -107.79461 | 104/98 | | | 250 | 104/98 | | | Westwater Canyon | 104/98 | Pump set at ~200′ (Ref. 53, p. 44) | Bedrock? |
| | 13.9.16.413** | | | 104/99 | | | 250 | 104/99 | | | Westwater Canyon | 104/99 | | |
| **SMC-33** | B-00415-O8* | 35.32146 | -107.81759 | | 30 | 101/31, 33, 34 | 54 | 101/31 | | | shallow alluvium/basin fill | 101/31, 32 | | Alluvial |
| | B-00415-O9* | | | | | | 57 | 101/32 | | | | | | |
| | B-00415-O10* | | | | 32 | 101/32 | 59 | 101/33 | | | | | | |
| | B-00415-O11* | | | | | | 72 | 101/34 | | | | | | |
| | 13.9.29.341** | | | 104/99 | | | 455 | 104/99 | | | T c | 104/99 | | |
| **SMC-34** | 13.9.28.111** | 35.332654 | -107.80274 | 104/99 | 58.2 (08/05/1977) | 104/99 | 125 | 104/99 | | | alluvium | 104/99 | | Alluvial |
| **SMC-35** | **Field duplicate** associated with SMC-11 | | | | | | | | | | | | | |
| **SMC-36** | **Field duplicate** associated with SMC-26 | | | | | | | | | | | | | |
| **SMC-39** | | 35.34677 | -107.7758 | | 86.6 | 58/30 | 88 | 58/30 | | | | | Low yield; Isotope sample only. | Inferred from depth and other references cited |
| | 13.9.22.212** | | | 104/99 | 87.5 (12/1957) | 104/99 | 95 | 104/99 | | | alluvium | 104/99 | | |

* New Mexico Office of the State Engineer well record identified by EPA-provided overplot of iWATERS database (Ref. 69) with well locations determined global positioning instrument during sampling (Ref. 106).
** Inferred well identification by wells from Ref. 107 within 200 meters of sampled well.

## Table 5: Federal and state drinking water standard exceedance concentrations by sample

| | | | Notes | SMC-01 | | SMC-03 | | SMC-04 | | SMC-05 | | SMC-07 | | SMC-08 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MCL | | MCL reference | Analysis reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference |
| *Primary* | | | | | | | | | | | | | | | |
| Gross alpha with U-nat reference (pCi/L) | 15 | Ref. 3, p. 431 | 61 | | | | | | | | | | | | |
| Arsenic (µg/L) | 10 | Ref. 3, p. 428 | 60 | | | | | | | | | | | | |
| Barium (µg/L) | 200 | | | | | | | | | | | | | | |
| Lead (µg/L) | 15 | Ref. 5 | | | | | | | | | | | | | |
| nitrate + nitrite (mg/L) | nitrate+nitrite=10 nitrate=10, nitrite=1 | Ref. 3, p. 428 | | 4.70* | 176 | 4.12* | 176 | | | | | | | | |
| Selenium (µg/L) | 50 | | | | | | | | | | | | | | |
| Uranium (µg/L) | 30 | Ref. 3, p. 431 | | 37.6 | 23 | | | | | | | | | | |
| *Secondary* | | | | | | | | | | | | | | | |
| Iron (µg/L) | 300 | Ref.4, p. 614 | 60 | | | | | | | | | | | 3090 | 8 |
| Manganese (µg/L) | 50 | | | | | | | | | | | | | 110 | 8 |
| pH (S.U.) | 6.5--8.5 | | | | | | | | | 8.6 | 34 | | | | |
| Sulfate (mg/L) | 250 | | | 353 | 177 | 369 | 177 | | | | | | | 911 | 177 |
| TDS (mg/L) | 500 | | | 884 | 14 | 884 | 179 | 698 | 179 | 592 | 179 | 534 | 179 | 1400 | 178 |

## Table 5 continued

| | | | Notes | SMC-09 | | SMC-10 | | SMC-11 | | SMC-12 | | SMC-13 | | SMC-14 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | duplicate of SMC-35 | | | | | | | |
| MCL | | MCL reference | Analysis reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference |
| ***Primary*** | | | | | | | | | | | | | | | |
| Gross alpha with U-nat reference (pCi/L) | 15 | Ref. 3, p. 431 | 61 | | | | | | | | | | | | |
| Arsenic (µg/L) | 10 | Ref. 3, p. 428 | 60 | | | | | 21.2 | 35 | 24.3 | 38 | 37.7 | 80 | | |
| Barium (µg/L) | 200 | | | | | | | | | | | | | | |
| Lead (µg/L) | 15 | Ref. 5 | | | | | | | | 32.9 | 38 | | | | |
| nitrate + nitrite (mg/L) | nitrate+nitrite=10<br>nitrate=10<br>nitrite=1 | Ref. 3, p. 428 | | 22.8 | 176 | 21.2 | 176 | | | 11.5 | 176 | 18.6 | 176 | 2.36* | 177 |
| Selenium (µg/L) | 50 | | | | | | | 352 | 35 | 363 | 38 | 604 | 80 | 51.1 | 83 |
| Uranium (µg/L) | 30 | Ref. 3, p. 431 | | 42.0 | 14 | 30.5 | 17 | 231 | 35 | 184 | 38 | 240 | 80 | | |
| ***Secondary*** | | | | | | | | | | | | | | | |
| Iron (µg/L) | 300 | Ref. 4, p. 614 | 60 | 1300 | 14 | | | | | 909 | 38 | | | 411 | 83 |
| Manganese (µg/L) | 50 | | | | | | | | | | | | | | |
| pH (S.U.) | 6.5–8.5 | | | | | | | | | | | | | 8.7 | 85 |
| Sulfate (mg/L) | 250 | | | 2070 | 177 | 2110 | 177 | 1580 | 177 | 955 | 177 | 1610 | 178 | 535 | 178 |
| TDS (mg/L) | 500 | | | 3400 | 178 | 3380 | 178 | 2440 | 179 | 1870 | 179 | 2710 | 179 | 1180 | 179 |

## Table 5 continued

| | | | Notes | SMC-15 | | SMC-16 | | SMC-17 | | SMC-18 | | SMC-20 | | SMC-21 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | equipment blank | | | | | | | | | | | |
| MCL | | MCL reference | Analysis reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference |
| *Primary* | | | | | | | | | | | | | | | |
| Gross alpha with U-nat reference (pCi/L) | 15 | Ref. 3, p. 431 | 61 | | | | | | | | | | | | |
| Arsenic (µg/L) | 10 | Ref. 3, p. 428 | 60 | | | | | 12.3 | 68 | | | | | | |
| Barium (µg/L) | 200 | | | | | | | | | | | | | | |
| Lead (µg/L) | 15 | Ref. 5 | | | | | | | | | | | | | |
| nitrate + nitrite (mg/L) | nitrate+nitrite=10 nitrate=10 nitrite=1 | Ref. 3, p. 428 | | 1.02* | 177 | | | 1.45* | 176 | | | 1.08* | 176 | 9.38* | 176 |
| Selenium (µg/L) | 50 | | | | | | | | | | | 74.1 | 41 | | |
| Uranium (µg/L) | 30 | Ref. 3, p. 431 | | | | | | 98.4 | 68 | | | 66.6 | 41 | | |
| *Secondary* | | | | | | | | | | | | | | | |
| Iron (µg/L) | 300 | Ref. 4, p. 614 | 60 | | | | | · 521 | 68 | | | | | | |
| Manganese (µg/L) | 50 | | | | | 56.7 | 65 | | | 75.4 | 71 | 53.6 | 41 | 130 | 44 |
| pH (S.U.) | 6.5--8.5 | | | | | | | | | | | | | | |
| Sulfate (mg/L) | 250 | | | | | 323 | 178 | 656 | 178 | 370 | 178 | | | 546 | 177 |
| TDS (mg/L) | 500 | | | | | 864 | 179 | 1100 | 179 | 732 | 179 | 504 | 179 | 3320 | 179 |

## Table 5 continued

| MCL | | MCL reference | Notes: Analysis reference | SMC-22 Concentration | SMC-22 page in reference | SMC-23 Concentration | SMC-23 page in reference | SMC-24 Concentration | SMC-24 page in reference | SMC-25 Concentration | SMC-25 page in reference | SMC-26 (duplicate of SMC-36) Concentration | SMC-26 page in reference | SMC-28 Concentration | SMC-28 page in reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Primary*** | | | | | | | | | | | | | | | |
| Gross alpha with U-nat reference (pCi/L) | 15 | Ref. 3, p. 431 | 61 | | | | | | | | | 35.3** | 24 | | |
| Arsenic (µg/L) | 10 | Ref. 3, p. 428 | 60 | 21.7 | 47 | | | | | 11.2 | 5 | | | | |
| Barium (µg/L) | 200 | | | | | | | | | | | | | | |
| Lead (µg/L) | 15 | Ref. 5 | | | | | | | | | | | | | |
| nitrate + nitrite (mg/L) | nitrate+nitrite=10<br>nitrate=10<br>nitrite=1 | Ref. 3, p. 428 | | 1.86* | 176 | 4.43* | 176 | 20.2 | 176 | 5.67* | 176 | 6.28* | 176 | 1.11* | 177 |
| Selenium (µg/L) | 50 | | | | | | | 66.8 | 11 | | | | | | |
| Uranium (µg/L) | 30 | Ref. 3, p. 431 | | 48.2 | 47 | | | | | | | 188 | 50 | 46.7 | 89 |
| ***Secondary*** | | | | | | | | | | | | | | | |
| Iron (µg/L) | 300 | Ref. 4, p. 614 | 60 | | | | | | | | | | | | |
| Manganese (µg/L) | 50 | | | | | | | | | | | | | | |
| pH (S.U.) | 6.5--8.5 | | | 9.2 | 49 | | | | | | | | | | |
| Sulfate (mg/L) | 250 | | | | | | | 2070 | 177 | | | | | | |
| TDS (mg/L) | 500 | | | 506 | 179 | | | 3310 | 178 | 504 | 178 | 572 | 179 | | |

## Table 5 continued

| MCL | | MCL reference | Analysis reference | SMC-30 | | SMC-31 | | SMC-32 | | SMC-33 | | SMC-34 | | SMC-35 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Notes | | | | | | | | | | | duplicate of SMC-11 | |
| | | | | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference |
| *Primary* | | | | | | | | | | | | | | | |
| Gross alpha with U-nat reference (pCi/L) | 15 | Ref. 3, p. 431 | 61 | | | | | | | | | | | | |
| Arsenic (µg/L) | 10 | Ref. 3, p. 428 | 60 | | | | | | | 21.0 | 74 | 29.3 | 77 | 23.6 | 53 |
| Barium (µg/L) | 200 | | | 300 | 92 | | | | | | | | | | |
| Lead (µg/L) | 15 | Ref. 5 | | | | | | | | | | | | | |
| nitrate + nitrite (mg/L) | nitrate+nitrite=10 nitrate=10, nitrite=1 | Ref. 3, p. 428 | | | | | | | | 9.62* | 176 | 6.15* | 176 | 12.7 | 176 |
| Selenium (µg/L) | 50 | | | | | | | | | 257 | 74 | 427 | 77 | 350 | 53 |
| Uranium (µg/L) | 30 | Ref. 3, p. 431 | | | | | | 113 | 98 | 164 | 74 | 119 | 77 | 224 | 53 |
| *Secondary* | | | | | | | | | | | | | | | |
| Iron (µg/L) | 300 | Ref. 4, p. 614 | 60 | | | | | 1690 | 98 | | | | | | |
| Manganese (µg/L) | 50 | | | | | 88.8 | 95 | 1100 | 98 | | | | | | |
| pH (S.U.) | 6.5--8.5 | | | | | | | | | | | | | | |
| Sulfate (mg/L) | 250 | | | | | | | 1100 | 178 | 899 | 178 | 1080 | 178 | 396 | 178 |
| TDS (mg/L) | 500 | | | | | 500 | 179 | 1630 | 179 | 1490 | 179 | 1780 | 179 | 2530 | 179 |

**Table 5 continued**

| MCL | | MCL reference | Notes<br>Analysis reference | SMC-36<br>duplicate of SMC-26<br>Concentration | <br><br>page in reference | TOTAL number of unique wells sampled with exceedance of specified contaminant |
|---|---|---|---|---|---|---|
| *Primary* | | | | | | |
| Gross alpha with U-nat reference (pCi/L) | 15 | Ref.3, p. 431 | 61 | 15.4** | 31 | 1 |
| Arsenic (µg/L) | 10 | Ref.3, p. 428 | | | | 8 |
| Barium (µg/L) | 200 | | | | | 1 |
| Lead (µg/L) | 15 | Ref. 5 | | | | 1 |
| nitrate + nitrite (mg/L) | nitrate+nitrite=10<br>nitrate=10,<br>nitrite=1 | Ref.3 p. 428 | 60 | 5.96* | 176 | 18 |
| Selenium (µg/L) | 50 | | | | | 8 |
| Uranium (µg/L) | 30 | Ref. 3, p. 431 | | 190 | 56 | 14 |
| *Secondary* | | | | | | |
| Iron (µg/L) | 300 | | | | | 5 |
| Manganese (µg/L) | 50 | | | | | 7 |
| pH (S.U.) | 6.5–8.5 | Ref. 4, p. 614 | 60 | | | 2 |
| Sulfate (mg/L) | 250 | | | | | 17 |
| TDS (mg/L) | 500 | | | 598 | 179 | 25 |

| | |
|---|---|
| **Number of unique well samples with primary MCL exceedances** | 21 |
| **Number of unique well samples with secondary MCL exceedances** | 25 |

Blank cells indicate no exceedance of referenced standards
*The analytical method did not distinguish between nitrate and nitrite; reported concentrations are for nitrate + nitrite. Reported concentrations for nitrate + nitrite between 1 and 10 mg/L may exceed the nitrite standard.
**Alpha activity values are calculated as follows (Ref. 61, p. 32): (gross alpha with U-nat reference) – (0.67*[uranium, mass concentration])

## Table 6: NMWQCC ground water standard exceedances by sample

All analytical data cited are from Ref. 107
NMWQCC ground water standards cited are from Ref. 7, p. 12-13.

| | | SMC-01 | | SMC-08 | | SMC-09 | | SMC-10 | | SMC-11 | | SMC-12 | | SMC-13 | | SMC-14 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Notes | | | | | | | | | duplicate of SMC-35 | | | | | | | |
| NMWQCC Standard | | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference |
| ***A. Human health*** | | | | | | | | | | | | | | | | | |
| nitrate (µg/L)* | 10 | | | | | 22.8* | 176 | 21.2* | 176 | | | 11.5* | 176 | 18.6* | 176 | | |
| Selenium (µg/L) | 50 | | | | | | | | | 367 | 37 | 382 | 40 | 618 | 82 | 42.9 | 85 |
| Uranium (µg/L) | 30 | 36.7 | 25 | | | 40.7 | 16 | 30.9 | 19 | 228 | 37 | 163 | 40 | 240 | 82 | | |
| ***B. Other standards for domestic water supply*** | | | | | | | | | | | | | | | | | |
| Iron (µg/L) | 1000 | | | 2740 | 9 | | | | | | | | | | | | |
| Manganese (µg/L) | 200 | | | | | | | | | | | | | | | | |
| Sulfate (mg/L) | 600 | | | 911 | 177 | 2070 | 177 | 2110 | 177 | 1580 | 177 | 955 | 177 | 1610 | 178 | | |
| TDS (mg/L) | 1000 | | | | | 3400 | 178 | 3380 | 178 | 2440 | 179 | 1870 | 179 | 2710 | 179 | 1180 | 179 |
| pH (S.U.) | 6–9 | | | | | | | | | | | | | | | | |

| | | SMC-17 | | SMC-20 | | SMC-21 | | SMC-22 | | SMC-24 | | SMC-26 | | SMC-28 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Notes | | | | | | | | | | | duplicate of SMC-36 | | | |
| NMWQCC Standard | | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference |
| ***A. Human health*** | | | | | | | | | | | | | | | |
| nitrate (µg/L)* | 10 | | | | | | | | | 20.2 | 176 | | | | |
| Selenium (µg/L) | 50 | | | 73.6 | 43 | | | | | 66.2 | 13 | | | | |
| Uranium (µg/L) | 30 | 99.5 | 70 | 63.9 | 43 | | | 42.9 | 49 | | | 188 | 52 | 46.4 | 91 |
| ***B. Other standards for domestic water supply*** | | | | | | | | | | | | | | | |
| Iron (µg/L) | 1000 | | | | | | | | | | | | | | |
| Manganese (µg/L) | 200 | | | | | | | | | | | | | | |
| Sulfate (mg/L) | 600 | 656 | 178 | | | | | | | 2070 | 177 | | | | |
| TDS (mg/L) | 1000 | 1100 | 179 | | | 3320 | 179 | | | | | | | | |
| pH (S.U.) | 6–9 | | | | | | | 9.2 | 49 | | | | | | |

*The analytical method did not distinguish between nitrate and nitrite; reported concentrations are for nitrate + nitrite. Concentrations for nitrate + nitrite greater than 10 mg/L indicated in this table may exceed the nitrate standard.

| Table 6 continued | | SMC-32 | | SMC-33 | | SMC-34 | | SMC-35 | | SMC-36 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Notes | | | | | | | duplicate of SMC-11 | | duplicate of SMC-26 | | |
| NMWQCC Standard | | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | Concentration | page in reference | |
| *A. Human health* | | | | | | | | | | | | |
| nitrate (µg/L)* | 10 | | | | | | | 12.7* | 176 | | | |
| Selenium (µg/L) | 50 | | | 268 | 76 | 434 | 79 | 375 | 55 | | | |
| Uranium (µg/L) | 30 | | | 166 | 76 | 117 | 79 | 231 | 55 | 187 | 58 | |
| *B. Other standards for domestic water supply* | | | | | | | | | | | | |
| Iron (µg/L) | 1000 | 1650 | 99 | | | | | | | | | |
| Manganese (µg/L) | 200 | 1150 | 99 | | | | | | | | | |
| Sulfate (mg/L) | 600 | 1100 | 178 | 899 | 178 | 1080 | 178 | | | | | |
| TDS (mg/L) | 1000 | 1630 | 179 | 1490 | 179 | 1780 | 179 | 2530 | 179 | | | |
| pH (S.U.) | 6--9 | | | | | | | | | | | |

| | |
|---|---|
| **Number of unique well samples with NMWQCC human health standard exceedances** | 17 |
| **Number of unique well samples with NMWQCC other standards for domestic water supply exceedances** | 14 |
| **Total number of unique well samples with NMWQCC standard exceedances** | 18 |

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Deputy Secretary

# MEMORANDUM *(transmitted via email)*

**TO:** LaDonna Turner, EPA Region 6 Site Assessment Manager
**FROM:** David L. Mayerson
**DATE:** January 11, 2010

**RE:** Request for evaluation of CLP laboratory quality control for San Mateo Creek basin SI water samples

NMED personnel have been examining analytical data in detail received from Houston Laboratories from NMED's SI sampling conducted in 2009. From this examination, several issues have come to light for which NMED requests explanation or response from EPA

For this analytical work, EPA assigned project number 09SF165 and work order numbers 0903074, 0904002, 0904006, and 0904011 for the requested metals and "wet" chemistry analyses.

1. NMED's CLP services request for this task included analyses for dissolved and total molybdenum (Mo); however these analyses were not included in results received by NMED.
Mo results were reported in an amended report on 4/8/2010 which was sent to Ladonna Turner, David Mayerson, and Dana Bahar
2. Charge balance errors (CBE), also known as cation-anion balances, that NMED calculated for a few of the analyses are higher than might be expected. NMED currently does not have an acceptance criterion for this measure, and was unable to identify an acceptance criterion for analyses performed under the EPA CLP. Moreover NMED staff has limited knowledge in the reasons why such a measure may vary for a specific sample. NMED requests that EPA examine NMED's CBE calculations and associated data in the attached table to help us understand if there should be any concerns about these data quality and accuracy. This is not a task that the Regional Lab has any expertise in.
3. The majority of analytical results for metals indicate close agreement between total and dissolved concentrations. However, several of the analyses report a concentration of a dissolved analyte that is higher than the concentration of the same total analyte; a few examples of this are SMC-01 (calcium), SMC-03 (barium and calcium), SMC-07 (barium and sodium), SMC-10 (uranium), SMC-13 (magnesium), SMC-14 (arsenic and selenium), SMC-16 (barium), and SMC-17 (selenium). While the difference between the values reported for dissolved and total concentrations generally is not large, such discrepancies are not acknowledged nor addressed in the report narrative. The laboratory does not compare total to dissolved results. The laboratory analyzes the samples and reports the results. We do an internal QA review of our data prior to it being reported to the customer – we do not do a full data validation.
4. Related to the issue above, sample uranium concentrations in sample SMC-32 are reported to be "U" (dissolved)/113 ppb (total); as stated above, correspondence between reported concentrations for total and dissolved species in all other samples is generally much closer, especially for uranium. NMED requests that uranium analytical data for this sample be reexamined for reporting accuracy. The laboratory went back to the raw data for this sample and verified that the reported result was correct.

Copies:

Dana Bahar, NMED
Earle Dixon, NMED

GMB 2010 correspondence file
NMED/GWQB/SOS read file

| Sample Number | K (mg/L) | Mg (mg/L) | Na (mg/L) | Ca (mg/L) | Cation total meq/L | *Cation Sum* | F (mg/L) | NO3+NO2 (mg/L) | Cl (mg/L) | HCO3 (mg/L) | SO4 (mg/L) | Anion total meq/L | Charge Balance Error % | *Anion Sum* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMC-03 | 4.1 | 40.1 | 54.3 | 172 | 14.35 | ***270.5*** | 0.39 | 4.12 | 32 | 272 | 369 | 13.13 | **4.44** | ***677.5*** |
| SMC-04 | 2.4 | 3.24 | 208 | 11.2 | 9.94 | ***224.9*** | 1.18 | 0.82 | 33 | 284 | 200 | 9.83 | **0.56** | ***519.0*** |
| SMC-05 | 0.5 | 0.58 | 199 | 2.83 | 8.86 | ***202.9*** | 1.28 | 0.86 | 27 | 308 | 105 | 8.08 | **4.61** | ***442.1*** |
| SMC-07 | 5.3 | 7.94 | 168 | 21.7 | 9.18 | ***202.9*** | 0.76 | 0.02 | 2.5 | 243 | 168 | 7.59 | **9.47** | ***414.3*** |
| SMC-08 | 2.3 | 23.4 | 341 | 106 | 22.11 | ***472.7*** | 0.125 | 0.05 | 78 | 10 | 911 | 21.34 | **1.77** | ***999.2*** |
| SMC-09 | 9.4 | 148 | 251 | 541 | 50.33 | ***949.4*** | 0.36 | 22.80 | 48 | 168 | 2070 | 47.59 | **2.80** | ***2309.2*** |
| SMC-10 | 7.0 | 149 | 261 | 567 | 52.09 | ***984.0*** | 0.56 | 21.20 | 47 | 170 | 2110 | 48.41 | **3.65** | ***2348.8*** |
| SMC-11 | 10.1 | 88.5 | 269 | 479 | 43.14 | ***846.6*** | 0.31 | 0.02 | 55 | 188 | 1580 | 37.55 | **6.94** | ***1823.3*** |
| SMC-12 | 0.5 | 10.3 | 628 | 59 | 31.12 | ***697.8*** | 0.91 | 11.50 | 125 | 210 | 955 | 27.08 | **6.94** | ***1302.4*** |
| SMC-13 | 8.4 | 73.7 | 355 | 389 | 41.13 | ***826.1*** | 0.5 | 18.60 | 59 | 180 | 1610 | 38.46 | **3.36** | ***1868.1*** |
| SMC-14 | 1.1 | 0.84 | 434 | 4.94 | 19.22 | ***440.9*** | 1.08 | 2.36 | 58 | 246 | 535 | 16.90 | **6.43** | ***842.4*** |
| SMC-16 | 2.7 | 17.2 | 266 | 47 | 15.40 | ***332.9*** | 1.68 | 0.02 | 25 | 359 | 323 | 13.40 | **6.94** | ***708.7*** |
| SMC-17 | 3.8 | 5.53 | 301 | 87.7 | 18.02 | ***398.1*** | 1.25 | 1.45 | 11 | 139 | 656 | 16.34 | **4.91** | ***808.7*** |
| SMC-18 | 8.1 | 14.8 | 136 | 89.9 | 11.83 | ***248.8*** | 0.29 | 0.02 | 10 | 167 | 370 | 10.74 | **4.83** | ***547.3*** |
| SMC-20 | 5.9 | 15.8 | 67.9 | 92.3 | 9.01 | ***181.9*** | 0.125 | 1.08 | 15 | 260 | 96 | 6.71 | **14.65** | ***372.2*** |
| SMC-21 | 4.8 | 183 | 257 | 536 | 53.11 | ***980.8*** | 0.46 | 9.38 | 42 | 153 | 546 | 15.24 | **55.41** | ***750.8*** |
| SMC-22 | 0.5 | 0.08 | 191 | 1.09 | 8.38 | ***192.7*** | 1.27 | 1.86 | 27 | 206 | 100 | 6.32 | **14.05** | ***336.1*** |
| SMC-23 | 0.5 | 1.44 | 143 | 7.07 | 6.70 | ***152.0*** | 0.43 | 4.43 | 33 | 192 | 49 | 5.19 | **12.71** | ***278.9*** |
| SMC-24 | 6.4 | 138 | 254 | 509 | 47.97 | ***907.4*** | 0.63 | 20.20 | 50 | 172 | 2070 | 47.69 | **0.29** | ***2312.8*** |
| SMC-25 | 1.0 | 8.26 | 102 | 64.9 | 8.38 | ***176.2*** | 1.43 | 5.67 | 26 | 181 | 144 | 6.86 | **9.94** | ***358.1*** |
| SMC-26 | 2.3 | 8.35 | 156 | 48.7 | 9.96 | ***215.3*** | 1.04 | 6.28 | 13 | 280 | 135 | 7.92 | **11.40** | ***435.3*** |
| SMC-28 | 3.3 | 6.47 | 70.1 | 52.4 | 6.28 | ***132.2*** | 0.69 | 1.11 | 2.5 | 136 | 144 | 5.35 | **7.98** | ***284.3*** |
| SMC-30 | 3.6 | 7.26 | 24.3 | 51.5 | 4.32 | ***86.7*** | 0.41 | 0.11 | 2.5 | 184 | 12 | 3.36 | **12.46** | ***199.0*** |
| SMC-31 | 1.6 | 7.82 | 151 | 36.2 | 9.06 | ***196.7*** | 0.98 | 0.02 | 7 | 286 | 120 | 7.44 | **9.85** | ***414.0*** |
| SMC-32 | 7.9 | 72.3 | 118 | 316 | 27.05 | ***514.2*** | 0.125 | 0.02 | 33 | 184 | 1100 | 26.86 | **0.36** | ***1317.1*** |
| SMC-33 | 3.6 | 24.8 | 262 | 225 | 24.76 | ***515.4*** | 0.73 | 9.62 | 46 | 153 | 899 | 22.72 | **4.30** | ***1108.4*** |
| SMC-34 | 7.8 | 39.3 | 317 | 247 | 29.55 | ***611.1*** | 0.52 | 6.15 | 53 | 163 | 1080 | 26.78 | **4.92** | ***1302.7*** |

Red values exceed 10%

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Secretary
JON GOLDSTEIN
Deputy Secretary

# MEMORANDUM *(transmitted via email)*

**TO:** LaDonna Turner, EPA Region 6 Site Assessment Manager
**FROM:** David L. Mayerson
**DATE:** January 11, 2010

**RE:** Request for evaluation of CLP laboratory quality control for San Mateo Creek basin SI water samples

NMED personnel have been examining analytical data in detail received from Houston Laboratories from NMED's SI sampling conducted in 2009. From this examination, several issues have come to light for which NMED requests explanation or response from EPA

For this analytical work, EPA assigned project number 09SF165 and work order numbers 0903074, 0904002, 0904006, and 0904011 for the requested metals and "wet" chemistry analyses.

1. NMED's CLP services request for this task included analyses for dissolved and total molybdenum (Mo); however these analyses were not included in results received by NMED.
2. Charge balance errors (CBE), also known as cation-anion balances, that NMED calculated for a few of the analyses are higher than might be expected. NMED currently does not have an acceptance criterion for this measure, and was unable to identify an acceptance criterion for analyses performed under the EPA CLP. Moreover NMED staff has limited knowledge in the reasons why such a measure may vary for a specific sample. NMED requests that EPA examine NMED's CBE calculations and associated data in the attached table to help us understand if there should be any concerns about these data quality and accuracy.
3. The majority of analytical results for metals indicate close agreement between total and dissolved concentrations. However, several of the analyses report a concentration of a dissolved analyte that is higher than the concentration of the same total analyte; a few examples of this are SMC-01 (calcium), SMC-03 (barium and calcium), SMC-07 (barium and sodium), SMC-10 (uranium), SMC-13 (magnesium), SMC-14 (arsenic and selenium), SMC-16 (barium), and SMC-17 (selenium). While the difference between the values reported for dissolved and total concentrations generally is not large, such discrepancies are not acknowledged nor addressed in the report narrative.
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Copies:

Dana Bahar, NMED
Earle Dixon, NMED

GMB 2010 correspondence file
NMED/GWQB/SOS read file

| Sample Number | K (mg/L) | Mg (mg/L) | Na (mg/L) | Ca (mg/L) | Cation total meq/L | *Cation Sum* | F (mg/L) | NO3+NO2 (mg/L) | Cl (mg/L) | HCO3 (mg/L) | SO4 (mg/L) | Anion total meq/L | Charge Balance Error % | *Anion Sum* | TDS mg/l sum | TDS (mg/L) (evap) | TDS % dif sum vs. evap | TDS calcula-ted | TDS mg/l dif evap vs. calc | Ratio TDS evap vs calc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMC-03 | 4.1 | 40.1 | 54.3 | 172 | 14.35 | ***270.5*** | 0.39 | 4.12 | 32 | 272 | 369 | 13.13 | **4.44** | ***677.5*** | 948.0 | 884 | 3.5 | 1111.2 | 227.2 | 0.8 |
| SMC-04 | 2.4 | 3.24 | 208 | 11.2 | 9.94 | ***224.9*** | 1.18 | 0.82 | 33 | 284 | 200 | 9.83 | **0.56** | ***519.0*** | 743.9 | 698 | 3.2 | 914.3 | 216.3 | 1.0 |
| SMC-05 | 0.5 | 0.58 | 199 | 2.83 | 8.86 | ***202.9*** | 1.28 | 0.86 | 27 | 308 | 105 | 8.08 | **4.61** | ***442.1*** | 645.1 | 592 | 4.3 | 829.9 | 237.9 | 1.1 |
| SMC-07 | 5.3 | 7.94 | 168 | 21.7 | 9.18 | ***202.9*** | 0.76 | 0.02 | 2.5 | 243 | 168 | 7.59 | **9.47** | ***414.3*** | 617.2 | 534 | 7.2 | 763.0 | 229.0 | 1.2 |
| SMC-08 | 2.3 | 23.4 | 341 | 106 | 22.11 | ***472.7*** | 0.125 | 0.05 | 78 | 10 | 911 | 21.34 | **1.77** | ***999.2*** | 1471.9 | 1400 | 2.5 | 1477.9 | 77.9 | 0.6 |
| SMC-09 | 9.4 | 148 | 251 | 541 | 50.33 | ***949.4*** | 0.36 | 22.80 | 48 | 168 | 2070 | 47.59 | **2.80** | ***2309.2*** | 3258.5 | 3400 | -2.1 | 3359.3 | 40.7 | 0.3 |
| SMC-10 | 7.0 | 149 | 261 | 567 | 52.09 | ***984.0*** | 0.56 | 21.20 | 47 | 170 | 2110 | 48.41 | **3.65** | ***2348.8*** | 3332.7 | 3380 | -0.7 | 3434.7 | 54.7 | 0.3 |
| SMC-11 | 10.1 | 88.5 | 269 | 479 | 43.14 | ***846.6*** | 0.31 | 0.02 | 55 | 188 | 1580 | 37.55 | **6.94** | ***1823.3*** | 2669.9 | 2440 | 4.5 | 2782.7 | 342.7 | 0.3 |
| SMC-12 | 0.5 | 10.3 | 628 | 59 | 31.12 | ***697.8*** | 0.91 | 11.50 | 125 | 210 | 955 | 27.08 | **6.94** | ***1302.4*** | 2000.2 | 1870 | 3.4 | 2126.2 | 256.2 | 0.4 |
| SMC-13 | 8.4 | 73.7 | 355 | 389 | 41.13 | ***826.1*** | 0.5 | 18.60 | 59 | 180 | 1610 | 38.46 | **3.36** | ***1868.1*** | 2694.2 | 2710 | -0.3 | 2802.2 | 92.2 | 0.3 |
| SMC-14 | 1.1 | 0.84 | 434 | 4.94 | 19.22 | ***440.9*** | 1.08 | 2.36 | 58 | 246 | 535 | 16.90 | **6.43** | ***842.4*** | 1283.4 | 1180 | 4.2 | 1431.0 | 251.0 | 0.6 |
| SMC-16 | 2.7 | 17.2 | 266 | 47 | 15.40 | ***332.9*** | 1.68 | 0.02 | 25 | 359 | 323 | 13.40 | **6.94** | ***708.7*** | 1041.6 | 864 | 9.3 | 1257.0 | 393.0 | 0.7 |
| SMC-17 | 3.8 | 5.53 | 301 | 87.7 | 18.02 | ***398.1*** | 1.25 | 1.45 | 11 | 139 | 656 | 16.34 | **4.91** | ***808.7*** | 1206.8 | 1100 | 4.6 | 1290.2 | 190.2 | 0.7 |
| SMC-18 | 8.1 | 14.8 | 136 | 89.9 | 11.83 | ***248.8*** | 0.29 | 0.02 | 10 | 167 | 370 | 10.74 | **4.83** | ***547.3*** | 796.1 | 732 | 4.2 | 896.3 | 164.3 | 1.0 |
| SMC-20 | 5.9 | 15.8 | 67.9 | 92.3 | 9.01 | ***181.9*** | 0.125 | 1.08 | 15 | 260 | 96 | 6.71 | **14.65** | ***372.2*** | 554.1 | 504 | 4.7 | 710.1 | 206.1 | 1.2 |
| SMC-21 | 4.8 | 183 | 257 | 536 | 53.11 | ***980.8*** | 0.46 | 9.38 | 42 | 153 | 546 | 15.24 | **55.41** | ***750.8*** | 1731.6 | 3320 | -31.4 | 1823.4 | 1496.6 | 0.5 |
| SMC-22 | 0.5 | 0.08 | 191 | 1.09 | 8.38 | ***192.7*** | 1.27 | 1.86 | 27 | 206 | 100 | 6.32 | **14.05** | ***336.1*** | 528.8 | 506 | 2.2 | 652.4 | 146.4 | 1.4 |
| SMC-23 | 0.5 | 1.44 | 143 | 7.07 | 6.70 | ***152.0*** | 0.43 | 4.43 | 33 | 192 | 49 | 5.19 | **12.71** | ***278.9*** | 430.9 | 440 | -1.0 | 546.1 | 106.1 | 1.6 |
| SMC-24 | 6.4 | 138 | 254 | 509 | 47.97 | ***907.4*** | 0.63 | 20.20 | 50 | 172 | 2070 | 47.69 | **0.29** | ***2312.8*** | 3220.2 | 3310 | -1.4 | 3323.4 | 13.4 | 0.3 |
| SMC-25 | 1.0 | 8.26 | 102 | 64.9 | 8.38 | ***176.2*** | 1.43 | 5.67 | 26 | 181 | 144 | 6.86 | **9.94** | ***358.1*** | 534.3 | 504 | 2.9 | 642.9 | 138.9 | 1.4 |
| SMC-26 | 2.3 | 8.35 | 156 | 48.7 | 9.96 | ***215.3*** | 1.04 | 6.28 | 13 | 280 | 135 | 7.92 | **11.40** | ***435.3*** | 650.6 | 572 | 6.4 | 818.6 | 246.6 | 1.1 |
| SMC-28 | 3.3 | 6.47 | 70.1 | 52.4 | 6.28 | ***132.2*** | 0.69 | 1.11 | 2.5 | 136 | 144 | 5.35 | **7.98** | ***284.3*** | 416.5 | 378 | 4.8 | 498.1 | 120.1 | 1.8 |
| SMC-30 | 3.6 | 7.26 | 24.3 | 51.5 | 4.32 | ***86.7*** | 0.41 | 0.11 | 2.5 | 184 | 12 | 3.36 | **12.46** | ***199.0*** | 285.7 | 254 | 5.9 | 396.1 | 142.1 | 2.2 |
| SMC-31 | 1.6 | 7.82 | 151 | 36.2 | 9.06 | ***196.7*** | 0.98 | 0.02 | 7 | 286 | 120 | 7.44 | **9.85** | ***414.0*** | 610.7 | 500 | 10.0 | 782.3 | 282.3 | 1.1 |
| SMC-32 | 7.9 | 72.3 | 118 | 316 | 27.05 | ***514.2*** | 0.125 | 0.02 | 33 | 184 | 1100 | 26.86 | **0.36** | ***1317.1*** | 1831.3 | 1630 | 5.8 | 1941.7 | 311.7 | 0.5 |
| SMC-33 | 3.6 | 24.8 | 262 | 225 | 24.76 | ***515.4*** | 0.73 | 9.62 | 46 | 153 | 899 | 22.72 | **4.30** | ***1108.4*** | 1623.7 | 1490 | 4.3 | 1715.5 | 225.5 | 0.5 |
| SMC-34 | 7.8 | 39.3 | 317 | 247 | 29.55 | ***611.1*** | 0.52 | 6.15 | 53 | 163 | 1080 | 26.78 | **4.92** | ***1302.7*** | 1913.8 | 1780 | 3.6 | 2011.6 | 231.6 | 0.4 |

Red values exceed 10%

**Fw: Data Questions for Christy**
**LaDonna Turner** to: Lisa Price 09/02/2010 01:50 PM

History: *This message has been replied to.*

----- Forwarded by LaDonna Turner/R6/USEPA/US on 09/02/2010 01:49 PM -----

| | |
|---|---|
| From: | Christy Warren/R6/USEPA/US |
| To: | LaDonna Turner/R6/USEPA/US@EPA |
| Date: | 04/21/2010 11:33 AM |
| Subject: | Re: Fw: Data Questions for Christy |

Ladonna,

In response to questions in the attached memo.

1. Data was provided by email.
2. We do not have knowledge of calculating CBE or of appropriate acceptance criteria for this calculation.
3. I spoke with Dave Stockton (Inorganic Team Leader) and he looked at the differences noted in the memo and indicated that the differences were not that great. This is not something that the laboratory "routinely" evaluates and comments on in a case narrative. This is more of a data validation issue - we can't validate our own data.
4. Dave Stockton went back and looked at the raw data for SMC-32 to verify the results reported - the results stand as reported.

Christy Warren
U.S. EPA Region 6 Laboratory
Sample Control Center
10625 Fallstone Road
Houston, Texas 77099
warren.christy@epa.gov
Office: 281-983-2137
Mobile: 281-415-6815
Fax: 281-983-2248
Fw: Data Questions for Christy

**Fw: Data Questions for Christy**

**LaDonna Turner** to: Christy Warren 04/21/2010 10:36 AM

Hi Christy.

I guess we still need to have a call with David. What's your schedule like? I am out of the office tomorrow and Friday, then I am out again next Tues. and Wed. Let me know what works.

Thanks. LaDonna

LT lab issues 01042010.doc

# REFERENCES

# 1-4

Vol. 55 No. 241 Friday, December 14, 1990 p 51532 (Rule)
1/13065

**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Part 300**

**[FRL-3730-8]**

**RIN 2050 AB73**

# Hazard Ranking System

**AGENCY:** Environmental Protection Agency.

**ACTION:** Final rule.

---

**SUMMARY:** The Environmental Protection Agency (EPA) is adopting revisions to the Hazard Ranking System (HRS), the principal mechanism for placing sites on the National Priorities List (NPL). The revisions change the way EPA evaluates potential threats to human health and the environment from hazardous waste sites and make the HRS more accurate in assessing relative potential risk. These revisions comply with other statutory requirements in the Superfund Amendments and Reauthorization Act of 1986 (SARA).

**DATES:** Effective date March 14, 1991. As discussed in Section III H of this preamble, comments are invited on the addition of specific benchmarks in the air and soil exposure pathways until January 14, 1991.

**ADDRESSES:** Documents related to this rulemaking are available at and comments on the specific benchmarks in the air and soil exposure pathways may be mailed to the CERCLA Docket Office, OS-245, U.S. Environmental Protection Agency, Waterside Mall, 401 M Street, SW, Washington, DC 20460, phone 202-382-3046. Please send four copies of comments. The docket is available for viewing by appointment only from 9:00 am to 4:00 pm, Monday through Friday, excluding Federal holidays. The docket number is 105NCP-HRS.

**FOR FURTHER INFORMATION CONTACT:** Steve Caldwell or Agnes Ortiz, Hazardous Site Evaluation Division, Office of Emergency and Remedial Response, OS-230, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, or the Superfund Hotline at 800-424-9346 (in the Washington, DC area, 202-382-3000).

**SUPPLEMENTARY INFORMATION:**

Table of Contents

# SUPERFUND CHEMICAL DATA MATRIX METHODOLOGY

Prepared For EPA
January 2004

# Superfund Chemical Data Matrix (SCDM)

The Superfund Chemical Data Matrix (SCDM) is a source for factor values and benchmark values applied when evaluating potential National Priorities List (NPL) sites using the Hazard Ranking System (HRS). Factor values are part of the HRS mathematical equation for determining the relative threat posed by a hazardous waste site and reflect hazardous substance characteristics, such as toxicity and persistence in the environment, substance mobility, and potential for bioaccumulation. Benchmarks are environment- or health-based substance concentration limits developed by or used in other EPA regulatory programs. SCDM contains HRS factor values and benchmark values for hazardous substances that are frequently found at sites evaluated using the HRS, as well as the physical, chemical, and radiological data used to calculate those values. The accompanying SCDM Methodology report describes how data are selected or calculated for inclusion in SCDM and how SCDM data, HRS factor values, and benchmarks are presented in formatted printouts.

On January 28, 2004, EPA released an updated SCDM with many revisions to the HRS factor values and benchmarks. These revisions were necessary both because of updates in the SCDM procedures used to assign HRS factor values and benchmarks and because of revisions to pertinent standards and criteria for individual hazardous substances and their associated characteristics.



### Superfund Chemical Data Matrix Report

- SCDM Methodology Report PDF
  - Part 1 - Table of Contents and Introduction (PDF) (5 pp, 283.3K)
  - Part 2 - Data Selection Methodology (PDF) (22 pp, 1.9MB)
  - Part 3 - Calculations in SCDM (PDF) (28 pp, 1.19MB)
- Appendix A - Chemical Data, Factor Values, and Benchmarks for Chemical Substances PDF
  - Part 1 - Acenaphthene to Cesium (PDF) (70 pp, 1.62MB)
  - Part 2 - Cesium 137(+D) (radionuclide) to Dichloropropane, 1,2 (PDF) (70 pp, 1.66MB)
  - Part 3 - Dichloropropene, 1,3- to Hexachlorodibenzofuran 1,2,3,7,8,9 (PDF) (70 pp, 1.65MB)
  - Part 4 - Hexachlorodibenzofuran 2,3,4,6,7,8- to Plutonium 236 (radionuclide) (PDF) (70 pp, 1.57MB)
  - Part 5 - Plutonium 238 (radionuclide) to Thorium 231 (radionuclide) (PDF) (70 pp, 1.60MB)
  - Part 6 - Thorium 232 (radionuclide) to Zinc 65 (radionuclide) and Footnotes (PDF) (61 pp, 1.43MB)
- Appendix BI - Hazardous Substance Factor Values (PDF) (15 pp, 155.8K)

- Appendix BII - Hazardous Substance Benchmarks (PDF) (32 pp, 413.5K)
- Appendix C - Hazardous Substance Synonyms Report (PDF) (3 pp, 72.8K)
- SCDM Interim Revised Values for Ammonia; Atrazine; Dibutyltin; Furfural; Nitrobenzene; Nitrosodimethylamine, N-; Perchlorate; Tributyltin; Tributyltin Oxide; and Trichloroethylene (TCE)
  - Ammonia Appendix A (PDF) (7 pp, 190.69K)
  - Ammonia Appendices BI & BII (PDF) (6 pp, 135.42K)
  - Atrazine Appendix A (PDF) (5 pp, 143.3K)
  - Atrazine Appendices BI & BII (PDF) (7 pp, 125.6K)
  - Dibutyltin Appendix A (PDF) (7 pp, 190K)
  - Dibutyltin Appendices BI & BII (PDF) (6 pp, 125.52K)
  - Furfural Appendix A (PDF) (5 pp, 201.2K)
  - Furfural Appendices BI & BII (PDF) (1 pg, 64.8K)
  - Nitrobenzene Appendix A (PDF) (5 pp, 205.2K)
  - Nitrobenzene Appendices BI & BII (PDF) (1 pg, 50.7K)
  - Nitrosodimethylamine, N- Appendix A (PDF) (5 pp, 207.1K)
  - Nitrosodimethylamine, N- Appendices BI & BII (PDF) (6 pp, 137.7K)
  - Perchlorate Appendix A (PDF) (5 pp, 66.8K)
  - Perchlorate Appendices BI & BII (PDF) (7 pp, 59K)
  - Tributyltin Appendix A (PDF) (7 pp, 180.49K)
  - Tributyltin Appendices BI & BII (PDF) (6 pp, 127.49K)
  - Tributyltin Oxide Appendix A (PDF) (7 pp, 197.17K)
  - Tributyltin Oxide Appendices BI & BII (PDF) (6 pp, 129.29K)
  - Trichloroethylene (TCE) Appendix A (PDF) (7 pp, 182.75K)
  - Trichloroethylene (TCE) Appendices BI & BII (PDF) (1 pg, 36.62K)

Please note that the January 2004 SCDM was developed by compiling a list of CERCLA hazardous substances used in the scoring of NPL sites since 1990. The previous SCDM versions were developed using all substances ever scored at a site using the original HRS. The January 2004 SCDM does not include any substance that has not been used in the scoring of a site since 1990, even if previously listed in SCDM.

There are 17 new entries (PDF) (1 pg, 41.3K) (with new CAS Numbers) in the January 2004 version of SCDM that were not in the 1996 version. There are 235 fewer entries (PDF) (5 pp, 57.6K). Some of these changes resulted from new naming conventions and more specific identification of isomers and congeners. Also, some substances were removed because they were pollutants and contaminants and not CERCLA hazardous substances.

NOTE: Please do not assume that any substance not listed in the January 2004 SCDM cannot be used for HRS scoring. The number of entries was reduced to save resources in developing, updating, and tracking changes in chemical properties. If values are needed for a substance that was not listed in the January 2004 SCDM and are thought to be critical to the listing decision, please request the value by calling the SCDM Helpline. As a preliminary value (for screening purposes only), the former 1996 value associated with the substance can be used, and EPA will verify the new value if necessary. For all technical questions concerning SCDM, please contact the SCDM Helpline.

**For further technical SCDM information, contact:**

SCDM Helpline
Available weekdays, 9:00 - 5:00 EST
Phone: (703) 461-2019
Email: SCDM@csc.com

**For other SCDM information, contact:**

Ms. Yolanda Singer
US Environmental Protection Agency

| CAS No. | Contaminant | MCL (mg/l) |
|---|---|---|
| (1) 15972–60–8 | Alachlor | 0.002 |
| (2) 116–06–3 | Aldicarb | 0.003 |
| (3) 1646–87–3 | Aldicarb sulfoxide | 0.004 |
| (4) 1646–87–4 | Aldicarb sulfone | 0.002 |
| (5) 1912–24–9 | Atrazine | 0.003 |
| (6) 1563–66–2 | Carbofuran | 0.04 |
| (7) 57–74–9 | Chlordane | 0.002 |
| (8) 96–12–8 | Dibromochloropropane | 0.0002 |
| (9) 94–75–7 | 2,4-D | 0.07 |
| (10) 106–93–4 | Ethylene dibromide | 0.00005 |
| (11) 76–44–8 | Heptachlor | 0.0004 |
| (12) 1024–57–3 | Heptachlor epoxide | 0.0002 |
| (13) 58–89–9 | Lindane | 0.0002 |
| (14) 72–43–5 | Methoxychlor | 0.04 |
| (15) 1336–36–3 | Polychlorinated biphenyls | 0.0005 |
| (16) 87–86–5 | Pentachlorophenol | 0.001 |
| (17) 8001–35–2 | Toxaphene | 0.003 |
| (18) 93–72–1 | 2,4,5-TP | 0.05 |
| (19) 50–32–8 | Benzo[a]pyrene | 0.0002 |
| (20) 75–99–0 | Dalapon | 0.2 |
| (21) 103–23–1 | Di(2-ethylhexyl) adipate | 0.4 |
| (22) 117–81–7 | Di(2-ethylhexyl) phthalate | 0.006 |
| (23) 88–85–7 | Dinoseb | 0.007 |
| (24) 85–00–7 | Diquat | 0.02 |
| (25) 145–73–3 | Endothall | 0.1 |
| (26) 72–20–8 | Endrin | 0.002 |
| (27) 1071–53–6 | Glyphosate | 0.7 |
| (28) 118–74–1 | Hexacholorbenzene | 0.001 |
| (29) 77–47–4 | Hexachlorocyclopentadiene | 0.05 |
| (30) 23135–22–0 | Oxamyl (Vydate) | 0.2 |
| (31) 1918–02–1 | Picloram | 0.5 |
| (32) 122–34–9 | Simazine | 0.004 |
| (33) 1746–01–6 | 2,3,7,8-TCDD (Dioxin) | $3\times10^{-8}$ |

[56 FR 3593, Jan. 30, 1991, as amended at 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992; 59 FR 34324, July 1, 1994]

## § 141.62 Maximum contaminant levels for inorganic contaminants.

(a) [Reserved]

(b) The maximum contaminant levels for inorganic contaminants specified in paragraphs (b) (2)–(6), (b)(10), and (b) (11)–(16) of this section apply to community water systems and non-transient, non-community water systems. The maximum contaminant level specified in paragraph (b)(1) of this section only applies to community water systems. The maximum contaminant levels specified in (b)(7), (b)(8), and (b)(9) of this section apply to community water systems; non-transient, non-community water systems; and transient non-community water systems.

| Contaminant | MCL (mg/l) |
|---|---|
| (1) Fluoride | 4.0 |
| (2) Asbestos | 7 Million Fibers/liter (longer than 10 μm). |
| (3) Barium | 2 |
| (4) Cadmium | 0.005 |
| (5) Chromium | 0.1 |
| (6) Mercury | 0.002 |
| (7) Nitrate | 10 (as Nitrogen) |
| (8) Nitrite | 1 (as Nitrogen) |
| ~~(9) Total Nitrate and Nitrite~~ | ~~10 (as Nitrogen)~~ |
| (10) Selenium | 0.05 |
| (11) Antimony | 0.006 |
| (12) Beryllium | 0.004 |
| (13) Cyanide (as free Cyanide). | 0.2 |
| (14) [Reserved] | |
| (15) Thallium | 0.002 |
| (16) Arsenic | 0.01 |

(c) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant levels for inorganic contaminants identified in paragraph (b) of this section, except fluoride:

BAT FOR INORGANIC COMPOUNDS LISTED IN SECTION 141.62(B)

| Chemical Name | BAT(s) |
|---|---|
| Antimony | 2,7 |
| Arsenic[4] | 1, 2, 5, 6, 7, 9, 12[5] |

with this subpart beginning January 1, 2004.

(2) Transient NCWSs. Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

(c) The Administrator, pursuant to Section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels identified in paragraph (a) of this section: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

[63 FR 69465, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001]

### § 141.66 Maximum contaminant levels for radionuclides.

(a) [Reserved]

(b) *MCL for combined radium-226 and -228.* The maximum contaminant level for combined radium-226 and radium-228 is 5 pCi/L. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

(c) *MCL for gross alpha particle activity (excluding radon and uranium).* The maximum contaminant level for gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/L.

(d) *MCL for beta particle and photon radioactivity.* (1) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year (mrem/year).

(2) Except for the radionuclides listed in table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of 2 liter per day drinking water intake using the 168 hour data list in "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800–553–6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

TABLE A.—AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE: A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR

| | | |
|---|---|---|
| 1. Radionuclide | Critical organ | pCi per liter |
| 2. Tritium | Total body | 20,000 |
| 3. Strontium-90 | Bone Marrow | 8 |

(e) *MCL for uranium.* The maximum contaminant level for uranium is 30 µg/L.

(f) *Compliance dates.* (1) Compliance dates for combined radium-226 and -228, gross alpha particle activity, gross beta particle and photon radioactivity, Drinking Water Act, as amended (42 U.S.C. 300g-1). These regulations control contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water. At considerably higher concentrations of these contaminants, health implications may also exist as well as aesthetic degradation. The regulations are not Federally enforceable but are intended as guidelines for the States.

### § 143.2 Definitions.

(a) *Act* means the Safe Drinking Water Act as amended (42 U.S.C. 300f *et seq.).*

(b) *Contaminant* means any physical, chemical, biological, or radiological substance or matter in water.

(c) *Public water system* means a system for the provision to the public of piped water for human consumption, if such a system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either a "community water system" or a "non-community water system."

(d) *State* means the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State does not have responsibility pursuant to section 1443 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

(e) *Supplier of water* means any person who owns or operates a public water system.

(f) *Secondary maximum contaminant levels* means SMCLs which apply to public water systems and which, in the judgement of the Administrator, are requisite to protect the public welfare. The SMCL means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of public water system. Contamimants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

[44 FR 42198, July 19, 1979, as amended at 53 FR 37412, Sept. 26, 1988]

### § 143.3 Secondary maximum contaminant levels.

The secondary maximum contaminant levels for public water systems are as follows:

| Contaminant | Level |
|---|---|
| Aluminum | 0.05 to 0.2 mg/l. |
| Chloride | 250 mg/l. |
| Color | 15 color units. |
| Copper | 1.0 mg/l. |
| Corrosivity | Non-corrosive. |
| Fluoride | 2.0 mg/l. |
| Foaming agents | 0.5 mg/l. |
| Iron | 0.3 mg/l. |
| Manganese | 0.05 mg/l. |
| Odor | 3 threshold odor number. |
| pH | 6.5–8.5. |
| Silver | 0.1 mg/l. |
| Sulfate | 250 mg/l. |
| Total dissolved solids (TDS) | 500 mg/l. |
| Zinc | 5 mg/l. |

These levels represent reasonable goals for drinking water quality. The States may establish higher or lower levels which may be appropriate dependent upon local conditions such as unavailability of alternate source waters or other compelling factors, provided that public health and welfare are not adversely affected.

[44 FR 42198, July 19, 1979, as amended at 51 FR 11412, Apr. 2, 1986; 56 FR 3597, Jan. 30, 1991]

### § 143.4 Monitoring.

(a) It is recommended that the parameters in these regulations should be monitored at intervals no less frequent than the monitoring performed for inorganic chemical contaminants listed in the National Interim Primary Drinking Water Regulations as applicable to community water systems. More frequent monitoring would be appropriate for specific parameters such as pH, color, odor or others under certain circumstances as directed by the State.

(b) Measurement of pH, copper and fluoride to determine compliance under

# REFERENCES

# 5-8

Electronic Code of Federal Regulations
e-CFR™

**e-CFR Data is current as of September 24, 2009**

## Title 40: Protection of Environment

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

Browse Previous | Browse Next

### Subpart I—Control of Lead and Copper

**Source:** 56 FR 26548, June 7, 1991, unless otherwise noted.

### § 141.80 General requirements.

(a) *Applicability and effective dates.* (1) The requirements of this subpart I constitute the national primary drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of this subpart applies to community water systems and non-transient, non-community water systems (hereinafter referred to as "water systems" or "systems").

(2) [Reserved]

(b) *Scope.* These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These requirements are triggered, in some cases, by lead and copper action levels measured in samples collected at consumers' taps.

(c) *Lead and copper action levels.* (1) The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with §141.86 is greater than 0.015 mg/L ( *i.e.* , if the "90th percentile" lead level is greater than 0.015 mg/L).

(2) The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with §141.86 is greater than 1.3 mg/L ( *i.e.* , if the "90th percentile" copper level is greater than 1.3 mg/L).

(3) The 90th percentile lead and copper levels shall be computed as follows:

(i) The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(ii) The number of samples taken during the monitoring period shall be multiplied by 0.9.

(iii) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(3)(ii) is the 90th percentile contaminant level.

# *State of New Mexico*
# *Drinking Water Regulations*

| | |
|---|---|
| **State:** | **20.7.10 NMAC (Revised April 16, 2007)** |
| **Federal:** | **40 CFR 141 (Revised July 1, 2007)**<br>**40 CFR 143** |

**www.nmenv.state.nm.us**

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**Drinking Water Regulations**

## State Regulations
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**Revised April 16, 2007**

## Federal Regulations

### Title 40 of the Code of Federal Regulations, Parts 141 and 143
### (excerpted from the July 1, 2007, edition, pages 334-558 and 613-615)

### PART 141 – NATIONAL PRIMARY DRINKING WATER REGULATIONS



### PART 143 – NATIONAL SECONDARY DRINKING WATER

**L.** "Service connection" means a pipe, hose, appurtenance, constructed conveyance or any other temporary or permanent connection between a public water system and a user.

**M.** "State act" means the Environment Improvement Act, NMSA 1978, Section 74-1-1 et seq.

**N.** "USEPA" means the United States environmental protection agency.

[20.7.10.7 NMAC - Rp 20 NMAC 7.1.I.103, 12/04/2002; A, 04/16/2007]

**20.7.10.8 - 20.7.10.99** [RESERVED]

**20.7.10.100 ADOPTION OF 40 CFR PART 141:**

**A.** Except as otherwise provided in this section, the regulations of the USEPA set forth at 40 CFR Part 141 through July 1, 2005 are hereby incorporated by reference into this part. (Notwithstanding the incorporation of 40 CFR Part 141 through July 1, 2005, the following USEPA regulations are also incorporated by reference to the extent that they amend Part 141:

(1) Stage 2 Disinfectants and Disinfection Byproducts Rule, 71 Fed. Reg. 388 (Jan. 4, 2006);

(2) Long Term 2 Enhanced Surface Water Treatment Rule, 71 Fed. Reg. 654 (Jan. 5, 2006).

**B.** The term "state" means the New Mexico environment department when used in 40 CFR Part 141, in lieu of the meaning set forth in 40 CFR section 141.2.

**C.** The term "service connection" has the meaning set forth in Subsection L of 20.7.10.7 NMAC, in addition to the meaning set forth in 40 CFR section 141.2.

[20.7.10.100 NMAC - N, 12/04/2002; A, 04/16/2007]

**20.7.10.101 ADOPTION OF 40 CFR PART 143:**

**A.** Except as otherwise provided, the regulations of the USEPA set forth at 40 CFR Part 143 through July 1, 2005 are hereby incorporated by reference into this part.

**B.** The term "state" means the New Mexico environment department when used in 40 CFR Part 143, in lieu of the meaning set forth in 40 CFR section 143.2.

[20.7.10.101 NMAC - N, 12/04/2002; A, 04/16/2007]

**20.7.10.102 GUIDANCE DOCUMENTS:** The current editions of the following materials, including all future editions and amendments are used by the department as guidance documents for determining generally acceptable standards for construction and operation of public water systems.

**A.** *Standards for disinfecting water mains, wells, water-storage facilities, and water treatment plants,* American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.

**B.** *Manual for the certification of laboratories analyzing drinking water for microbiological parameters*, New Mexico Environment Department, Drinking Water Bureau, 525 Camino de Los Marquez, Santa Fe, Suite 4, New Mexico 87501.

**C.** *Laboratory certification manual for chemistry and radiochemistry parameter, drinking water analysis*, New Mexico Environment Department, Drinking Water Bureau, 525 Camino de Los Marquez, Santa Fe, Suite 4, New Mexico 87501.

**D.** *Recommended standards for water works*, Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, P.O. Box 7126, Albany, New York 12224.

**E.** *Recommended standards for water facilities*, Construction Programs Bureau, New Mexico Environment Department, 1190 St. Francis Drive, Santa Fe, New Mexico 87503.

**F.** NSF listings - *drinking water treatment chemicals - health effects*, American National Standards Institute, NSF/ANSI 60, 25 West 43rd Street, New York, NY 10036.

**G.** NSF listings - *drinking water system components - health effects*, American National Standards Institute, NSF/ANSI 61, 25 West 43rd Street, New York, NY 10036.

**H.** NSF listings - *drinking water treatment units - health effects,* American National Standards Institute, NSF/ANSI 42, 44, 53, 58, 67, 177, 25 West 43rd Street, New York, NY 10036.

**I.** NSF listings - *plumbing system components - health effects,* American National Standards Institute, NSF/ANSI 14, 24, 25 West 43rd Street, New York, NY 10036.

**J.** List of approved backflow prevention assemblies, University of Southern California Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, Kaprielian Hall 200, Los Angeles, CA 90089-2531.

**K.** UL listings - *drinking water treatment additives*, Underwriters Laboratory, 333 Pfingston Road, Northbrook, IL 60062-2096.

**TITLE 20 ENVIRONMENTAL PROTECTION**
**CHAPTER 6 WATER QUALITY**
**PART 2 GROUND AND SURFACE WATER PROTECTION**

**20.6.2.1 ISSUING AGENCY:** Water Quality Control Commission
[12-1-95; 20.6.2.1 NMAC - Rn, 20 NMAC 6.2.I.1000, 1-15-01]

**20.6.2.2 SCOPE:** All persons subject to the Water Quality Act, NMSA 1978, Sections 74-6-1 et seq.
[12-1-95; 20.6.2.2 NMAC - Rn, 20 NMAC 6.2.I.1001, 1-15-01]

**20.6.2.3 STATUTORY AUTHORITY:** Standards and Regulations are adopted by the commission under the authority of the Water Quality Act, NMSA 1978, Sections 74-6-1 through 74-6-17.
[2-18-77, 9-20-82, 12-1-95; 20.6.2.3 NMAC - Rn, 20 NMAC 6.2.I.1002, 1-15-01]

**20.6.2.4 DURATION:** Permanent.
[12-1-95; 20.6.2.4 NMAC - Rn, 20 NMAC 6.2.I.1003, 1-15-01]

**20.6.2.5 EFFECTIVE DATE:** December 1, 1995 unless a later date is cited at the end of a section.
[12-1-95, 11-15-96; 20.6.2.5 NMAC - Rn, 20 NMAC 6.2.I.1004, 1-15-01; A, 1-15-01]

**20.6.2.6 OBJECTIVE:** The objective of this Part is to implement the Water Quality Act, NMSA 1978, Sections 74-6-1 et seq.
[12-1-95; 20.6.2.6 NMAC - Rn, 20 NMAC 6.2.I.1005, 1-15-01]

**20.6.2.7 DEFINITIONS**: Terms defined in the Water Quality Act, but not defined in this part, will have the meaning given in the act. As used in this part:

**A.** **"abandoned well"** means a well whose use has been permanently discontinued or which is in a state of disrepair such that it cannot be rehabilitated for its intended purpose or other purposes including monitoring and observation;

**B.** **"abate" or "abatement"** means the investigation, containment, removal or other mitigation of **water pollution;**

**C.** **"abatement plan"** means a description of any operational, monitoring, contingency and closure requirements and conditions for the prevention, investigation and abatement of water pollution, and includes Stage 1, Stage 2, or Stage 1 and 2 of the abatement plan, as approved by the secretary;

**D.** **"adjacent properties"** means properties that are contiguous to the discharge site or property that would be contiguous to the discharge site but for being separated by a public or private right of way, including roads and highways.

**E.** **"background"** means, for purposes of ground-water abatement plans only and for no other purposes in this part or any other regulations including but not limited to surface-water standards, the amount of ground-water contaminants naturally occurring from undisturbed geologic sources or water contaminants which the responsible person establishes are occurring from a source other than the responsible person's facility; this definition shall not prevent the secretary from requiring abatement of commingled plumes of pollution, shall not prevent responsible persons from seeking contribution or other legal or equitable relief from other persons, and shall not preclude the secretary from exercising enforcement authority under any applicable statute, regulation or common law;

**F.** **"casing"** means pipe or tubing of appropriate material, diameter and weight used to support the sides of a well hole and thus prevent the walls from caving, to prevent loss of drilling mud into porous ground, or to prevent fluid from entering or leaving the well other than to or from the injection zone;

**G.** **"cementing"** means the operation whereby a cementing slurry is pumped into a drilled hole and/or forced behind the casing;

**H.** **"cesspool"** means a **"drywell"** that receives untreated domestic liquid waste containing human excreta, and which sometimes has an open bottom and/or perforated sides. A large capacity cesspool means a cesspool that receives greater than 2,000 gallons per day of untreated domestic liquid waste;

**I.** **"collapse"** means the structural failure of overlying materials caused by removal of underlying materials;

(32) PAHs: total naphthalene plus monomethylnaphthalenes..................0.03 mg/l
(33) benzo-a-pyrene.......................................................0.0007 mg/l

**B. Other Standards for Domestic Water Supply**

(1) Chloride (Cl) ..........................................................250.0 mg/l
(2) Copper (Cu) ............................................................1.0 mg/l
(3) Iron (Fe) ..............................................................1.0 mg/l
(4) Manganese (Mn) .........................................................0.2 mg/l
(6) Phenols.................................................................0.005 mg/l
(7) Sulfate ($SO_4$) .......................................................600.0 mg/l
(8) Total Dissolved Solids (TDS) ...........................................1000.0 mg/l
(9) Zinc (Zn) ..............................................................10.0 mg/l
(10) pH.....................................................................between 6 and 9

**C. Standards for Irrigation Use - Ground water shall meet the standards of Subsection A, B, and C of this section unless otherwise provided.**

(1) Aluminum (Al)...........................................................5.0 mg/l
(2) Boron (B) ..............................................................0.75 mg/l
(3) Cobalt (Co) ............................................................0.05 mg/l
(4) Molybdenum (Mo) .......................................................1.0 mg/l
(5) Nickel (Ni) ............................................................0.2 mg/l

[2-18-77, 1-29-82, 11-17-83, 3-3-86, 12-1-95; 20.6.2.3103 NMAC - Rn, 20 NMAC 6.2.III.3103, 1-15-01; A, 9-26-04]
[Note: For purposes of application of the amended numeric uranium standard to past and current water discharges (as of 9-26-04), the new standard will not become effective until June 1, 2007. For any new water discharges, the uranium standard is effective 9-26-04.]

**20.6.2.3104 DISCHARGE PERMIT REQUIRED:** Unless otherwise provided by this Part, no person shall cause or allow effluent or leachate to discharge so that it may move directly of indirectly into ground water unless he is discharging pursuant to a discharge permit issued by the secretary. When a permit has been issued, discharges must be consistent with the terms and conditions of the permit. In the event of a transfer of the ownership, control, or possession of a facility for which a discharge permit is in effect, the transferee shall have authority to discharge under such permit, provided that the transferee has complied with Section 20.6.2.3111 NMAC, regarding transfers.
[2-18-77, 12-24-87, 12-1-95; Rn & A, 20.6.2.3104 NMAC - 20 NMAC 6.2.III.3104, 1-15-01; A, 12-1-01]

**20.6.2.3105 EXEMPTIONS FROM DISCHARGE PERMIT REQUIREMENT:** Sections 20.6.2.3104 and 20.6.2.3106 NMAC do not apply to the following:

**A.** Effluent or leachate which conforms to all the listed numerical standards of Section 20.6.2.3103 NMAC and has a total nitrogen concentration of 10 mg/l or less, and does not contain any toxic pollutant. To determine conformance, samples may be taken by the agency before the effluent or leachate is discharged so that it may move directly or indirectly into ground water; provided that if the discharge is by seepage through non-natural or altered natural materials, the agency may take samples of the solution before or after seepage. If for any reason the agency does not have access to obtain the appropriate samples, this exemption shall not apply;

**B.** Effluent which is discharged from a sewerage system used only for disposal of household and other domestic waste which is designed to receive and which receives 2,000 gallons or less of liquid waste per day;

**C.** Water used for irrigated agriculture, for watering of lawns, trees, gardens or shrubs, or for irrigation for a period not to exceed five years for the revegetation of any disturbed land area, unless that water is received directly from any sewerage system;

**D.** Discharges resulting from the transport or storage of water diverted, provided that the water diverted has not had added to it after the point of diversion any effluent received from a sewerage system, that the source of the water diverted was not mine workings, and that the secretary has not determined that a hazard to public health may result;

**E.** Effluent which is discharged to a watercourse which is naturally perennial; discharges to dry arroyos and ephemeral streams are not exempt from the discharge permit requirement, except as otherwise provided in this section;

**F.** Those constituents which are subject to effective and enforceable effluent limitations in a National Pollutant Discharge Elimination System (NPDES) permit, where discharge onto or below the surface of the ground so that water contaminants may move directly or indirectly into ground water occurs downstream from the outfall

C. The standards are not intended as maximum ranges and concentrations for use, and nothing herein contained shall be construed as limiting the use of waters containing higher ranges and concentrations.
[2-18-77; 20.6.2.3101 NMAC - Rn, 20 NMAC 6.2.III.3101, 1-15-01]

**20.6.2.3102: [RESERVED]**
[12-1-95; 20.6.2.3102 NMAC - Rn, 20 NMAC 6.2.III.3102, 1-15-01]

**20.6.2.3103 STANDARDS FOR GROUND WATER OF 10,000 mg/l TDS CONCENTRATION OR LESS:** The following standards are the allowable pH range and the maximum allowable concentration in ground water for the contaminants specified unless the existing condition exceeds the standard or unless otherwise provided in Subsection D of Section 20.6.2.3109 NMAC. Regardless of whether there is one contaminant or more than one contaminant present in ground water, when an existing pH or concentration of any water contaminant exceeds the standard specified in Subsection A, B, or C of this section, the existing pH or concentration shall be the allowable limit, provided that the discharge at such concentrations will not result in concentrations at any place of withdrawal for present or reasonably foreseeable future use in excess of the standards of this section. These standards shall apply to the dissolved portion of the contaminants specified with a definition of dissolved being that given in the publication "*methods for chemical analysis of water and waste of the U.S. environmental protection agency*," with the exception that standards for mercury, organic compounds and non-aqueous phase liquids shall apply to the total unfiltered concentrations of the contaminants.

A. **Human Health Standards**-Ground water shall meet the standards of Subsection A and B of this section unless otherwise provided. If more than one water contaminant affecting human health is present, the toxic pollutant criteria as set forth in the definition of toxic pollutant in Section 20.6.2.1101 NMAC for the combination of contaminants, or the Human Health Standard of Subsection A of Section 20.6.2.3103 NMAC for each contaminant shall apply, whichever is more stringent. Non-aqueous phase liquid shall not be present floating atop of or immersed within ground water, as can be reasonably measured.

(1) Arsenic (As)....................0.1 mg/l
(2) Barium (Ba)....................1.0 mg/l
(3) Cadmium (Cd)....................0.01 mg/l
(4) Chromium (Cr)....................0.05 mg/l
(5) Cyanide (CN)....................0.2 mg/l
(6) Fluoride (F)....................1.6 mg/l
(7) Lead (Pb)....................0.05 mg/l
(8) Total Mercury (Hg)....................0.002 mg/l
(9) Nitrate ($NO_3$ as N)....................10.0 mg/l
(10) Selenium (Se)....................0.05 mg/l
(11) Silver (Ag)....................0.05 mg/l
(12) Uranium (U)....................0.03 mg/l
(13) Radioactivity: Combined Radium-226 & Radium-228....................30 pCi/l
(14) Benzene....................0.01 mg/l
(15) Polychlorinated biphenyls (PCB's)....................0.001 mg/l
(16) Toluene....................0.75 mg/l
(17) Carbon Tetrachloride....................0.01 mg/l
(18) 1,2-dichloroethane (EDC)....................0.01 mg/l
(19) 1,1-dichloroethylene (1,1-DCE)....................0.005 mg/l
(20) 1,1,2,2-tetrachloroethylene (PCE)....................0.02 mg/l
(21) 1,1,2-trichloroethylene (TCE)....................0.1 mg/l
(22) ethylbenzene....................0.75 mg/l
(23) total xylenes....................0.62 mg/l
(24) methylene chloride....................0.1 mg/l
(25) chloroform....................0.1 mg/l
(26) 1,1-dichloroethane....................0.025 mg/l
(27) ethylene dibromide (EDB)....................0.0001 mg/l
(28) 1,1,1-trichloroethane....................0.06 mg/l
(29) 1,1,2-trichloroethane....................0.01 mg/l
(30) 1,1,2,2-tetrachloroethane....................0.01 mg/l
(31) vinyl chloride....................0.001 mg/l

# National Hydrography Dataset (NHD) - High-resolution

Metadata also available as

## Metadata:



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*Identification_Information:*
*Citation:*
*Citation_Information:*
*Originator:*
U.S. Geological Survey in cooperation with U.S. Environmental Protection Agency, USDA Forest Service, and other Federal, State and local partners (see dataset specific metadata under Data_Set_Credit for details).
*Publication_Date:* See dataset specific metadata.
*Publication_Time:* Unknown
*Title:* National Hydrography Dataset (NHD) - High-resolution
*Geospatial_Data_Presentation_Form:* vector digital data
*Publication_Information:*
*Publication_Place:* Reston, Virginia
*Publisher:* U.S. Geological Survey
*Online_Linkage:* <http://nhd.usgs.gov>
*Description:*
*Abstract:*
The National Hydrography Dataset (NHD) is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD data was originally developed at 1:100,000-scale and exists at that scale for the whole country. This high-resolution NHD, generally developed at 1:24,000/1:12,000 scale, adds detail to the original 1:100,000-scale NHD. (Data for Alaska, Puerto Rico and the Virgin Islands was developed at high-resolution, not 1:100,000 scale.) Local resolution NHD is being developed where partners and data exist. The NHD contains reach codes for networked features, flow direction, names, and centerline representations for areal water bodies. Reaches are also defined on waterbodies and the approximate shorelines of the Great Lakes, the Atlantic and Pacific Oceans and the Gulf of Mexico. The NHD also incorporates the National Spatial Data Infrastructure framework criteria established by the Federal Geographic Data Committee.
*Purpose:*

The NHD is a national framework for assigning reach addresses to water-related entities, such as industrial discharges, drinking water supplies, fish habitat areas, wild and scenic rivers. Reach addresses establish the locations of these entities relative to one another within the NHD surface water drainage network, much like addresses on streets. Once linked to the NHD by their reach addresses, the upstream/downstream relationships of these water-related entities--and any associated information about them--can be analyzed using software tools ranging from spreadsheets to geographic information systems (GIS). GIS can also be used to combine NHD-based network analysis with other data layers, such as soils, land use and population, to help understand and display their respective effects upon one another. Furthermore, because the NHD provides a nationally consistent framework for addressing and analysis, water-related information linked to reach addresses by one organization (national, state, local) can be shared with other organizations and easily integrated into many different types of applications to the benefit of all.

*Time_Period_of_Content:*
- *Time_Period_Information:*
  - *Single_Date/Time:*
- *Currentness_Reference:* See dataset specific metadata.

*Status:*
- *Progress:* In work
- *Maintenance_and_Update_Frequency:* Irregular

*Spatial_Domain:*
- *Bounding_Coordinates:*
  - *West_Bounding_Coordinate:* -168.500000
  - *East_Bounding_Coordinate:* -64.549578
  - *North_Bounding_Coordinate:* 71.499607
  - *South_Bounding_Coordinate:* 17.673030

*Keywords:*
- *Theme:*
  - *Theme_Keyword_Thesaurus:*
    U.S. Department of the Interior, U.S. Geological Survey, 1999, Standards for National Hydrography Dataset (<http://mapping.usgs.gov/standards/>)
  - *Theme_Keyword:* FWHYDROGRAPHY
  - *Theme_Keyword:* Hydrography
  - *Theme_Keyword:* Stream / River
  - *Theme_Keyword:* Lake / Pond
  - *Theme_Keyword:* Canal / Ditch
  - *Theme_Keyword:* Reservoir
  - *Theme_Keyword:* Spring / Seep
  - *Theme_Keyword:* Swamp / Marsh
  - *Theme_Keyword:* Artificial Path
  - *Theme_Keyword:* Reach Code
- *Place:*
  - *Place_Keyword_Thesaurus:*
    U.S. Department of Commerce, 1977, Countries, dependencies, areas of special sovereignty, and their principal administrative divisions (Federal Information Processing Standards 10-3): Washington, D.C., National Institute of Standards and Technology.
  - *Place_Keyword:* US

*Access_Constraints:* None

*Use_Constraints:*

None. Acknowledgment of the originating agencies would be appreciated in products derived from these data.

*Point_of_Contact:*

*Contact_Information:*

*Contact_Organization_Primary:*

*Contact_Organization:* Earth Science Information Center, U.S. Geological Survey

*Contact_Address:*

*Address_Type:* mailing address

*Address:* 507 National Center

*City:* Reston

*State_or_Province:* VA

*Postal_Code:* 20192

*Country:* USA

*Contact_Voice_Telephone:* 1 888 ASK USGS

*Contact_Voice_Telephone:* 1 888 275 8747

*Contact_Electronic_Mail_Address:* ask@usgs.gov

*Hours_of_Service:* 0800-1600 Eastern Time

*Contact_Instructions:*

In addition to the address above there are other ESIC offices throughout the country. A full list of these offices is at URL: <http://mapping.usgs.gov/esic/esic_index.html>

*Data_Set_Credit:* See dataset specific metadata.

*Native_Data_Set_Environment:*

Microsoft Windows 2000 Version 5.1 (Build 2600) Service Pack 1; ESRI ArcCatalog 8.3.0.800

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*Data_Quality_Information:*

*Attribute_Accuracy:*

*Attribute_Accuracy_Report:*

Statements of attribute accuracy are based on accuracy statements made for U.S. Geological Survey Digital Line Graph (DLG) data, which is estimated to be 98.5 percent. One or more of the following methods were used to test attribute accuracy: manual comparison of the source with hardcopy plots; symbolized display of the DLG on an interactive computer graphic system; selected attributes that could not be visually verified on plots or on screen were interactively queried and verified on screen. In addition, software validated feature types and characteristics against a master set of types and characteristics, checked that combinations of types and characteristics were valid, and that types and characteristics were valid for the delineation of the feature. Feature types, characteristics, and other attributes conform to the Standards for National Hydrography Dataset (USGS, 1999) as of the date they were loaded into the database. All names were validated against a current extract from the Geographic Names Information System (GNIS). The entry and identifier for the names match those in the GNIS. The association of each name to reaches has been interactively checked, however, operator error could in some cases apply a name to a wrong reach. This statement is generally true for the most common sources of NHD data. Other sources and methods may have been used to create or update NHD data. In some cases, additional information may be found in the NHDMetadata table.

*Logical_Consistency_Report:*

Points, nodes, lines, and areas conform to topological rules. Lines intersect only at nodes, and all nodes anchor the ends of lines. Lines do not overshoot or undershoot other lines where they are supposed to meet. There are no duplicate lines. Lines bound areas and lines identify the areas to the left and right of the lines. Gaps and overlaps among areas do not exist. All areas close.

*Completeness_Report:*

The completeness of the data reflects the content of the sources, which most often are the published USGS topographic quadrangle and/or the USDA Forest Service Primary Base Series (PBS) map. The USGS topographic quadrangle is usually supplemented by Digital Orthophoto Quadrangles (DOQs). Features found on the ground may have been eliminated or generalized on the source map because of scale and legibility constraints. In general, streams longer than one mile (approximately 1.6 kilometers) were collected. Most streams that flow from a lake were collected regardless of their length. Only definite channels were collected so not all swamp/marsh features have stream/rivers delineated through them. Lake/ponds having an area greater than 6 acres were collected. Note, however, that these general rules were applied unevenly among maps during compilation. Reaches codes are defined on all features of type stream/river, canal/ditch, artificial path, coastline, and connector. Waterbody reach codes are defined on all lake/pond and most reservoir features. Names were applied from the GNIS database. Detailed capture conditions are provided for every feature type in the Standards for National Hydrography Dataset available online through <http://mapping.usgs.gov/standards/>. This statement is generally true for the most common sources of NHD data. Other sources and methods may have been used to create or update NHD data. In some cases, additional information may be found in the NHDMetadata table.

*Positional_Accuracy:*

*Horizontal_Positional_Accuracy:*

*Horizontal_Positional_Accuracy_Report:*

Statements of horizontal positional accuracy are based on accuracy statements made for U.S. Geological Survey topographic quadrangle maps. These maps were compiled to meet National Map Accuracy Standards. For horizontal accuracy, this standard is met if at least 90 percent of points tested are within 0.02 inch (at map scale) of the true position. Additional offsets to positions may have been introduced where feature density is high to improve the legibility of map symbols. In addition, the digitizing of maps is estimated to contain a horizontal positional error of less than or equal to 0.003 inch standard error (at map scale) in the two component directions relative to the source maps. Visual comparison between the map graphic (including digital scans of the graphic) and plots or digital displays of points, lines, and areas, is used as control to assess the positional accuracy of digital data. Digital map elements along the adjoining edges of data sets are aligned if they are within a 0.02 inch tolerance (at map scale). Features with like dimensionality (for example, features that all are delineated with lines), with or without like characteristics, that are within the tolerance are aligned by moving the features equally to a common point. Features outside the tolerance are not moved; instead, a feature of type connector is added to join the features. This statement is generally true for the most common sources of NHD data. Other sources and methods may have been used to create or update NHD data. In some cases, additional information may be found in the NHDMetadata table.

*Vertical_Positional_Accuracy:*

*Vertical_Positional_Accuracy_Report:*

Statements of vertical positional accuracy for elevation of water surfaces are based on accuracy statements made for U.S. Geological Survey topographic quadrangle maps. These maps were compiled to meet National Map Accuracy Standards. For vertical accuracy, this standard is met if at least 90 percent of well-defined points tested are within one-half contour interval of the correct value. Elevations of water surface printed on the published map meet this standard; the contour intervals of the maps vary. These elevations were transcribed into the digital data; the accuracy of this transcription was checked by visual comparison between the data and the map. This statement is generally true for the most common sources of NHD data. Other sources and methods may have been used to create or update NHD data. In some cases, additional information may be found in the NHDMetadata table.

*Lineage:*

*Process_Step:*

*Process_Description:*

The processes used to create and maintain high-resolution NHD data can be found in the table called "NHDMetadata". Because NHD data can be downloaded using several user-defined areas, the process descriptions can vary for each download. The NHDMetadata table contains a list of all the process descriptions that apply to a particular download. These process descriptions are linked using the DuuID to the NHDFeatureToMetadata table which contains the com_ids of all the features within the download. In addition, another table, the NHDSourceCitation, can also be linked through the DuuID to determine the sources used to create or update NHD data.

*Process_Date:* Unknown

*Process_Step:*

*Process_Description:* See dataset specific metadata.

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*Spatial_Data_Organization_Information:*

*Direct_Spatial_Reference_Method:* Vector

*Point_and_Vector_Object_Information:*

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*Spatial_Reference_Information:*

*Horizontal_Coordinate_System_Definition:*

*Geographic:*

*Latitude_Resolution:* 0.000001

*Longitude_Resolution:* 0.000001

*Geographic_Coordinate_Units:* Decimal degrees

*Geodetic_Model:*

*Horizontal_Datum_Name:* North American Datum of 1983

*Ellipsoid_Name:* Geodetic Reference System 80

*Semi-major_Axis:* 6378137.000000

*Denominator_of_Flattening_Ratio:* 298.257222

*Vertical_Coordinate_System_Definition:*

*Altitude_System_Definition:*

*Altitude_Datum_Name:* National Geodetic Vertical Datum of 1929

*Altitude_Resolution:* 0.1

*Altitude_Distance_Units:* meters

*Altitude_Encoding_Method:*
Explicit elevation coordinate included with horizontal coordinates

---

*Entity_and_Attribute_Information:*
*Overview_Description:*
*Entity_and_Attribute_Overview:*
The National Hydrography Dataset is a comprehensive set of digital spatial data that encodes information about naturally occurring and constructed bodies of water, paths through which water flows, and related entities. The information encoded about features includes a feature date, classification by type, other characteristics, a unique common identifier, the feature length or area, and (rarely) elevation of the surface of water pools and a description of the stage of the elevation. For reaches, encoded information includes a reach code. Names and their identifiers in the Geographic Names Information System, are assigned to most feature types. The direction of flow is encoded for networked features. The data also contains relations that encode metadata, and information that supports the exchange of future updates and improvements to the data. The names and definitions of all feature types, characteristics, and values are in the Standards for National Hydrography Dataset: Reston, Virginia, U.S. Geological Survey, 1999. The document is available online through <http://mapping.usgs.gov/standards/>.
*Entity_and_Attribute_Detail_Citation:*
The names and definitions of all feature types, characteristics, and values are in U.S. Geological Survey, 1999, Standards for National Hydrography Dataset High Resolution: Reston, Virginia, U.S. Geological Survey. The document is available online through <http://mapping.usgs.gov/standards/>. Information about tables and fields in the data are available from the user documentation for the National Hydrography Dataset at <http://nhd.usgs.gov>. The National Map - Hydrography Fact Sheet is also available at: <http://erg.usgs.gov/isb/pubs/factsheets/fs06002.html>.

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*Distribution_Information:*
*Distributor:*
*Contact_Information:*
*Contact_Organization_Primary:*
*Contact_Organization:* Earth Science Information Center, U.S. Geological Survey
*Contact_Address:*
*Address_Type:* mailing address
*Address:* 507 National Center
*City:* Reston
*State_or_Province:* VA
*Postal_Code:* 20192
*Country:* USA
*Contact_Voice_Telephone:* 1 888 ASK USGS
*Contact_Voice_Telephone:* 1 888 275 8747
*Contact_Electronic_Mail_Address:* ask@usgs.gov
*Hours_of_Service:* 0800-1600 Eastern Time

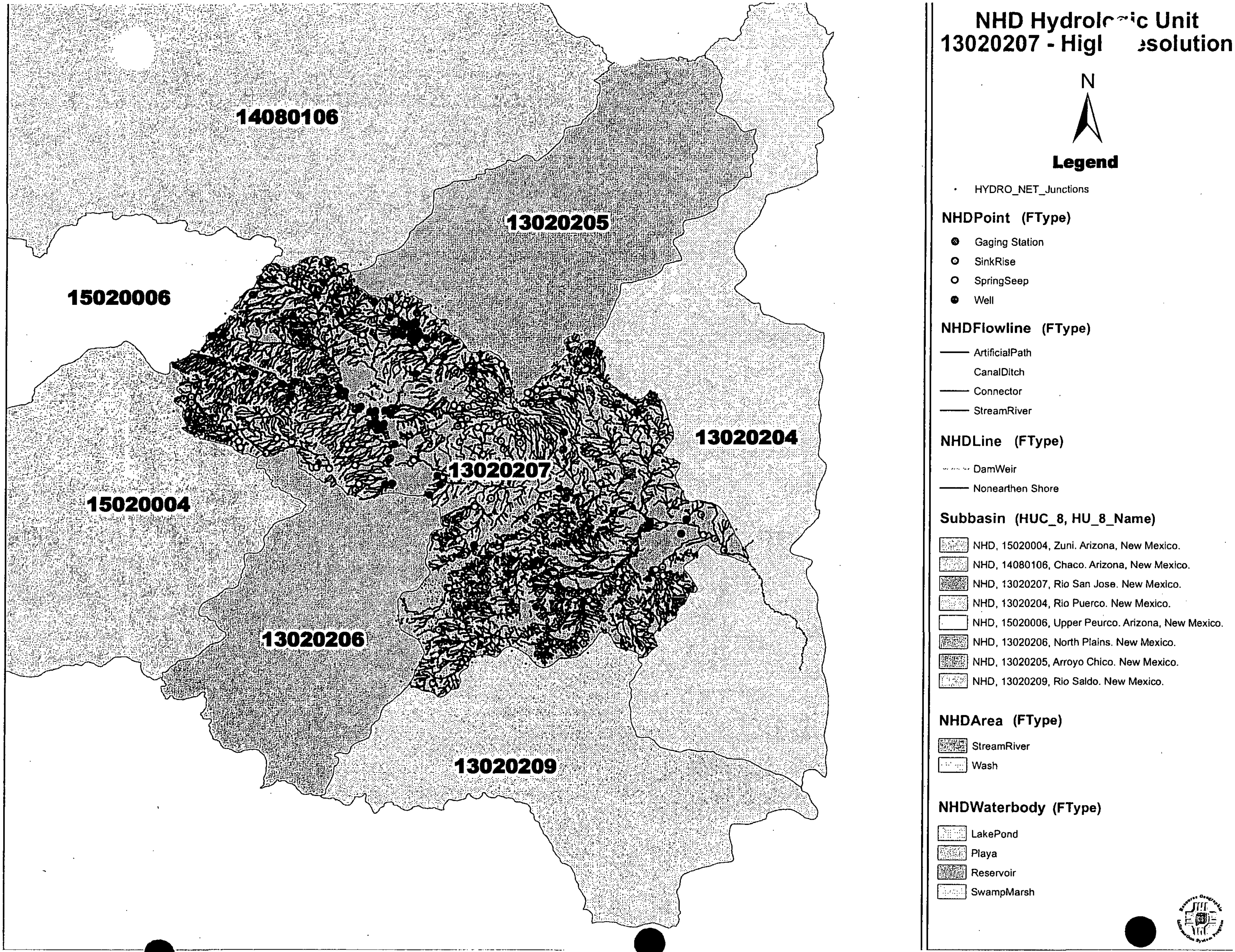
*Contact_Instructions:*
In addition to the address above there are other ESIC offices throughout the country. A full list of these offices is at URL: <http://mapping.usgs.gov/esic/esic_index.html>
*Standard_Order_Process:*
*Digital_Form:*
*Digital_Transfer_Information:*
*Format_Name:* ArcGIS Geodatabase
*Format_Version_Number:* 8.3
*File_Decompression_Technique:* tar and uncompress

---

*Metadata_Reference_Information:*
*Metadata_Date:* 20040415
*Metadata_Contact:*
*Contact_Information:*
*Contact_Organization_Primary:*
*Contact_Organization:* Earth Science Information Center, U.S. Geological Survey
*Contact_Address:*
*Address_Type:* mailing address
*Address:* 507 National Center
*City:* Reston
*State_or_Province:* VA
*Postal_Code:* 20192
*Country:* USA
*Contact_Voice_Telephone:* 1 888 ASK USGS
*Contact_Voice_Telephone:* 1 888 275 8747
*Contact_Electronic_Mail_Address:* nhd@usgs.gov
*Hours_of_Service:* 0800-1600 Eastern Time
*Contact_Instructions:*
In addition to the address above there are other ESIC offices throughout the country. A full list of these offices is at URL: <http://mapping.usgs.gov/esic/esic_index.html>
*Metadata_Standard_Name:* FGDC Content Standard for Digital Geospatial Metadata
*Metadata_Standard_Version:* FGDC-STD-001-1998
*Metadata_Time_Convention:* local time
*Metadata_Extensions:*
*Online_Linkage:* <http://www.esri.com/metadata/esriprof80.html>
*Profile_Name:* ESRI Metadata Profile

---

Generated by mp version 2.7.33 on Tue Jul 20 16:04:29 2004



NHD Hydrolo ic Unit
13020207 - Higl esolution
N
Legend
HYDRO_NET_Junctions
NHDPoint (FType)
Gaging Station
SinkRise
SpringSeep
Well
NHDFlowline (FType)
ArtificialPath
CanalDitch
Connector
StreamRiver
NHDLine (FType)
DamWeir
Nonearthen Shore
Subbasin (HUC_8, HU_8_Name)
NHD, 15020004, Zuni. Arizona, New Mexico.
NHD, 14080106, Chaco. Arizona, New Mexico.
NHD, 13020207, Rio San Jose. New Mexico.
NHD, 13020204, Rio Puerco. New Mexico.
NHD, 15020006, Upper Peurco. Arizona, New Mexico.
NHD, 13020206, North Plains. New Mexico.
NHD, 13020205, Arroyo Chico. New Mexico.
NHD, 13020209, Rio Saldo. New Mexico.
NHDArea (FType)
StreamRiver
Wash
NHDWaterbody (FType)
LakePond
Playa
Reservoir
SwampMarsh
14080106
13020205
15020006
13020204
13020207
15020004
13020206
13020209

| AREA | PERIMETER | Z0HUCS_UTM | HUC_10 | ID | SQ_MILES |
|---|---|---|---|---|---|
| 832918503.89120 | 150918.65644 | 208 | 1302020703 | 205 | 321.592 |

# REFERENCES

# 9-12

```
Identification_Information:
  Citation:
    Citation_Information:
      Originator:
        U.S. Department of Commerce
        Bureau of the Census
        Geography Division
      Publication_Date: 2001
      Title: TIGER/Line Files, Redistricting Census 2000
      Edition: Redistricting Census 2000
      Series_Information:
        Series_Name: TIGER/Line Files
        Issue_Identification: Version (MMYY) represents the month and year file
created
      Publication_Information:
        Publication_Place: Washington, DC
        Publisher:
          U.S. Department of Commerce
          Bureau of the Census
          Geography Division
  Description:
    Abstract:
      TIGER, TIGER/Line, and Census TIGER are registered trademarks of the Bureau
      of the Census. The Redistricting Census 2000 TIGER/Line files are an extract
      of selected geographic and cartographic information from the Census TIGER
      data base.  The geographic coverage for a single TIGER/Line file is a county
      or statistical equivalent entity, with the coverage area based on January 1,
      2000 legal boundaries.  A complete set of Redistricting Census 2000 TIGER/Line
      files includes all counties and statistically equivalent entities in the
United
      States and Puerto Rico.  The Redistricting Census 2000 TIGER/Line files will
      not include files for the Island Areas. The Census TIGER data base represents
      a seamless national file with no overlaps or gaps between parts.  However,
each
      county-based TIGER/Line file is designed to stand alone as an independent data
      set or the files can be combined to cover the whole Nation.  The Redistricting
      Census 2000 TIGER/Line files consist of line segments representing physical
      features and governmental and statistical boundaries.  The Redistricting
Census
      2000 TIGER/Line files do NOT contain the ZIP Code Tabulation Areas (ZCTAs) and
      the address ranges are of approximately the same vintage as those appearing in
      the 1999 TIGER/Line files.  That is, the Census Bureau is producing the
      Redistricting Census 2000 TIGER/Line files in advance of the computer
processing
      that will ensure that the address ranges in the TIGER/Line files agree with
the
      final Master Address File (MAF) used for tabulating Census 2000.  The files
contain
      information distributed over a series of record types for the spatial objects
of a
      county.  There are 17 record types, including the basic data record, the shape
      coordinate points, and geographic codes that can be used with appropriate
software
      to prepare maps.  Other geographic information contained in the files includes
      attributes such as feature identifiers/census feature class codes (CFCC) used
to
      differentiate feature types, address ranges and ZIP Codes, codes for legal and
      statistical entities, latitude/longitude coordinates of linear and point
features,
      landmark point features, area landmarks, key geographic features, and area
      boundaries.  The Redistricting Census 2000 TIGER/Line data dictionary contains
      a complete list of all the fields in the 17 record types.
    Purpose:
```

In order for others to use the information in the Census TIGER data base in a
geographic information system (GIS) or for other geographic applications, the
Census Bureau releases to the public extracts of the data base in the form of
TIGER/Line files. Various versions of the TIGER/Line files have been
released;
previous versions include the 1990 Census TIGER/Line files, the 1992
TIGER/Line
files, the 1994 TIGER/Line files, the 1995 TIGER/Line files, the 1997
TIGER/Line
files, the 1998 TIGER/Line files, and the 1999 TIGER/Line files. The
Redistricting
Census 2000 TIGER/Line files were originally produced to support the Census
2000
Redistricting Data Program.
Supplemental_Information:
To find out more about TIGER/Line files and other Census TIGER
data base derived data sets visit http://www.census.gov/geo/www/tiger.
Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2000
Currentness_Reference: 2000
Status:
Progress: Complete
Maintenance_and_Update_Frequency:
TIGER/Line files are extracted from the Census TIGER data base when needed for
geographic programs required to support the census and survey programs of the
Census Bureau. No changes or updates will be made to the Redistricting Census
2000 TIGER/Line files. Future releases of TIGER/Line files will reflect
updates
made to the Census TIGER data base and will be released under a version
numbering
system based on the month and year the data is extracted.
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: +131.000000
East_Bounding_Coordinate: -64.000000
North_Bounding_Coordinate: +72.000000
South_Bounding_Coordinate: -15.000000
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Line Feature
Theme_Keyword: Feature Identifier
Theme_Keyword: Census Feature Class Code (CFCC)
Theme_Keyword: Address Range
Theme_Keyword: Geographic Entity
Theme_Keyword: Point/Node
Theme_Keyword: Landmark Feature
Theme_Keyword: Political Boundary
Theme_Keyword: Statistical Boundary
Theme_Keyword: Polygon
Theme_Keyword: County/County Equivalent
Theme_Keyword: TIGER/Line
Theme_Keyword: Topology
Theme_Keyword: Street Centerline
Theme_Keyword: Latitude/Longitude

Theme_Keyword: ZIP Code
Theme_Keyword: Vector
Theme_Keyword: TIGER/Line Identification Number (TLID)
Theme_Keyword: Street Segment
Theme_Keyword: Coordinate

Theme_Keyword: Boundary
Place:
Place_Keyword_Thesaurus:
FIPS Publication 6-4
FIPS Publication 55
Place_Keyword: United States
Place_Keyword: Puerto Rico
Place_Keyword: County
Access_Constraints: None
Use_Constraints:
None. Acknowledgment of the U.S. Bureau of the Census would be appreciated for products derived from these files. TIGER, TIGER/Line, and Census TIGER are registered trademarks of the Bureau of the Census.
Native_Data_Set_Environment:
TIGER/Line files are created and processed in a VMS environment. The environment consists of two Alpha Server 8400s clustered together running OpenVMS version 6.2-1H3 used for production operations. The Census TIGER system is driven by DEC Command language (DCL) procedures which invoke C software routines to extract selected geographic and cartographic information (TIGER/Line files) from the operational Census TIGER data base.
Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Accurate against Federal information Processing Standards (FIPS), FIPS Publication 6-4, and FIPS-55 at the 100% level for the codes and base names. The remaining attribute information has been examined but has not been fully tested for accuracy.
Logical_Consistency_Report:
The feature network of lines (as represented by Record Types 1 and 2) is compete for census purposes. Spatial objects in TIGER/Line belong to the "Geometry and Topology" (GT) class of objects in the "Spatial Data Transfer Standard" (SDTS) FIPS Publication 173 and are topologically valid. Node/geometry and topology (GT)-polygon/chain relationships are collected or generated to satisfy topological edit requirements. These requirements include:
* Complete chains must begin and end at nodes.
* Complete chains must connect to each other at nodes.
* Complete chains do not extend through nodes.
* Left and right GT-polygons are defined for each complete chain element and are consistent throughout the extract process.
* the chains representing the limits of the files are free of gaps.
The Census Bureau performed automated tests to ensure logical consistency and limits of files. All polygons are tested for closure. The Census Bureau uses its internally developed Geographic Update System to enhance and modify spatial and attribute data in the Census TIGER data base. Standard geographic codes, such as FIPS codes for states, counties, municipalities, and places, are used when encoding spatial entities. The Census Bureau performed spatial data tests for logical consistency of the codes during the compilation of the original Census TIGER data base files. Most of the Codes themselves were provided to the Census Bureau by the USGS, the agency responsible for maintaining FIPS 55. Feature attribute information has been examined but has not been fully tested for consistency.

```
  Completeness_Report:
    Data completeness of the TIGER/Line files reflects the contents of the Census
TIGER
    data base at the time the TIGER/Line files (Redistricting Census 2000 version)
were
    created.
  Positional_Accuracy:
    Horizontal_Positional_Accuracy:
      Horizontal_Positional_Accuracy_Report:
        The information present in these files is provided for the purposes of
statistical
        analysis and census operations only.  Coordinates in the TIGER/Line files
have six
        implied decimal places, but the positional accuracy of these coordinates is
not as
        great as the six decimal places suggest.  The positional accuracy varies
with the
        source materials used, but generally the information is no better than the
established
        national map Accuracy standards for 1:100,000-scale maps from the U.S.
Geological
        Survey (USGS); thus it is NOT suitable for high-precision measurement
applications
        such as engineering problems, property transfers, or other uses that might
require
        highly accurate measurements of the earth's surface.  The USGS
1:100,000-scale maps
        met national map accuracy standards and use coordinates defined by the North
        American Datum, 1983.  For the contiguous 48 States, the cartographic
fidelity of
        most of the Redistricting Census 2000 TIGER/Line files, in areas outside the
        1980 census Geographic Base File/Dual Independent map Encoding (GBF/DIME)
file
        coverage and selected other large metropolitan areas, compare favorable with
the
        USGS 1:100,000-scale maps.  The Census Bureau cannot specify the accuracy of
        features inside of what was the 1980 GBF/DIME-File coverage or selected
metropolitan
        areas.  The Census Bureau added updates to the TIGER/Line files that
enumerators
        annotated on maps sheets prepared from the Census TIGER data base as they
attempted
        to traverse every street feature shown on the Census 2000 map sheets; the
Census
        Bureau also made other corrections from updated map sheets supplied by local
        participants for Census Bureau programs.  The locational accuracy of these
updates
        is of unknown quality.  In addition to the Federal, State, and local
sources,
        portions of the files may contain information obtained in part from maps and
        other materials prepared by private companies.  Despite the fact the
TIGER/Line
        data positional accuracy is not as high as the coordinate values imply, the
        six-decimal place precision is useful when producing maps.  The precision
allows
        features that are next to each other on the ground to be placed in the
correct
        position, on the map, relative to each other, without overlap.
  Lineage:
    Source_Information:
      Source_Citation:
        Citation_Information:
          Originator:
```

U.S. Department of Commerce
Bureau of the Census
Geography Division
Publication_Date: Unpublished material
Title: Census TIGER data base
Edition: Redistricting Census 2000
Type_of_Source_Media: On line
Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2000
Source_Currentness_Reference: Date the file was made available to create TIGER/Line File extracts.
Source_Citation_Abbreviation: TIGER
Source_Contribution:
Selected geographic and cartographic information (line segments) from the Census TIGER data base.
Process_Step:
Process_Description:
In order for others to use the information in the Census TIGER data base in a GIS or for other geographic applications, the Census Bureau releases periodic extracts of selected information from the Census TIGER data base, organized as topologically consistent networks. Software (TIGER DB routines) written by the Geography Division allows for efficient access to Census TIGER system data.
TIGER/Line files are extracted from the Census TIGER data base by county or statistical equivalent area. Census TIGER data for a given county or statistical equivalent area is then distributed among 17 fixed length record ASCII files, each one containing attributes for either line, polygon, or landmark geographic data types. The Census Bureau has released various versions of the TIGER/Line files since 1988, with each version having more updates (feature and feature names, address ranges and ZIP Codes, coordinate updates, revised field definitions, etc.) than the previous version.
Source_Used_Citation_Abbreviation: Census TIGER data base
Process_Date: 2000
Spatial_Data_Organization_Information:
Indirect_Spatial_Reference:
Federal Information Processing Standards (FIPS) and feature names and addresses.
Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Node, network
Point_and_Vector_Object_Count: 570 to 56,000
SDTS_Point_and_Vector_Object_Type: Entity point
SDTS_Point_and_Vector_Object_Type: Complete chain
Point_and_Vector_Object_Count: 790 to 83,000
SDTS_Point_and_Vector_Object_Type: GT-polygon composed of chains
Point_and_Vector_Object_Count: 290 to 33,000
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Geographic:
Latitude_Resolution: 0.000458
Longitude_Resolution: 0.000458
Geographic_Coordinate_Units: Decimal degrees

```
Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:
      The TIGER/Line files contain data describing three major
      types of features/entities;
      Line Features -
      1) Roads
      2) Railroads
      3) Hydrography
      4) Miscellaneous transportation features and selected power lines and pipe
lines
      5) Political and statistical boundaries
      Landmark Features -
      1) Point landmarks, e.g., schools and churches.
      2) Area landmarks, e.g., Parks and cemeteries.
      3) Key geographic locations (KGLs), e.g., shopping centers and factories.
      Polygon features -
      1) Geographic entity codes for areas used to tabulate the Census 2000 census
      statistical data and 1990 geographic areas
      2) Locations of area landmarks
      3) Locations of KGLs
      The line features and polygon information form the majority of data in the
TIGER/Line
      files.  Some of the data/attributes describing the lines include coordinates,
feature
      identifiers (names), CFCCs (used to identify the most noticeable
characteristic of a
      feature), address ranges, and geographic entity codes.  The TIGER/Line files
contain
      point and area labels that describe landmark features and provide locational
reference.
      Area landmarks consist of a feature name or label and feature type assigned to
a polygon
      or group of polygons.  Landmarks may overlap or refer to the same set of
polygons.
      The Census TIGER data base uses collections of spatial objects (points, lines,
and
      polygons) to model or describe real-world geography.  The Census Bureau uses
these
      spatial objects to represent features such as streets, rivers, and political
boundaries
      and assigns attributes to these features to identify and describe specific
features
      such as the 500 block of Market Street in Philadelphia, Pennsylvania.
    Entity_and_Attribute_Detail_Citation:
      U.S. Bureau of the Census, TIGER/Line files,
      Redistricting Census 2000 Technical Documentation.  The TIGER/Line
documentation
      defines the terms and definitions used within the files.
Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization:
          U.S. Department of Commerce
          Bureau of the Census
          Geography Division
          Products and Services Staff
      Contact_Address:
        Address_Type: Physical address
        Address: 8903 Presidential Parkway, WP I
        City: Upper Marlboro
        State_or_Province: Maryland
```

```
        Postal_Code: 20772
      Contact_Voice_Telephone: (301) 457-1128
      Contact_Address:
        Address_Type: Mailing address
        Address: Bureau of the Census
        City: Washington
        State_or_Province: District of Columbia
        Postal_Code: 20233-7400
      Contact_Voice_Telephone: (301) 457-1128
      Contact_Facsimile_Telephone:
        (301) 457-4710
        Contact_Electronic _Mail_Address: tiger@census.gov
  Resource_Description: Redistricting Census 2000 TIGER/Line Files
  Distribution_Liability:
    No warranty, expressed or implied is made and no liability is
    assumed by the U.S. Government in general or the U.S. Census Bureau in specific
as
    to the positional or attribute accuracy of the data.  The act of distribution
shall
    not constitute any such warranty and no responsibility is assumed by the U.S.
    Government in the use of these files.
  Standard_Order_Process:
    Digital_Form:
      Digital_Transfer_Information:
        Format_Name: TGRLN (compressed)
        Format_Version_Number: Redistricting Census 2000
        Format_Version_Date: 2000
        File_Decompression_Technique: PK-ZIP, version 1.93A or higher
      Digital_Transfer_Option:
        Online_Option:
          Computer_Contact_Information:
            Network_Address:
              Network_Resource_Name: www.census.gov/geo/www/tiger
    Fees:
      The online copy of the TIGER/Line files may be accessed without charge.  See
      http://www.census.gov/geo/www/tiger for information on availability on
CD-ROM/DVD
      and associated costs for these products.
    Ordering_Instructions:
      To obtain more information about ordering TIGER/Line files visit
      http://www.census.gov/geo/www/tiger.
      Technical_Prequisites: The Redistricting Census 2000 TIGER/Line files contain
geographic
      data only and do not include display or mapping software or statistical data.
A
      list of vendors who have developed software capable of processing TIGER/Line
files
      can be found by visiting http://www.census.gov/geo/www/tiger
Metadata_Reference_Information:
  Metadata_Date: 2000
  Metadata_Contact:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization:
          U.S. Department of Commerce
          Bureau of the Census
          Geography Division
          Products and Services Staff
      Contact_Address:
        Address_Type: Physical Address
        Address: 8903 Presidential Parkway, WP I
        City: Upper Marlboro
        State_or_Province: Maryland
```

```
      Postal_Code: 20772
    Contact_Voice_Telephone: (301) 457-1128
    Contact_Electronic_Mail_Address: tiger@census.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: 19940608
```

```
Identification_Information:
  Citation:
    Citation_Information:
      Originator: USDA/NRCS - National Cartography & Geospatial Center
      Title: Enhanced Digital Raster Graphic 30x60 1:100,000
  Description:
    Purpose: The Enhanced DRG is useful as a source or background layer in a GIS, as
a means to perform quality assurance on other digital products, and as a source for
the collection and revision of vector data.  The removal of the collar information
allows the Enhanced DRGs to be edge-matched and displayed simultaneously in a
Geographic Information System.
  Time_Period_of_Content:
    Time_Period_Information:
      Single_Date/Time:
        Calendar_Date: 1963 - 1997
  Status:
    Progress: Planned
  Spatial_Domain:
    Bounding_Coordinates:
      West_Bounding_Coordinate: -109.05017
      East_Bounding_Coordinate: -103.00196
      North_Bounding_Coordinate: 37.00029
      South_Bounding_Coordinate: 31.33217
  Keywords:
    Theme:
      Theme_Keyword_Thesaurus: Standard for Geospatial Dataset File Naming
      Theme_Keyword: Digital Raster Graphic, DRG
    Place:
      Place_Keyword_Thesaurus: GNIS
      Place_Keyword: New Mexico
      Place_Keyword: *
  Use_Constraints:

    The U.S. Department of Agriculture, Service Center Agencies should be
acknowledged as the data source in products derived from these data.

    This data set is not designed for use as a primary regulatory tool in permitting
or citing decisions, but may be used as a reference source.  This is public
information and may be interpreted by organizations, agencies, units of government,
or others based on needs; however, they are responsible for the appropriate
application.  Federal, State, or local regulatory bodies are not to reassign to the
Service Center Agencies any authority for the decisions that they make.  The Service
Center Agencies will not perform any evaluations of these data for purposes related
solely to State or local regulatory programs.

    Photographic or digital enlargement of these data to scales greater than at
which they were originally mapped can cause misinterpretation of the data.  Digital
data files are periodically updated, and users are responsible for obtaining the
latest version of the data.
  Point_of_Contact:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization: National Cartography and Geospatial Center
      Contact_Address:
        Address: 501 W. Felix St, Bldg 23
        City: Fort Worth
        State_or_Province: Texas
        Postal_Code: 76115
Data_Quality_Information:
  Lineage:
    Source_Information:
      Source_Citation:
        Citation_Information:
```

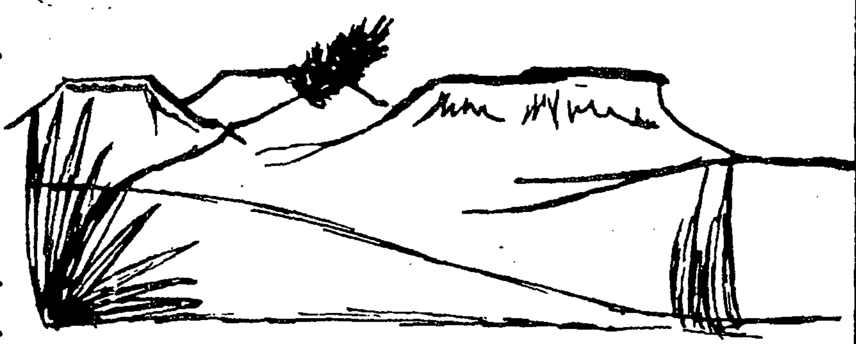
```
        Originator:
          Beartooth Mapping, Inc
        Publication_Date: 2001
        Title: Enhanced Digital Raster Graphic
      Source_Scale_Denominator: 100,000
    Process_Step:
      Process_Description: No post processing was done on these files.  Data was
originally developed by USGS (http://mcmcweb.er.usgs.gov/drg) and enhanced by
Beartooth Mapping, Inc. (www.beartoothmaps.com).
      Process_Date: 200010
Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Planar:
      Grid_Coordinate_System:
        Grid_Coordinate_System_Name: Universal Transverse Mercator
        Universal_Transverse_Mercator:
          UTM_Zone_Number: 13
          Transverse_Mercator:
            Scale_Factor_at_Central_Meridian: 0.9996
            Longitude_of_Central_Meridian: -105
            Latitude_of_Projection_Origin: 0.0
            False_Easting: 500000.0
            False_Northing: 0.0
    Geodetic_Model:
      Horizontal_Datum_Name: North American Datum of 1983 (NAD83)
      Ellipsoid_Name: GRS1980
      Semi-major_Axis: 6378137.0
      Denominator_of_Flattening_Ratio: 298.257222101
Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:
      Each raster entity or pixel contains a color index from 0 through 12
referencing a color palette of RGB values from 0 through 255 in which the standard
colors used in the DRGE are defined.
    Entity_and_Attribute_Detail_Citation: Detailed information about the digital
raster graphics is available at http://mcmcweb.er.usgs.gov/drg/drg_technical.html.
In addition to the general information, the site provides standards and
specifications for the imagery.
Distribution_Information:
  Distribution_Liability:

    Although these data have been processed successfully on a computer system at the
U.S. Department of Agriculture, no warranty expressed or implied is made by the
Service Center Agencies regarding the utility of the data on any other system, nor
shall the act of distribution constitute any such warranty.  The U.S. Department of
Agriculture will warrant the delivery of this product in computer readable format,
and will offer appropriate adjustment of credit when the product is determined
unreadable by correctly adjusted computer input peripherals, or when the physical
medium is delivered in damaged condition.  Request for adjustment of credit must be
made within 90 days from the date of this shipment from the ordering site.

    Neither the U.S. Department of Agriculture, nor any of its agencies are liable
for misuse of the data, for damage, for transmission of viruses, or for computer
contamination through the distribution of these data sets.  The U.S. Department of
Agriculture prohibits discrimination in all its programs and activities on the basis
of race, color, national origin, sex, religion, age, disability, political beliefs,
sexual orientation, or marital or family status. (Not all prohibited bases apply to
all programs.)
  Standard_Order_Process:
    Digital_Form:
      Digital_Transfer_Information:
        Format_Name: Tag Image File Format (TIFF)
Metadata_Reference_Information:
```

Metadata_Date: 2004-09-29
Metadata_Standard_Name: SCI Minimum Compliance Metadata
Metadata_Standard_Version: SCI Std 003-02

IMPACTS OF URANIUM MINING ON
SURFACE AND SHALLOW GROUND WATERS
GRANTS MINERAL BELT, NEW MEXICO



HEALTH
& ENVIRONMENT
department

EID/GWH-86/2

# IMPACTS OF URANIUM MINING ON SURFACE AND SHALLOW GROUND WATERS GRANTS MINERAL BELT, NEW MEXICO

BY: Bruce M. Gallaher and
Steven J. Cary

NEW MEXICO ENVIRONMENTAL IMPROVEMENT DIVISION
SANTA FE, NEW MEXICO

SEPTEMBER, 1986

Denise Fort, Director
Environmental Improvement Division

Ernest C. Rebuck, Chief
Ground Water/Hazardous Waste Bureau

3. Evaluation of hydraulic relationships between surface waters and shallow ground waters in the two districts.

4. Characterization of chemical and hydraulic impacts of mine dewatering effluents on surface waters and shallow ground waters in the two districts.

5. Analysis of the vulnerability of shallow ground waters in the two districts to contamination from uranium industry activities.

6. Characterization of the quality of runoff from uranium mine waste piles.

The second goal of this assessment is to develop recommendations for the solution of identified problems. Strategies evaluated for controlling pollution from uranium mining sources are

1. *Application of the federal National Pollutant Discharge Elimination System* (NPDES) permits and of state surface and ground water quality regulations to address water pollution problems in the Grants Mineral Belt.

2. Use of the Resource Conservation and Recovery Act (RCRA) and the federal "Superfund" to mitigate uranium mining impacts on water quality.

3. Use of state radiation protection regulations as water pollution control tools.

4. Use of land treatment practices to prevent nonpoint source pollution from uranium mine waste piles.

## 2.3 AREAL DESCRIPTION

### 2.3.1. Location and Major Features

The Grants Mineral Belt is an approximately rectangular area in northwest New Mexico, encompassing portions of McKinley, Cibola, Sandoval, and Bernalillo counties. The Mineral Belt is approximately 100 miles long and 25 miles wide (Figure 2.1). The name "Mineral Belt" refers primarily to the uranium ore found in this area. Locations of uranium mining areas within the Mineral Belt are indicated on the map.

The Belt encompasses portions of the Laguna and Canoncito Reservations along its southeast extent, and a corner of the Navajo Reservation at its northwest extent. Interstate-40 lies to the south of the Mineral Belt; located along I-40 are the local population centers of Grants-Milan and Gallup. Smaller communities in the area include Crownpoint, San Mateo, and Laguna. Just north of the Grants Mineral Belt is Chaco Canyon, a National Monument noted for its ancient pueblo ruins.

Major topographic features in the area include the Zuni Mountains southeast of Gallup, the Cebolleta Mountains in the southeast corner of McKinley County, and Mount Taylor northeast of Grants. The Continental Divide cuts approximately through the middle of the Belt, with stream courses to the east (e.g., Rio Paguate, Rio Moquino, and San Mateo Creek) being part of the Rio Grande drainage and stream courses to the west (e.g. Puerco River, and Coyote Wash) part of the Colorado River drainage. Characteristic landforms include rugged mountains,

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broad, flat valleys, mesas, cuestas, rock terraces, steep escarpments, canyons, lava flows, volcanic cones, buttes, and arroyos.

### 2.3.2. Climate and Vegetation

The climate in the region is arid to semiarid. Annual precipitation is 20-to-30 inches in the mountain areas and 8-to-10 inches in the lower areas. The majority of precipitation occurs in the summer as brief, intense thunderstorms. Mountain areas usually receive significant amounts of snow in the winter. Evaporation exceeds precipitation throughout the region.

Potential evapotranspiration is more than 30 inches of water in an average year. Because less than 17 inches of precipitation on the average is received annually, there is a large net water deficit. Although small water surpluses occur in winter (December thru February), large water deficits are incurred during the remainder of the year. The deficit is greatest during the warm growing season months of June through September.

Vegetation of the region is typical of that of other semiarid climates of the Southwest. Most of the low-lying area is grassland with some cacti and yucca. Pinon and juniper are the dominant trees found on upland and north-facing slopes. Ponderosa pines and firs are found in the high mountain areas. In much of the valley areas, vegetation is insufficient to prevent erosion. Riparian vegetation along stream courses is limited; where it does occur, it consists primarily of cottonwood and salt cedar trees.

### 2.3.3. Geology

The Belt lies along the southern edge of the San Juan Basin, which is in the eastern part of the Colorado Plateau physiographic province. It is a region of scarped tablelands with broad valleys, and local canyons cut in Mesozoic and younger sedimentary rocks (Stone and others, 1983). The rocks are comprised principally of alternating shales and sandstones and some limestones.

Primary structural geologic features in the Grants Mineral Belt area are the Chaco Slope, Zuni Uplift, and Acoma Sag (Figure 2.2). Along the Chaco Slope, Cretaceous and Tertiary rocks out crop. Mesozoic and Upper Palezoic sediment and Precambrian igneous and metamorphic rocks are exposed in the Zuni Uplift (Stone and others, 1983). These strata dip to the northeast toward the basin axis. Figure 2.3 is a cross-section of the San Juan Basin; the Grants Mineral Belt falls in the region between the southwest edge and Crownpoint. Figure 2.4 is a stratigraphic column of the underlying geologic formations in the principal mining districts.

Of significance to this study is the Morrison Formation, of Upper Jurassic age. In descending order, it consists of the Brushy Basin member, the Westwater Canyon member, and the Recapture member. The Westwater Canyon member is host to the major uranium ore deposits and also to a major aquifer of the Grants Mineral Belt. It consists of interbedded fluvial arkosic sandstone, claystone, and mudstone. Its average thickness is 250 feet, but it thins to 100 feet southward and eastward. The Brushy Basin member, which overlies the Westwater, consists of a relatively impervious shale. Included in the Brushy Basin member, is the Jackpile Sandstone which bears the uranium ore body that is mined near Laguna and the Poison

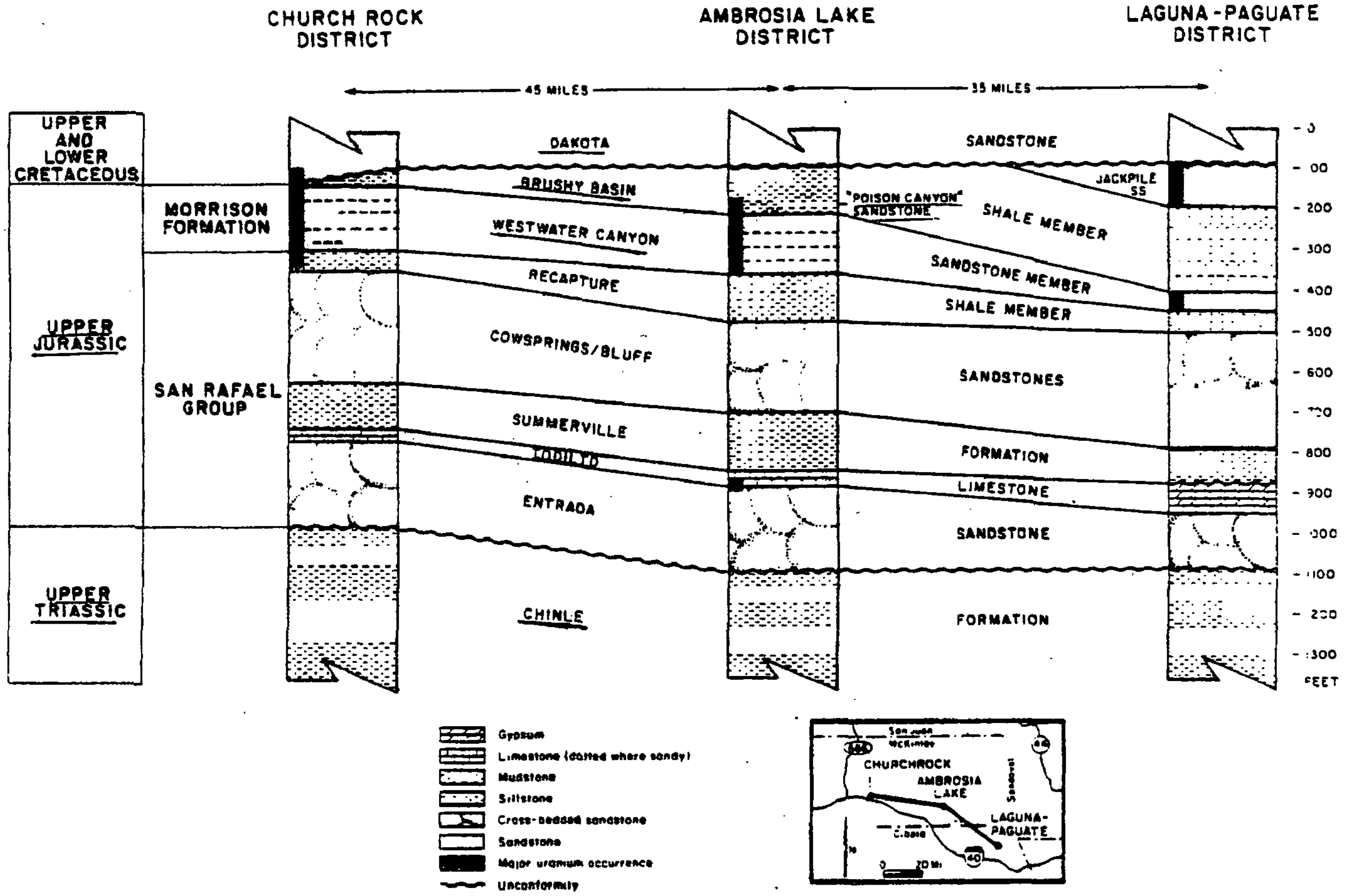



FIGURE 2.4 Stratigraphic sections of the Church Rock, Ambrosia Lake, and Laguna-Paguate mining district (after N.M. Energy and Minerals Dept., 1984).

Canyon Sandstone which bears uranium that is mined near Grants. The average thickness of the Brushy Basin member is 185 feet; toward the southwest part of the San Juan Basin, in the vicinity of Gallup, the Brushy Basin member is absent. Underlying the Morrison Formation is the San Raphael Group which includes the Todilto Limestone, a uranium bearing unit that is mined near Grants.

The Dakota Sandstone is a Lower Cretaceous formation overlying the Morrison Formation. It consists of massive quartz sandstone interbedded with coal lenses. In the southwest part of the San Juan Basin, where the Brushy Basin member is absent, the Dakota Sandstone and Westwater Canyon member form a single hydrologic unit.

Much of the emphasis of this study is on the relatively thin veneers of Quaternary unconsolidated to semi-consolidated alluvial, eolian, and terrace deposits that overlie the consolidated rock units in the valley bottoms. These deposits are predominantly silty or clayey fine sand, with occasional concentrations of coarse sand or gravel. Alternating periods of erosion and deposition have resulted in marked disconformities within the alluvium (Leopold and Snyder, 1951). Thickness of the alluvial deposits in the area of concern is usually less than 200 feet.

### 2.3.4. Water Resources

#### Surface Water.

Prior to uranium mining and discharge of dewatering effluents, most streams in the Grants Mineral Belt area were ephemeral. Peak flows occurred in the late summer, during heavy thunderstorms. Somewhat less intense flows also occurred in the late winter and early spring, due to melting of snow in the mountains. Because vegetation in the area is insufficient to impede erosion, runoff from these waters carries a heavy sediment load.

The only significant naturally perennial waters are a few small springs along the Puerco River, and streams draining the flanks of Mt. Taylor. The most significant of the perennial streams are Rio Paguate and Rio Moquino which drain the northeast slope of Mt. Taylor and traverse the Laguna-Paguate mining district (see Figure 2.1). Since construction of San Mateo Reservoir, San Mateo Creek has flowed continuously near the community of San Mateo, located on the northwest side of Mt. Taylor in the Ambrosia Lake district. Because of streamflow losses, however, San Mateo Creek normally becomes ephemeral within one mile below San Mateo.

The water in these channels is eventually lost to evaporation and infiltration to shallow alluvial aquifers. Recharge of bedrock aquifers also occurs in short stretches where the streams intersect bedrock outcrops.

#### Ground Water.

As stated previously, the Westwater Canyon member of the Morrison Formation is a principal aquifer in the area, with yields to wells of up to several hundred gallons per minute. Reliable water supplies are also available from the Gallup Sandstone, the Dakota Sandstone, the Glorieta Sandstone, and the San Andres Limestone. Dewatering of uranium mines has resulted in a significant decline in water levels in the aquifers tapped (mainly the Morrison Formation) and in adjacent formations

Other aquifer systems occur in the unconsolidated valley fills (alluvium) along the San Mateo Creek and the Puerco River, with yields to wells usually less than fifty gallons per minute. The alluvial deposits range from 0 to about 170 feet in thickness; water is found anywhere from a few feet to 100 feet below the surface. Recharge of the alluvial aquifers occurs both from infiltration of surface flow and from bedrock discharges in the form of seeps and springs.

Alluvial ground water-level maps for the Puerco River and the San Mateo Creek valleys are shown in Figures 2.5 and 2.6, respectively. The general direction of alluvial ground water flow in both valleys is to the southwest, corresponding to the slope of the land surface.

Water Use.

Historically, the principal uses of water in the Grants Mineral Belt have been domestic use and livestock watering. Domestic and municipal wells tap both alluvial and bedrock aquifers throughout the area. Numerous shallow domestic wells are located around the municipalities of Milan and Gallup. Milan derives its municipal water supply from wells tapping the San Andres Limestone. The adjacent community of Grants produces municipal water from wells tapping basalt, alluvium, the San Andres Limestone, and the Glorieta Sandstone. Most of the water supply for the City of Gallup comes from the Gallup Sandstone. Crownpoint derives its water supply from the Morrison Formation. Water for livestock is primarily derived from the shallow alluvial aquifer.

Irrigated agriculture is limited, but occurs to some extent along the valleys of Bluewater Creeks the Rio San Jose, and San Mateo Creek, and along the North Fork of Puerco River from the state road 566 bridge downstream to Gallup (see Figure 3.1). The main crops are vegetables and forage.

The advent of uranium mining has brought support industries which utilize ground water to some extent to the area; examples include cement and caustic soda plants. Moreover, large amounts of ground water are pumped from the uranium mines and discharged to surface watercourses or utilized by uranium mills.

Use of surface water has been limited due to its predominantly ephemeral nature. The discharge of mine dewatering effluents, however, has caused the now perennial streams to become important livestock water supplies.

2.3.5. Land Use

The Grants Mineral Belt is a complex mixture of Indian reservations and Federal, state, and private lands. The land is primarily used for livestock grazing by Indian and private ranchers. Logging occurs to a small extent in the mountain areas. In the Gallup area, coal mining has occurred since the 1880s.

Uranium mining began in the 1950s. The uranium companies have both leased lands from the Federal government, the state, and Indians tribes, and bought some lands outright.

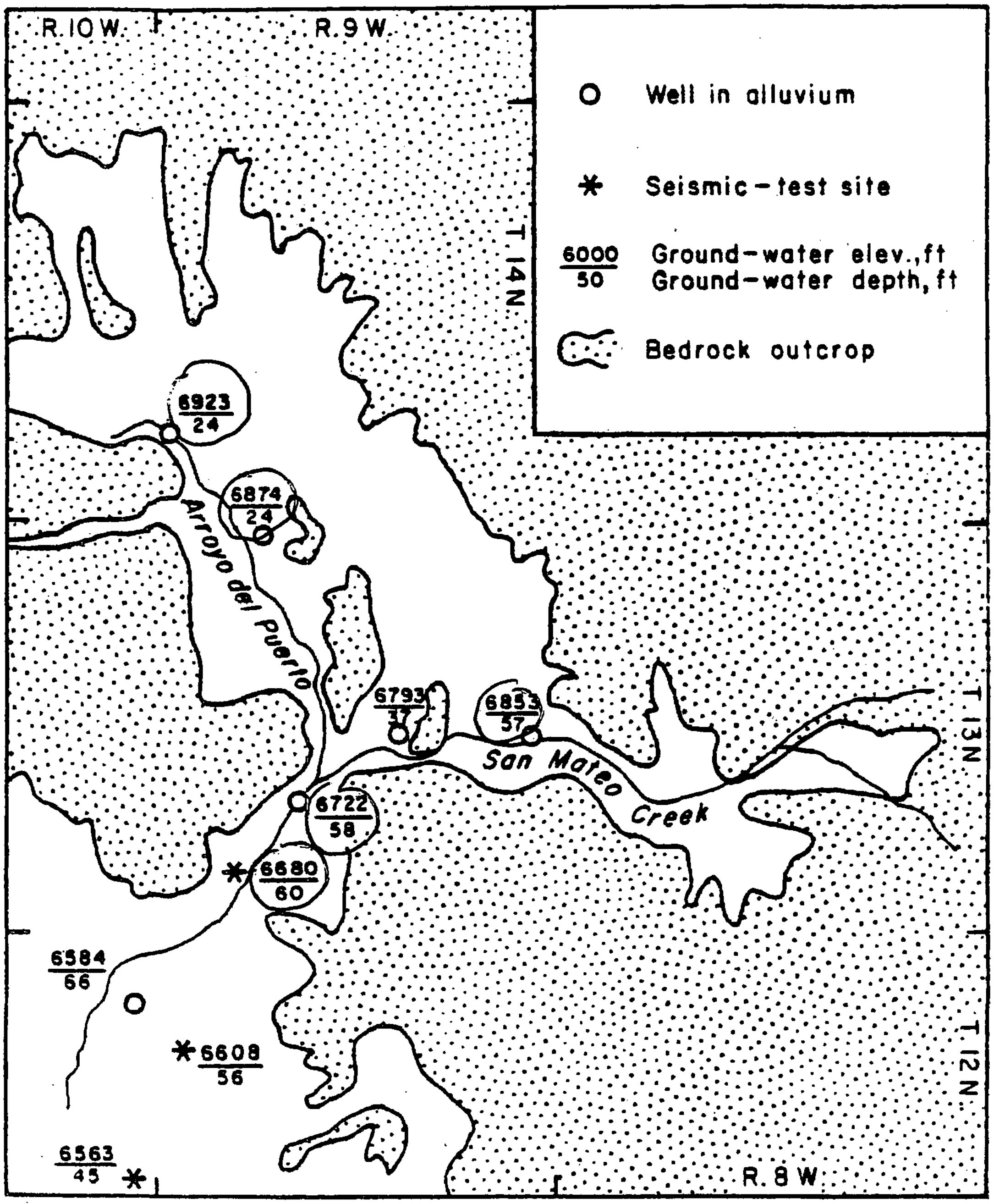



FIGURE 2.6 Alluvial ground water levels along San Mateo Creek and the Arroyo del Puerto (after Brod and Stone, 1981).

## 2.4 HISTORY OF THE URANIUM INDUSTRY IN THE STUDY AREA

Four mining districts have been developed within the Grants Mineral Belt, and are, from east to west, the Laguna-Paguate, Ambrosia Lake, Smith Lake, and the Church Rock mining districts (see Figure 2.1). There has been extensive exploration and new mine development in areas such as the Crownpoint, Nose Rock, and Marquez.

Extraction of uranium ore from the Laguna-Paguate and Ambrosia Lake mining districts began in the early 1950s using strip and open-pit mining methods. At that time most of the ores were extracted from sandstones of the Morrison Formation in the Laguna-Paguate district and the Todilto limestone in Ambrosia Lake district (see Figure 2.4). By 1954, the Laguna-Paguate district had become host to the largest open pit uranium mine in the United States, the Jackpile-Paguate mine (NM Energy and Minerals Department, 1981). By its closure in 1980, over 2700 acres of land had been disturbed (U.S. Department of the Interior, 1980). As late as 1979, the Jackpile-Paguate mine contributed more than 40% of the uranium ore mined in the Grants Mineral Belt (NM Energy and Minerals Department, 1981).

After the initial discovery of uranium in the Todilto limestone in 1950, numerous open-pit mines dotted the landscape of Ambrosia Lake where the limestone was exposed near the ground surface. Drilling downdip from the initial surface discoveries led to the delineation of ore bodies within the Poison Canyon and Westwater Canyon members of the Morrison Formation (see Figure 2.4 for detailed descriptions of units).

Eventual discovery of large subsurface deposits within the Westwater Canyon member established the Ambrosia Lake mining district as a major uranium production area. In 1980, the Ambrosia Lake mining district contained over two-thirds of the active uranium mines in the state (NM Energy and Minerals Department, 1981). Virtually all of these mines are underground with depths averaging approximately 900 feet. Several major aquifers are penetrated by these shafts.

Delineation and development of ore bodies in the Church Rock mining district began in 1965. Zones of mineralization are recognized at depths exceeding 1800 feet with average shaft depths of approximately 1600 feet. Several major water-bearing strata also are penetrated by the Church Rock mine shafts. As is the present case in Ambrosia Lake, mining in the Church Rock area is conducted by the room and pillar method. This involves mining out blocks of ore while leaving adjacent pillars of ore or waste as support for the roof (Figure 2.7). The size of the rooms depends on the strength of the roof.

Activities of the New Mexico uranium mining industry peaked in 1978-80, following a world wide shortage of the metal and increasing demands for the metal as a electrical power generation fuel. At present, however, the industry is experiencing a severe decline. The following table summarizes the severity of this decline:

| CATEGORY | 1977-78[a] | 1983[b] |
|---|---|---|
| Active Mines | 40 | 13 |
| Active Mills | 5 | 2 |
| Employment | 8,000 | 1,533 |
| Share of total U.S. production | 46% | 24% |

a Chris Wentz, NM Energy and Minerals Department, personal communication (1983)

b NM Energy and Minerals Department (1984).

## 2.5 OVERVIEW OF URANIUM MINING OPERATIONS

Surface (open-pit) mining and underground mining have accounted for virtually all of the uranium mined in New Mexico. Solution mining has been found to be successful in pilot test projects, but commercial application of the technique has yet to have an impact on New Mexico's industry. Total production from surface and underground mines has been nearly equal.

Both types of mines contribute waste to natural surface drainage systems. Solid wastes are derived from both types while liquid wastes are almost exclusively derived from underground mines.

In the surface mining method,the topsoil and overburden overlying the ore are removed and stockpiled. The uranium ore is then removed and stored prior to shipment to a milling facility. Occasionally, berms and ditches are constructed around the waste and storage piles to control runoff from the piles as well as to divert upstream flood waters away from the piles.

As the mine is further developed, the overburden may be backfilled to fill mined-out areas of the pit. Ultimately, the mined area may be graded and seeded to restore the land surface to its pre-mined condition. Few active or inactive mines have been even marginally reclaimed.

Ore bodies that are located more than about one hundred feet below the land surface are accessed by vertical shafts (see Figure 2.7) The mine extends laterally from the vertical shafts, sometimes for distances greater than a mile.

Because underground mines are developed in a way that minimizes the amount of waste rock removed, far less solid waste is produced than in a surface mine. In terms of contaminant concentrations, however, the underground mine waste rock can be more enriched and can be of greater concern than surface mine waste rock. Underground waste rock is stored in a spoils area that may be, but usually is not, bermed to control runoff.

Since most of the deeper ore bodies lie beneath major bedrock aquifers, dewatering operations are required. Most of the produced water in the Grants Mineral Belt is pumped from within the mines and discharged to settling ponds and to drainage channels. Water also can be pumped from wells that are drilled into the water-bearing strata near the mine in an effort to depressurize the aquifer.

To comply with effluent limitations specified by the federal National Pollutant Discharge Elimination System (NPDES) permits, most mines treat water. Prior to discharge, a flocculant and barium chloride are added to reduce suspended solids concentrations and to coprecipitate radium. Elevated concentrations of dissolved uranium are reduced by a separate ion-exchange treatment.

The average underground mine in the Grants Mineral Belt continuously discharges more than 1000 gallons per minute of produced water. Collectively, more than 150 billion gallons of water were pumped from aquifers in the Grants Mineral Belt between 1956 and 1982 (Perkins and Goad, 1980). Lyford and others (1980) provide a comprehensive assessment of the hydrologic effects on the aquifer system of this sustained pumping. Local water-level declines in the Morrison Formation in excess of 500 feet have resulted from the dewatering.

## III. METHODS AND APPROACH

Monitoring activities for this assessment were centered on the three major active mining districts in the Grants Mineral Belt: Laguna-Paguate, Ambrosia Lake, and Church Rock. In the former district, monitoring focused on characterization of natural surface water quality and the effects of open-pit uranium mining on surface water quality. In the latter two districts, monitoring involved characterization of the quality of both natural surface waters and natural ground waters and of the impacts of uranium mining activities on these waters. Instrumentation was installed at sites along representative stream segments in each of the two districts in order to characterize hydraulic and contaminant migration relationships between surface water and shallow ground-water flow systems. Water samples were collected and analyzed for general water-quality constituents as well as parameters specifically associated with uranium mining and milling. In all, over 440 samples were collected at a total of 74 monitoring stations. Chemical analyses of these samples have provided a body of over 10,000 data points.

Section 3.1 describes the monitoring locations for surface water and ground water and for runoff. This section also describes the types of data collected at each site and the frequency of water sampling and hydrological measurements. Section 3.2 explains the methodologies used to collect water quality samples, field data collection, and hydrological measurements. The water-quality constituents monitored and analytical methods for their determination are described in section 3.3. Data interpretation methods are reviewed in section 3.4. The actual data and interpretation of their significance are the subject of the remaining chapters of this report.

### 3.1 MONITORING SITE LOCATIONS AND INSTRUMENTATION

#### 3.1.1. Surface Water

Monitoring at these stations began in 1977 and continued through 1982. Table 3.1 lists these stations; the stations locations are shown in Figures 3.1, 3.2, and 3.3. Most of these sites had continuous flow during the assessment. Flow at the Puerco River, San Mateo Creek at U.S. Geological Survey (USGS) gage, and the Arroyo del Puerto stations was attributable predominantly to the discharge of uranium mine dewatering effluents. Flow at San Mateo Creek at San Mateo Reservoir, and Rios Moquino and Paguate stations, on the other hand, was naturally perennial and not augmented by dewatering effluents. The two Arroyo del Puerto stations actually function as one station; the "Kerr-McGee cattails" site was sampled when there was no flow at the USGS gage site.

In addition to the stations listed in Table 3.1, a number of sites were sampled (1) during runoff events, and (2) along the Puerco River during and after the United Nuclear Corporation (UNC) uranium mill tailings spill on July 16, 1979. A detailed analysis of the consequences of this spill is presented in a separate report (Gallaher and Cary, 1986).

Through sampling efforts distinct from this assessment, EID staff have collected one grab sample per year from most uranium industry point sources. In 1980 and 1981, uranium industry point source discharges and the assessment stations were sampled concurrently.

Water Quality.
Surface water samples were collected at each monitoring station on a quarterly basis, and occasionally during runoff events. More frequent sampling was conducted at the two Puerco River stations after the UNC tailings spill: daily or every two days for two weeks after the event; weekly for another two weeks; monthly through July 1980; and finally quarterly.

Hydrology.
Five of the stations listed in Table 3.1 are equipped with surface-flow gages. Gage 08349800, the Rio Paguate station below the Jackpile Mine, had been installed by the USGS in 1976 as part of their routine water measurement effort. The other four gages were installed, operated, and maintained by the USGS specifically for this study under funding from the EID. The USGS found that the site initially chosen at the Highway 566 bridge on the Puerco River was not favorable for obtaining accurate measurements or continuous records, because the channel is quite unstable at that location. Consequently, this station was moved in 1980 to a more favorable site a few miles downstream. Flow records for all five stations are summarized in the annual USGS publication, "Water Resources Data, New Mexico". (Water Data Report NM-76-1 to NM-82-1).

Instantaneous flow measurements at ungaged surface-water stations were taken while collecting water samples. Measurements were made with a Price pygmy meter according to procedures detailed by the U.S. Department of the Interior (1977).

### 3.1.2. Ground Water

Cluster Concept.
The purpose of ground-water monitoring was to study the hydrologic and water quality relationships between surface and ground water and to evaluate the movement of contaminants in the alluvial aquifer. The monitoring well clusters are designed to detect the early stages of contamination of the aquifer.

Figure 3.4 illustrates an idealized well cluster. One well is drilled about 10 feet from the channel edge to a deph of about 35 feet. Another well is drilled adjacent to the first, but about 70 feet deep. These two wells enable sampling of the aquifer at the same location, but at different depths. For some clusters, a single boring was drilled, but cased and perforated so that it can actually function as two wells -- one shallow and one deep. The well is given one number and the two depths are distinguished by putting a "U" for "upper" or an "L" for "lower" after the well number. A third well is placed about 200 feet upstream of the first, 10 feet from the channel edge and drilled to a depth of 35 feet. A final 35-foot-deep well is placed 200 feet from the first in a direction perpendicular to the channel. Thus the cluster design enables determination of water-quality differences along the stream channel, away from the stream channel, and at different depths in the aquifer. Not every cluster was constructed as shown in Figure 3.4, but only one cluster has less than two wells.

Locations of the ten cluster sites for this study are shown on Figures 3.1 and 3.2. Table 3.2 lists additional information for each well, such as depth, casing diameter, and screened interval. Well locations are described in accordance with New Mexico State Engineer Office procedures, illustrated on Figure 3.5. Gallup, Lee, Sandoval, Otero, and Roundy clusters were installed in 1977-1978, while additional clusters, Entrada, Windmill, Springstead, Confluence, and BLM, were installed in 1981. Gal-5 was drilled in 1980 in order to further investigate the UNC tailings spill impacts at that site.

All monitoring wells were installed with either air rotary or hollow-stem auger drilling rigs. To avoid introducing contaminants into the wells, no drilling muds or fluids were added during the drilling operation. PVC plastic was selected as well casing material.

Water Quality.

Ground water samples were collected quarterly, concurrent with collection of surface water samples. Additionally, for a year after the UNC tailings spill, the Gallup cluster was sampled on a monthly basis.

Hydrology.

A water-level recorder (continuous-reading) was installed on a single well at each of the original five clusters. As water-level readings at the Gallup cluster indicated that there is little water-level fluctuation along the Puerco River, continuous recorders were not installed at the Entrada, Windmill, Springstead, and Confluence sites. A recorder was installed at the BLM well cluster, however, because of its location above the river stretch receiving dewatering effluent. Water-level measurements were taken with a steel tape on all gaged wells monthly when the chart was changed on the recorders. The steel protective casings of the wells at each cluster were surveyed relative to one another, so that all water levels are measurements of relative depths within a cluster.

Short-term aquifer performance tests were performed on at least one well at each of the Puerco River clusters. Details on these tests are given in Gallaher and Cary (1986).

### 3.1.3. Runoff Sampling

Large quantities of materials associated with uranium ore are brought to the surface of the earth and deposited as mine tailings. These materials, when exposed to rainfall and snowmelt, have the potential to contaminate runoff with radionuclides and other trace elements associated with uranium mining. In 1982, a runoff sampling program was conducted to evaluate the runoff quality of these waste piles and the potential impact on surface and ground water quality in the region.

In order to sample the runoff, single-stage samplers were installed in tandem at a number of sites in ephermeral watercourses in ephemeral watercourses above and below mine waste piles (Table 3.3 and Figures 3.1 and 3.2). The sampler design was such that, when the water level of a runoff event reached a certain height, a sample of the runoff was collected in a quart bottle at the bottom of the sampler. The samplers were checked frequently by EID personnel during the summer of 1982; the longest period any sampler went unchecked was two weeks.

In addition to the single-stage samplers, grab samples were taken at miscellaneous sites above and below waste piles during runoff events. The locations and frequency of these samplings were dictated by the weather, by the presence of EID personnel, and by what seemed appropriate to the particular event and location.

### 3.1.4 Leach Tests.

In conjunction with the runoff sampling program, mine wastes themselves were subjected to leach tests in order to determine the potential for constituents to leach out of the waste piles and into runoff or ground water. Samples were collected from waste piles at the following six mine locations:

| WASTE PILE LOCATION | NUMBER OF COMPOSITE SAMPLES* |
|---|---|
| United Nuclear Corporation-NE, Church Rock | 4 |
| Kerr McGee-I, Church Rock | 4 |
| Hyde | 6 |
| Vallejo | 7 |
| Poison Canyon | 8 |
| Old San Mateo | 8 |

*See section 3.2.1.

The United Nuclear and Kerr-McGee sites had received mine wastes within the year before the time of sampling; the others sites were inactive or abandoned. Leach test methods are discussed in Section 3.3.3.

## 3.2 SAMPLING AND MEASUREMENT METHODOLOGIES

### 3.2.1. Water Quality

Field Data

Temperature, conductivity, and pH were measured in the field concurrent with collection of water samples. Temperature and conductivity were measured with a Yellow Springs Instruments model 33 S-C-T meter. Field pH was determined with a Hellige Color Comparator, if the sample was clear. Turbid samples were measured in the field with either an Orion pH meter or a Corning pH Meter. A two-point calibration was performed with standard pH buffers before each use of the meters.

Measurements of dissolved oxygen in ground water along the Puerco River were done to provide additional input data for a computer model utilized in the study (WATEQFC, see section 3.4.3). Measurements were taken twice on each 5-inch well with a Yellow Springs Instruments oxygen meter before and after pumping or sampling activities were initiated during a site visit. For these measurements the probe of the meter was lowered into the well so that it would be within the screened interval at the bottom of the well. The meter was calibrated with the Winkler method.

Surface Water Samples.

Grab samples were collected from the stream bank by hand-dipping water with a clean polyethlyene beaker from the stream into a 15-liter carboy. The polyethlyene, acid-washed carboys were rinsed with stream water prior to filling. The carboy samples were treated on-site as described below.

Ground Water Samples.

A truck-mounted electric submersible pump was used to collect samples from the five-

# IV. NATURAL SURFACE WATER QUALITY IN

# THE GRANTS MINERAL BELT

EID sampling programs have provided quantification of the quality of natural surface waters that have been unaffected by uranium mining within the Grants Mineral Belt. These natural waters serve as a baseline against which the impact of uranium industry effluents can be evaluated. Since 1978, the EID has systematically sampled the few naturally perennial waters in the region. These data were augmented in 1982, when samples of snowmelt and thunderstorm runoff from ephemeral watercourses were collected. All natural surface water sampling sites were located upstream from uranium mining activities.

Three aspects of natural water quality are specifically addressed in this chapter. The first is the chemical quality of sediment-free water; that is, the concentrations of dissolved salts, trace elements, and radioactivity. The second aspect is the high sediment load that is typically carried by ephemeral streams in the Grants Mineral Belt during runoff events. Finally, the chemical and radiological quality of raw, unfiltered runoff is discussed. Sediment-laden runoff characteristically has large concentrations of trace elements and radionuclides.

## 4.1 PERENNIAL STREAMS

Under natural conditions, most watercourses in the Grants Mineral Belt flow only when sustained by snowmelt or storm runoff. Nonetheless, there are a few perennial watercourses in the three mining districts investigated in this regional assessment. Perennial waters in the Church Rock district are limited to a few small springs along the Puerco River. In the Ambrosia Lake district, San Mateo Creek has flowed continuously in the vicinity of the community of San Mateo since the construction of San Mateo Reservoir upstream. Both the Rio Paguate and the Rio Moquino, which originate on the well-vegetated northeast slope of Mount Taylor, are perennial. These streams flow into the Jackpile-Laguna district, converge, and as the Rio Paguate, complete the traverse of the district.

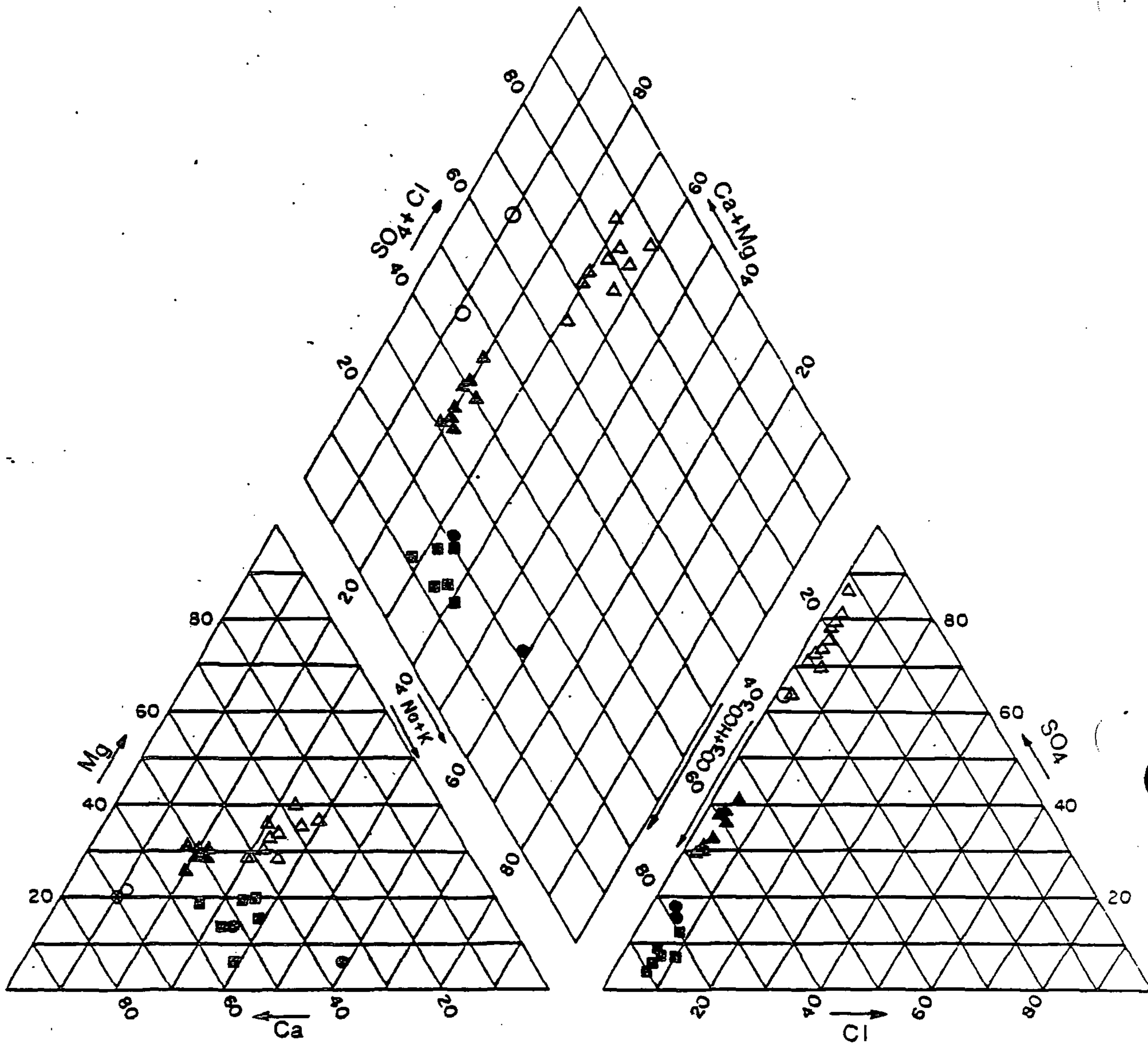
## 4.2 DISSOLVED SUBSTANCES

Dissolved salts in surface waters of the Grant Mineral Belt originate chiefly from weathered rocks and residues from evapotranspiration. Shale and limestone units are the primary geologic sources of dissolved solids in the region.

### 4.2.1. General Chemistry

Evaluation of sampling data shows that natural concentrations of the total dissolved solids in streams in the Grants Mineral Belt vary from less than 200 mg/l to over 1500 mg/l. The least saline waters are perennial San Mateo Creek and ephemeral flows in the South Fork of the Puerco River. The most saline water is found in the perennial Rio Moquino. The Mancos Shale, from which the Rio Moquino valley was excavated, has been shown to be one of the largest sources of salinity in the entire Colorado River Basin (Jackson and Julander, 1982).

A Piper diagram graphically illustrates the geochemical composition of different surface waters in the Grants Mineral Belt (Figure 4.1). Natural waters from the Rio




| NATURAL SURFACE WATERS | | TDS |
|---|---|---|
| ● | Puerco River South Fork at 566 bridge (ephemeral flow) | 300 |
| ○ | Puerco River North Fork at BLM (ephemeral flow) | 580 |
| ■ | San Mateo Creek at San Mateo (perennial stream) | 180 |
| ▲ | Rio Paguate above Jackpile (perennial stream) | 490 |
| △ | Rio Moquino above Jackpile (perennial stream) | 1530 |

FIGURE 4.1 Geochemical composition of natural surface waters, Grants Mineral Belt. Ions are expressed percentages of total equivalents per liter.

Moquino and ephemeral flows in the North Fork of the Puerco River are dominated by dissolved calcium and sulfate, which are abundant in the Mancos Shale. In contrast, South Fork of Puerco River and San Mateo Creek flow chiefly in limestone terrain and are enriched with bicarbonate ions. The perennial Rio Paguate has waters of chemical composition intermediate between these two types.

### 4.2.2. Trace Elements and Radioactivity

Dissolved trace element and radionuclide concentrations are very low in perennial streams in the Grants Mineral Belt. Dissolved concentrations in ephemeral flows are similarly very low, but may be slightly higher in line with the increased sediment loads (Table 4.1). Owing to the uniformly low concentrations found, the data are combined in Table 4.1 rather than presented by separate drainages or mining districts.

Dissolved concentrations of trace elements are usually quite low because existing natural compounds have low solubility under the neutral or slightly alkaline pH conditions common in the region and because the majority of dissolved trace elements in surface water become attached to sediment grains or form precipitates (Popp and Lacquer, 1980). Like the trace elements, most naturally occurring radionuclides are relatively insoluble.

## 4.3. SUSPENDED SEDIMENT

Suspended sediment levels in surface waters of the Grants Mineral Belt span a wide range of concentrations (Table 4.2). The few naturally perennial streams, such as Rio Moquino, Rio Paguate, and, locally, San Mateo Creek, are virtually sediment free, but most of the region is drained by dry arroyos that carry turbid flash floods after summer thunderstorm activity. The tremendous sediment concentrations of regional arroyos are among the world's highest (Gregory and Walling, 1973).

The majority of streamflows in watercourses in the Grants Mineral Belt are of the short-lived, turbid type. Maximum suspended sediment concentrations in these arroyos are many hundreds of thousands of milligrams per liter (mg/l) (Busby, 1979). The Puerco River exemplifies this type of stream. The name "puerco", which means "murky", has been applied to several regional streams that are "too thick to drink, to thin to plow."

The high suspended sediment concentrations are attributable to three major environmental factors. First, several geological strata in the region weather to silt and clay-sized particles that are easily carried in suspension by flowing water Important sediment-producing rock units are shales, including the Mancos Shale of the Puerco River Valley (Dane and Bachman, 1965; Jackson and Julander, 1982). Second, the semiarid climate prevents establishment of protective vegetative cover on the soil. In lowland areas the soil is sparsely vegetated with drought-resistant plants, including shrubs and bunch grasses. Overgrazing by livestock has rendered the ground surface even more vulnerable to erosion. Third, the late summer (July-September) rainy season brings intense thunderstorms that rapidly generate large volumes of runoff. Whether overland or in a channel, these flows readily entrain exposed sediment grains.

TABLE 4.1 Median Dissolved Concentrations of Trace Elements and Radioactivity in Natural Surface Waters. Number of samples given in parentheses.

| CONSTITUENT | DISSOLVED CONCENTRATION Perennial Streams | | Ephemeral Flows | |
|---|---|---|---|---|
| | (ug/l) | | | |
| As | <5 | (39) | <5 | (3) |
| Ba | 100 | (30) | <100 | (3) |
| Cd | <1 | (26) | <1 | (3) |
| Pb | <5 | (26) | <5 | (3) |
| Mo | <10 | (36) | <10 | (8) |
| Se | <5 | (39) | <5 | (7) |
| U-natural | <5 | (37) | 10 | (5) |
| V | <10 | (29) | 25 | (3) |
| Zn | <50 | (27) | <50 | (3) |
| | (pCi/l) | | | |
| Gross alpha | 2 | (29) | 17 | (3) |
| Ra-226 | 0.1 | (36) | 1.2 | (11) |
| Pb-210 | 1 | (2) | 4.5 | (10) |
| Po-210 | -- | -- | 2.3 | (7) |
| Th-238 | -- | -- | 0.3 | (7) |
| Th-230 | -- | -- | 0.3 | (7) |
| Th-232 | -- | -- | 0.2 | (7) |

## 4.4. CHEMICAL QUALITY OF TURBID WATERS

Suspended sediment can be a significant transport agent for chemical substances in water. In the ephemeral watercourses of the Grants Mineral Belt, high suspended sediment concentrations account for the major proportion of contaminant transport (see Keith, 1978).

### 4.4.1. Relation of Chemical Quality to Suspended Sediments

Data presented in Tables 4.3 and 4.4 illustrate the extreme variability in trace element and radionuclide levels in unfiltered waters. Concentrations of those constituents may range from below analytically detectable levels up to 1000 times greater than detectable levels.

Concentrations of most trace elements and radionuclides in turbid runoff demonstrate a strong, statistically significant dependence on the amount of sediment present in the sample. Regression analyses for individual constituents show that, in most cases, the amount of a particular constituent detected in an unfiltered water sample is a positive, linear, first-order function of total suspended sediment; correlation coefficients (r) are often greater than 0.90. In other words, each additional quantity of sediment added to surface water volume usually adds constant proportions of adsorbed or precipitated trace elements and radionuclides. The relation between the concentration of a particular constituent and the sediment concentration (i.e., the slope of a regression line) varies between drainages and depends chiefly on the elemental composition of rocks and sediments in the basins.

While data from the Ambrosia Lake mining district are limited, natural runoff in that district appears to be poorer in quality than runoff in the Church Rock district. In particular, the median concentrations of selenium and uranium in Ambrosia Lake runoff are 6 and 3 times greater, respectively, than in Church Rock runoff. These larger values are probably reflective of the abundance of uranium-ore-bearing outcrops in the Ambrosia Lake district (e.g., at the Poison Canyon mine). In contrast to the other trace elements, noteworthy is the virtual absence of molybdenum in runoff in both districts.

### 4.4.2. Radiological Quality of Turbid Waters

Radioactive substances were present in detectable concentrations in all of the runoff samples analyzed in this study. In the Ambrosia Lake mining district, gross alpha particle activity measurements of 5 samples ranged from 33 picocuries per liter (pCi/l) to 2100 pCi/l with a median concentration of 1200 pCi/l. Gross beta particle activity measurements of 4 samples ranged from 546 pCi/l to 2,000 pCi/l with a median concentration of 1,060 pCi/l. Slightly lower radioactivities were measured in 12 samples collected in the Church Rock mining district.

High radionuclide concentrations may be present in turbid flows throughout northwestern New Mexico, including the Grants Mineral Belt. Ephemeral washes draining northward from the Grants Mineral Belt into the San Juan Basin exhibit similar patterns of radioactivity to those within the drainages sampled. During turbid flow conditions, gross alpha and gross beta activities as high as several thousand pCi/l have been measured by the U.S. Geological Survey in the Chaco Wash

TABLE 4.2. Suspended Sediment Concentrations in Natural Surface Waters.

| STREAM | SUSPENDED SEDIMENT CONCENTRATION (mg/l) Log Mean | Min. | Max. | No. of Samples |
|---|---|---|---|---|
| Perennial Streams | | | | |
| San Mateo Creek at San Mateo Reservoir | 10 | <1 | 83 | 7 |
| Rio Moquino above Jackpile-Paguate Mine | 14 | <1 | 73 | 10 |
| Rio Paguate above Jackpile-Paguate Mine | 4 | <1 | 59 | 12 |
| Ephemeral Flows | | | | |
| San Mateo Creek Drainage below San Mateo | 8,100 | 940 | 32,000 | 4 |
| Puerco River-South Fork Drainage | 22,400 | 5,600 | 73,000 | 3 |
| Puerco River-North Fork Drainage | 55,700 | 3,700 | 561,000 | 3 |

TABLE [illegible]. Total Trace Element Concentrations in Nat[illegible]unoff, 1982. All concentrations given in millig[illegible]er liter (mg/l)

| CONSTITUENT | AMBROSIA LAKE MINING DISTRICT (Based on 6 Samples) | | | CHURCH ROCK MINING DISTRICT (Based on 13 Samples) | | |
|---|---|---|---|---|---|---|
| | MAX. | MIN. | MEDIAN | MAX. | MIN. | MEDIAN |
| As | 0.26 | 0.05 | 0.13 | 0.30 | 0.02 | 0.08 |
| Ba | 43.5 | 1.4 | 7.7 | 9.6 | 0.44 | 4.8 |
| Cd | 0.05 | 0.003 | 0.006 | 0.06 | 0.001 | 0.003 |
| Pb | 2.0 | 0.05 | 0.52 | 2.0 | 0.01 | 0.17 |
| Mo | <0.01 | 0.005 | <0.01 | 0.02 | <0.01 | <0.01 |
| Se | 0.15 | <0.005 | 0.03 | 0.03 | <0.005 | <0.005 |
| U-natural | 0.56 | 0.03 | 0.10 | 0.22 | 0.005 | 0.03 |
| V | 3.2 | 0.18 | 0.61 | 0.92 | 0.04 | 0.40 |
| Zn | 1.7 | 0.38 | 1.5 | 8.5 | <0.05 | 0.38 |

samples in parentheses.

| CONSTITUENT | AMBROSIA LAKE MINING DISTRICT | | | CHURCH ROCK MINING DISTRICT | | |
|---|---|---|---|---|---|---|
| | MAX. | MIN. | MEDIAN | MAX. | MIN. | MEDIAN |
| Gross Alpha Activity | 2,100 | 33 | 1,200 (5) | 1,600 | 7 | 720 (12) |
| Gross Beta Activity | 2,000 | 546 | 1,060 (4) | 1,480 | 135 | 710 (9) |
| Pb - 210 | 720 | 4 | 88 (4) | 74 | 0 | 53 (7) |
| Po - 210 | 43 | --- | --- (1) | 450 | 9 | 80 (6) |
| Ra - 226 | 321 | 2 | 15 (4) | 47 | 1 | 19 (9) |
| Th - 228 | ND | ND | --- | 43 | 3 | 22 (7) |
| Th - 230 | ND | ND | --- | 42 | 0 | 24 (7) |
| Th - 232 | ND | ND | --- | 43 | 3 | 24 (7) |

Note: *ND = No data available

drainage basin (see USGS Water Resources Data, New Mexico, Water Reports NM-75-1 through NM-81-1). The USGS, however, has not performed analyses for specific radionuclides.

Samples of unfiltered runoff from three sites were tested for the isotopes lead-210, polonium-210, radium-226, and thorium-228,-230, and-232. Most of these radionuclides are in the uranium-238 decay series (Figure 4.2). While the observed radionuclide concentrations presented in Table 4.4 are weighted toward the Church Rock district, they are thought to be representative of the entire Grants Mineral Belt. The Church Rock, Ambrosia Lake, and Laguna-Paguate mining districts are very similar in terms of sedimentary geology and landform development. Moreover, sediments collected from Ambrosia Lake and Laguna-Paguate mining districts (Popp and others, 1983) contain concentrations of radium-226 and lead-210 similar to these in the Church Rock district (Weimer, andothers, 1981).

The partitioning of different radionuclides between solid and dissolved phases is significant in runoff. Radium-226 and lead-210, the chief radiological concerns in Grants Mineral Belt runoff, tend to adsorb onto suspend sediments rather than to remain dissolved in runoff (Table 4.5). EID data indicate that 85-to-95 percent of the radum-226 and lead-210 detected in a turbid water sample is bound to the sediment.

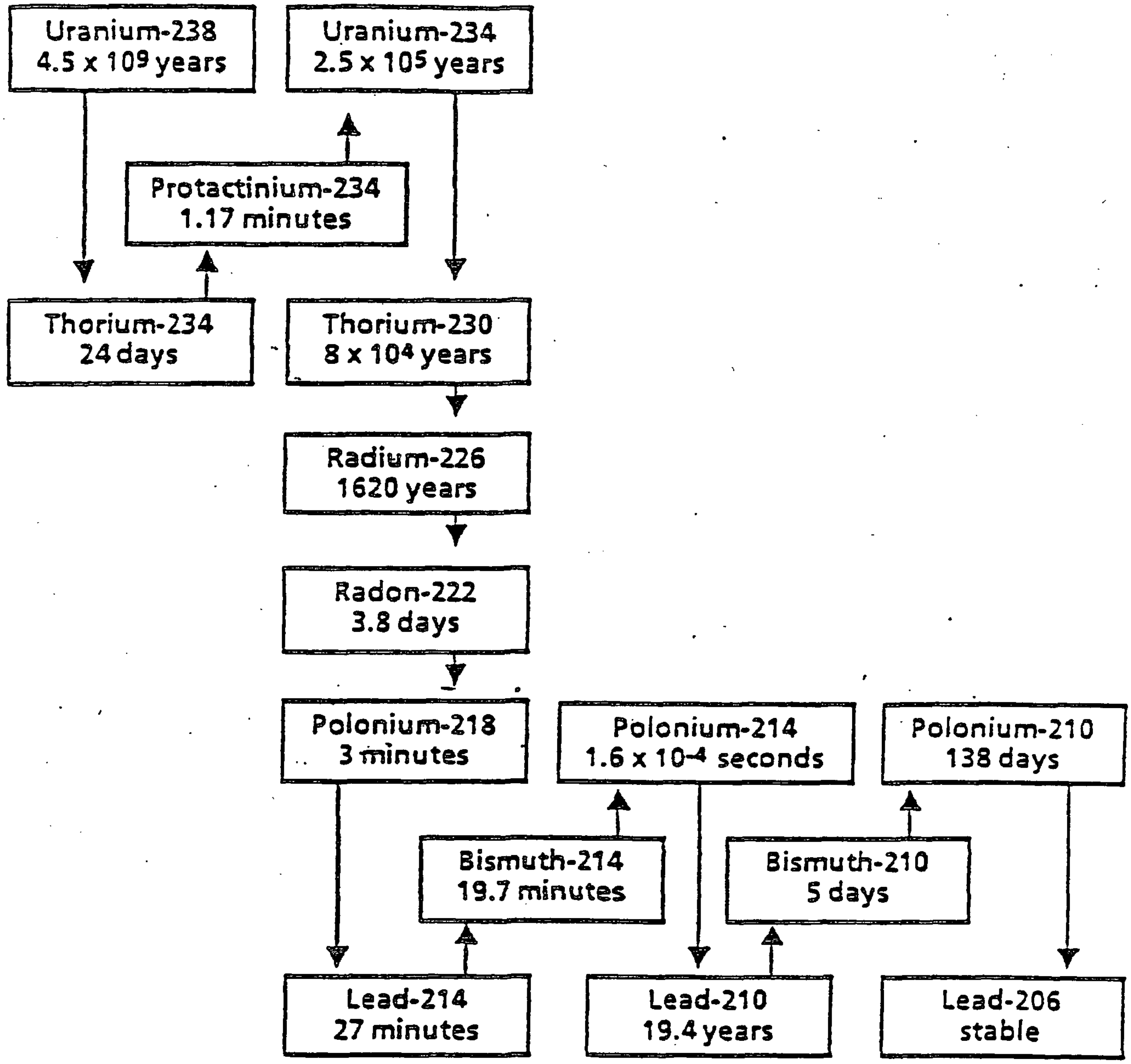



FIGURE 4.2 Principal radionuclides in the uranium-238 decay chain. The half-life of each nuclide is shown. Downward pointing arrows indicate alpha emissions and upward pointing arrows indicate beta and/or gamma emissions.

TABLE 4.5. Partitioning of Radium-226 and Lead-210 between Dissolved and Suspended Fractions of Natural Runoff.

| LOCATION | DATE (M-D-Y) | Ra-226 (pCi/l) Dissolved | Ra-226 (pCi/l) Suspended | Pb-210 (pCi/l) Dissolved | Pb-210 (pCi/l) Suspended |
|---|---|---|---|---|---|
| 'uerco River-North Fork BLM cluster | 08-04-82 | 5.8 ± 1.7 | 41 ± 14 | 33 ± 5 | 31 ± 18 |
| | 08-24-82 | 1.3 ± 0.3 | 2.7 ± 1.1 | 5 ± 3 | 6 ± 4 |
| 'uerco River-South Fork at Hwy 566 Bridge | 08-12-82 | 0.4 ± 0.1 | 19 ± 6 | 2 ± 2 | 51 ± 17 |
| | 08-23-82 | 1.2 ± 0.4 | 28 ± 8 | 6 ± 2 | 55 ± 21 |
| | 08-05-82 | 3 ± 1 | 13 ± 15 | 14 ± 2 | 21 ± 9 |
| | 09-21-82 | 4 ± 1 | 19 ± 6 | 14 ± 2 | 60 ± 12 |
| mateo Creek at Hwy 53 Bridge | 08-03-82 | 0.7 ± 0.2 | 22 ± 7 | 4 ± 2 | 39 ± 8 |

# V. PRELIMINARY EVALUATION OF THE EFFECTS OF URANIUM MINE WASTE PILES AND OPEN PITS ON NATURAL SURFACE WATER QUALITY

Uranium mine waste piles, both active and abandoned, exert a potentially significant influence on the quality of surface waters in the Grants Mineral Belt. Since the regional onset of uranium mining in the early 1950s, a large area has been explored, prospected, and mined for uranium ore. In a comprehensive survey, Anderson (1980) described 21 abandoned or inactive uranium mine sites in Cibola County and 72 such sites in McKinley County. In addition, Perkins (1979) listed 34 mines that were then active.

In the majority of cases, each mine has associated waste piles. Waste piles may include one or more of the following: barren (non-ore-bearing) overburden, low-grade ore (i.e., are with too low a uranium content to be economically milled), and ore stockpiled for later milling. The EPA (1983) estimated that an average surface mine generates about 6 million metric tons of solid waste per year, while an underground mine generates considerably less - - about 20 thousand metric tons per year. For surface mines waste dumps are larger in proportion to the amount of ore produced, because such dumps are mostly barren overburden. Since the waste varies with respect to ore content, potential impacts on water quality are quite variable. This chapter discusses the impacts of mine waste piles on surface water quality.

The EID investigated the effects of mine waste piles on surface water quality, through runoff sampling and laboratory studies. The sampling program collected water and suspended sediment samples in ephemeral watercourses receiving runoff from mine waste piles. Analysis of runoff samples provided data on concentrations of trace elements and radioactivity in affected arroyos. In conjunction with the runoff sampling, dry samples of mine waste were collected and leached in the laboratory to determine the potential for constituents to leach into surface or ground water.

Open pits created by surface mining have a potential to effect water quality similar to that of waste piles. The exposure of the ore body in open-pit mining subjects it directly to the same runoff factors as waste piles. In addition, as mentioned above, open pits typically have large amounts of waste in the vicinity of the operation. In order to focus on the potential for open pit mining operations to effect water quality, stream sampling was conducted at the largest open pit operation in the Grants Mineral Belt, the Jackpile-Paguate mine. This mining operation is of water quality interest not only because of its size but because of the confluence of two perennial streams within the mining area.

## 5.1 RESULTS OF RUNOFF SAMPLING

Runoff samples were collected from several sites representing varying degrees of proximity to, and input from, uranium mine waste piles. The data provide information on the water quality impacts of specific piles. The data also help to define generic water quality problems associated with uranium mine waste piles in the region. Throughout the discussion that follows, interpretation of the data is facilitated by frequent reference to natural runoff quality described in Chapter IV. The observations in this section apply directly to the Ambrosia Lake mining district where almost all the samples were collected. Limited sampling results suggest similar sampling results would be obtained in the Church Rock district.

All of the runoff sampling data presented herein reflect instantaneous contaminant concentrations, specific to a particular location and time. Because of the random and short-lived nature of the runoff events, however, the total quantity of mine waste material entering local drainages is unknown. Nonetheless, the mine waste-affected runoff contaminant concentrations exceed natural levels by up to several hundred times, and thus are of concern.

### 5.1.1. Sediment

Results of runoff sampling suggest that sediment concentrations from uranium mine waste piles in Ambrosia Lake district are comparable to natural sediment concentrations in the district. In 11 samples from drainages with mine waste piles, suspended sediment concentrations ranged from 764 to 75,500 mg/l with a median of about 40,000 mg/l. Three samples from drainages unaffected by waste piles varied from 939 mg/l to 50,000 mg/l with a median of about 32,000 mg/l. The number of samples though is too small to permit definitive statistical analysis.

Cooley (1979) reported that runoff from uranium mine waste piles picks up "clay, silt, and sand, which, depending on the proximity of stream channels, may be transported and deposited downstream." It has been noted that erosion of mine waste piles is accelerated relative to undisturbed soil profiles for a number of reasons, chief of which are lack of topsoil, steep angle of slopes, presence of toxic elements and buildup of salt in the near surface (which inhibit vegetative growth), and poor water retention characteristics (U.S. EPA, 1983).

The U.S. EPA (1983) has stated that most abandoned mines in the region are small surface mines that have little impact on surface waters. Based on recent extensive work by Anderson (1980), we estimate that 10 to 20 percent of all abandoned mines and a few large active mines in the Grants Mineral Belt have waste piles that are directly eroding into local drainage channels.

### 5.1.2. Trace Elements and Radionuclides

The problem of poor water quality due to high sediment loads is exacerbated when the sediment comes from rock that is geologically enriched in uranium and associated elements, as is the case for mine waste piles. Total contaminant concentrations in drainages affected by uranium mine waste piles are positively correlated with suspended sediment concentrations, just as they are under natural conditions (see Section 4.4) except that waste-affected runoff has proportionally higher contaminant concentrations per quantity of sediment. Therefore, an effective means of evaluating the degree of contamination is comparison of the amount of contaminant per gram of sediment rather than per liter of water. While samples collected at the base of a waste pile reflect uranium mine waste contaminant concentrations, other samples collected far downsteam (up to 5 miles) from any source of contaminants, reflect dilution processes which make them indistinguishable from natural conditions.

#### Trace Elements

Table 5.1 compares ranges and median of contaminant concentrations found in unfiltered runoff from uranium mine waste piles with those of unfiltered natural runoff. In runoff from these waste piles, uranium and molybdenum maxima exceed maxima in natural runoff by over two orders of magnitude. Maximum arsenic, selenium, and vanadium concentrations exceed maximum natural runoff levels by six to eight times. Other elements (i.e., barium, cadmium, lead, and zinc) are not appreciably above background concentrations. These results indicate that uranium mine waste piles are potential major sources of uranium and molybdenum and perhaps of arsenic, selenium, and vanadium in surface waters. These findings are in general agreement with EPA data (U.S. EPA, 1983).

### Radionuclides

Radionuclides in unfiltered waste pile runoff are also elevated with respect to levels in natural runoff (Table 5.1). The data also are graphically depicted in a "box and whisker" plots in Figure 5.1. The lower and upper ends of the box represent the 25th and 75th percentile values, respectively; the vertical line within the box is the median value; and the lower and upper extent of the lines (whiskers) are the minimum and maximum values of the data set (McLeod, Hipel, and Comancho, 1983). Maximum gross alpha particle activity exceeds maximum natural runoff activity by 200 times. Maximum levels of two major alpha emitters, natural uranium and radium-226, exceed natural maximum runoff levels by over 100 times. Gross beta particle activity and its chief contributor, lead-210, are also far in excess of natural runoff levels. Natural runoff and waste pile levels of thorium-230 and polonium-210 cannot be compared because of lack of data.

The Old San Mateo Mine illustrates specific impacts of a large waste pile on nearby surface water drainage system, San Mateo Creek (Figure 5.2). Three nearby stations uncontaminated by mine wastes were used to define trace element and radionuclide levels in natural sediments in the area. In contrast, with natural sediment, the waste materials (sediments from the waste pile) contained elevated levels of gross alpha and gross beta particle activities, radium-226, natural uranium , arsenic, lead, molybdenum, selenium, and vanadium. Contaminant concentrations in stream bottom sediments decreased ultimately to natural levels with distance from the waste pile as other sediments carried along the watercourse become mixed with the mine waste material. Contaminated sediments from Old San Mateo Mine are in evidence at least 550 meters downstream from the mine waste pile. Nonetheless, even natural levels, of trace elements and radionuclides in bottom sediment are relatively high. Bottom sediments can under go a continuing cycle of resuspension in runoff and deposition further downstream.

## 5.2 MINE WASTE LEACHING TESTS

Thirty seven composite mine waste samples were leached with acetic acid and deionized water in the slightly modified EPA EP toxicity test procedure described in section 3.3.3. Acetic acid (pH $<5$) simulated the leaching effects of natural rainfall, which is similarily acidic, and deionized water (pH $>7.5$), the leaching effects of rainfall after contacting the alkaline rich soils common to the Grants Mineral Belt. Leachates were analyzed for arsenic, barium, cadmium, lead, molybdenum, selenium, vanadium, zinc, and gross alpha and gross beta particle activities. By definition, a material exhibits the characteristic of EP toxicity if any of the contaminant concentrations in the leachate exceed federal safe drinking water standards by 100 times or more (40 CFR 261, Appendix II).

Table 5.2 presents average leachate concentrations obtained from tests of mine wastes. None of the samples subjected to this test exhibited the characteristic of EP toxicity. No EP toxicity limits have been established for those constituents found in the highest concentrations, natural uranium and gross alpha activity. The uranium concentrations account for most of the alpha activity (for natural uranium, 1.0 mg/l is equivalent to 677 pCi/l of alpha activity, at secular equilibrium). These results suggest that in a neutral or slightly acidic environment, contaminants in uranium mine wastes have a relatively low potential for leaching or for significantly degrading ground water quality.

LE 5.1. Total Contaminant Concentrations ir ıbrosia Lake Waste Pile Runoff Compared with N... al Runoff. Number of samples in paren...ses.

| CONSTITUENT | MINE WASTE PILE RUNOFF Range | MINE WASTE PILE RUNOFF Median | NATURAL RUNOFF Range | NATURAL RUNOFF Median |
|---|---|---|---|---|
| | | (mg/l) | | |
| As | <0.005-1.5 | 0.21 (15) | 0.05 - 0.26 | 0.13 (6) |
| Ba | 0.18 - 37.5 | 5.9 (15) | 1.4 - 43.5 | 7.7 (6) |
| Cd | <0.001-0.02 | 0.006 (15) | 0.003 - 0.05 | 0.006 (6) |
| Pb | 0.02 - 2.5 | 0.56 (15) | 0.05 - 2.0 | 0.52 (6) |
| Mo | <0.001 - 3.2 | 0.02 (15) | 0.005 - <0.01 | <0.01 (6) |
| Se | <0.005 - 0.85 | 0.03 (15) | <0.005 - 0.15 | 0.03 (6) |
| U-natural | 0.04 - 62.6 | 0.58 (15) | 0.03 - 0.56 | 0.10 (6) |
| V | 0.04 - 24.8 | 1.1 (15) | 0.18 - 3.2 | 0.61 (6) |
| Zn | <0.05 - 4.4 | 1.7 (15) | 0.38 - 1.7 | 1.5 (6) |
| | | (pCi/l) | | |
| Gross Alpha | 300 - 420,000 | 10,800 (15) | 33 - 2,100 | 1,200 (5) |
| Gross Beta | 177 - 168,000 | 6,700 (15) | 546 - 2,000 | 1,060 (5) |
| Pb - 210 | 29 - 30,050 | 1,000 (6) | 4 - 720 | 88 (4) |
| Ra-226 | 1 - 34,900 | 650 (6) | 2 - 321 | 15 (4) |

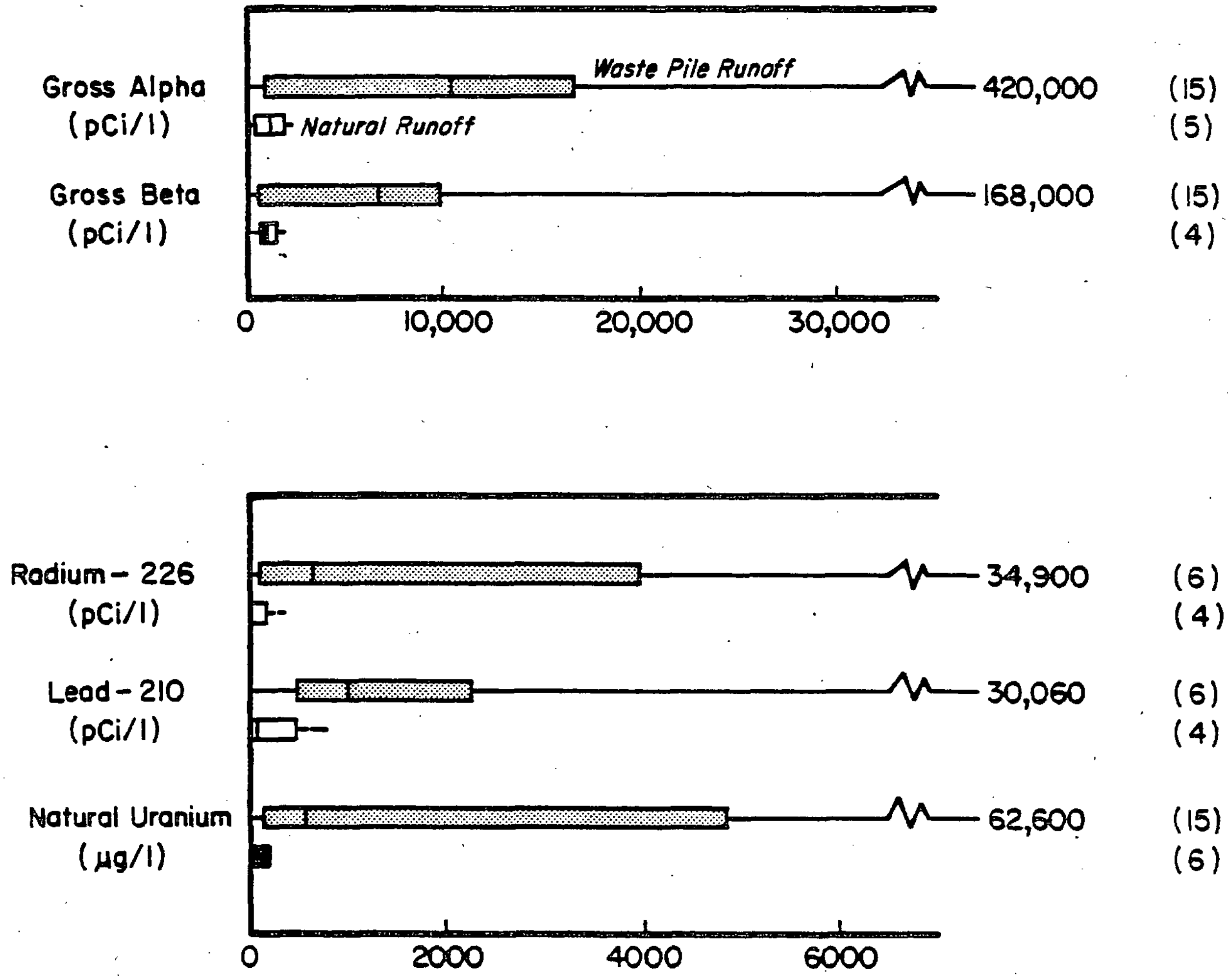



FIGURE 5.1 Total radioactivity and uranium concentrations in uranium mine spoils piles runoff, Grants Mineral Belt.

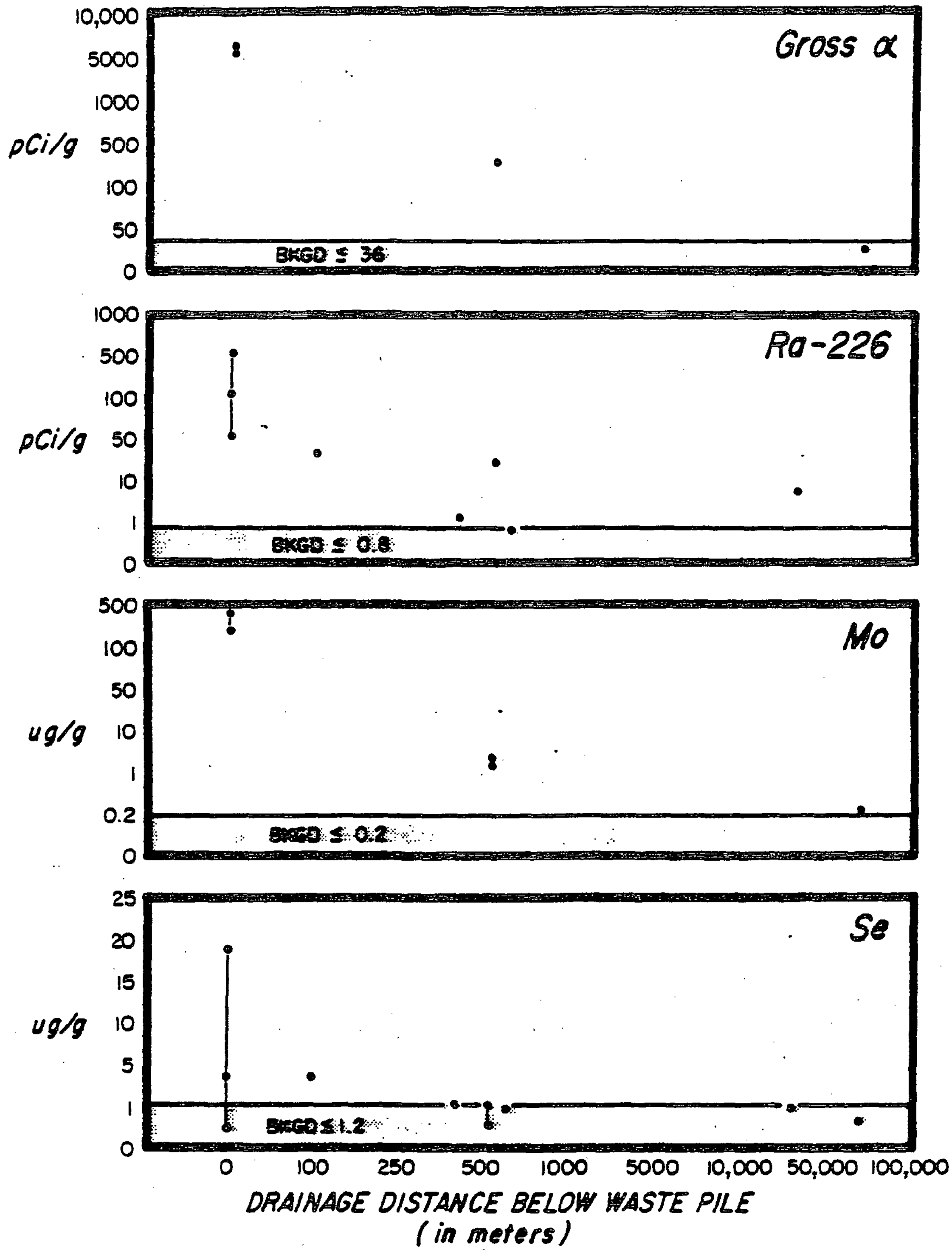



FIGURE 5.2 Persistence/attenuation of selected contaminants in sediments within the drainage system below the Old San Mateo Mine waste pile. Each analysis is represented by dot; some stations have multiple analyses. Three nearby stations were used to define natural background levels.

TABLE 5 Results of Mine Waste Leaching Tests (EP Toxici[illegible] Water Extract)

**AVERAGE CONCENTRATIONS (mg/l)**

| MINE | As | Ba | Cd | Pb | Mo | Se | U-natural | V | Zn | Gross Alpha* | Gro Bet |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UNC-NE Church Rock (4 composite samples) | .005 | .145 | <.001 | <.005 | <.01 | .026 | .910 | .029 | <.05 | 706 | 250 |
| KM-1 Church Rock (4 composite samples) | .006 | .142 | <.001 | <.005 | .132 | .097 | 1.09 | .015 | <.05 | 663 | 282 |
| Hyde** (6 composite samples) | <.005 | <.10 | .001 | .006 | <.01 | .015 | .231 | .01 | .139 | 240 | 143 |
| Vallejo (7 composite samples) | .006 | .102 | <.001 | .005 | <.01 | .006 | .136 | .011 | <.05 | 93 | 28 |
| Poison Canyon (8 composite samples) | .010 | .176 | .01 | <.005 | .021 | .007 | .056 | .080 | <.05 | 51 | 7 |
| Old San Mateo (8 composite samples) | .029 | .162 | .003 | <.005 | .955 | .069 | 1.42 | .011 | <.05 | 1030 | 164 |
| RCRA ALLOWABLE LIMITS | 5 | 100 | 1.0 | 5 | NL*** | NL*** | NL*** | NL*** | NL*** | NL*** | NL* |

*Concentration in pCi/l
** Acetic Acid Extract
*** No established limit.

## 5.3 PERENNIAL FLOW THROUGH AN OPEN PIT MINE

The water quality impacts of an open pit uranium mine on perennial streams were studied at the Jackpile-Paguate mine on the Pueblo of Laguna east of Grants. This mine, covering more than 2700 acres of disturbed land, is by far the largest open pit uranium mine in the Grants Mineral Belt. In its twenty-five years of operation, this mine has excavated almost 200 million tons of overburden and mine waste. This is stored in 28 dump sites spread over more than 1100 acres. The pit itself encompasses about 1,000 acres and, in places, approaches 400 feet in depth (U.S. Department of the Interior, 1980).

Two of the several natural perennial streams which descend the northeast flank of Mt. Taylor, the Rio Paguate and the Rio Moquino, converge within the mine; the Rio Paguate continues through the open pit area and eventually flows into the Paguate Reservoir. Water released from the reservoir flows into the Rio San Jose near the town of Laguna. Figure 5.3 shows these features.

A reconnaissance of the Jackpile-Paguate mine area performed by Cooley (1979) provided visual evidence of uranium mine waste piles affecting surface waters. He reported that mine waste had been dumped along the margins of Rio Paguate and that:

> During large flows the river cuts laterally into debris piles. Corrosion of the unconsolidated debris adds considerable bedload and suspended sediment to the river.

Data presented in a recent study by Popp and others (1983) demonstrate that mining activities at the Jackpile-Paguate mine have caused a significant increase in the naturally occurring radioactivity in that drainage system. Detailed chemical and radiological analyses were performed on the sediment which has accumulated in Paguate Reservoir downstream from mine. The data clearly show elevated levels of uranium-238 decay products in sediments da... after the mid-1950s. Additionally, lead-210 concentrations in sediments increased from pre-mining levels of approximately 2 pCi/g to average post-mining concentrations of approximately 10 pCi/g.

The perennial waters that traverse the mine area have been studied by the EID for uranium-industry impacts since 1978. Surface water samples were collected quarterly at two background sites (Rio Paguate and Rio Moquino upstream from the mine) and one impacted site (Rio Paguate below the mine). Figure 5.3 shows the sampling locations.

As a result of the typically low sediment concentrations in the Rio Paguate, the concentrations of suspended (total minus dissolved) radioactive substances are usually negligible relative to those of the dissolved fraction (Table 5.3). During periods of runoff, however, total radioactivity would be expected to increase because of greater sediment concentrations.

Water quality data from the three sites sampled by the EID demonstrate that the dissolved concentrations of several constituents increase in the streams flowing through the mine area. Table 5.4 shows that average concentrations of gross alpha emitters, radium-226, arsenic, barium, cadmium, lead, molybdenum, selenium, natural uranium, vanadium, and zinc are quite low in the waters above the mine. In fact, both background streams, dissolved concentrations of arsenic, cadmium, lead, molybdenum, selenium, natural uranium, vanadium, and zinc were below detection limits for at least 67 percent of the samples. Among the trace elements, only barium was detected in more than half of the samples in the two streams.

By the time the Rio Paguate exits the Jackpile-Paguate mine, several dissolved constituents elevated above background levels (Table 5.4). Radioactive parameters experience the largest dissolved concentrations increases; gross alpha particle activity, radium-226, and natural

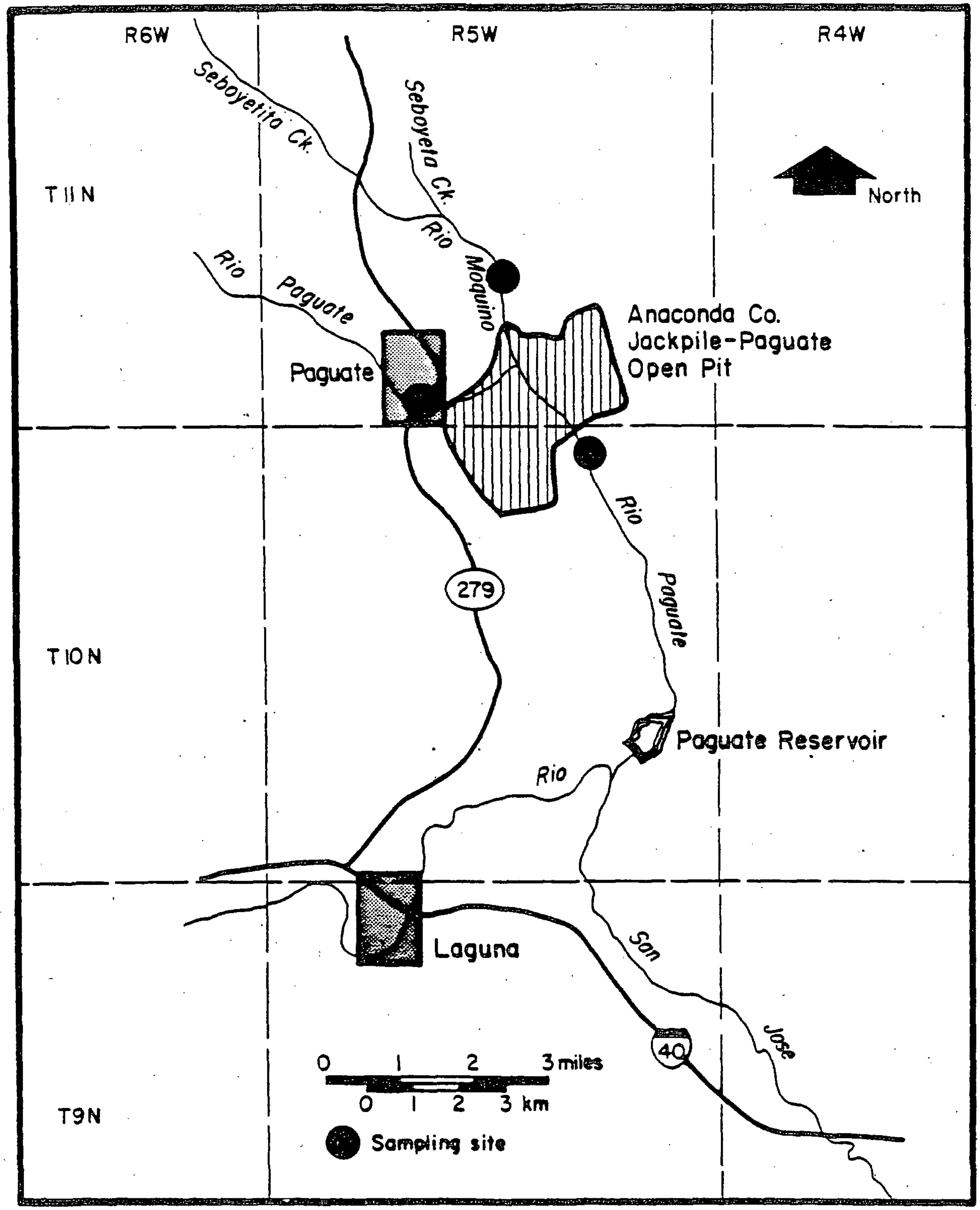



FIGURE 5.3 Major features of the Laguna-Paguate mining district

TABLE 5.3. Radioactivity and Suspended Solids Concentrations in Rio Paguate below the Jackpile - Paguate Mine.

| SAMPLE DATE | GROSS ALPHA ACTIVITY (pCi/l) | | RADIUM-226 (pCi/l) | | TOTAL SUSPENDED SOLIDS (mg/l) |
|---|---|---|---|---|---|
| | Dissolved | Total | Dissolved | Total | |
| 6-09-80 | 78 ± 6* | 79 ± 6 | 3.6 ± 0.1 | 4.1 ± 0.2 | 36 |
| 12-08-80 | 71 ± 10 | 68 ± 10 | 1.0 ± 0.03 | 1.1 ± 0.1 | 27 |
| 6-24-81 | 155 ± 22 | 153 ± 15 | 1.4 ± 0.04 | 1.7 ± 0.1 | 5 |

* Picocuries per liter ± one sigma counting error.

TABLE 5.4. Average Surface Water Quality Above and Below the Jackpile-Paguate Mine. Averages based on a minimum of 7 samples.

| DISSOLVED CONSTITUENT (ug/l unless noted) | RIO MOQUINO ABOVE JACKPILE MINE | RIO PAGUATE ABOVE JACKPILE MINE | RIO PAGUATE BELOW JACKPILE MINE |
|---|---|---|---|
| TDS (mg/l) | 1540 | 525 | 1705 |
| $SO_4$ (mg/l) | 825 | 155 | 960 |
| pH (s.u.) | 8.2 | 8.0 | 8.2 |
| As | <5 | 6 | 6 |
| Ba | 145 | 130 | 145 |
| Cd | 2 | <1 | 2 |
| Pb | <5 | <5 | <5 |
| Mo | 7 | 7 | 7 |
| Se | 5 | 5 | 6 |
| U-natural | 6 | 6 | 120 |
| V | 10 | 9 | 10 |
| Zn | <250 | <250 | <250 |
| Gross alpha (pCi/l) | 3.7 | 1.0 | 79 |
| Gross beta (pCi/l) | 9.6 | 4.2 | 48 |
| Ra-226 (pCi/l) | 0.48 | 0.19 | 3.7 |

* For locations, are given on Figure 5.3

uranium all increase by factors of 10 or more. Aside from uranium, there are no statistically significant increases in dissolved trace elements concentrations.

# VI. HYDROLOGIC EFFECTS OF MINE DEWATERING EFFLUENTS

Disposal of uranium mine dewatering effluents in the normally dry arroyos of the Grants Mineral Belt has had a significant impact on regional surface waters and ground waters. Where dewatering occurs, ephemeral streams are transformed into perennial streams. The artifically supplied perennial streams have dramatically increased the volume of water that recharges underlying alluvial aquifers. The added recharge has raised water tables and increased the amount of ground water that can be easily obtained from shallow wells. As a result, more near-surface ground waters and surface waters are available.

## 6.1. HISTORY

The history of uranium mine dewatering has been summarized by Perkins and Goad (1980). In general, dewatering has been performed continuously in the region since at least 1956. The Church Rock and Ambrosia Lake mining districts have witnessed the largest volume of mine dewatering. Water production from mines in the Ambrosia Lake district has been continuous since 1956, with peak production in the early 1960s. Significant dewatering in the Church Rock area began in 1967 and peaked about 1980. Decline of the industry since 1980 has caused several mines to close and the flow of dewatering effluents to diminish in both the Ambrosia Lake and Church Rock districts. Some mines which are not extracting ore, however, have been placed on "stand-by status" and continue dewatering operations. Figure 6.1 illustrates the history of minewater production in the Grants Mineral Belt through 1982.

## 6.2. HYDROLOGIC IMPACTS ON REGIONAL SURFACE WATERS

### 6.2.1. General Characteristics of Flow Before and During Mine Dewatering

Prior to dewatering of underground uranium mines in the 1950s and 1960s, the regional drainages were ephemeral. These streams experienced an wide range of discharges, from zero flow to large flash floods (e.g., Busby, 1979). Maximum discharges of flash floods often reach several thousand cubic feet per second (cfs) (Thomas and Dunne, 1981). The only significant perennial waters in the region are a few small springs along the Puerco River, and perennial streams draining the north and east flanks of Mt. Taylor.

Discharges of uranium mine dewatering effluents have transformed several ephemeral streams to perennial streams flowing for many miles. Minewaters have provided perennial baseflow for Pipeline Arroyo and the Puerco River in the Church Rock mining district, and Arroyo del Puerto and San Mateo Creek in the Ambrosia Lake mining district. Other newly created perennial streams occur in other regional mining districts not covered by this report. Table 6.1 presents approximate average distances that perennial flow conditions are sustained by various mine discharges during 1979-1981. The greater distances occur along river reaches where stream bottom leakage rates are relatively low.

Before mine dewatering, flow in the Puerco River, for example, was distinctly seasonal (Figure 6.2). One season of flow was late winter (February through April) a time of gentle frontal precipitation and melting snow. May and June were months of little or no precipitation and low stream flow in the Puerco River. The second season of flow was middle-to-late summer (July through October). Summers in the region are usuall characterized by frequent, intense, and isolated thunderstorms that can produce large

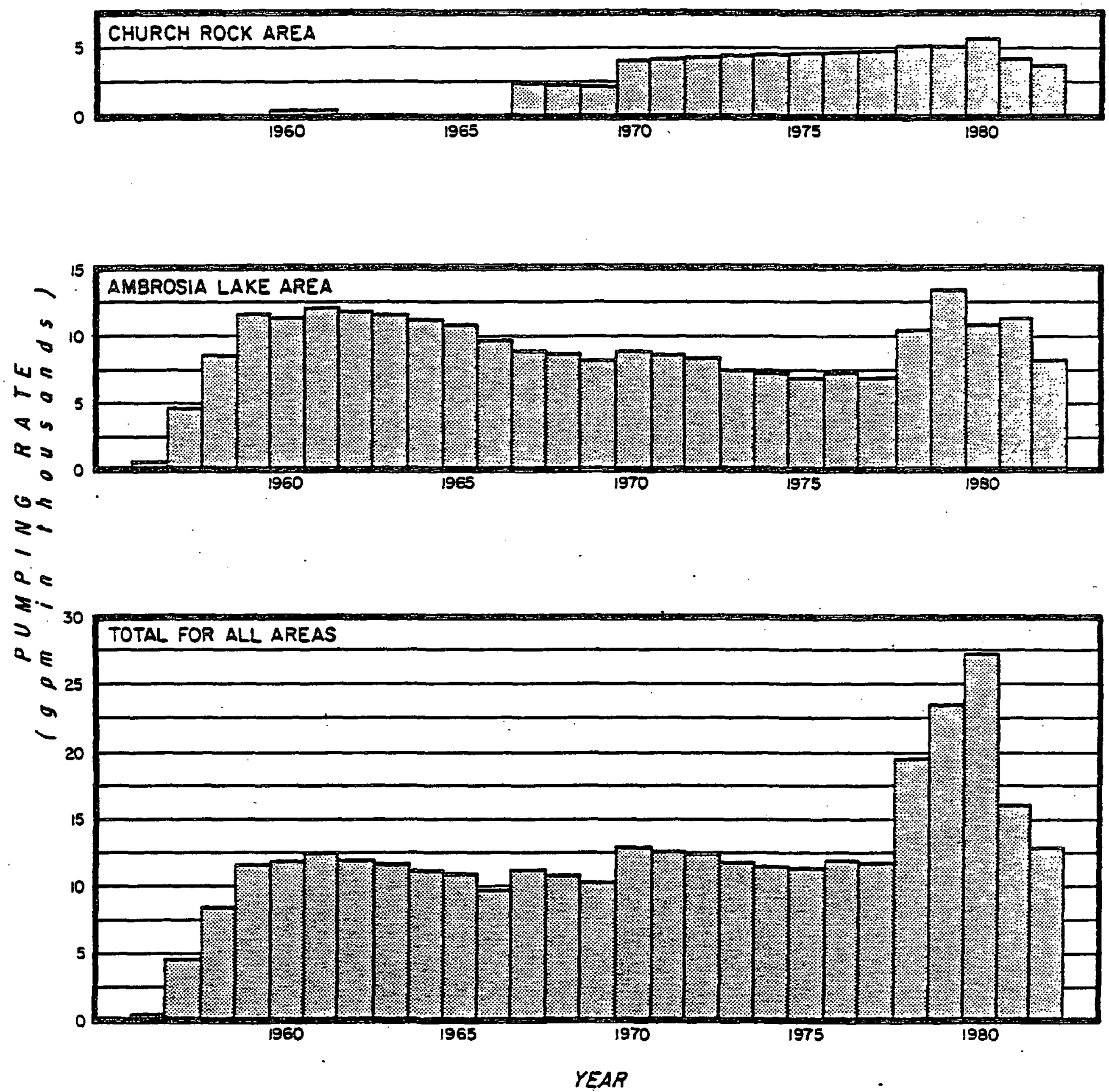



FIGURE 6.1 Water production by uranium mines, Grants Mineral Belt.

TABLE 6.1 Approximate Average Distances of Constant Flow below Mine Discharges, 1979-1981. Location of mining districts shown on Figure 2.1.

| DRAINAGE CHANNEL | VOLUME OF DISCHARGE (gallons per minute) | APPROXIMATE DISTANCE OF FLOW* (miles) |
|---|---|---|
| | *Church Rock Mining District* | |
| Puerco River | 5000 | 50 |
| | *Ambrosia Lake Mining District* | |
| Arroyo del Puerto | 2300 | 5 |
| San Mateo Creek | 1500 | 3 |
| | *Mt. Taylor Mining District* | |
| San Lucas/Arroyo Chico | 4000 | 40 |
| | *Crownpoint Mining District* | |
| Kim-me-ni-oli Wash | 3400 | 20 |
| | *Marquez Mining Area* | |
| Rio Marquez | 1000 | 15 |
| Rio Salado | 1000 | 10 |

*Distances are based on the authors' observations, review of EID files, and U.S. Geological Survey annual water data reports.

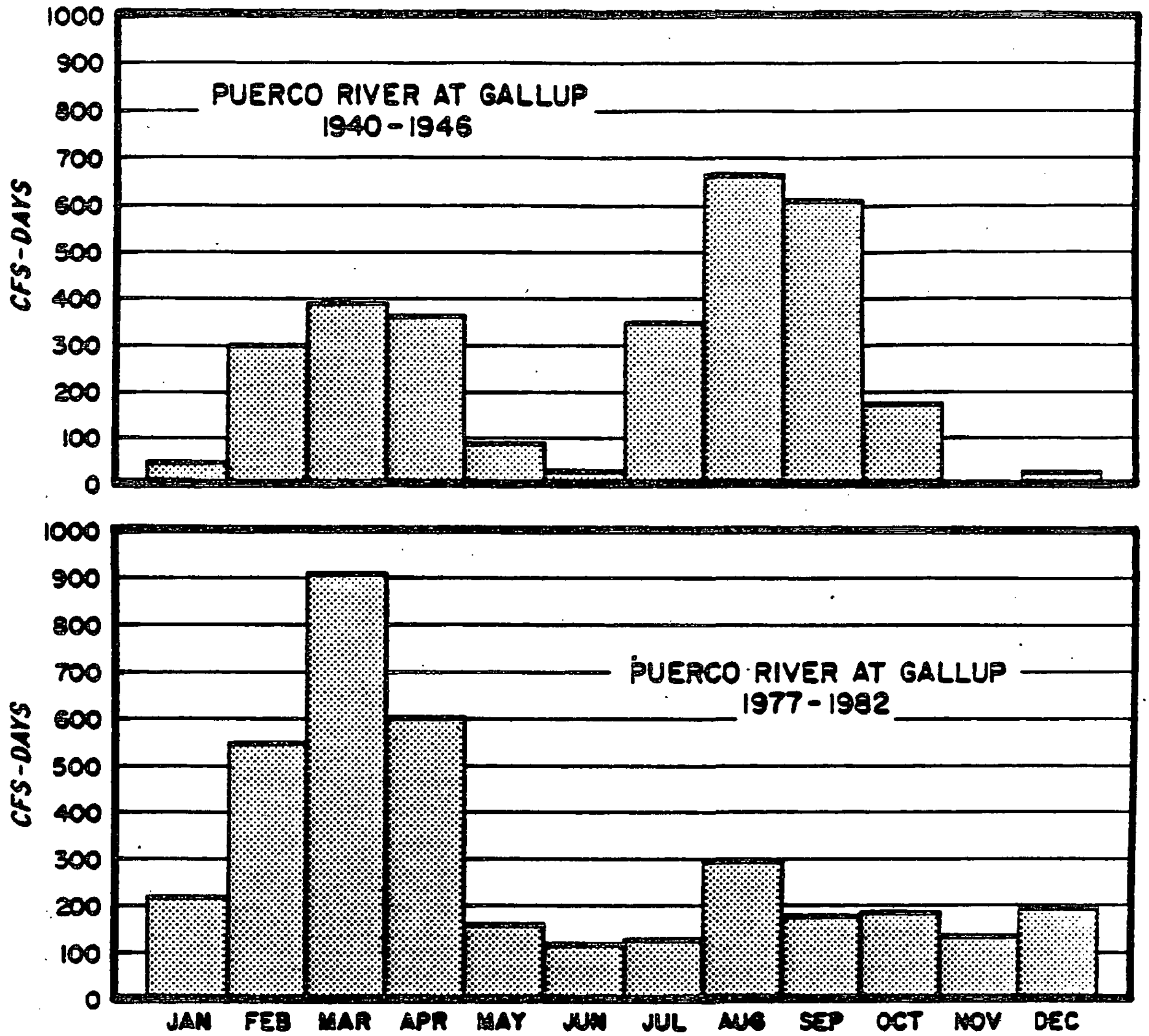



FIGURE 6.2 Monthly flow in the Puerco River at Gallup before mine-dewatering and with flow augmented by mine dewatering

flash floods. Autumn months of November through January were once again dry, in terms of both precipitation and stream flow.

With ongoing mine dewatering, flow in the Puerco River become continuous. Figure 6.2 shows that climatic dry seasons (May through June and November through January) are no longer times of no flow in the Puerco. Whereas during these months in the 1940s the Puerco River was often without flow, between 1977 and 1982 the river was never dry and flow at all months averaged at least 120 cfs-days.

Figure 6.2 depicts augmented late winter stream flows, but few high flows in middle-to-late summer. The dearth of summer high flows in recent years reflects the failure of significant summer thunderstorms to materialize over the basin from 1978 to 1981. These storms returned in 1982 and 1983. A longer period of record would probably show the continued presence of the two high flow seasons that typified the pre-mining era.

### 6.2.2. Characteristics of Low Flows

Flow duration curves constructed for daily discharges in the Puerco River for the periods 1940 to 1946 and 1977 to 1982 further demonstrate the change in low flow conditions attributable to the continuous discharges of uranium mine dewatering effluents (Figure 6.3). Prior to mine dewatering, streamflow in the Puerco River at Gallup was greater than 1 cfs only 20 percent of the time (Curve A). In fact, the stream was normally dry. Since mine dewatering, however, the Puerco River has been perennial. The median discharge (that flow that has been equalled or exceeded 50 percent of the time) is now about 5 cfs at Gallup (Curve B) under the new artificial flow regime.

The Pipeline Arroyo/Puerco River system is now perennial from the Church Rock mines to as far as Arizona, a distance of about 50 river miles. Eventually, unless naturally augmented, all surface flow is lost to infiltration, evaporation, and transpiration. Comparison of median flow at Church Rock (Curve C) and Gallup (Curve B) suggests that about 2.5 cfs of flow is lost between these two gages. As the Puerco River continues into Arizona, its flow eventually becomes intermittent and then ephemeral.

### 6.2.3. Annual Water Yield

Annual water yield, or the yearly volume of surface flow, in the Puerco River at Gallup has increased substantially because of mine dewatering (Table 6.2). The logarithmic mean annual water yield at Gallup was about 1900 cfs-days in the 1940s. This is assumed to be representative of pre-mining conditions The years 1977-1982 exhibit a logarithmic mean annual water yield of about 3400 cfs-days. These years, therefore, exhibit a 78 percent increase in water yield over pre-mining conditions.

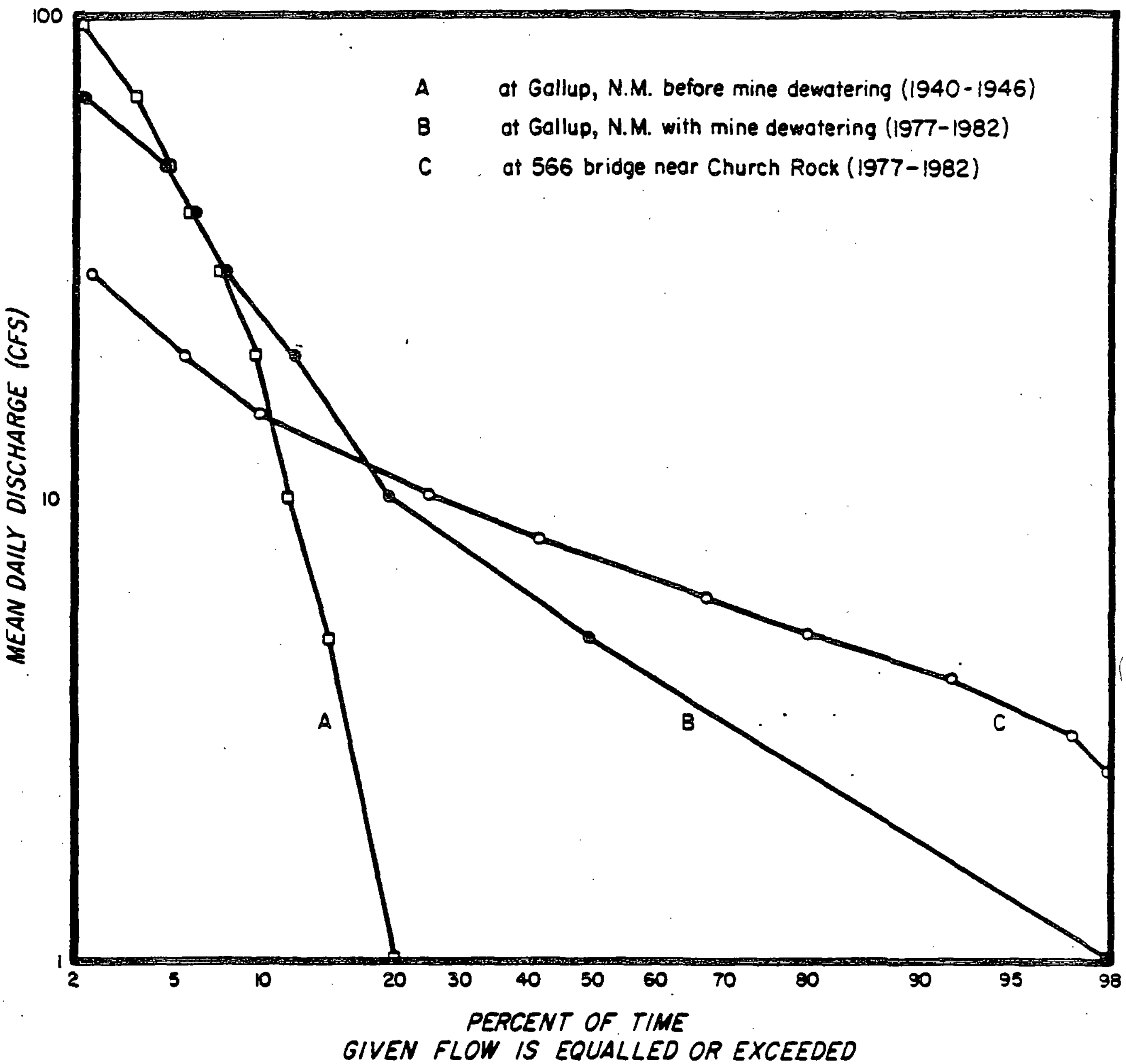



FIGURE 6.3 Flow duration curves for the Puerco River before mine dewatering and with mine dewatering

TABLE 6.2 Annual discharge for the Puerco River at Gallup before Mine Dewatering and with Flow Augmented by Mine Dewatering in cfs-days. Source: USGS.

| BEFORE MINE DEWATERING | | WITH MINE DEWATERING | |
|---|---|---|---|
| Water Year | Annual Discharge | Water Year | Annual Discharge |
| 1940 | 7,283 | 1978 | 1,502 |
| 1941 | 1,459 | 1979 | 5,656 |
| 1942 | 2,893 | 1980 | 5,463 |
| 1943 | 741 | 1981 | 2,702 |
| 1944 | 3,264 | 1982 | 3,446 |
| 1945 | 645 | | |
| Log Mean | 1,906 | | 3,366 |

Although no stream flow data exist for San Mateo Creek before mine dewatering, flow records for 1977 through 1982 include periods both of active discharge to San Mateo Creek and of no discharge. Dewatering was ongoing in 1977, when flow measurement in San Mateo Creek began. At that time, about 2900 gallons per minute of dewatering effluents were released to San Mateo Creek (Perkins and Goad, 1980). Beginning in spring 1978, however, virtually all effluents were diverted for irrigation and to an adjacent drainage basin and did not reach San Mateo Creek. The impact of this diversion on flow in the stream can be seen in Figure 6.4. It is clear that the dewatering effluents maintained a small perennial stream at the gage site. Without the minewaters, flow in San Mateo Creek at the gage site is much reduced and ephemeral.

## 6.3 HYDROLOGIC IMPACTS ON REGIONAL GROUND WATERS

Streams created by the discharge of dewatering effluents are, with the possible exception of a few reaches, losing flow to the subsurface. While some surface flow is evaporated or transpired, a large volume infiltrates into the arroyo beds, and thereby recharges the shallow alluvial aquifers of the Puerco River, Arroyo del Puerto, and San Mateo Creek, among others.

Rates of infiltration were probably greater at the onset of mine dewatering than they are today because of a gradual "filling" of available storage in the alluvium. Infiltration rates along Arroyo del Puerto and San Mateo Creek are rapid Relative to the Puerco River, due to an abundance of sandy material in San Mateo Creek and because of influences of underlying dewatered bedrock aquifers. Gaging data indicate average stream bed losses along the San Mateo Creek of approximately 0.72 $m^3$/min/km, as compared with bed losses along the Puerco River of about 0.24 $m^3$/min/km (EPA 1983).

Infiltration has been estimated to range from at least 90 percent to perhaps 99 percent of mine discharge (EPA, 1983). A review of flow records from the Church Rock mining district showed seepage losses of 7.5 $m^3$/min in October 1975, and 7.25 $m^3$/min in July

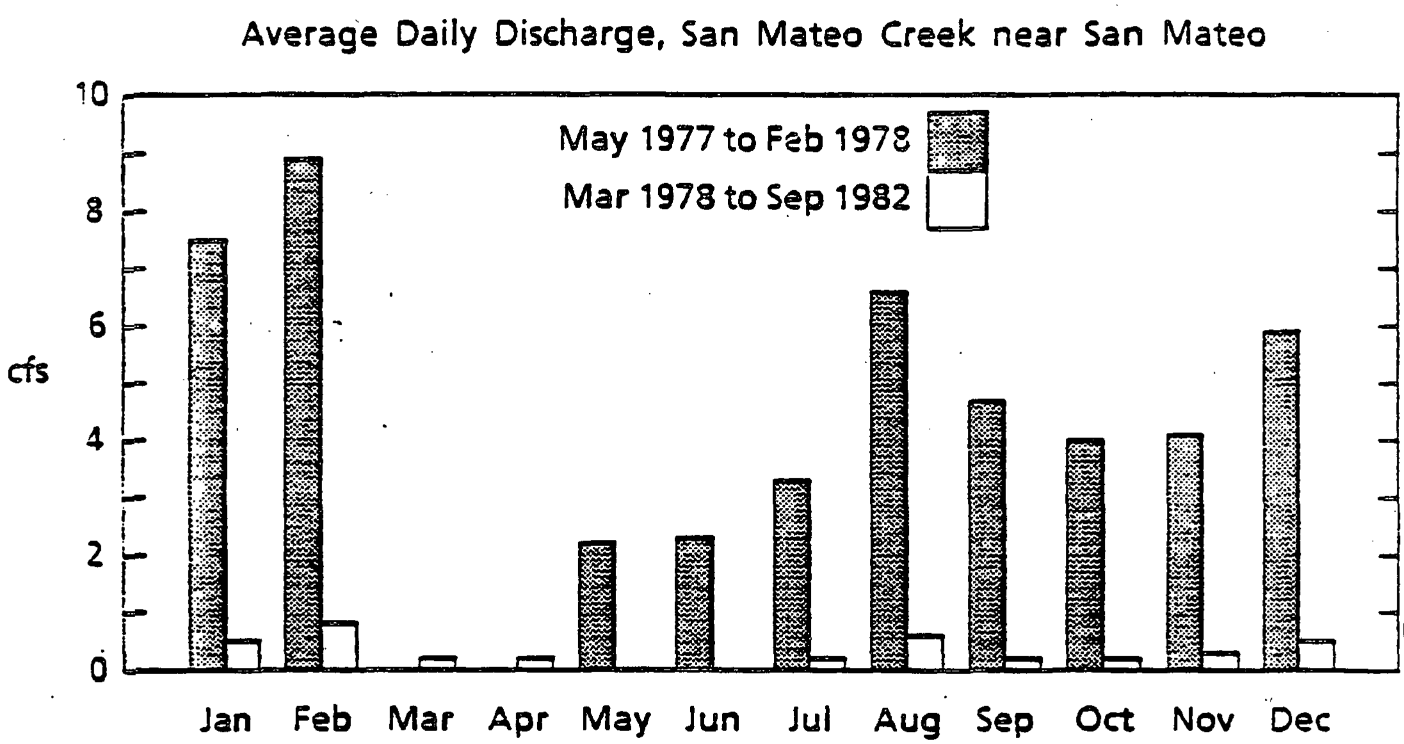



FIGURE 6.4 Average daily discharge for San Mateo Creek near San Mateo before and after diversion of mine dewatering effluents

1977 and May 1978. In the Ambrosia Lake mining district, infiltration was calculated at 7.54 m³/min.

The overall hydrologic impact of mine dewatering on bedrock aquifers has been a region-wide acceleration of drawdown in these aquifers. In a limited number of stream reaches, however, the hydraulic connection between the alluvial aquifer and underlying bedrock allows some recharge of deeper sandstone aquifers (Lyford, 1979), i.e., water pumped from the mines is returned to the sandstone aquifers via recharge.

### 6.3.1. Hydraulic Connection Between Surface Waters and Shallow Ground Waters

While recharge generally is a continuous process along the minewater-dominated streams, it is intermittent under natural conditions. The intermittency of natural recharge largely minimizes the potential for dilution of contaminant concentrations in minewater affected ground water. Under natural conditions, ground-water levels most clearly demonstrate a response to surface flows in late winter and early spring. This period, usually February to April, is one of warming weather, melting snows, and gentle frontal rains. Stream flows during this period are usually increased above low winter flows. Moreover, these higher flows tend to be of long duration, often lasting several weeks. These flows, even though not of the magnitude of summer flash floods, provide a prolonged period of heightened flows that enhance infiltration to the underlying alluvium.

Figures 6.5 and 6.6 illustrate the intermittency of recharge from natural runoff along a reach of San Mateo Creek. In March and early April of 1980, a time when mine dewatering discharges to the channel were insignificant, occasional flows of less than 1 cfs, recharged the alluvium and caused the water table to rise slowly (Figure 6.5). In late April, however, stream flow increased to as great as 3 cfs. The period of increased flow was almost two weeks long, ending on April 29, 1980. Ground water response to the elevated flows was rapid: the water table began to rise within one week and peaked in mid-May, more than one foot higher than in mid-April.

In general, shallow ground water levels are much less responsive to summer flash floods. Such floods exhibit peak discharges often as great as several thousand cfs, but their potential for recharging ground water is offset by their brevity. The large volumes of thunderstorm runoff usually traverse miles of arroyo bed in a matter of hours. While most of the water eventually does infiltrate, it may penetrate only a short distance into the alluvium. Very little water reaches the water table; most is ultimately evaporated or transpired.

The relationship between surface flows and ground water levels in summer is illustrated in Figure 6.6. After receiving significant recharge in late April 1980, the alluvial aquifer underlying San Mateo Creek experienced a declining water table through the summer. Brief runoff events generated by thunderstorms during August had an insignificant impact on the declining levels. Even the high flows of September, which had an instantaneous peak discharge of 16 cfs (U.S. Geological Survey, 1980), failed to percolate to the underlying alluvial aquifer in noticeable quantities. While summer flash floods resulting from thunderstorms are probably too short-lived to significantly recharge alluvial aquifers, San Mateo Creek and other alluvial systems in the region do demonstrate a close hydraulic connection that is most responsive to late winter and spring stream flow.

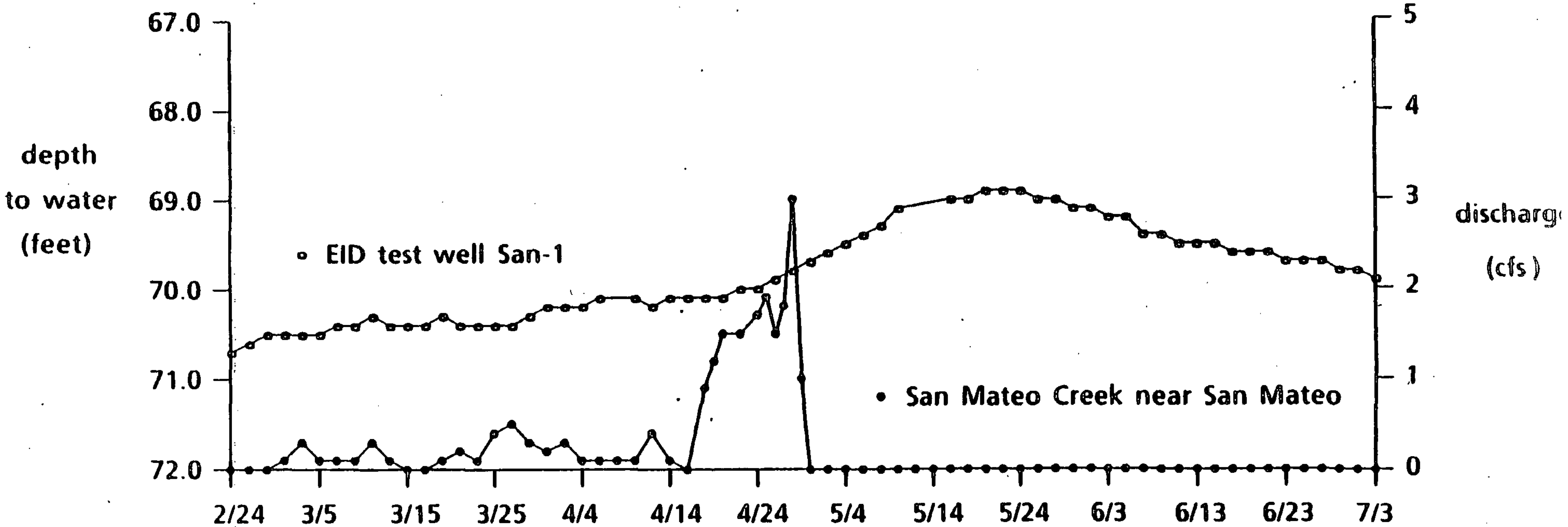



FIGURE 6.5 Streamflow and ground-water levels at the San Mateo Creek near San Mateo gaging site, February-July, 1980

6.3.2. Storage of Water in Alluvial Aquifers

Much of the water resulting from the dewatering of uranium mines has gone into storage in valley fill aquifers. Indeed, in the Ambrosia Lake district, water tables in affected aquifers may have risen as much as 50 feet between the onset of mine dewatering in the 1950s and the late 1970s (Kerr McGee Nuclear Corp., 1981).

Minewater production has been greatly reduced in the Ambrosia Lake district in recent years. Major minewater producers of the 1960s and 1970s (Kerr-McGee and Ranchers Exploration, for example) have drastically curtailed or completely ceased their discharges of dewatering effluents into San Mateo Creek and Arroyo del Puerto. Cessation of minewater discharges in this drainage basin has resulted in a diminished volume of water recharging the alluvium. Water levels in well OTE-1, below the confluence of Arroyo del Puerto and San Mateo Creek, showed continuous decline from March 1978 to March 1982 (Figure 6.7). During this time the water table at this site fell a total of eight feet, a rate of 2.0 feet per year. Alluvial water levels subsequent to the cessation of mine dewatering now appear to be returning to their natural conditions.

6.3.3. Bedrock Aquifers

For the most part, ground water recharge by dewatering effluents is limited to the shallow alluvial aquifers. There are a few stream reaches, however, in which the saturated valley fill overlies permeable bedrock with a downward hydraulic gradient. These places are recharge zones for northward dipping bedrock aquifers such as the Morrison Formation. At these localities, dewatering effluents are drawn by the downward gradients into the alluvium and eventually into the underlying sandstone.

Recharge of bedrock units by minewaters is seen to occur at varying degrees in virtually all of the mining districts where minewaters flow across bedrock subcrops or outcrops (Figure 6.8). This recharge mechanism has been noted in the Church Rock area by Raymondi and Conrad (1983) and Gallaher and Cary (1986); at Ambrosia Lake by Kaufmann, Eadie, and Russell (1976), Brod and Stone (1981), and Stephens (1983), and near San Mateo by Gulf Minerals Resource Co. (1979).

The total volume of minewater which enters the bedrock units probably represents only a small fraction of that which infiltrates to the shallow alluvial aquifers. Nevertheless, in the Ambrosia Lake district, effluents discharged to the Arroyo del Puerto and to the San Mateo Creek constitute a significant proportion of the locally derived recharge in the Dakota and Morrison Formations.

Recharge of the Morrison Formation by minewaters within the drainages is encouraged by regional dewatering of the unit by the mines. Despite some return flow of formation waters, local water level declines in excess of 500 feet have resulted from the dewatering (Lyford and others, 1980).

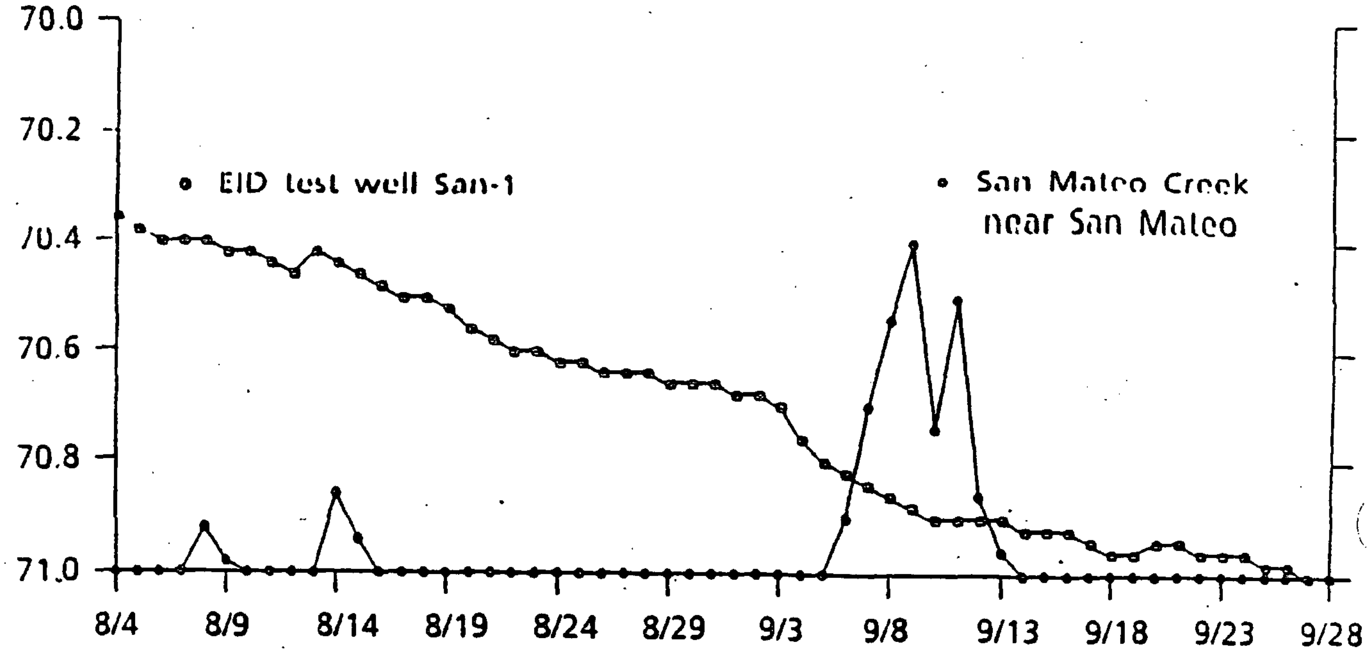



FIGURE 6.6 Streamflow and ground-water levels at the San Mateo Creek near San Mateo gaging site, August-September, 1980

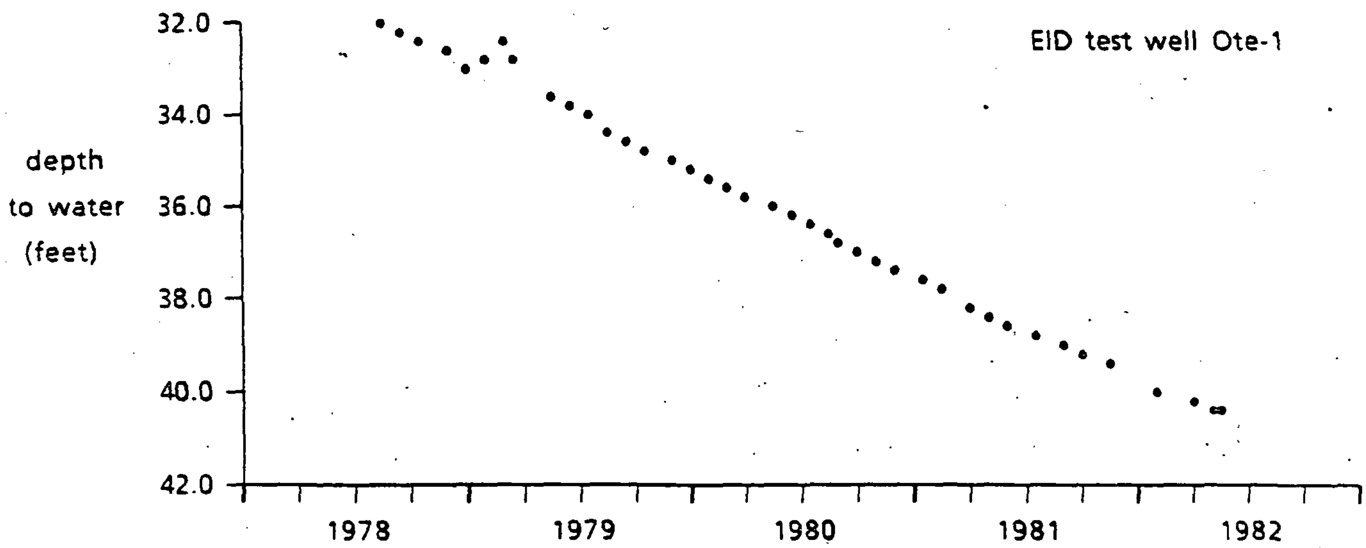



FIGURE 6.7 Ground water levels at EID test well OTE-1, 1978-1982

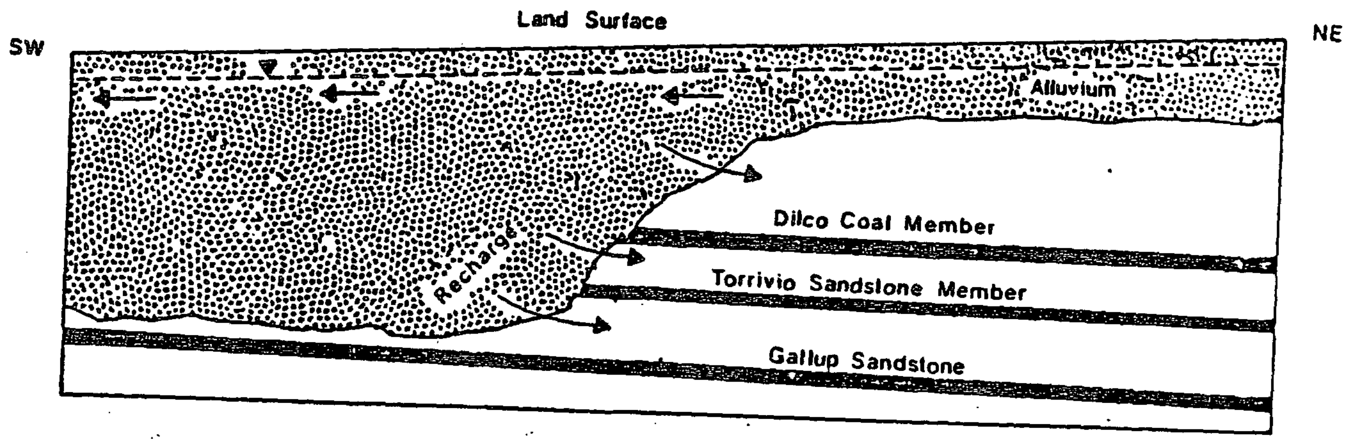



FIGURE 6.8 Conceptual diagram illustrating alluvial aquifer ground water recharge to underlying bedrock aquifers (after Raymondi and Conrad, 1983).

# VII. IMPACTS OF MINE DEWATERING EFFLUENTS ON SURFACE WATER QUALITY

This chapter documents the chemical influences that mine dewatering effluents have had on the natural surface water environment. The chemical quality of treated minewaters differs in several important ways from the chemical quality of receiving surface waters. Dewatering effluents are most often different with respect to amounts of total dissolved solids and suspended sediments, general ionic composition, and concentrations of trace elements and radionuclides associated with uranium ore deposits.

In most affected drainages, dewatering effluents constitute a substantial portion of the total amount of water. Therefore, water quality characteristics of receiving streams frequently have been altered to reflect the chemical character of minewater rather than their natural quality. A comparison of the quality of effluent streams with regulatory standards is presented in Chapter IX.

## 7.1 RAW MINEWATERS

A review of the literature indicates that various trace elements, radionuclides, and dissolved salts can be found in raw (i.e. untreated) uranium mine dewatering effluents (Clark, 1974; U.S. EPA, 1975; Perkins and Goad, 1980). In raw minewaters in the Grants Mineral Belt (Table 7.1), the constituents present at elevated concentrations are 1) gross alpha and beta particle activities and the radionuclides radium-226, lead-210, and natural uranium; 2) the trace elements molybdenum and selenium and; 3) dissolved solids, particularly sulfate. Occasionally, barium, arsenic, and vanadium are detected at elevated concentrations in raw minewaters.

It was only in the past decade that mine dewatering effluents received any noteworthy treatment before their release into Grants Mineral Belt drainages. Until that time thousands of gallons per minute of raw minewaters were discharged to Arroyo del Puerto and the Puerco River. As suggested by Table 7.1, these waters often contained high levels of uranium, radium-226, and gross alpha particle activity.

## 7.2 TREATED MINEWATERS

Beginning in the mid-1970's, the quality of minewaters discharged to watercourses began to improve, because many mine operators adopted minewater treatment systems. The basic treatment strategy is outlined by Perkins and Goad (1980):

> Once the water pumped from a mine reaches the surface it usually goes through one or more mine water settling ponds. At most facilities a flocculant is added to promote settling. Barium chloride is usually added to the liquid after it has gone through one or more suspended solids settling ponds. Further settling and precipitation of radium as a barium sulfate salt then occurs as the liquid moves through additional settling pond(s). Where uranium levels are high enough to justify it, the liquid is usually run through an ion exchange (IX) plant for recovery of uranium contained in the mine water. The IX plant may either precede or follow barium chloride treatment.

a result of treatment, minewater concentrations of radium-226, lead-210, polonium-210, natural uranium, and gross alpha activity are considerably reduced. Concentrations of most other minewater constituents, though, are not greatly influenced by these treatments. As collected by EID personnel.

| ONSTITUENT | AMBROSIA LAKE MINING DISTRICT | | | | CHURCH ROCK MINING DISTRICT | | | |
|---|---|---|---|---|---|---|---|---|
| | MAX. | MIN. | MEDIAN | SAMPLE SIZE | MAX. | MIN. | MEDIAN | SAMPLE SIZE |
| | (mg/l) | | | | | | | |
| TDS | 1,800 | 740 | 1,235 | 10 | 960 | 434 | 525 | 9 |
| $SO_4$ | 1,030 | 310 | 715 | 10 | 458 | 126 | 156 | 9 |
| | (mg/l) | | | | | | | |
| As | 0.08 | 0.008 | 0.021 | 8 | 0.40 | 0.005 | 0.008 | 6 |
| Mo | 5.30 | <0.01 | 1.19 | 10 | 0.791 | 0.008 | 0.030 | 6 |
| Se | 1.22 | 0.014 | 0.075 | 10 | 0.071 | 0.011 | | 6 |
| U-natural | 20.0 | 1.56 | 3.82 | 10 | 27.30 | 2.100 | 4.3460 | 6 |
| | (pCi/l ± one sigma standard error of counting) | | | | | | | |
| Gross alpha | 11,900 ± 1,400 | 490 ± 50 | 3,050 ± 300 | 14 | 24,000 ± 1000 | 460 ± 30 | 3,205 ± 150 | 10 |
| Gross beta | 6,550 ± 590 | 30 ± 16 | 280 ± 7 | 14 | 6,440 ± 550 | 530 ± 100 | 1,320 ± 200 | 6 |
| Pb - 210 | 1,300 ± 100 | 15 ± 4 | 690 ± 52 | 4 | 1,200 ± 100 | 44 ± 4 | -- | 2 |
| Po - 210 | 14 ± 2 | 0.95 ± 0.35 | 4 ± 0.5 | 4 | 10 ± 1 | 3.4 ± 0.4 | -- | 2 |
| Ra - 226 | 1,650 ± 50 | 30 ± 9 | 280 ± 7 | 14 | 2,500 ± 800 | 7.0 ± 0.2 | 295 ± 5 | 10 |
| Th - 228 | 0.6 ± 0.3 | -0.1 ± 0.1 | 0.0 ± 0.1 | 5 | 0.1 ± 0.1 | -0.2 ± 0.2 | -- | 2 |
| Th - 230 | 1,400 ± 100 | 0.2 ± 0.1 | 3.3 ± 0.5 | 5 | 210 ± 10 | 0.1 ± 0.1 | -- | 2 |
| Th - 232 | 4.0 ± 0.2 | 0.0 ± 0.1 | 0.0 ± 0.1 | 5 | 0.1 ± 0.1 | 0.0 ± 0.1 | -- | 2 |

demonstrated in Table 7.2, a seven-fold reduction in average radium-226 and natural uranium concentrations in treated minewaters is found when 1975 data are compared with 1981-82 data.

TABLE 7.2 Comparison of 1975 Mine Dewatering Effluent Quality with 1981-82 Quality. Number of samples in parentheses.

| Constituent | Flow-Weighted Means | |
|---|---|---|
| | 1975* | 1981-82** |
| Total Radium-226 (pCi/l) | 71.2 (23) | 10.5 (15) |
| Total Uranium-natural (mg/l) | 7.25 (23) | 1.0 (14) |

* Calculated from data in U.S. EPA (1975).
** Calculated from data in EID files.

The quality of treated mine effluents during the period 1978 through 1982 is summarized for key constituents in Table 7.3. It is readily evident that substantial variability in water quality exists between the two major mining districts, as well as within each mining district. Most striking in this regard are the concentrations of total dissolved solids, sulfate, molybdenum, selenium, and radium-226.

The wide range in radium-226 concentrations reflects occasional poor operation of the radium treatment systems. Thomson and Matthews (1981) attribute these "upsets" to incomplete mixing of the mine waters with barium chloride and to poor settling of the barium-radium sulfate precipitates. Variability in molybdenum, selenium, sulfate, and total dissolved solids, on the other hand, cannot be attributed to ineffectual treatment. This variability instead reflects chemical differences in the ground waters discharged from the mines, as indicated in Table 7.1.

As would be expected, sludges which accumulate in the minewater treatment pond bottoms as a result of settling, floculation, and precipitation are highly concentrated in radium-226 and other radionuclides. Analyses presented by Perkins and Goad (1980) and additional data in EID files indicate that the radium-226 concentrations in the accumulated sludges probably average more than 200 pCi/gram. Under standards proposed by EPA (1976), uranium mine wastes with a radium-226 concentration in excess of 5 pCi/gram would be treated as hazardous materials and subject to special handling and disposal procedures.

## 7.3 EFFECTS OF MINE DEWATERING EFFLUENTS ON SURFACE-WATER QUALITY

The previous chapter discussed the significant effects that discharge of minewater effluents has had on the hydrology of watercourse in the Grants Mineral Belt. Effects on water quality have been similarly significant. This section discusses how the quality of these effluents differs from the quality of runoff that constitutes the natural water quality of the stream and how the quality of these artifically maintained streams changes as the waters flow downstream.

### 7.3.1. Comparison of the Quality of Mine Dewatering Effluents with Natural Runoff Quality

Under natural, pre-mining conditions, watercourses receiving mine dewatering effluents, such San Mateo Creek and the Puerco River, often have low flows or are even dry. When flow occurs in these watercourses, it is the result either of storm runoff or of runoff from snow melt. Therefore, comparison of the quality of mine dewatering effluents with natural storm runoff collected by EID personnel. Number of samples in parentheses.

| ONSTITUENT | AMBROSIA LAKE MINING DISTRICT MAX. | MIN. | MEDIAN | AVG. | CHURCH ROCK MINING DISTRICT MAX. | MIN. | MEDIAN | AVG. |
|---|---|---|---|---|---|---|---|---|
| | | | | mg/l | | | | |
| TDS | 2,615 | 510 | 1,610 | 1440 (26) | 1,190 | 360 | 452 | 580 (16) |
| $SO_4$ | 1,370 | 185 | 755 | 655 (22) | 600 | 60 | 136 | 210 (17) |
| As | 0.20 | <0.005 | 0.011 | 0.02 (26) | 0.02 | <0.005 | <0.005 | 0.007 (16) |
| Ba | 1.7 | 0.1 | 0.21 | 0.24 | 2.1 | 0.10 | 0.413 | 0.5 (15) |
| Mo | 3.2 | 0.03 | 0.80 | 1.0 (27) | 0.6 | 0.01 | 0.01 | 0.2 (15) |
| Se | 1.0 | 0.01 | 0.09 | 0.24 (27) | 0.3 | 0.01 | 0.04 | 0.07 (15) |
| U natural | 3.0 | 0.2 | 1.56 | 1.5 (26) | 1.8 | 0.6 | 1.07 | 1.0 (14) |
| V | 0.29 | <0.01 | 0.029 | 0.08 (21) | 0.07 | 0.01 | 0.012 | 0.02 (13) |
| | | | | pCi/l ± SE* | | | | |
| Gross alpha | 1,760 ± 100 | 54 ± 14 | 635 ± 70 | 780 (14) | 1,200 ± 100 | 280 ± 30 | 440 ± 40 | 600 (11) |
| Gross beta | 945 ± 225 | 84 ± 16 | 377 ± 125 | 435 (6) | 663 ± 125 | 322 ± 30 | 460 ± 74 | 480 (6) |
| Pb - 210 | 33 ± 6 | 6.9 ± 2.6 | 14 ± 5 | 15 (9) | 10 ± 2 | 4.5 ± 2.3 | -- | -- (2) |
| Po - 210 | 14 ± 2 | 0.95 ± 0.35 | 1.1 ± 0.4 | 6 (4) | 15 ± 5 | 3.4 ± 0.4 | 9.8 ± 7.4 | 10 (13) |
| Ra - 226 | 200 ± 10 | 0.12 ± 0.04 | 6.4 ± 1.2 | 27 (28) | 89 ± 5 | 0.67 ± 0.2 | 2.0 ± 0.2 | 10 (13) |
| Ra - 228 | 0 ± 2 | 0 ± 2 | 0 ± 2 | 0 (5) | <0.2 | <0.2 | -- | -- (2) |
| Th - 228 | <0.3 | <0.1 | <0.1 | 0.2 (3) | 0 ± 2 | 0 ± 2 | -- | -- (2) |
| Th - 230 | 4.0 ± 0.5 | <0.3 | 0.7 ± 0.2 | 1.7 (3) | 3.9 ± 0.5 | <0.2 | -- | -- (2) |
| Th - 232 | <0.1 | <0.1 | <0.1 | <0.1 (3) | <0.2 | <0.2 | -- | -- (2) |

*SE = Standard Error of Measurement (one sigma) quality provides an indication of how the change from ephemeral to artificially-maintained perennial watercourses has affected chemical quality.

### Suspended Sediment

In all effluent-dominated watercourses, suspended sediment concentrations under minewater baseflow conditions are smaller than the concentrations borne by thunderstorm runoff (see Chapter IV). EID and uranium industry self-monitoring data indicate that these simple treatment measures, used to remove radium-226 before discharge to watercourses ~~usually~~ reduce suspended sediment concentrations from more than 100 mg/l in the untreated minewater to less than 10 mg/l in the final effluent. Runoff has average suspended sediment concentrations greater than 30,000 mg/l.

Although treated minewaters are relatively free of sediment when they are discharged, they eventually become burdened with suspended silts and clays. Stream channels in the Grants Mineral Belt which receive mine dewatering effluents are relatively free of suspended sediments just below the point of minewater discharge. Silt and clay particles are entrained from the channel bed as flow continues downstream. On November 13, 1980, for example, suspended sediment concentration increased from 52 mg/l below the Kerr-McGee Church Rock I mine outfall in Pipeline Arroyo to 3500 mg/l in the Puerco River in Gallup approximately 19 miles downstream. Similar trends were evident on other days as well.

San Mateo Creek in the Ambrosia Lake district also entrains sediment. The prevalence of sand over fine-grained sediments in the San Mateo Creek alluvium, however, causes suspended sediment concentrations, typically less than 400 mg/l, to be lower than in the Puerco River system.

### Dissolved Solids

Concentrations of total dissolved solids (TDS) in minewaters are variable in the Grants Mineral Belt. In the western portions of the Ambrosia Lake mining district, mines produce waters with 1200 to 1800 mg/l TDS (Perkins and Goad, 1980). These concentrations are reflected in Arroyo del Puerto, where TDS concentrations are often 1500 to 2,000 mg/l. Mixing of mine dewatering effluents with natural waters resulting from runoff occasionally dilutes TDS levels in this watercourse to less than 1,000 mg/l. Minewaters discharged to Arroyo del Puerto thus bear about twice the concentration of dissolved solids of that in natural runoff in the area, which is typically below 1,000 mg/l TDS.

In contrast, minewaters produced in the Church Rock and the eastern portion of the Ambrosia Lake districts usually contain only a few hundred mg/l TDS. Data presented by Perkins and Goad (1980) demonstrate that effluents discharged to Pipeline Canyon and San Mateo Creek contain only 300 to 600 mg/l TDS. TDS values in natural runoff are quite similar. In the these areas, therefore, minewaters have not influenced the TDS concentrations of receiving streams. It is noteworthy that the TDS concentrations are only one-fourth of those found in western portion of the Ambrosia Lake minewaters despite the fact that all minewaters are produced largely from the Morrison Formation. High TDS concentrations in the western portion of the Ambrosia Lake district have been attributed to greater mineralization of the host rock and to dewatering-induced leakage of more saline ground water into the mines from the overlying Dakota Formation (Brod, 1979; Kelley and others, 1980).

e relative concentrations of specific ions in minewaters appear to differ from concentrations found in natural runoff. Analysis of Figures 7.1 and 7.2 indicates that minewaters generally have proportionally more sodium and sulfate than natural runoff.

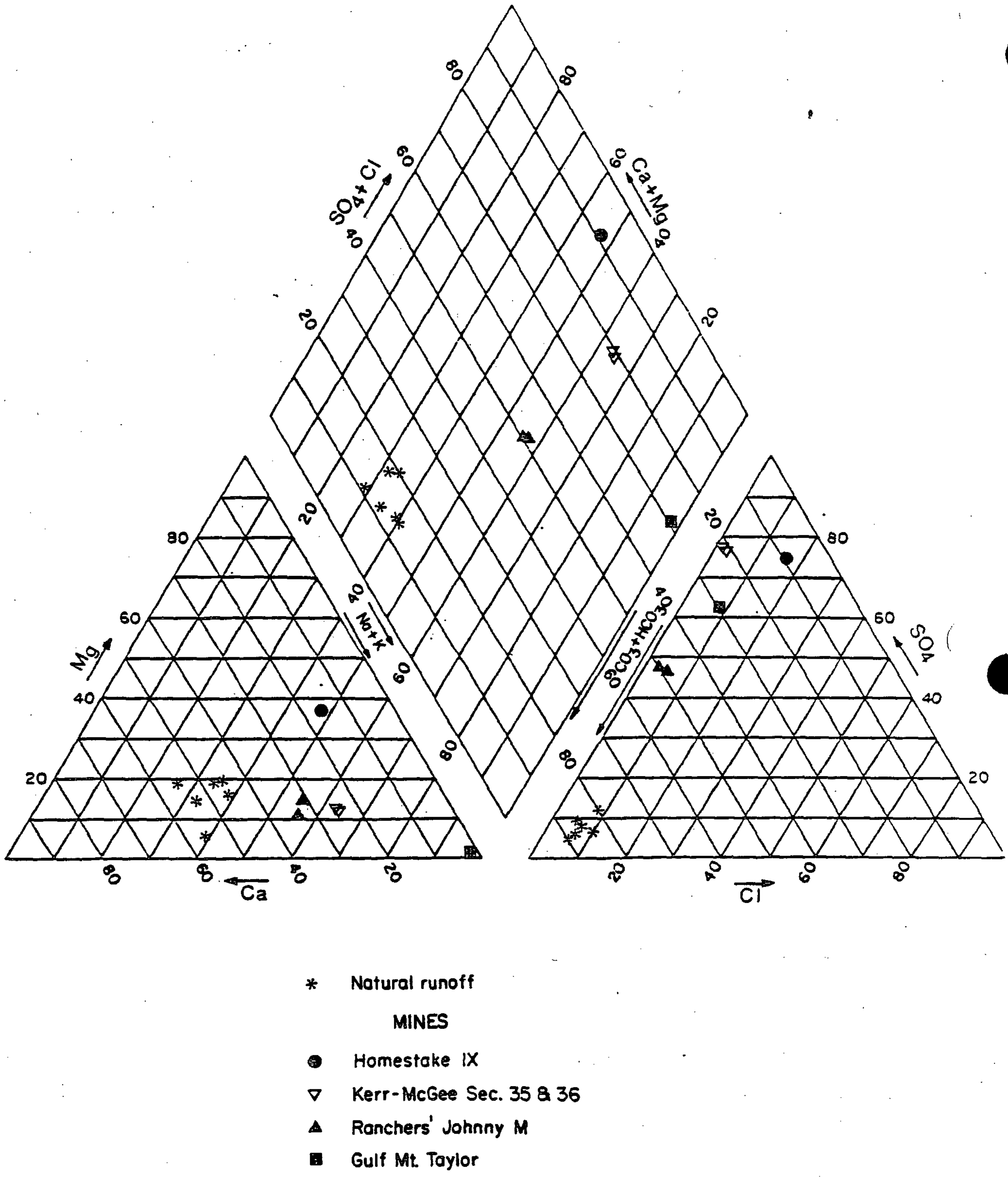
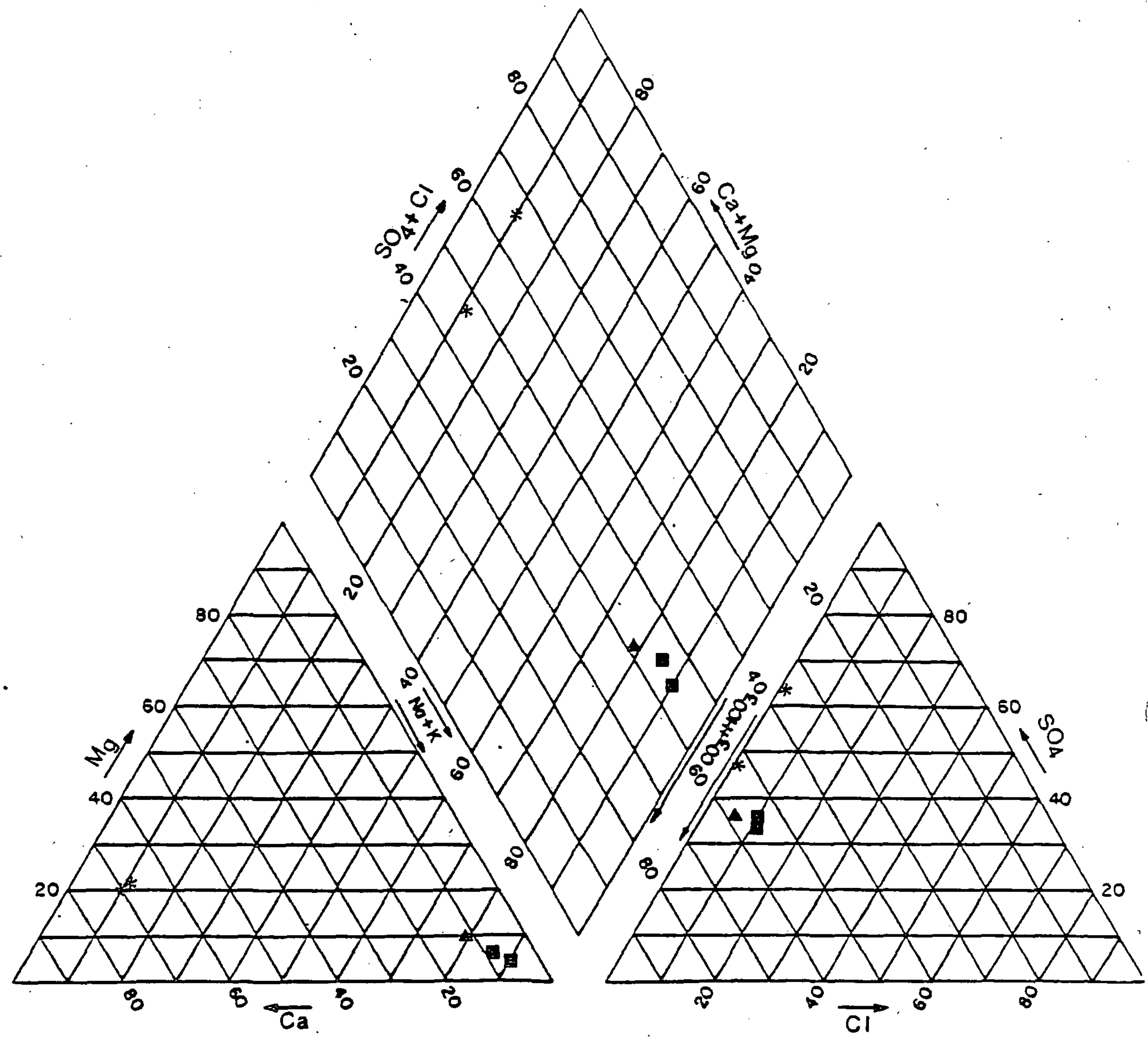



FIGURE 7.1 Comparison of the ionic composition of mine dewatering effluents and natural runoff, Ambrosia Lake mining district. Ions are expressed as percentage of total equivalents per liter.




* Natural runoff

MINES

▲ Kerr-McGee Church Rock

■ UNC Church Rock NE

FIGURE 7.2 Comparison of the ionic composition of mine dewatering effluents and natural runoff, Church Rock mining district. Ions are expressed as percentage of total equivalents per liter.

### Total versus Dissolved Concentrations

In contrast to natural runoff in which contaminants are largely associated with suspended sediment and precipitates, trace elements and radionuclides in treated minewaters are generally present in the dissolved form. The proportions of minewater contaminants in the dissolved phase are highly variable, but typically the dissolved fraction of a contaminant constitutes more than 50 percent of the total concentration (Table 7.4). Usually, more than 85 percent of the total concentration of gross alpha activity, molybdenum, selenium, and natural uranium in minewaters is in the dissolved fraction. Dissolved radium-226 proportions average about 30 percent of the total concentration.

The following discussion of trace elements and radionuclides focuses on comparison of total constituent concentrations in treated minewaters with total concentrations in natural runoff. Direct comparisons of dissolved concentrations are limited by the amount of available data. Nonetheless, based on information in Table 7.4, it can be assumed for many contaminants that even if minewaters and runoff have nearly equivalent total contaminant concentrations, then the dissolved concentrations in minewaters are probably significantly greater than in natural runoff, particularly for gross alpha particle activity, molybdenum, selenium, and natural uranium.

### Trace Elements

Of the nine trace elements routinely analyzed in treated minewaters, only the concentrations of molybdenum, selenium, and uranium are consistently higher than in natural runoff (Figure 7.3). Si--e these trace elements are known to be naturally associated with uranium ores, their p ence in surface watercourses suggests that the watercourse is receiving mine dewatering effluents. Arsenic, vanadium, and barium are occasionally detected in significant concentrations in minewaters, the latter because it is added in the treatment process to remove radium-226. Cadmium, lead, and zinc are usually below detectable levels in dewatering effluents and are therefore judged not to be of concern in these waters.

Uranium is the trace element with the highest concentrations in mine effluents throughout the Grants Mineral Belt. The median concentrations of total uranium in Ambrosia Lake and Church Rock effluents of 1.6 and 1.1 mg/l, respectively, are over 16 and 37 times greater than the median concentrations of natural runoff in the districts.

Molybdenum levels in minewaters vary from extremely low levels to more than 3 mg/l. Discharges in the Ambrosia Lake district have median total molybdenum concentrations of 0.80 mg/l. In comparison, only a small fraction of the natural runoff samples collected during this study contained detectable concentrations (> 0.01 mg/l) of total molybdenum. Lower concentrations are found in the Church Rock district, where the median total molybdenum concentration in effluents is 0.01 mg/l.

The third element that is consistently higher in mine dewatering effluents than in natural runoff is selenium. Treated effluent normally contains less than 0.04 to 0.09 mg/l selenium, but a few Ambrosia Lake mines discharge effluent with selenium concentrations approaching 1.0 mg/l. In contrast, data indicate median total selenium levels in natural runoff of 0.03 mg/l in Ambrosia Lake district and <0.005 mg/l in the Church Rock district.

T other metals that occasionally appear in dewatering effluents are arsenic and vanadium. Elevated levels of arsenic and vanadium appear to be restricted to one facility in the region. T discharge from the Homestake ion exchange facility in Ambrosia Lake contains average total arsenic and vanadium concentrations of 0.05 and 0.17 mg/l, respectively.

TABLE 7.4 Percentage of Total Constituent Concentrations in the Dissolved Phase of Treated Minewaters, Ambrosia Lake and Church Rock Mining Districts, 1980.

| CONSTITUENT | NO. OF SAMPLES | PERCENT IN DISSOLVED PHASE | |
|---|---|---|---|
| | | RANGE | MEAN |
| As | 3 | 12 - 90 | 57 |
| Ba | 5 | <35 - 100 | <71 |
| Mo | 6 | 88 - 100 | 95 |
| Se | 5 | 83 - 100 | 93 |
| U-natural | 5 | 68 - 100 | 89 |
| V | 5 | 20 - 100 | 61 |
| Gross alpha | 6 | 82 - 100 | 94 |
| Gross beta | 5 | 72 - 100 | 93 |
| Ra-226 | 6 | 2 - 71 | 32 |

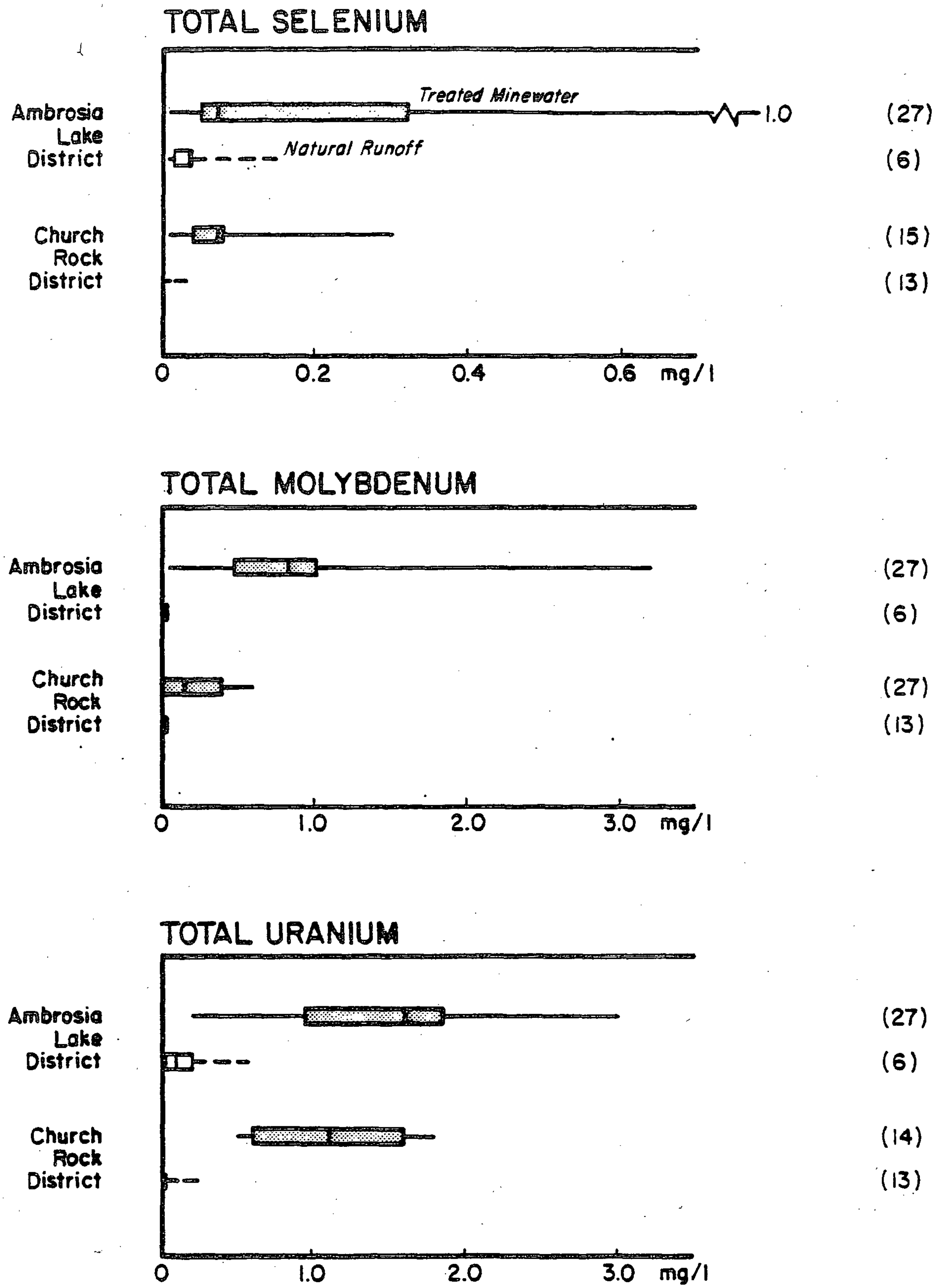



FIGURE 7.3 Comparison of selected total trace element concentrations in treated minewaters and natural runoff

Barium is of potential interest because it is added as barium chloride to co-precipitate radium-?6 from minewaters before their discharge to watercourses. Median total barium concentrations in natural runoff in Ambrosia Lake and Church Rock districts are 7.7 and 4.8 mg/l, respectively. These are many times greater than the concentrations of 0.212 and 0.413 in treated minewaters from these districts.

### Radionuclides

With the exception discussed above of natural uranium, median total concentrations of radionuclides in treated minewaters are less than those measured for natural runoff (Figure 7.4). Compared to natural runoff, however, minewaters have a higher, usually considerably higher, percentage of total radionuclide concentrations associated with the dissolved phase. EID data indicate that as much as 99 percent of the gross alpha and gross beta particle activities of natural runoff are associated with precipitates and suspended sediment. In contrast, over 90 percent of this radioactivity in treated minewaters is normally associated with the dissolved fraction (see Table 7.4). Total suspended sediments in dewatering effluents are quite low (averaging about 5 mg/l).

The total gross alpha particle activity of dewatering effluents is comparable to natural runoff levels. Dissolved gross alpha levels of several hundred to over 1,000 pCi/l in dewatering effluents, on the other hand, are ten to one hundred times greater than dissolved gross alpha levels in natural runoff (normally less than 20 pCi/l). On average, dissolved uranium accounts for more than 80 percent of the observed total gross alpha activity. Other alpha-emitters in the uranium-238 decay series (chiefly, thorium-230, radium-226, and polonium-210) are present in small concentrations in the effluents relative to uranium (see Table 7.3).

ledian total gross alpha and beta concentrations are roughly equivalent in Ambrosia Lake and Church Rock mine effluents. Maximum concentrations of these constituents in Ambrosia Lake discharges, though, are about 40 percent greater than in the Church Rock discharges. The differences are most likely due to more effective ion-exchange treatment of the minewaters in the Church Rock district.

Despite high concentrations of radium-226 in raw minewaters, most mines discharge minewaters with 6 pCi/l or less of total radium-226 (Figure 7.4). While an average of about 30 percent of the radium in these effluents may be in the dissolved form, natural runoff often exceeds 15 pCi/l in total radium-226, but is quite low in dissolved radium-226, usually less than 2 pCi/l. Three facilities, evidently sampled during "upset" conditions, discharged effluent containing 75, 89, and 200 pCi/l total radium-226, concentrations similar to concentrations in untreated minewater. Large influxes of dissolved radium-226 may be introduced to receiving watercourses from any mine with ineffective radium-removal processes.

None of the thorium isotopes or radium-228 are normally present in detectable levels in minewaters. Treated minewaters have exhibited up to 33 pCi/l of total lead-210 and up to 15 pCi/l of total polonium-210. Greater concentrations (several hundred pCi/l) may ocur during periods of ineffective minewater treatment. Although the data are limited, there does not appear to be significant differences between the Ambrosia Lake concentrations and those presented for the Church Rock district. Natural runoff, in comparison, typically contains between 40 to 90 pCi/l each of total lead-210 and polonium-210.

### 7.3.2. Fates of Minewater Constituents in Surface Drainage Channels

Of the trace elements and radionuclides identified earlier as being elevated above levels in natural runoff, only radium-226 and lead-210 are known to undergo significant partitioning

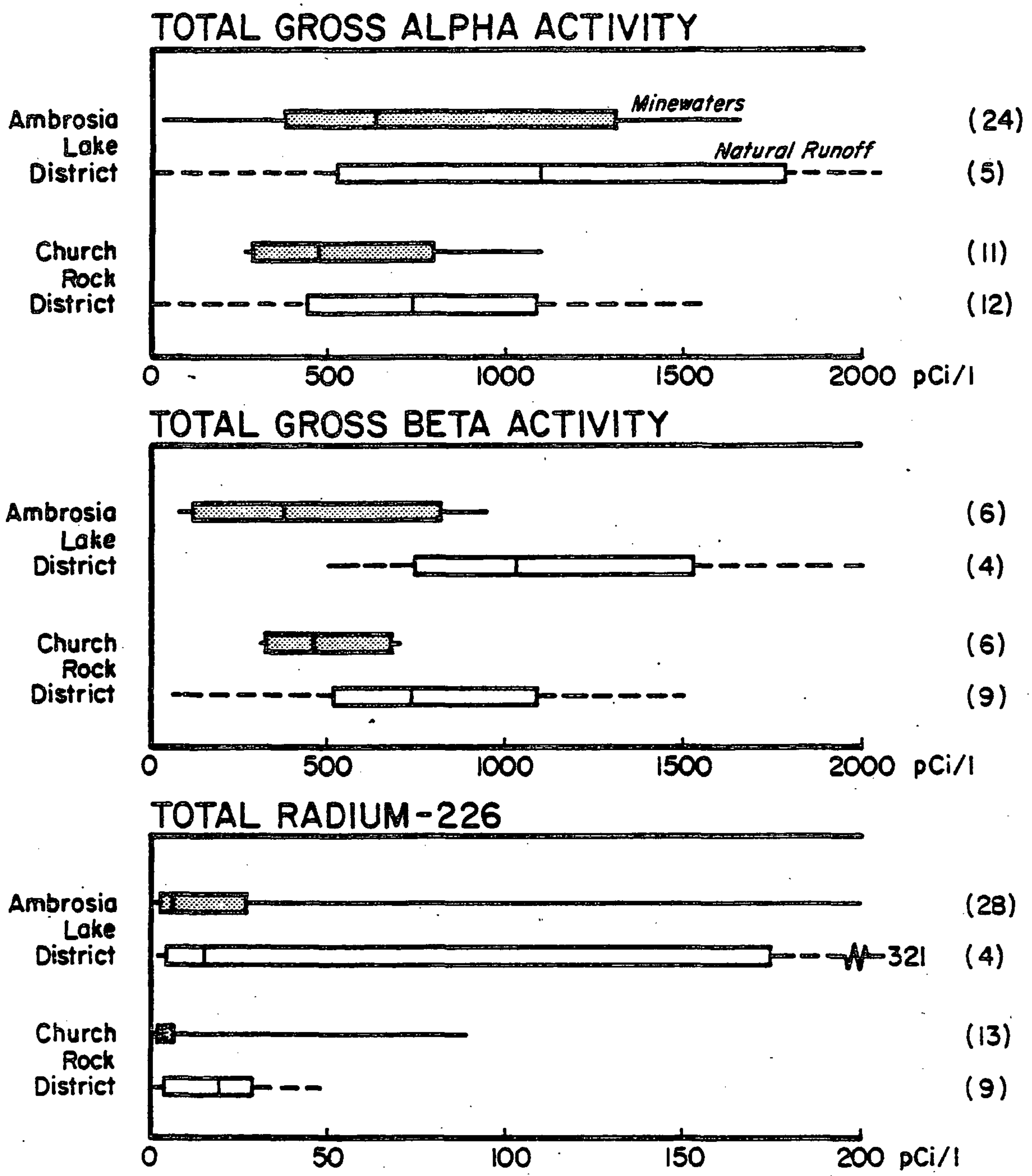



FIGURE 7.4 Comparison of total radioactivity in mine dewatering effluents and natural runoff

changes between dissolved and suspended phases as they travel downstream. These radionuclides are usually lost from solution shortly after their release to regional arroyos. Investigation of both dissolved and suspended phases revealed that precipitates and sediments suspended in the water account for virtually all these constituents. As shown in Table 7.5, a significant proportion of radium-226 is discharged to the Puerco River in dissolved form, but by the time radium-226 has travelled a few miles almost none remain in solution.

Once precipitated or bound to the stream sediments, minewater contaminants are subject to being moved downstream during normal artificially-maintained flows or, more significantly, during natural runoff events. During major streamflows, minewater-affected sediments are scoured from the stream bottoms, mixed with other sediments carried by the streamflows, and redeposited variable distances downstream. In drainages with sediment-rich streamflows, minewater-affected sediments generally become indistinguishable from other sediments carried along the watercourse and deposited on the stream bottom due to the large dilution factors involved and to the elevated levels of natural radioactivity in regional soils. Popp and others (1983) confirmed this along various drainages within the Rio Puerco watershed.

While dissolved radium-226 and lead-210 usually precipitate or are adsorbed by stream sediments, these radionuclides appear to stay in solution in stream channels that are relatively sediment free. Dissolved radium-226 concentrations along the Arroyo del Puerto, for example, consistently range between 3 and 6 pCi/l.

Unlike radium-226 and lead-210, the trace elements uranium, molybdenum, and selenium, and the major dissolved solids generally are not rapidly attenuated in the channels of receiving waters. These constituents generally remain in solution and move downstream with the minewater. Figure 7.5 shows downstream changes in water quality along the Puerco River on October 6, 1976 as an example (U.S. Geological Survey, 1977). The data show that constituents not precipitating or interacting rapidly with sediment decline gradually in concentration downstream, but still may be found in significant levels 50 miles from the mines. The declines in selenium and gross alpha concentrations are most likely related to decreasing pH levels downstream. While the initial dissolved radium-226 concentration is significantly elevated in contrast with the radium-226 levels measured during this study, concentrations nevertheless decline rapidly downstream. Similar responses have been found by the U.S. Geological Survey and the EID at more typical concentrations.

Table 7.5 Comparison of dissolved versus suspended concentrations of radium-226 at sites along the Puerco River. Data represent average concentrations. Number of samples in parentheses.

| Site | Dissolved Ra-226 (pCi/l) | Total Ra-226 (pCi/l) | Suspended* Ra-226 (pCi/l) | River Miles From Mines |
|---|---|---|---|---|
| Church Rock Mines | 3.2**(13) | 9.98(13) | 6.78 | ---- |
| Puerco R. at NM 566 | 0.22 (14) | 8.06 (13) | 7.84 | 5.1 |
| Puerco R. at Gallup | 0.11 (12) | 7.93 (12) | 7.82 | 18.5 |

*Determined by subtraction.
**Estimate based on data in Table 7.4.

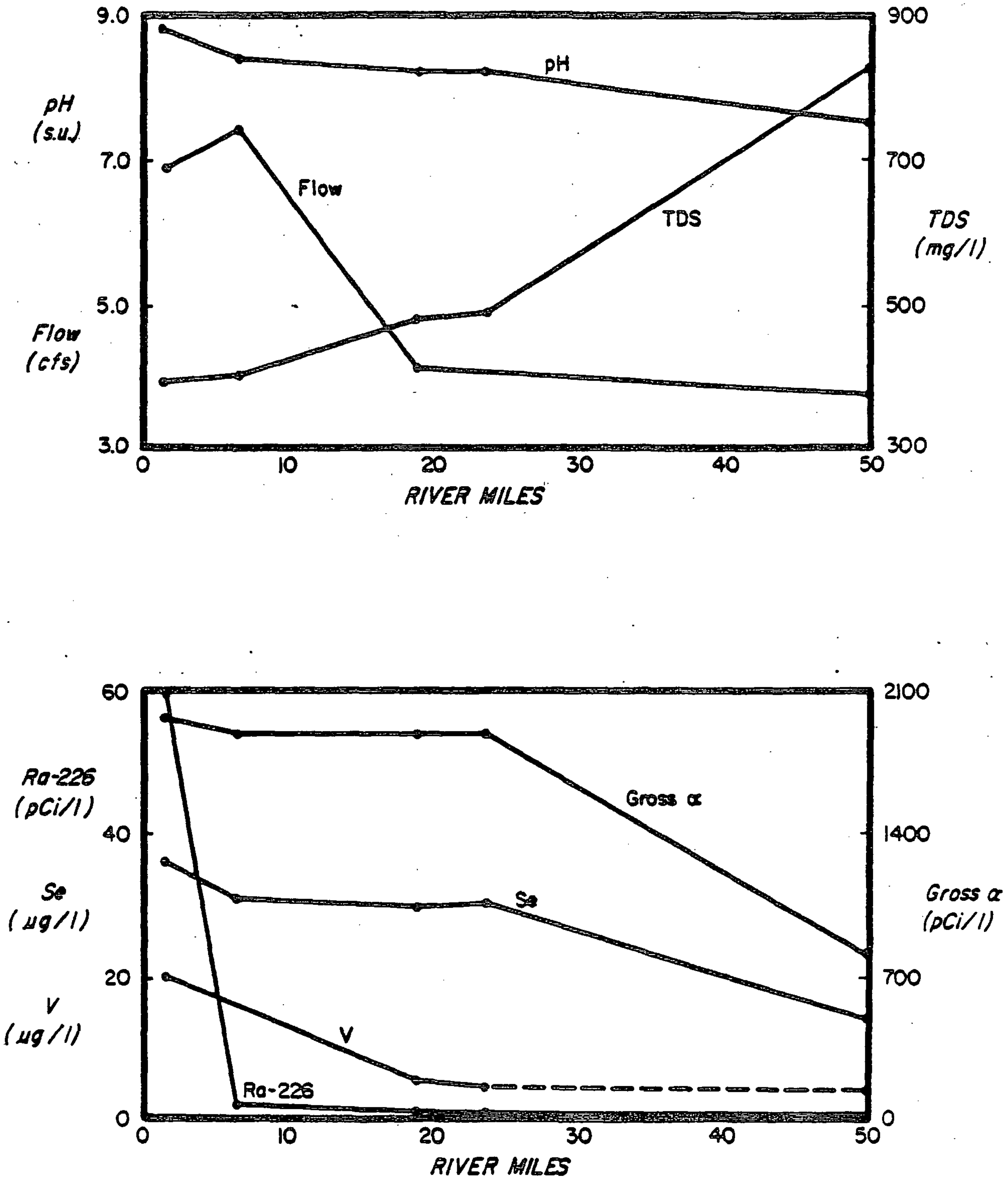



FIGURE 7.5 Water quality and flow along the Puerco River from the Church Rock mines to the New Mexico-Arizona border, October 6, 1976 (source: U.S. Geological Survey).

# VIII. MINEWATER IMPACTS ON THE QUALITY OF SHALLOW GROUND WATERS

Release of dewatering effluents to Grants Mineral Belt arroyos greatly increased the volume of water infiltrating to shallow alluvial aquifers. This infiltration has been accompanied by a gradual change in the overall chemistry of these ground waters. In certain locations along San Mateo Creek and the Puerco River, the alluvial ground waters now bear a stronger chemical resemblance to minewaters than to natural waters. This condition is most pronounced in areas where stream-bottom leakage is high. Evaluation of this apparent change is somewhat hampered, however, by the lack of pre-mining ground water quality data.

Many of the impacts realized by surface waters are not experienced by underlying ground waters. Minewater constituents that adsorb to sediments or form insoluble precipitates do not usually reach ground waters. Chief among such constituents is radium-226. As shown previously, radium-226 quickly leaves solution in most Grants Mineral Belt streams, either by adsorbing to sediments or by forming insoluble precipitates, and thus is not found in significant concentration in alluvial ground water. On the other hand, chemical constituents that do not readily interact with earth materials or form insoluble precipitates, such as uranium, selenium or molybdenum, may be found in ground waters in concentrations approaching those in undiluted minewater and suggest ground water degradation from mine dewatering effluents.

Within the drainages studied effluent-dominated surface flows more closely approximate the infiltration capacity of the stream channel bottoms than those associated with natural runoff. The factor that most controls recharge volumes at any given location within these drainages, therefore, is duration of surface flow rather than flow rate or volume. Because of their perennial nature, effluents potentially may affect ground-water quality to a greater extent than would be projected from a comparison of volume of effluent-to-volume of natural runoff.

Variation of effluent seepage will cause fluctuations in ground water quality in the alluvium. For example, during spring runoff more dilution (mixing) of effluent with surface water takes place. This commingled water then may gradually with ground water in the alluvium. Under this condition, ground water quality is probably only locally affected. Conversely, under low-flow conditions and with the same amount of effluent discharged, ground water contamination may become more significant. Factors contributing to degradation of ground water quality include effluent quality and quantity, the amount of mixing of surface and ground water, permeability of the aquifer, surface and ground water quality, dispersion, advection, and the biological and geochemical processes taking place in the subsurface.

## 8.1 ESTIMATION OF NATURAL GROUND-WATER QUALITY

While the available data are limited, natural, alluvial ground-water quality can be generally described for some constituents. Pre-mining analyses in the Ambrosia Lake and Church Rock mining districts are limited in quantity and scope. Due to the rural nature of San Mateo Creek and the North Fork of the Puerco River, minimal testing of wells was performed before 1974. Most of the pre-mining data are limited to one-time samplings of a few isolated windmills for general chemical characteristics, e.g., sulfate and total dissolved solids, and there are no pre-mining trace element or radionuclide data available for either drainage. The following analysis of natural ground water quality in these drainages uses pre-mining data from stock wells 16-K-336 and 16-K-340 located along the

San Mateo Creek (Figure 8.2). There are no pre-mining data available for alluvial waters along the Arroyo del Puerto.

The most useful information for describing natural alluvial ground-water quality comes from wells drilled for and sampled during this assessment. In particular, data obtained from wells located upstream of uranium industry activities reflect the equivalent of pre-mining conditions at those locations. These wells include the BLM wells along the Puerco River (Figure 8.1) and the Lee wells along the San Mateo Creek in the Ambrosia Lake district in the Church Rock district (Figure 8.2)

8.1.1. General Chemistry

Superimposed on any local variabilities in alluvial ground water quality along the North Fork of the Puerco River are regional-scale quality changes. The available records suggest that natural alluvial ground water trends from a calcium sulfate water at the BLM cluster near Pinedale Bridge to a sodium sulfate water at well 16-K-340, and subsequently to a sodium bicarbonate water near Church Rock at well 16-K-336. The ionic composition are presented in Figure 8.3. The calcium-rich water is reflective of gypsum ($CaSO_4$) and lime ($CaOH$) abundant in the soils near Pinedale. The proportion of sodium increases downstream after soils derived from rocks of Jurassic age are encountered (see Figure 2.5). All of these regional changes appear to be gradual trends in response to changes in the parent rocks.

Along the North Fork of the Puerco River, water quality is highly variable with respect to total dissolved solids (TDS) concentrations. TDS concentrations range from less than 200 to over 1500 mg/l and generally increase with increasing distance from the river channel. The relative proportions of principal cations and anions, however, do not appear to change appreciably with increasing distance from the channel.

Natural alluvial ground waters along the San Mateo Creek trend from a sodium bicarbonate water at the Lee wells to a sodium-sulfate-bicarbonate water at the Sandoval Ranch (Figure 8.4). The bicarbonate is reflective of limestone rocks near the village of San Mateo.

Natural TDS concentrations in San Mateo Creek ground waters range from 500 to 1,000 mg/l (Brod and Stone, 1981). Along the six-mile distance from the Lee wells near San Mateo downstream to the Sandoval Ranch windmill, TDS concentrations do not significantly change; the increase is from 540 to 650 mg/l.

There are no data to describe natural TDS concentrations downstream for the Sandoval Ranch, but concentrations are not expected to increase dramatically in the three-mile distance to the Otero well cluster location (see Figure 8.2). While San Mateo Creek alluvial waters downstream of the Sandoval Ranch could be affected by the inflow of Arroyo del Puerto alluvial ground waters, available data suggest that there was minimal alluvial water along the Arroyo del Puerto under pre-mining conditions (Kerr-McGee Nuclear Corp., 1981).

8.1.2. Molybdenum

Under natural conditions concentrations of molybdenum in alluvial ground waters along the North Fork of the Puerco River and San Mateo Creek are expected to be low. Molybdenum concentrations in ground waters produced from all BLM and Lee wells are very low, consistently less than detection limit of 0.010 mg/l. While there are no other ground water data available for estimating natural molybdenum concentrations, analyses

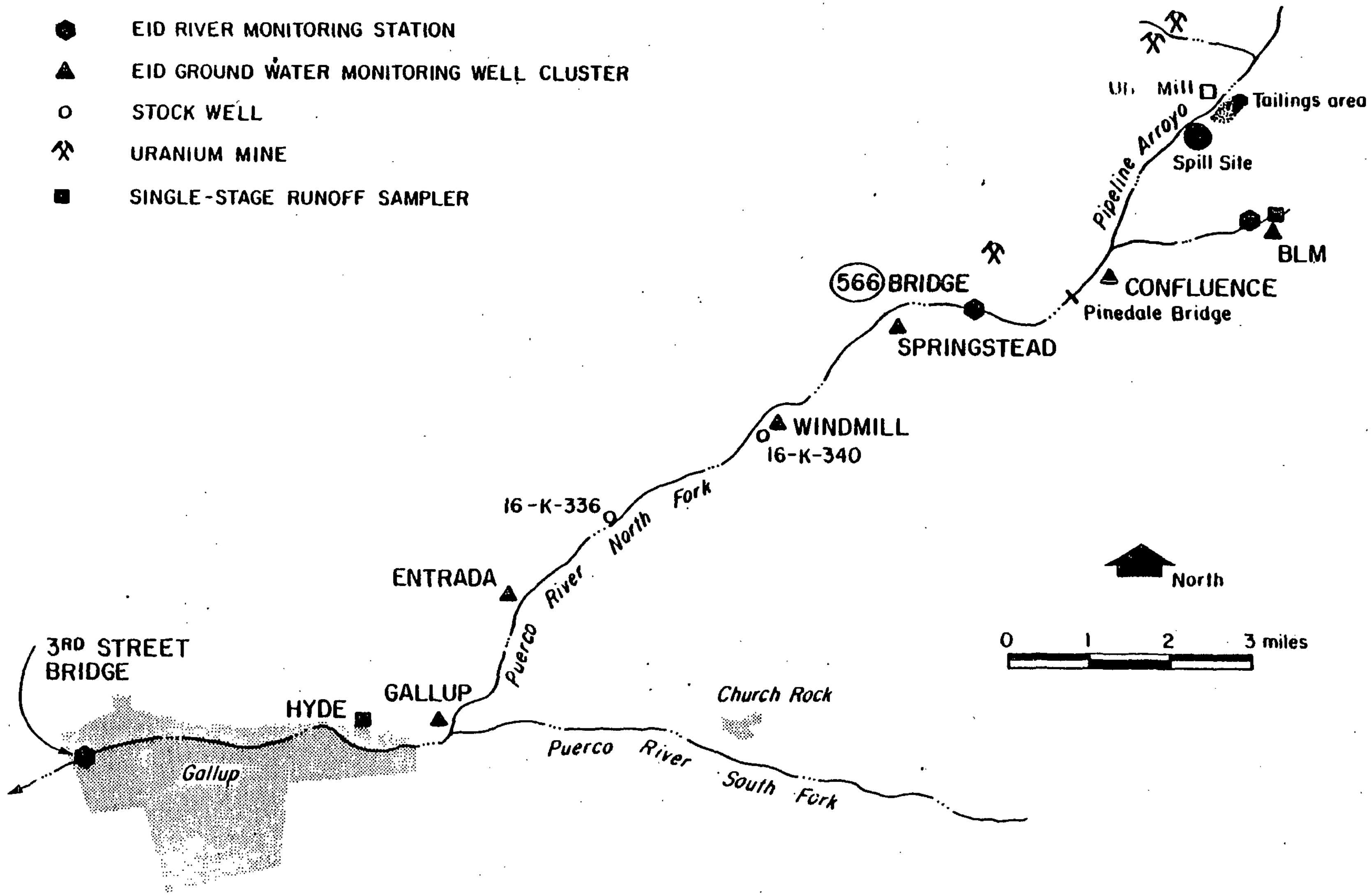



FIGURE 8.1 Well locations in the Church Rock mining district and along the Puerco River

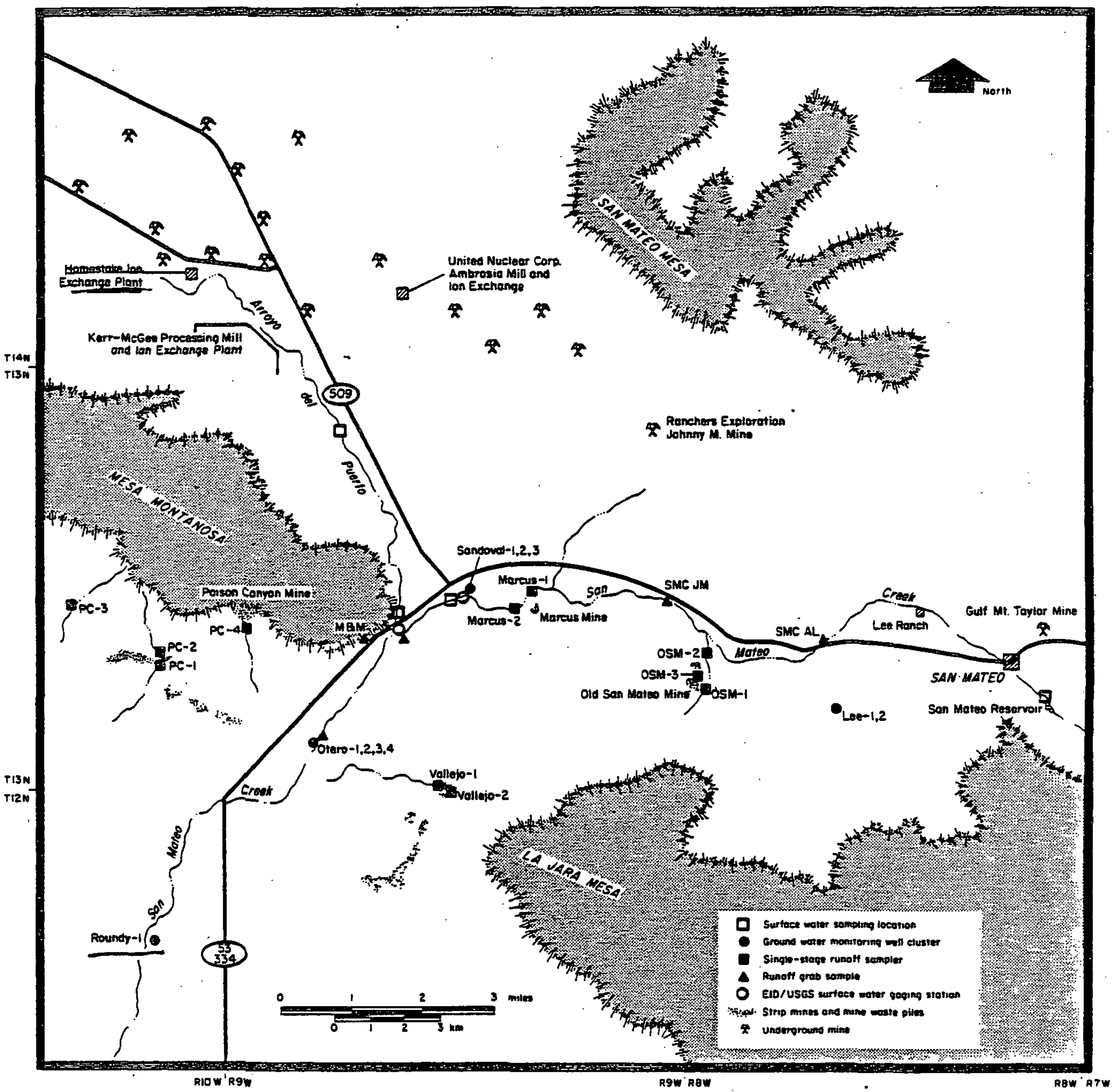



FIGURE 8.2 Well locations in the Ambrosia Lake mining district

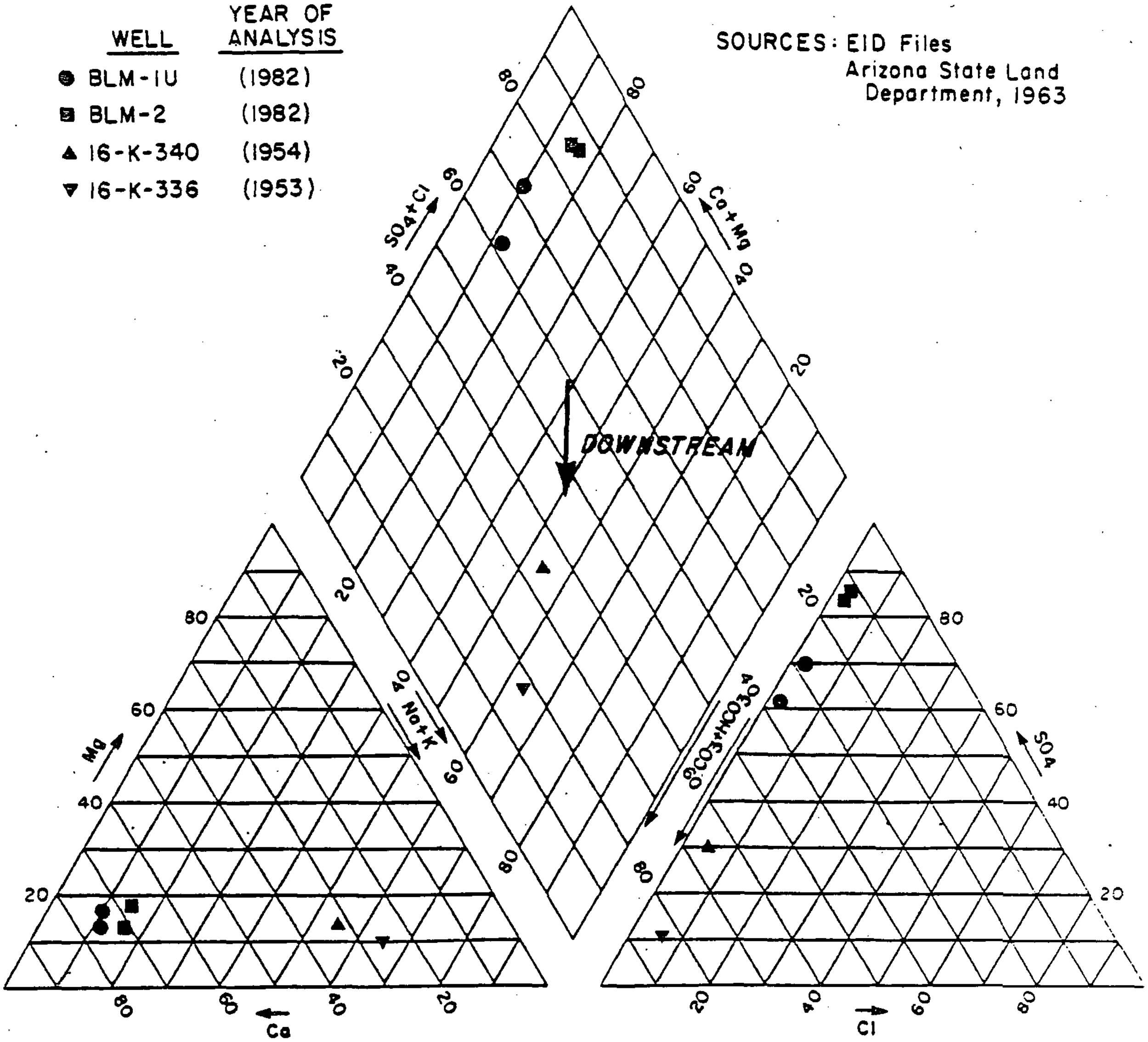



FIGURE 8.3 Natural alluvial ground water quality along the North Fork of the Puerco River

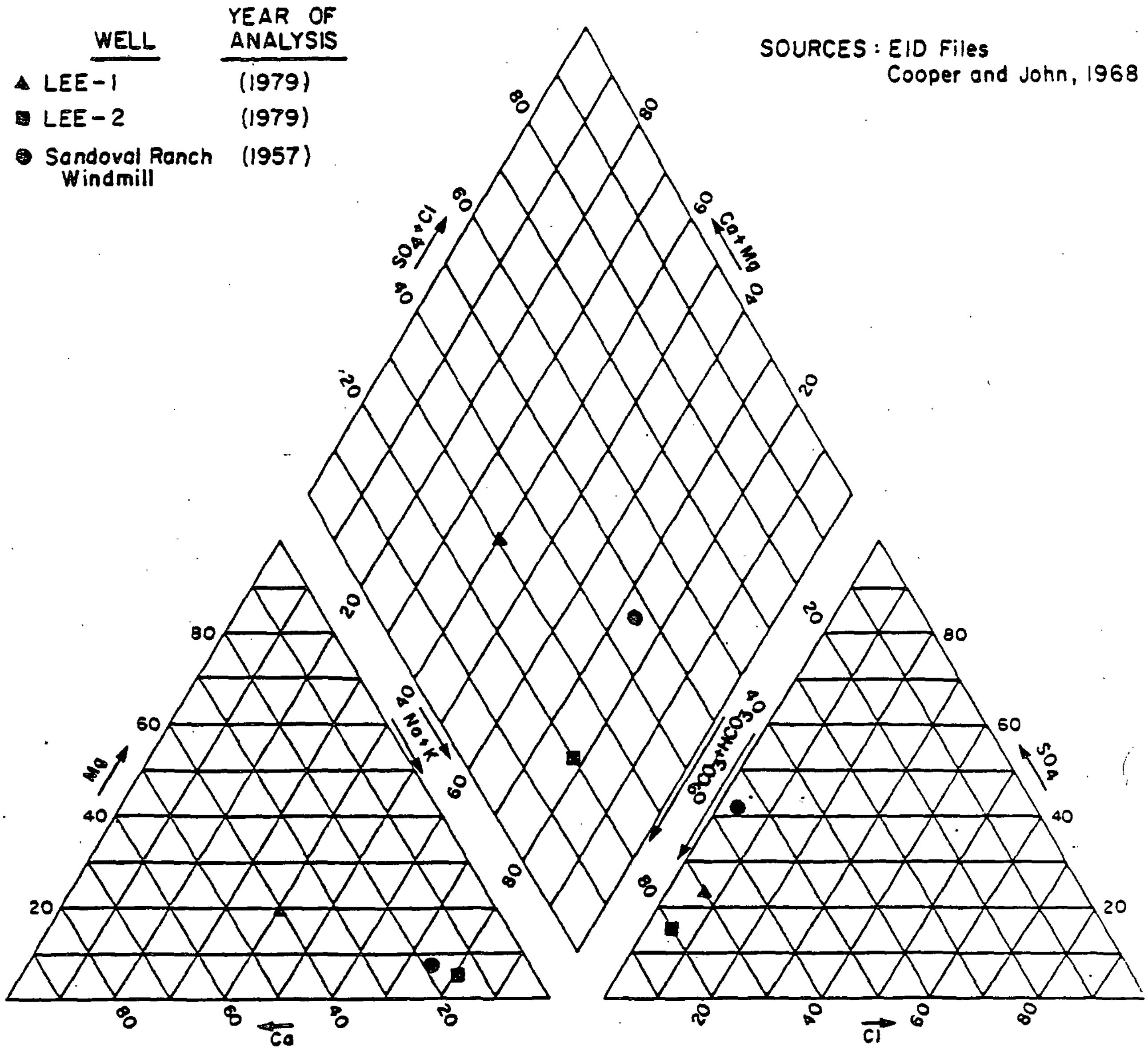



FIGURE 8.4 Natural alluvial ground water quality along San Mateo Creek

concentrations of 0.018 mg/l (EID files). Although minewaters have been discharged to the San Mateo Creek above this well since 1976, the depth of the well (130 feet) moderates the impacts of the mine discharges and, as a worst case, the 1980 selenium concentration represents an upper limit estimate of the pre-mining concentration. Natural selenium concentrations in ground water may increase downstream from the Sandoval Ranch because of the probable contribution of selenium-enriched Poison Canyon sediments to the San Mateo Creek alluvium.

## 8.2 IDENTIFICATION OF IMPACTS ATTRIBUTABLE TO MINE DEWATERING EFFLUENTS

Due to the lack of pre-mining data, comprehensive descriptions of the impacts of mine dewatering can not be made for all locations. At many locations, however, minewater impacts can be indirectly estimated after joint consideration of several pieces of hydrogeochemical evidence. The principal indicators that suggest if ground water has been impacted at a given location include the following:

1. Molybdenum concentrations in alluvial ground water greater than 0.03 mg/l. Mine dewatering effluents are the principal sources of dissolved molybdenum in the Puerco River and San Mateo Creek channels. Runoff from uranium mine waste piles may contain detectable levels of dissolved molybdenum, but due to the infrequency of runoff events and dominantly sediment-bound nature of the waste pile contaminants, significant impacts to ground water, if any, should be restricted to the immediate vicinity of the waste pile. The presence of molybdenum in concentrations greater than 0.03 mg/l in alluvial wells along these channels is indicative of the presence of mine dewatering effluents. The absence of molybdenum in these wells, on the other hand, does not mean that minewater impacts are not evident because not all effluents contain elevated levels of molybdenum (see Table 7.3).

2. Uranium concentrations greater than 0.06 mg/l in alluvial ground water along the North Fork of the Puerco River, and greater than 0.03 mg/l upstream and 0.1 mg/l downstream of the confluence of San Mateo Creek with Arroyo del Puerto. The values constitute the estimated upper limit concentrations found in these ground waters under natural conditions.

3. Selenium concentrations greater than 0.01 mg/l along the North Fork of the Puerco River, and greater than 0.15 mg/l along the San Mateo Creek upstream of its confluence with Arroyo del Puerto. Natural selenium concentrations along these river reaches are expected to be relatively low. Natural conditions below the San Mateo Creek-Arroyo del Puerto confluence cannot be projected because of the uncertainty regarding the added influence of selenium-enriched Poison Canyon sediment on ground water quality.

4. Major changes in total dissolved solids concentrations and in general ground water chemistry composition within a distance less than 3 miles. Natural changes in TDS concentrations and in composition are expected to be gradual; rapid changes in both are indicative of minewater effects.

5. Significant decline in molybdenum, uranium, or selenium concentrations with increasing depth in the upper portion of an alluvial aquifer. Contaminants contributed to the aquifer through stream bottom recharge (as is the case with minewaters) are expected to be more concentrated in the upper portion of the aquifer than contaminants naturally occurring in the ground water.

of unfiltered natural runoff indicate the virtual absence of molybdenum in sediments and natural waters in these drainages (see Table 4.3).

### 8.1.3. Uranium-natural

Statistical analyses have been performed on data from the North Fork of the Puerco River in attempt to estimate naturally occurring uranium concentrations in alluvial ground waters within that drainage (see Sinclair Probability Plots, section 3.4.1). These analyses allow differientation of natural ground waters from those influenced by uranium industry wastewaters (i.e., minewaters and the United Nuclear Corporation uranium mill tailings spill). Details of these analyses are given fully elsewhere (Gallaher and Cary, 1986) and are only summarized here.

Results of the analyses suggest that natural uranium concentrations for the North Fork of the Puerco River average approximately 0.02 mg/l and rarely exceed 0.06 mg/l. The estimated average natural concentration is identical to that suggested by U.S. EPA (1975). Average uranium concentrations at the BLM cluster range from 0.014 to 0.048 mg/l.

Natural uranium concentrations in alluvial waters along San Mateo Creek potentially may be higher than along the Puerco River. The abundant natural uranium ore outcrops in the San Mateo Creek drainage (for example, at Marcus and Poison Canyon mines; see Figure 8.2) probably contribute sediments enriched in uranium to the alluvium and these, in turn, contribute uranium to ground waters flowing in the alluvium. That natural runoff in the Ambrosia Lake mining district typically contains total uranium concentrations about three times higher than in the Church Rock mining district is indirect evidence for this mechanism (see Table 4.3).

While uranium concentrations at the Lee wells are consistently below the limit of detection (0.010 mg/l), the Lee wells are completed in alluvium largely derived from non-ore bearing rock material. As ground water flows downvalley from the Lee well cluster, natural uranium concentrations are anticipated to increase gradually as ground water flows through a more uranium-enriched alluvium. Pre-mining uranium concentrations at the Sandoval Ranch are estimated to have been less than 0.030 mg/l, based on interpretation of gross alpha activity concentrations obtained from a 1975 sampling of an alluvial windmill at the ranch (U.S. EPA, 1975). Natural uranium concentrations may increase further downstream. U.S. EPA (1975) estimated that background concentrations may approach 0.1 mg/l within the Ambrosia Lake mining district.

### 8.1.4. Selenium

Under natural conditions selenium concentrations in alluvial ground water along the North Fork of the Puerco River are expected to be uniformily low, that is, less than 0.01 mg/l. Average concentrations in the two BLM wells are <0.005 and <0.007 mg/l. Further, analyses of unfiltered natural runoff indicates the virtual absence of selenium in sediments and natural waters in this drainage (see Table 4.3).

In contrast, along San Mateo Creek, natural selenium levels may be significantly elevated. Selenium is known to be locally enriched in soils and plants in the Poison Canyon area (Cannon, 1953; Rapaport, 1963). It is noteworthy that median total selenium concentrations in natural runoff are over six times greater in the Ambrosia Lake mining district than in the Church Rock mining district (see Table 4.3).

Selenium concentrations in the Lee wells are generally undetectable (<0.005 mg/l). A 1980 EID analysis of the downstream Sandoval Ranch windmill showed selenium

## 8.3 CHANGES IN IONIC CHEMISTRY

Alluvial ground waters that are recharged primarily by dewatering effluents have been found to assume the ionic composition of the minewaters. Such water-quality changes are seen in areas of ground-water recharge along the Puerco River and San Mateo Creek. Pronounced changes in ionic composition of alluvial ground waters, for example, are seen at the Confluence test well cluster along the Puerco River. This well cluster is located about one mile below the confluence of Pipeline Arroyo, the channel receiving most of the Church Rock mine discharges, and the Puerco River. It is therefore immediately downgradient from the point where native ground waters are potentially affected by minewaters (see Figure 8.1).

Figure 8.5 shows that ground waters produced from wells CON-IL and CON-3 have ionic compositions similar to dewatering effluent and unlike natural waters, as represented by the BLM well cluster. Wells CON-IU and CON-2, on the other hand, produce waters more similar to natural waters. Ground water in well CON-3, which chemically most resembles the minewaters, also has a total dissolved solids concentration similar to minewaters (500 mg/l versus greater than 1000 mg/l at the BLM cluster). It is apparent that some water in the alluvial aquifer at that well cluster has been transformed from the strongly calcium-magnesium sulfate type to an intermediate type that tends toward sodium bicarbonate. Other test wells along the Puerco River that produce ground waters with ionic signatures similar to that for CON-3 are SPR-1, SPR-3U, GAL-1, GAL-2, and GAL-4. Because of the lack of pre-dewatering ground water quality data, it can not be definitely stated that all of these wells have been affected by the dewatering effluents.

The water quality of shallow ground waters in the San Mateo Creek-Arroyo del Puerto drainage has also been transformed by dewatering effluents. This change in major chemistry is most evident near the confluence of San Mateo Creek and Arroyo del Puerto (see Figure 8.2). One mile upstream along San Mateo Creek, alluvial ground waters at the Sandoval monitoring well cluster are of the sodium-sulfate-bicarbonate water chemistry type with a total dissolved solids concentration of about 650 mg/l (Figure 8.6). Although minewater from Ranchers Johnny M. Mine enters San Mateo Creek about 3 miles above the well cluster, no significant changes in ionic composition are evident in the test wells because of the close chemical similarity between minewaters and natural ground water at the site (see Sandoval Ranch windmill analysis, Figure 8.4).

In contrast, downstream from the confluence EID test wells on the San Mateo Creek produce alluvial ground water that bears a strong ionic resemblance to Ambrosia Lake minewaters. Figure 8.6 shows that ground waters at OTE-2, OTE-4, and RDY-1 now are all of the calcium-magnesium sulfate type, as are the minewaters introduced via Arroyo del Puerto. Corresponding to the shift in San Mateo Creek's alluvial ground water chemistry, total dissolved solids concentrations increased from about 650 mg/l at the Sandoval well cluster to over 2100 mg/l at the Otero well cluster, located three miles downstream.

## 8.4 TRACE ELEMENTS AND RADIONUCLIDES IN GROUND WATER

In addition to altering the dominant water chemistry and total dissolved solids concentrations of ground waters, infiltration of minewaters has elevated the concentrations of trace elements and gross radioactivity. Specifically, in test wells determined to have been affected by minewaters, the concentrations of uranium, molybdenum, selenium, and gross alpha particle activity are elevated above natural levels by 10 to 40 times. Evidence suggests that infiltration of mine effluents has caused similar responses elsewhere in the region beneath zones of significant stream bottom leakage

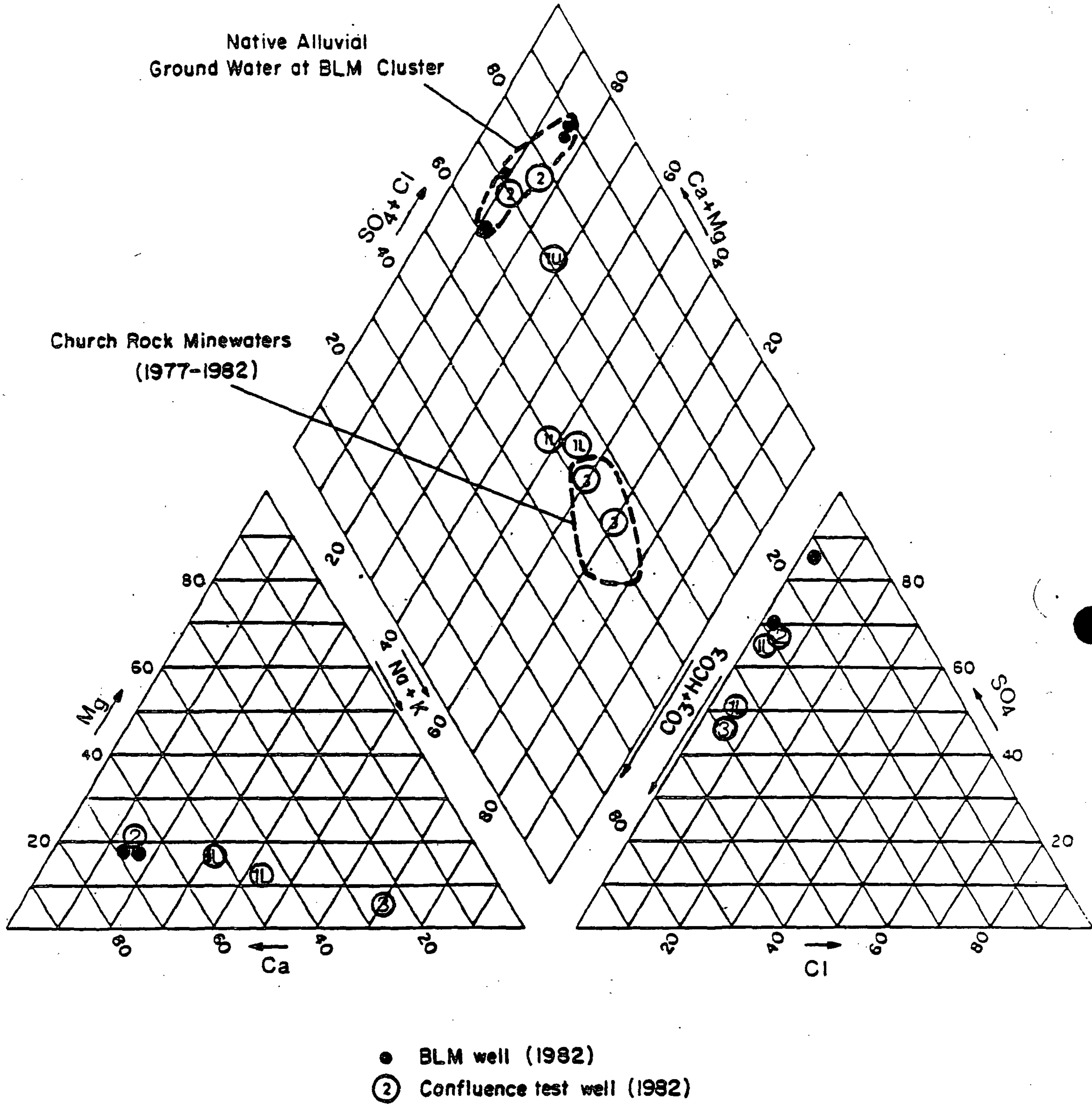



FIGURE 8.5 Ground water quality along the Puerco River near the BLM and Confluence well clusters.

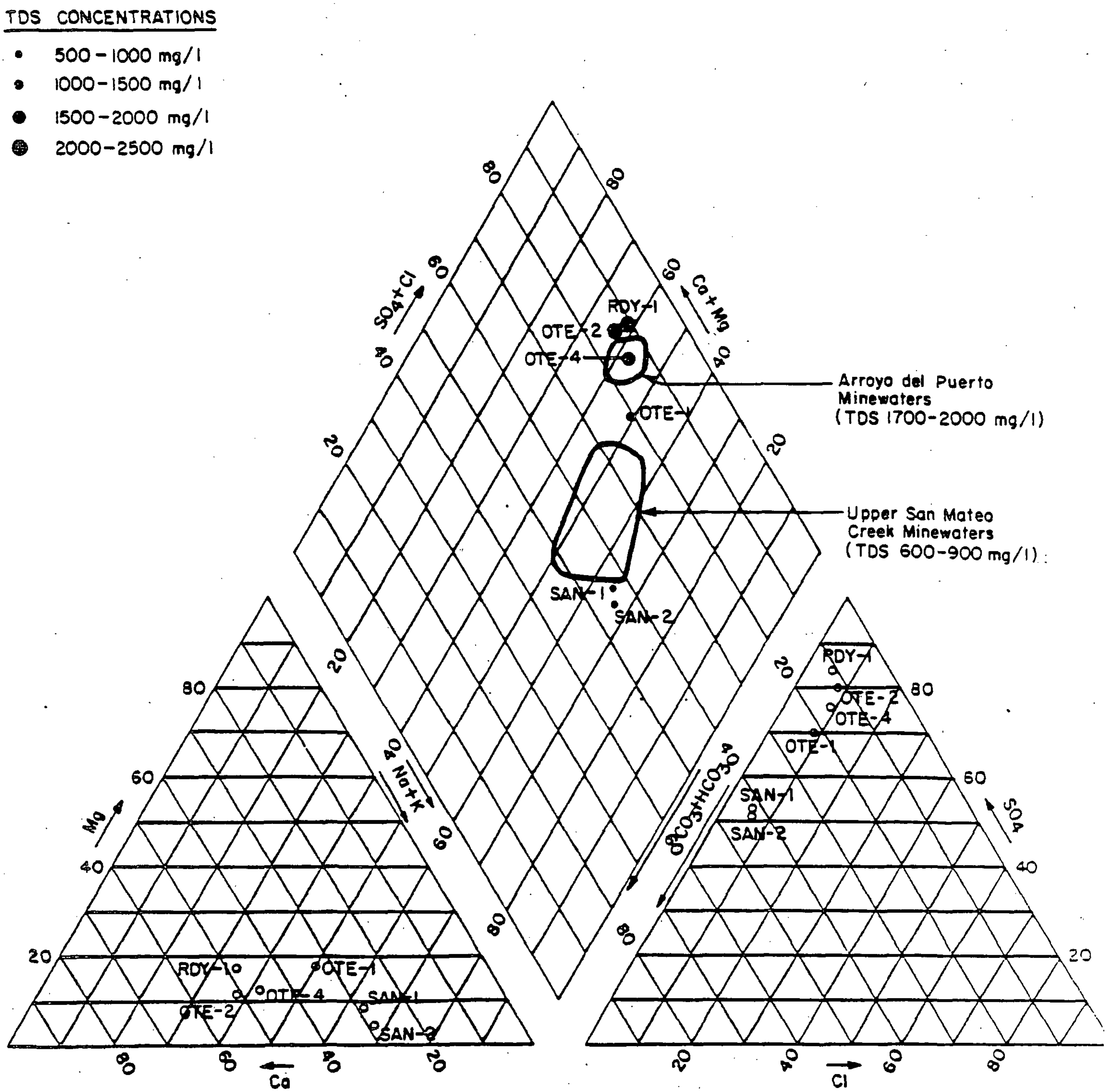



FIGURE 8.6 Ground water quality along San Mateo Creek

Degradation of ground water quality is most pronounced in the Ambrosia Lake mining district. This is to be expected for the following reasons: 1) approximately two-thirds of the historical minewater production from New Mexico uranium mining areas has been in this district (see Figure 6.1); 2) the quality of the discharged water overall is poorer than that in the Church Rock mining district (see Table 7.3); and 3) hydrogeologic conditions along Ambrosia Lake drainages result in relatively rapid infiltration of the wastewaters.

Table 8.1 shows mean contaminant concentrations detected in EID test wells along San Mateo Creek, the principal drainage of the Ambrosia Lake mining district. Uranium, molybdenum, and selenium concentrations at the Lee wells are below detectable levels of 0.005 to 0.01 mg/l. Uranium and molybdenum levels at the Sandoval well cluster are 10 to 20 times detectable limits due to infiltration of dewatering effluents. Other trace elements did not exhibit concentrations elevated above those found at the Lee wells.

Down valley below the confluence with the Arroyo del Puerto, uranium, molybdenum, and selenium concentrations are found to be approximately three times greater than at the Sandoval well cluster. Uranium and molybdenum concentrations in the Otero wells are as much 7 times greater than natural levels projected for this portion of the San Mateo Creek (see section 8.1) and therefore indicate that ground water at that location has been substantially degraded by minewaters. Moreover, both uranium and molybdenum significantly decline in concentration with increasing depth. (For example, molybdenum concentrations decline from 0.38 and 0.28 mg/l in the shallower wells OTE-1 and OTE-2 (54 and 57 feet total depth, respectively) to < 0.01 mg/l in well OTE-4, a deeper well (72 feet total depth) in the same cluster.) Selenium is elevated in all the Otero wells, but is known to be naturally enriched in the area and can not be exclusively attributed to mine dewatering effluents. Generally, the pattern of trace element concentrations in the Otero wells coincides with that of the Sandoval wells (uranium > molybdenum > selenium)..

As with uranium, gross alpha particle activity concentrations are also significantly elevated along the San Mateo Creek below the Lee wells. These concentrations almost exclusively reflect the alpha radiation of uranium. Gross beta particle activities along the San mateo Creek are found in concentrations as much as 100 times those detected at the Lee wells. It is unknown which radionuclide(s) contribute principally to the gross beta concentrations.

Radium-226 concentrations may also increase due to minewater impacts, but the increases can not be verified due to the lack of pre-mining data. Table 8.1 shows radium-226 concentrations of about 0.05 pCi/l for the Lee wells. All but one of the other test wells along San Mateo Creek produce water containing more than 0.10 pCi/l of radium-226, on the average. Student-t and Mann-Whitney statistical tests show that the mean values for radium-226 in all the minewater-affected wells are significantly greater (95% confidence) than levels at the Lee wells. Despite the suggestion that minewaters have elevated radium-226 levels in alluvial ground waters, this increase is small and of little practical significance. A measureable amount of radium-226 may reach ground water, but most of the dissolved radium-226 in surface waters (up to 4 pCi/l) clearly does not.

Due to lack of pre-mining data, definitive statements can not be made regarding the influence of mine dewatering effluents at the Roundy well location, the most downstream well on the San Mateo Creek drainage The average uranium concentration of 0.13 mg/l is slightly above the EPA-estimated maximum natural level of 0.1 mg/l. In contrast, however, molybdenum is below analytically detectable levels. Selenium levels are greatly elevated, but because ground water quality is potentially influenced by Poison Canyon, where sediments are enriched in selenium, these levels can not be exclusively attributed to minewaters.

TABLE 8.1. Mean Trace Element and Radionuclide Concentrations in Wells in the San Mateo Creek Drainage, 1977-1982. Number of samples for each well is shown in parentheses and standard deviations are specified for all means. Well locations are indicated on Figure 8.2.

| | WELLS ABOVE URANIUM MINE DISCHARGES | | WELLS BELOW URANIUM MINE DISCHARGES | | | | | |
|---|---|---|---|---|---|---|---|---|
| | LEE-1 (13) | LEE-2 (14) | SAN-1 (13) | SAN-2 (12) | OTE-1 (14) | OTE-2 (15) | OTE-4 (12) | RDY-1 (12) |
| | ug/l | | | | | | | |
| As | ND | 6.8 ± 1.7 | ND | ND | ND | 6.8 ± 3.4 | ND | 5.9 ± 2.4 |
| Ba | 133 ± 38 | 113 ± 18 | 112 ± 28 | 108 ± 22 | 112 ± 33 | 132 ± 50 | 124 ± 40 | 139 ± 38 |
| Cd | ND | ND | ND | ND | ND | ND | ND | ND |
| Pb | ND | ND | ND | ND | ND | ND | ND | ND |
| Mo | ND | 9.6 ± 3.3 | 133 ± 60 | 131 ± 55 | 381 ± 115 | 257 ± 145 | ND | ND |
| Se | ND | ND | 18.5 ± 7.2 | 18.0 ± 7.7 | 80 ± 25 | 72 ± 25 | 102 ± 30 | 273 ± 128 |
| U | ND | ND | 222 ± 41 | 251 ± 79 | 754 ± 69 | 668 ± 144 | 166 ± 23 | 129 ± 11 |
| V | ND | 12 ± 2.7 | ND | ND | ND | ND | ND | ND |
| Zn | ND | ND | ND | ND | ND | ND | ND | ND |
| | pCi/l | | | | | | | |
| Ra-226** (pCi/l) | 0.05 ± .02 | 0.04 ± .02 | 0.15 ± .03 | 0.09 ± .03 | 0.11 ± .03 | 0.15 ± .06 | 0.13 ± .02 | 0.15 ± .03 |
| gross alpha | 4 ± 2 | 6.6 ± 1.05 | 184 ± 38 | 209 ± 69 | 496 ± 49 | 463 ± 49 | 123 ± 19 | 92 ± 13 |
| gross beta | 3 ± 2 | 4 ± 2 | 89 ± 37 | 96 ± 39 | 300 ± 93 | 291 ± 92 | 72 ± 33 | 63 ± 19 |

*ND = not analytically detected

**Radium-226 values reflect samples analyzed by the New Mexico Scientific Laboratory Division (SLD); for uniformity data by Eberline Instrument Corp. were not used in calculation of the mean.

The UNC uranium mill tailings spill in July 1979 greatly complicated the task of evaluating minewater impacts on alluvial ground waters in the Puerco River valley. The spill contained large concentrations of many radionuclides and trace elements, including the alpha emitters thorium-230 and uranium and the trace elements molybdenum, vanadium, and selenium. Thus, in all data collected since July 1979 there are always two potential sources for contaminants: the spill and minewaters. There are some pre-spill data for the Gallup cluster, but no pre-spill data exist for the Entrada, Windmill, Springstead, or Confluence well clusters.

Despite this major obstacle, the sources of elevated uranium in Puerco River valley ground waters are indicated through the use of the same probability techniques used to estimate natural uranium levels. These analyses allow differentiation of ground waters influenced by the spill from those influenced by minewaters. Whereas those ground waters that are high in both uranium and sulfate have been affected by the UNC spill, which was enriched in sulfuric acid, those wells that produce high uranium, but low sulfate, have been affected by minewaters, but not the spill. Only these results of these analyses (Gallaher and Cary, 1986) related to wells affected by minewaters are summarized here.

Mine dewatering effluents have degraded Puerco River alluvium with trace elements and radionuclides, although not to the same degree as along San Mateo Creek. Results of the aforementioned probability analysis suggest that fewer than one-third (6 of 21) of the EID wells along the Puerco River have been significantly impacted by uranium industry activities (minewaters and spill waters). Relatively low infiltration rates along this reach of the river effectively moderate the impacts to the underlying ground water.

Two test wells, SPR-1 and CON-3, were found to contain elevated levels of uranium attributable principally to minewaters. Table 8.2 summarizes the trace element and radionuclide concentrations found in these two wells and in BLM wells representative of natural alluvial quality. The data indicate a pattern of minewater effects similar to that documented along San Mateo Creek. Uranium and gross alpha particle activity are clearly elevated above natural levels in the two downstream wells. Molybdenum also shows increases above background although for SPR-1 the increase is negligible as it is the detectable limit. A small increase in selenium concentrations is suggested in CON-3 samples.

While minewater impacts along a given river reach may be relatively limited, they may be more significant further downstream if stream bottom leakage rates increase because of changing hydrogeologic conditions. The resultant ground water quality impacts would be highly site specific, depending on many factors including the infiltration rate, quality of the minewaters, and natural quality of ground water.

In reviewing the data for trace elements and radionuclides, it is clear that dewatering effluents are having similar effects throughout the Grants Mineral Belt. Uranium and gross particle alpha activity concentrations are often elevated in alluvial ground waters downstream from minewater discharges. Molybdenum usually appears elevated although there are exceptions. Selenium also reaches shallow ground water from minewater sources. Selenium, however, can also be locally elevated under natural conditions in Ambrosia Lake. Unless confirmed by evidence of low pre-mining concentrations, the presence of elevated selenium is not alone sufficient to demonstrate contamination by mine dewatering effluents.

TABLE 8.2. Mean Trace Elements and Radionuclides Concentrations of Selected Wells in the Puerco River Valley. Number of samples per well is shown in parentheses.

| CONSTITUENT (ug/l) | WELLS ABOVE URANIUM MINE DISCHARGES BLM 1U (2) | BLM-2 (2) | WELLS AFFECTED BY URANIUM MINE DISCHARGES SPR-1 (1) | CON-3 (2) |
|---|---|---|---|---|
| | ug/l | | | |
| As | ND* | 14 | 9 | 6 |
| Ba | 100 | 150 | ND | 180 |
| Cd | ND | ND | ND | ND |
| Pb | ND | ND | ND | ND |
| Mo | ND | ND | 10 | 170 |
| Se | ND | 7.5 | 5 | 11 |
| U | 14 | 48 | 145 | 433 |
| V | ND | ND | ND | ND |
| Zn | ND | ND | ND | ND |
| | pCi/l | | | |
| gross alpha | 10±3 | 28±10 | 56±15 | 278±10 |
| gross beta | 2.6 ± 2.9 | 16±4 | NA** | 118±22 |
| Ra-226 | 0.13±0.06 | 0.32±0.10 | NA | 0.37±0.12 |

*ND = Not analytically detected
**NA = Data not available; analysis not requested

## 8.5 GEOCHEMICAL ATTENUATION OF MINEWATER CONSTITUENTS

Ground water quality data collected from EID wells in the Grants Mineral Belt show uranium, radium-226, selenium, and molybdenum concentrations and gross alpha particle activity that are above natural levels, but not as high as in the discharged minewaters. For most of these contaminants, however, ground water concentrations are of the same order of magnitude as in the sources.

Mechanisms which may reduce the contaminant concentrations include dilution surface adsorption, cation exchange, precipitation, hydrodynamic dispersion, and molecular diffusion. Dispersion and dilution may eventually reduce contaminant concentrations, but these processes are slow and may take years or even decades to be effective. Dilution, adsorption, cation exchange and precipitation are more likely mechanisms.

Decreases of uranium, for example, from more than l.0 mg/l in minewaters to 0.5 mg/l in alluvial aquifers can probably be attributed to dilution by native ground waters. Uranium, molybdenum, and selenium all form anions in the geochemical environment of the Grants Mineral Belt and are therefore not greatly affected by some of the most effective attenuation processes, such as surface adsorption and cation exchange. These contaminants are therefore relatively mobile in both surface waters and shallow ground waters.

The tendency for uranium to precipitate from solution in Puerco River alluvium was analyzed using a computer program (WATEQFC) for calculating chemical equilibria of natural waters. Emphasis was placed on assessing the chemical stability of ground waters in EID wells most impacted by minewaters. Calculations were performed separately on natural uncontaminated ground water (BLM-1U) and on ground water dominated by mine dewatering effluents (CON-3). The predominant phase of uranium is calculated by the computer program WATEQFC to be di- oxide species. These complexes are subject to minimal adsorption because of their net negative charge and large molecular radii Tripathi, 1982; Langmuir, 1978) and are therefore very mobile in alkaline aqueous environments. Selected results of the geochemical modeling for the predominant uranium minerals are reported in Table 8.3.

The modeling output that all of the uranium species constituents are undersaturated with respect to their mineral phases by at least one hundred times. It can be inferred that uranium concentrations in the alluvial aquifer cannot be expected to decline solely as a result of long term equilibrium adjustment.

For dissolved radium-226, in contrast to uranium, the alkaline, oxidizing conditions found in the Grants Mineral Belt promote attenuation and discourage mobility. Because of its net positive charge, radium-226 is drawn to cation exchange sites on negatively charged clay minerals, organic matter, and metallic oxide coatings on the surfaces of alluvial materials. For surface and ground waters in the Grants Mineral Belt, only a small fraction of all radium-226 present remains in solution. Most radium-226 is probably immobilized in the stream channels sediments. Attenuation of radium-226 is so effective in Grants Mineral Belt alluvium that apparently minewaters increase the typical dissolved radium-226 concentrations normally carried by regional ground waters by only about 0.l pCi/l.

TABLE 8.3 Selected Mineral Saturation Indices for Uranium in Puerco River Alluvial Ground Water.

| Well No. | Sample Date (M-D-Y) | Mineral or Precipitate Phase | Formula | Saturation Index |
|---|---|---|---|---|
| BLM-1U | 01-19-82 | Tyuyamunite | $Ca(UO_2)_2(VO_4)_2$ | -4.9 |
| CON-3 | 01-20-82 | Tyuyamunite | $Ca(UO_2)_2(VO_4)_2$ | -2.7 |
| | | Carnotite-A | $K2(UO_2)_2(VO_4)_2 \cdot 3H_2O$ | -3.3 |
| | | Carnotite-B | $K2(UO_2)_2(VO_4)_2 \cdot 3H_2O$ | -3.5 |
| | | Schoepite | $UO_2(OH)_2H_2O$ | -3.6 |
| | | Coffinite | $USiO_4$ | -4.4 |
| | | Rutherfordine | $UO_2CO_3$ | -4.4 |

Although data are lacking for other uranium-238 decay products, it seems unlikely that any of the major daughter products from uranium mining activities could significantly degrade ground-water quality within the alkaline pH ranges typical of the minewaters. Thorium-230, lead-210, and polonium-210 all form cations in solution and their attenuation is likely to be as effective as radium-226 attenuation. Overall, the threat to ground water is judged to be small.

# IX. EVALUATION OF WATER QUALITY

Earlier chapters have provided an overview of both natural water quality in the Grants Mineral Belt and water quality impacted by uranium mining. In order to evaluate the significance of observed water quality, current and potential uses that are made of the water in this area need to be considered along with relevant aspects of surface and ground water hydrology and the physio-chemical fate of minewater constituents. Furthermore, because of the radioactivity associated with both natural and mining-impacted flows, the quality of these flows needs to be compared with established standards and criteria for public exposure.

All surface waters in the Grants Mineral Belt, whether natural or mining-impacted, are used by livestock for watering. Only artificially maintained perennial streams, however, are used for irrigation or have potential use for domestic water supply. All three uses are made of ground waters. The contaminant and radioactivity levels of surface and ground waters in the Grants Mineral Belth raises concerns about the suitability of natural and mining-impacted surface waters and mining-impacted ground waters for present and potential uses.

## 9.1 WATER USES

Comparison of water quality with criteria and standards provides a means of evaluating whether water quality in the Grants Mineral Belt is consistent with current use. Livestock watering is the major use of surface waters. Watering from effluent-dominated streams is commonplace. Livestock even use turbid flows that may include both natural runoff and runoff from mine tailings.

Irrigation of gardens is practiced along the Puerco River from the Highway 566 bridge to the City of Gallup. Hoses are used to draw water up from the incised stream to gardens.

Ground waters are used as domestic water supply sources. The authors know of no documented domestic use of surface waters in the Grants Mineral Belt. Nonetheless, the potential for effluent-dominated streams, as modified in chemical quality by physio-chemical processes, to affect the quality ground waters provides sufficient rationale to evaluate such streams as sources of domestic water supply. Moreover, municipalities have considered the possibility of using dewatering effluents to supplement existing water supply sources (Hiss, 1980).

Selected criteria and standards for livestock watering, irrigation, and domestic water supply are given in Table 9.1. The only comprehensive evaluation of water quality necessary to support livestock watering remains that done by the National Academy of Sciences-National Academy of Engineering (NAS/NAE, 1972) for the EPA. The NAS/NAE recommendations are in the form of water quality criteria, that is, concentrations which, if not exceeded, are expected to be suitable to support a specific water use. NAS/NAE (1972) also recommended water quality criteria to support irrigation use. As part of the Molybdenum Project, the relationship between molybdenum levels in irrigation waters and plants was investigated (Vleck and Lindsay, 1977). The New Mexico Ground Water Regulations include standards designed to protect ground water quality for agricultural use (NM WQCC, 1983). These standards are used in this report for comparison purposes only. The regulations should be consulted for information on the applicability of the standards.

TABLE 9.1. Selected Criteria and Standards for Livestock Watering, Irrigation, and Domestic Water Supply.

| CONSTITUENT | WATER USE | | | | | |
|---|---|---|---|---|---|---|
| | Livestock Watering | Irrigation | | | Domestic Water Supply | |
| | NAS/NAE | NAS/NAE | Molybdenum Project | New Mexico Ground Water Regulations | New Mexico Water Supply Regulations | New Mexico Ground Water Regulations |
| | mg/l | | | | | |
| TDS | 3,000 | | | 1,000 | | 1,000 |
| $SO_4$ | | | | 600 | | 600 |
| As | 0.2 | 0.10 | | 0.1 | 0.05 | 0.1 |
| Ba | | | | 1.0 | 1. | 1.0 |
| Cd | 0.050 | 0.010 | | 0.1 | 0.010 | 0.01 |
| Pb | 0.1 | 5.0 | | 0.05 | 0.05 | 0.05 |
| Mo | | | 0.020 | 1.0 | | |
| Se | 0.05 | 0.02 | | 0.05 | 0.01 | 0.05 |
| U-natural | | | | 5.0 | | 5.0 |
| V | 0.1 | 0.10 | | | | |
| Zn | 25 | 2.0 | | 10.0 | 5. | 10.0 |
| | pCi/l | | | | | |
| Gross Alpha[a] | 15 | | | | 15 | |
| Combined Ra-226 and Ra-228 | 5 | 5 | | 30.0 | 5 | 30.0 |

SOURCES: NAS/NAE - NAS/NAE (1972)
Molybdenum Project - Vlec[illegible]nd Lindsay (1977)
New Mexico Water Supply [illegible]ulations - NM EIB (1985)
New Mexico Ground W[illegible]gulations - NM WQCC (1983)

Two sources of comparison were used to evaluate the quality of water for domestic use. Standards in the New Mexico Water Supply Regulations (NM EIB, 1985) are applicable to water emanating from water supply systems, not to surface and ground waters and are used only for comparison purposes. Similarly, the standards in the New Mexico Ground Water Regulations (NM WQCC, 1983) are not applicable to effluent-dominated streams and are used only for comparison purposes. Both sets of regulations should be consulted for information on their applicability.

As both natural water quality and the quality of waters affected or produced by uranium mining contain radioactivity, standards and criteria in the New Mexico Radiation Protection Regulations (NM EID, 1980) are used as a basis of comparison. The Radiation Protection Regulations are not applicable to natural water quality or uranium mining and the standards and criteria are used only for purposes of comparison. The regulations should be consulted for information on applicability.

## 9.2 NATURAL SURFACE WATERS

Perennial streams in the Grants Mineral Belt are limited in number, extent, and flow. The other natural source of surface water is runoff associated with storms and snowmelt. Without mine dewatering, runoff would be the surface waters in the Arroyo del Puerto, San Mateo Creek below the community of San Mateo, and the Puerco River. Both natural perennial streams and natural runoff may be used by livestock for watering.

The quality of perennial streams, which normally carry little sediment, is consistent with the livestock watering use. Trace elements and radioactivity concentrations, however, raise concerns about the suitability of natural runoff for this use. Furthermore, levels of radioactivity in natural runoff are sometimes excessive in comparison to health criteria and standards.

### 9.2.1. Perennial Streams

Dissolved concentrations of trace elements and radionuclides are naturally low in perennial streams in the Grants Mineral Belt. Comparison of natural water quality with livestock watering criteria for six trace elements, gross alpha particle activity, and radium-226 indicates that natural concentrations are normally much less than the criteria (Table 9.2). Similarly, the livestock criteria of 3,000 mg/l total dissolved solids (NAS/NAE, 1972) is almost double the mean natural concentration of 1530 mg/l found in the Rio Moquino at the Jackpile Mine. The Rio Moquino has higher dissolved solids concentrations than the Rio Paguate or San Mateo Creek below San Mateo Reservoir.

### 9.2.2. Natural Runoff

Trace elements and radionuclides are found to have highly variable levels in natural runoff resulting from storms. These levels are statistically correlated with the amount of suspended sediment carried by the water. Despite the high amounts of sediment that are sometimes carried by natural runoff, livestock may still use these waters. Therefore, natural runoff quality was compared with livestock watering criteria for the same six trace elements used for the comparison with perennial stream quality, but with very different results.

TABLE 9.2. Comparison of Dissolved Concentrations of Trace Elements and Radioactivity in Perennial Natural Waters with Livestock Watering Criteria.

| CONSTITUENT | MEDIAN CONCENTRATION | LIVESTOCK WATERING CRITERIA[a] |
|---|---|---|
| | mg/l | |
| As | <0.005 | 0.2 |
| Cd | <0.001 | 0.050 |
| Pb | <0.005 | 0.1 |
| Se | <0.005 | 0.05 |
| V | <0.010 | 0.1 |
| Zn | <0.050 | 25 |
| | pCi/l | |
| Gross alpha | 2 | 15 |
| Ra-226 | 0.1 | 5[b] |

[a] The criteria are from NAS/NAE (1972).

[b] The criterion applies to combined radium-226 and radium-228.

Measured total concentrations of trace elements and radioactivity indicate that natural runoff quality may not be consistent with its use for livestock watering (Table 9.3). Lead, vanadium, gross alpha particle activity, and radium-226 are the primary constituents affecting the suitability of natural runoff for livestock watering as median concentrations of all four constituents exceed criteria in both the Ambrosia Lake and the Church Rock mining districts. Even though the gross alpha particle activity criterion excludes alpha activity due to natural uranium, the median gross alpha activities of 1200 and 720 pCi/l in the Ambrosia Lake and the Church Rock mining districts, respectively, far exceed corresponding natural uranium medians of 68 and 20 pCi/l (at equilibrium, 1 mg/l of natural uranium is equivalent to 677 pCi/l).

Of lesser concern are arsenic and selenium in the Ambrosia Lake district and arsenic and cadmium in the Church Rock district because of exceedances of livestock watering criteria by maximum concentrations. The maximum concentration of cadmium measured in the Ambrosia Lake district is at the criterion level.

State limits on allowable concentrations of radionuclides that maybe discharged to unrestricted areas (that is, areas not controlled for the purposes of protecting an individual from exposure to radiation or radioactive materials) provide another means of evaluating the relative importance of radionuclides concentrations. These maximum permissible concentrations (MPCs), however, apply only to state-licensed facilities, not to natural runoff (see NMEID, 1980). Comparison of natural runoff quality with MPCs indicates that radium-226 is of concern in areas unaffected by the uranium industry in the Church Rock mining district and both radium-226 and lead-210 are of concern in similar areas in the Ambrosia Lake district (Table 9.4). Polonium-210 exceeds half its MPC in the Church Rock district; all other radionuclides are present in small amounts compared to MPCs. While these data are limited, it does appear that the radiological quality of natural runoff may be worse in the Ambrosia Lake district than in the Church Rock district.

While radium-226 and lead-210 sometimes exceed MPCs in uncontaminated, natural runoff, natural radiation levels may be a cause for concern even when these radionuclides simply approach MPCs. A sample from the South Fork of the Puerco River on September 21, 1982, provides a typical example (Table 9.5). Both radium-226 and lead-210 occurred at about 75 percent of their respective MPCs in this sample. Even though no radionuclide in the sample exceeded its MPC, the sum of the ratio of each radionuclide concentration to its MPC exceeds 1.00 (actual value, 1.66) and thus is in excess of specifications set forth in Part 4, Appendix A, Note 1 of the New Mexico Radiation Protection Regulations (NM EID, 1980). Uranium industry facilities licensed under these regulations are not permitted to release water of this quality to unrestricted areas. Yet, watercourses in the Grants Mineral Belt may receive water of this quality simply as a result of natural circumstances.

TABLE 9.3. Comparison of Total Concentrations of Trace Elements and Radioactivity in Natural Runoff with Livestock Watering Criteria.

| CONSTITUENT | AMBROSIA LAKE MINING DISTRICT | | CHURCH ROCK MINING DISTRICT | | LIVESTOCK WATERING CRITERIA[a] |
|---|---|---|---|---|---|
| | Median | Maximum | Median | Maximum | |
| | mg/l | | | | |
| As | 0.13 | 0.26 | 0.08 | 0.30 | 0.2 |
| Cd | 0.006 | 0.05 | 0.003 | 0.06 | 0.050 |
| Pb | 0.52 | 2.0 | 0.17 | 2.0 | 0.1 |
| Se | 0.03 | 0.15 | <0.005 | 0.03 | 0.05 |
| V | 0.61 | 3.2 | 0.40 | 0.92 | 0.1 |
| Zn | 1.5 | 1.7 | 0.38 | 8.5 | 25 |
| | pCi/l | | | | |
| Gross alpha | 1,200 | 2,100 | 720 | 1,600 | 15 |
| Ra-226 | 15 | 321 | 19 | 47 | 5[b] |

[a] The criteria are from NAS/NAE (1972).

[b] The criterion applies to combined radium-226 and radium-228.

TABLE 9.4. Comparison of Total Radioactivity in Natural Runoff with Maximum Permissible Concentrations for Releases to Unrestricted Areas. All concentrations are in picocuries per liter (pCi/l).

| ADIONUCLIDES | AMBROSIA LAKE MINING DISTRICT | | CHURCH ROCK MINING DISTRICT | | MAXIMUM PERMISSIBLE Concentration[a] |
|---|---|---|---|---|---|
| | Median | Maximum | Median | Maximum | |
| Pb-210 | 88 | 720 | 53 | 74 | 100 |
| Po-210 | | 43[b] | 80 | 450 | 700 |
| Ra-226 | 15 | 321 | 19 | 47 | 30 |
| Th-228 | | | 22 | 43 | 7,000 |
| Th-230 | | | 24 | 42 | 2,000 |
| Th-232 | | | 24 | 43 | 2,000 |
| U-natural | 68 | 379 | 149 | 203 | 30,000 |

[a] The maximum permissible concentrations are from Table II of Appendix A to Part 4 of the New Mexico Radiation Protection Regulations (NM EID, 1980). The concentrations are not applicable to natural runoff and are used only for comparison purposes.

[b] Only a single measurement is available.

TABLE 9.5. Total Radionuclide Concentration/Maximum Permissible Concentration Ratios for the South Fork of the Puerco River on September 21, 1982.

| RADIONUCLIDE | CONCENTRATION (pCi/l) | MPC[a] (pCi/l) | CONCENTRATION/MPC RATIO |
|---|---|---|---|
| Pb-210 | 74 ± 12 | 100 | 0.74 |
| Po-210 | 90 ± 3 | 700 | 0.13 |
| Ra-226 | 23 ± 6 | 30 | 0.77 |
| Th-230 | 42 ± 4 | 2,000 | 0.02 |
| U-natural | 14 | 30,000 | 0.0005 |
| | | TOTAL | 1.66 |

[a]The maximum permissible concentrations are from Table 11 of Appendix A to Part 4 of the New Mexico Radiation Protection Regulations (NM EID, 1980). The concentrations are not applicable to natural surface waters and are used only for comparison purposes.

## 9.3 URANIUM MINE WASTE PILES AND OPEN PITS

A potential concern about degradation of surface water quality from uranium mining is runoff from uranium mining operations - specifically, from mine waste piles and open pit operations. Both surface and underground mining produce waste piles. While the waste piles vary considerably in respect to ore content, the existence of the piles creates the potential for trace elements and radioactivity to be carried by runoff into surface water courses. Similarly, open pit mining exposes the ore body and creates the potential for contamination of surface waters through runoff. Furthermore, open pit mines have large waste piles nearby which may be subject to erosion.

Investigation of the largest open pit mine in the Grants Mineral Belt, the Jackpile-Paguate mine, indicates that while certain radioactive parameters are significantly elevated downstream from the mine, water quality both upstream and downstream is consistent with the livestock watering use. Investigation of mine waste piles in the Ambrosia Lake mining district, however, indicates that runoff from the piles is of a considerably lesser quality than natural runoff. Thus, such runoff is definitely not suitable for livestock watering and raises concerns about its levels of radioactivity. Similar results are expected to be found in the Church Rock district.

### 9.3.1. Runoff From Mine Waste Piles

Runoff from uranium mine waste piles exerts a potentially significant impact on surface water quality in the Grants Mineral Belt because of the trace elements and radioactivity associated with sediment carried by this runoff. Similar to the situation with natural runoff, livestock may ingest such turbid waters.

Total concentrations of arsenic, cadmium, lead, selenium, vanadium, gross alpha particle activity, and radium-226 found in mine waste pile runoff in the Ambrosia Lake District are not consistent with ingestion of this water by livestock (Table 9.6). This conclusion remains true even after the gross alpha activity is corrected for the alpha activity due to natural uranium (1 mg/l is equivalent to 667 pCi/l), which is not included in the livestock watering criterion. The median and maximum uranium values of 389 and 41,800 pCi/l are far below the measured gross alpha activity levels. In fact, for all constituents except arsenic, maximum concentrations are one to four orders of magnitude above livestock watering criterion. Even for arsenic, the maximum concentration exceeds the livestock watering criterion by over seven times. The median concentration of arsenic, though, is at its criterion level and selenium levels normally do not exceed its criterion.

Even though maximum permissible concentrations (MPCs) for release of radionuclides to unrestricted areas do not apply to runoff from mine waste piles, comparison with MPCs provides a means of evaluating the relative importance of radionuclides concentrations. Even median concentrations of lead-210 and radium-226 exceed MPCs by an order magnitude and maximum concentrations exceed MPCs two and three orders of magnitude, respectively (Table 9.7). While natural uranium concentrations are normally below its MPC, this level was exceeded by the maximum measured concentration.

TABLE 9.6. Comparison of Total Concentrations of Trace Elements and Radioactivity in Mine Waste Pile Runoff in the Ambrosia Lake Mining District with Livestock Watering Criteria.

| CONSTITUENT | MEDIAN | MAXIMUM | LIVESTOCK WATERING CRITERIA[a] |
|---|---|---|---|
| mg/l | | | |
| As | 0.21 | 1.5 | 0.2 |
| Pb | 0.56 | 2.5 | 0.1 |
| Se | 0.03 | 0.85 | 0.05 |
| V | 1.1 | 24.8 | 0.1 |
| pCi/l | | | |
| Gross alpha | 10,800 | 420,000 | 15 |
| Ra-226 | 650 | 34,900 | 5[b] |

[a] The criteria are from NAS/NAE (1972).

[b] The criterion applies to combined radium-226 and radium-228.

TABLE 9.7. Comparison of Total Radioactivity in Mine Waste Piles in the Ambrosia Lake Mining District with Maximum Permissible Concentrations for Releases to Unrestricted Areas. All concentrations are in mg/l.

| RADIONUCLIDE | MEDIAN | MAXIMUM | MAXIMUM PERMISSIBLE CONCENTRATIONS[a] |
|---|---|---|---|
| Pb-210 | 1,000 | 30,050 | 100 |
| Ra-226 | 650 | 34,900 | 30 |
| U-natural | 389 | 41,800 | 30,000 |

[a] The maximum permissible concentrations are from Table II of Appendix A to Part 4 of the New Mexico Radiation Protection Regulations (NM EID, 1980). The concentrations are not applicable to natural runoff and are used only for comparison purposes.

When the results of comparison with livestock watering criteria and MPCs are considered together, the obvious conclusion is that while the quality of natural runoff in the Ambrosia Lake mining district is poor, mine waste pile runoff is worse. While information on the quality of mine waste pile runoff in the Church Rock district was not collected, this same conclusion is expected to hold in that district also.

### 9.3.2. Effect of an Open-Pit Mine on Surface Water Quality

Streams above and below the Jackpile-Paguate open-pit mine are likely to be used for livestock watering. In comparison to water quality in the Rio Paguate and the Rio Moquino above the mine, total dissolved solids and dissolved levels of gross alpha particle activity and radium-226 are significantly elevated in the Rio Paguate below the mine. In addition, dissolved concentrations of some trace elements are slightly elevated.

Comparison of livestock watering criteria with dissolved concentrations below the mine indicates that all constituents except for gross alpha and radium-226 are much less than recommended criteria (Table 9.8). Only the recommended criterion for gross alpha activity is apparently exceeded. The criterion, however, based on the criterion for domestic water supply (NAS/NAE, 1972), excludes uranium and the mean natural uranium concentration of 0.12 mg/l below mine accounts for 81 pCi/l of alpha activity. Therefore, the gross alpha activity is within the standard and the streams both above and below the Jackpile-Paguate mine are suitable for livestock use.

## 9.4. RELATIONSHIP OF RUNOFF QUALITY TO STREAM QUALITY

Under natural conditions (i.e., without mine dewatering), flow in San Mateo Creek below the community of San Mateo and the Puerco River consists of waters derived from runoff. *Comparison of natural runoff from storms with livestock watering* criteria indicates that such waters are not suitable for livestock watering primarily because of excessive concentrations of lead, vanadium, gross alpha particle activity, and radium-226. Data, while restricted to the Ambrosia Lake mining district, indicates that runoff from uranium mine waste piles is even less suited for livestock watering because of even higher concentrations of the same constituents.

Nonetheless, there are two lines of evidence that, when considered together, suggest that the direct effects of runoff, natural or uranium mine waste pile, on water quality are primarily local in extent. First, trace elements and radionuclides in runoff are bound up with sediment. Both trace element and radionulcide concentrations in runoff have been found to have linear, first-order statistical correlations with sediment concentrations. Further, leach tests did not produce significant leaching of trace elements from mine wastes. In addition, investigations of the partitioning of lead-210 and radium-226 between suspended and dissolved phases of runoff indicate that almost all of the radioactivity is associated with the suspended phase.

Secondly, sediments from an area become mixed with other sediments carried by the watercourse and thus diluted and then deposited along the stream bottom. The investigations of sediment deposition downstream from the San Mateo mine waste pile serve as a case example. Sediments originally identifiable as having the waste pile as their source on the basis of trace element and radionuclide concentrations,

TABLE 9.8 Comparison of Dissolved Concentrations of Total Dissolved Solids, Trace Elements, and Radioactivity in the Rio Paguate below the Jackpile-Paguate Mine with Livestock Watering Criteria.

| CONSTITUENT | MEDIAN CONCENTRATION | LIVESTOCK WATERING CRITERIA[a] |
|---|---|---|
| mg/l | | |
| TDS | 1,705 | 3,000 |
| As | 0.006 | 0.2 |
| Cd | 0.002 | 0.050 |
| Pb | <0.005 | 0.1 |
| Se | 0.006 | 0.05 |
| V | 0.010 | 0.1 |
| Zn | <0.25 | 25 |
| pCi/l | | |
| Gross alpha | 79 ± 18[b] | 15 |
| Ra-226 | 3.7 ± 0.14 | 5[c] |

[a] The criteria are from NAS/NAE (1972).

[b] The gross alpha particle criterion excludes alpha activity due to natural uranium. Therefore, while the mean apparently exceeds the criterion, actually the gross alpha is accounted for by the mean natural uranium concentration of 0.12 mg/l, which is equivalent to 81 pCi/l.

[c] The radium criterion applies to combined radium-226 and radium-228.

eventually become so mixed with other sediments as to no longer be chemically distinguishable. This phenomon has been noted by Popp and others (1983).

Watercourses of the Grants Mineral Belt, nonetheless, are dynamic systems. While dilution and deposition of sediments serve as natural mechanisms that limit adverse water quality impacts of runoff, such sediments do not necessarily remain deposited on channel bottoms. Instead, storm runoff or flow resulting from mine dewatering may entrain sediment and thus result in resuspension, further mixture, and later redeposition downstream. Thus, re-entrainments and later redeposition serves as a process for carrying trace elements and radioactivity downstream in Grants Mineral Belt watercourses.

## 9.~~6~~5 IMPACT OF MINEWATER DISCHARGES ON SURFACE WATER QUALITY

In terms of both quantity and quality, discharged minewaters are the dominant type of surface waters in the Grants Mineral Belt. Treated minewaters are used directly for livestock watering and irrigation and thus should be evaluated for suitability for these uses. Further, they infiltrate to shallow alluvial aquifers and may thus secondarily be used as a source of domestic water supply. Therefore, direct comparison of treated minewater quality with domestic water supply standards indicate the changes in chemical quality, whether by natural means or treatment, that treated minewaters must undergo to be suitable as domestic water sources.

In the Ambrosia Lake mining district, the treated minewater constituents of greatest concern in relation to water uses are selenium, radium-226, and secondarily molybdenum (Table 9.9). Selenium normally exceeds standards and criteria established for livestock watering, irrigation, and domestic water supply. Selenium is of special concern as it remains soluble as minewaters flow downstream. Median radium-226 concentrations slightly exceed both the livestock watering and irrigation criteria and the New Mexico Water Supply Regulations standard for domestic water supply. The maximum radium-226 concentration also exceeds the New Mexico Ground Water Regulations standard for protection of ground waters for domestic water supply use. While radium-226 readily becomes adsorbed onto sediment or is co-precipitated and thus through these mechanisms tends to become deposited on stream bottoms, the radium-226 associated with sediments may also be later entrained and transported downstream by runoff or dewatering effluents.

While minewaters are not known to be used for irrigation in the Ambrosia Lake mining district, the use of minewaters for irrigation in the Church Rock district indicates that potential for such use exists. Molybdenum levels are normally more than a magnitude higher than the criterion recommended by Vleck and Lindsay (1977) to prevent excessive plant uptake of molybdenum. Further, while molybdenum levels normally meet the considerably higher New Mexico Ground Water Regulations standard for protection of ground water for irrigation use, the maximum measured molybdenum level even exceeds that less restrictive standard by a factor of three. Molybdenum like selenium remains in solution.

Concentrations of other constituents shown on the table raise further concerns about the use of treated minewaters in the Ambrosia Lake mining district. Total dissolved solids and sulfate concentrations normally exceed the New Mexico Ground Water Regulations standard for protection of ground waters for irrigation and domestic water supply use. Arsenic meets the livestock watering criterion, but the

TABLE 9[illegible] Comparison of Total Concentrations in Minewater Discharges in the Ambrosia Lake Mining District with Water Use Criteria and Standards.

| CONSTITUENT | MINEWATER CONCENTRATIONS: Median | MINEWATER CONCENTRATIONS: Maximum | USE CRITERIA AND STANDARDS: Livestock Watering (NAS/NAE) | Irrigation: (NAS/NAE) | Irrigation: (The Molybdenum Project | Irrigation: (NM Ground Water Regulations) | Domestic Water Supply: (NM Water Supply Regulations) | Domestic Water Supply: (NM Ground Water Regulations) |
|---|---|---|---|---|---|---|---|---|
| | mg/l | | | | | | | |
| TDS | 1,610 | 2,615 | 3,000 | | | 1,000 | | 1,000 |
| $SO_4$ | 755 | 1,370 | | | | 600 | | 600 |
| As | 0.011 | 0.20 | 0.2 | 0.10 | | 0.1 | 0.05 | 0.1 |
| Ba | 0.21 | 1.7 | | | | 1.0 | 1. | 1.0 |
| Mo | 0.80 | 3.2 | | | 0.020 | 1.0 | | |
| Se | 0.09 | 1.0 | 0.05 | 0.02 | | 0.05 | 0.01 | 0.05 |
| U natural | 1.56 | 3.0 | | | | 5.0 | | 5.0 |
| V | 0.029 | 0.29 | 0.1 | 0.10 | | | | |
| | pCi/l | | | | | | | |
| Gross Alpha[a] | 635 | 1,760 | 15 | | | | 15 | |
| Ra-226[b] | 6.4 | 200 | 5 | 5 | | | 5 | 30 |

NOTE: Information on the sources of the use criteria and standards is found in Table 9.1.

[a]The gross alpha particle activity criteria exclude alpha activity due to natural uranium. Therefore, while the measured concentrations apparently are exceedances, the median and maximum natural uranium concentrations account for 1,060 and 2,030 pCi/l, respectively.

maximum arsenic level exceeds its irrigation criterion and standard and its domestic water supply standards. While barium levels normally meet the New Mexico Water Supply Regulations standard for domestic water supply and the New Mexico Ground Water Regulations standard for protection of ground waters for irrigation and domestic water supply use, the maximum barium level exceeds these standards. In a similar manner, vanadium levels normally meet and the maximum level exceeds livestock watering and irrigation criteria.

Gross alpha particle activity levels, which exceed the numeric levels of both the livestock watering criterion and the New Mexico Water Supply Regulations standard for domestic water supply, are accounted for by the alpha activity of natural uranium and thus are not exceedances as the criterion and the standard do not include alpha activity due to natural uranium. There is actually a large disparity between the calculated natural uranium alpha activity and the lower measured gross alpha activity levels as the median and maximum alpha activity levels for uranium are 1,060 and 2,030 pCi/l, respectively. Such differences, though, are common as a result of the difficulties of measuring gross alpha activity.

In the Church Rock mining district, the treated minewater constituents of greatest concern in relation to water uses are selenium and radium-226 (Table 9.10). Selenium normally exceeds criteria and standards established for livestock watering, irrigation, and domestic water supply. Maximum radium-226 concentrations exceed livestock watering and irrigation criteria and domestic water supply standards.

Of lesser concern in the Church Rock district are barium and molybdenum. Barium is normally below its New Mexico Ground Water Regulations standard for protection of ground waters irrigation and domestic water supply, but the maximum observed concentration was slightly higher than twice the standard of 1.0 mg/l. Molybdenum levels are normally less than the irrigation criterion recommended by Vleck and Lindsay (1977) and even the maximum level is only about one-half the New Mexico Ground Water Regulations standard for protection of ground waters for irrigation use. The irrigation criterion, however, is exceeded by the maximum observed level. While the maximum measured total dissolved solids concentration of 1,190 mg/l exceeds the New Mexico Ground Water Regulations standard for protection of ground waters for irrigation and domestic water supply use, concentrations are normally less than half the standard.

Gross alpha particle activity exceeds the numeric level of both the livestock watering criterion and the New Mexico Water Supply Regulations standard for domestic use since the criterion and the standard do not include alpha activity due to natural uranium, these levels are not exceedances. The median and maximum natural uranium concentrations are equivalent to 724 and 1,220 pCi/l of alpha activity, respectively. The differences between gross alpha activity and the calculated alpha activity due to natural uranium are attributable to the difficulties of measuring accurate gross alpha activity levels accurately.

In summary, comparisons of treated minewater quality with criteria and standards raises concern about the suitability of these waters for livestock watering, irrigation, and domestic water supply uses. Treated minewaters in the Ambrosia Lake district are poorer in quality and less suitable for these uses than those in the Church Rock district (Table 9.11). Overall, the major constituents affecting the suitability of treated minewaters are selenium, molybdenum, radium-226, total dissolved solids, and sulfate. Of these five, total dissolved solids and sulfate are the least important, as these waters are not known to be used as domestic water

TABLE 9.[illegible] Comparison of Total Concentations of Minewate[illegible]scharges in the Church Rock Mining District with [illegible]er Use Criteria and Standards.

| CONSTITUENT | MINEWATER CONCENTRATION | | USE CRITERIA AND STANDARDS | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Median | Maximum | Livestock Watering (NAS/NAE) | Irrigation (NAS/NAE) | Irrigation (The Molybdenum Project | Irrigation (NM Ground Water Regulations) | Domestic Water Supply (NM Water Supply Regulations) | Domestic Water Supply (NM Ground Water Regulations) |
| | mg/l | | | | | | | |
| TDS | 452 | 1,190 | 3,000 | | | 1,000 | | 1,000 |
| $SO_4$ | 136 | 600 | | | | 600 | | 600 |
| As | <0.005 | 0.02 | 0.2 | | | 0.1 | 0.05 | 0.1 |
| Ba | 0.413 | 2.1 | | | | 1.0 | 1. | 1.0 |
| Mo | 0.01 | 0.6 | | | 0.020 | 1.0 | | |
| Se | 0.042 | 0.3 | 0.05 | 0.02 | | 0.05 | 0.01 | 0.05 |
| U-natural | 1.07 | 1.8 | | | | 5.0 | | 5.0 |
| V | 0.012 | 0.07 | 0.1 | 0.10 | | | | |
| | pCi/l | | | | | | | |
| Gross Alpha[a] | 440 | 1,200 | 15 | | | | 15 | |
| Ra-226[b] | 2.0 | 89 | 5 | 5 | | | 5 | 30 |

NOTE: Information on the sources of the use criteria and standards is found in Table 9.1.

[a]The gross alpha particle activity criteria exclude alpha activity due to natural uranium. Therefore, while the measured concentrations apparently are exceedance, the median and maximum natural uranium concentrations account for 724 and 1,220 pCi/l, respectively.

TABLE 9.11. Constitutents of Treated Minewaters and Affected Water Uses. Major constituents affecting water uses are indicated by M; secondary constituents by S.

| Constituent | AMBROSIA LAKE MINING DISTRICT | | | CHURCH ROCK MINING DISTRIC | | |
|---|---|---|---|---|---|---|
| | Livestock Watering | Irrigation | Domestic Water Supply | Livestock Watering | Irrigation | Domestic Water Supply |
| TDS | | M | M | | S | S |
| $SO_4$ | | M | M | | | |
| As | | S | S | | | |
| Ba | | S | S | | S | S |
| Mo | | M | | | S | S |
| Se | M | M | M | M | M | M |
| V | S | S | | | | |
| Ra-226 | M | M | M | S | S | S |

NOTE: A constituent affecting a water use is considered major if the median concentration exceeds the most sensitive criterion or standard given in Table 9.1 for a specific use (i.e., measured levels normally exceed the criterion). A constituent is considered secondary if the median meets, but the maximum exceeds the most sensitive criterion or standard for a specific use (i.e., while measured levels normally meet the criterion, exceedances are found).

supplies or, in the Ambrosia Lake district where total dissolved solids concentrations are higher, for irrigation. Further, a compliance evaluation of total dissolved solids and sulfate in relation to irrigation use would need to consider individual ions, soils, crops, and acceptable yields. As mentioned earlier, radium-226 decreases as waters flow downstream from adsorption and co-precipitation and deposition, but may be resuspended. Selenium and molybdenum, however, remain soluble and thus continue to affect water use downstream as well as at the point of discharge.

Most radionuclides in treated minewaters are well below the maximum permissible concentrations (MPCs) for releases to unrestricted areas except for radium-226 (Table 9.12). While the MPCs apply only to state-licensed facilities and not to treated minewaters, here again MPCs serve as a useful basis for comparison. Radium-226 concentrations are normally below its MPC, but maximum levels exceed the MPC by almost three and seven times in the Church Rock and Ambrosia Lake mining districts, respectively. The maximum levels reflect poor operation of treatment systems. The only other radionuclide present in significant amounts in relation to its MPC is lead-210 in the Ambrosia Lake district. The median and maximum measured concentrations are 1/7 and 1/3 the MPC, respectively. Both radium-226 and lead-210 are usually lost from by becoming sediment-bound and deposited on stream bottoms, but may later be resuspended.

Animals exposed to Puerco River water tend to have higher concentrations of radionuclides in their tissues than control animals (Ruttenber and others, 1980). Evidence suggests that observed radionuclide concentrations have resulted from prolonged ingestion of contaminants predominantly derived from mine dewatering effluents and native soils. A separate EID study (Lapham and Millard, 1983) is intended to examine livestock throughout the Grants Mineral Belt and to quantify the risk to people who eat these animals.

While no current health standard for uranium was exceeded in treated minewaters, recent data suggest that chemical and radiological toxicities for uranium have been substantially underestimated. The New Mexico Ground Water Regulations standard of 5.0 mg/l was established for chemical toxicity, and the MPC for releases to unrestricted areas, equivalent to 44.3 mg/l, is based on radiotoxicity. In contrast, suggested maximum daily limits for potable water, developed from recent data by the U.S. Environmental Protection Agency (1983), are 0.21 mg/l and 0.015 mg/l based on chemical toxicity and radiotoxicity, respectively. If these more stringent limits are used for comparison, virtually none of the effluent affected waters would be considered suitable for potable water without further treatment.

## 9.6 IMPACT OF MINEWATER DISCHARGES ON GROUND WATER QUALITY

Dewatering effluents have infilterated shallow alluvial aquifers to such an extent that ground waters along San Mateo Creek downstream from the Ambrosia Lake mining district to the Otero well cluster and in localized areas along the Puerco River downstream from the Church Rock mining district now have a strong chemical resemblance to treated minewaters. Comparison of mean values for five wells along San Mateo Creek and two wells on the Puerco River determined to be affected by minewaters with use criteria and standards indicates that only molybdenum, selenium, and perhaps gross alpha are currently found in high enough concentrations to raise concerns about the suitability of shallow ground waters for livestock watering, irrigation, and domestic water supply uses (Table 9.13). Concentrations of other constituents are well below use criteria and standards.

TABLE 9.12. Comparison of Total Radioactivity in Minewater Discharges with Maximum Permissible Concentrations for Releases to Unrestricted Areas. All concentrations in pCi/l.

| RADIONUCLIDES | AMBROSIA LAKE MINING DISTRICT | | CHURCH ROCK MINING DISTRICT | | MAXIMUM PERMISSIBLE CONCENTRATION[a] |
|---|---|---|---|---|---|
| | Median | Maximum | Median | Maximum | |
| Pb-210 | 14 ± 5 | 33 ± 6 | --- | 10 ± 2[b] | 100 |
| Po-210 | 1.1 ± 0.4 | 14 ± 2 | 9.8 ± 7.4 | 15 ± 5 | 700 |
| Ra-226 | 6.4 ± 1.2 | 200 ± 10 | 2.0 ± 0.2 | 89 ± 5 | 30 |
| Ra-228 | 0 ± 2 | 0 ± 2 | --- | 0 ± 2[b] | 30 |
| Th-228 | <0.1 | <0.3 | --- | <0.2[b] | 7,000 |
| Th-230 | 0.7 ± 0.2 | 4.0 ± 0.5 | --- | 3.9 ± 0.5[b] | 2,000 |
| Th-232 | <0.1 | <0.1 | --- | <0.2[b] | 2,000 |
| U-natural[c] | 1,060 | 2,030 | 724 | 1,220 | 30,000 |

[a] Maximum permissible concentrations are from Table II of Appendix A to Part 4 of the New Mexico Radiation Regulations (NM EID, 1980). The concentrations are not applicable to treated minewaters and are used only for comparison.

[b] Only two samples were analyzed for this radionuclide in the Church Rock mining district.

[c] Uranium radioactivity was calculated from total concentrations in mg/l by using the conversion facor, 1.0 mg/l equals 677 pCi/l.

TABLE 9.13. Mean Concentrations of Ground Water Constituents Exceeding Use Criteria and Standards.

| WELL | MOLYBDENUM Mean Concentrations (mg/l) | MOLYBDENUM Affected Use | SELENIUM Mean Concentrations (mg/l) | SELENIUM Affected Use | GROSS ALPHA Mean Concentrations (pCi/l) | GROSS ALPHA Affected Use |
|---|---|---|---|---|---|---|
| San Mateo Creek | | | | | | |
| SAN-1 | | | 0.018 | DWS | 184 ± 38 | LW, DWS |
| SAN-2 | | | 0.018 | DWS | 209 ± 69 | LW, DWS |
| OTE-1 | 0.381 | IRR | 0.080 | LW, IRR, DWS | | |
| OTE-2 | 0.261 | IRR | 0.072 | LW, IRR, DWS | | |
| OTE-4 | | | 0.102 | LW, IRR, DWS | | |
| Puerco River | | | | | | |
| CON-3 | 0.170 | IRR | 0.011 | DWS | | |

NOTE: The following use criteria and standards were used in preparing the table:

LW (livestock watering)

| | | |
|---|---|---|
| Se | 0.05 mg/l | NAS/NAE (1972) |
| Gross alpha | 15 pCi/l | NAS/NAE (1972) |

IRR (irrigation)

| | | |
|---|---|---|
| Mo | 0.150 mg/l | The Molybdenum Project (Vleck and Lindsay, 1977) |
| Se | 0.02 mg/l | NAS/NAE (1972) |

DWS (domestic water supply)

| | | |
|---|---|---|
| Se | 0.01 mg/l) | New Mexico Water Supply Regulations (NM EIB, 1977) |
| Gross alpha | 15 pCi/l (except for uranium and radon) | New Mexico Water Supply Regulations (NM EIB, 1977) |

Selenium is the major constituent affecting the suitability of ground water for present and future use. The most sensitive use is domestic water supply; the least sensitive, livestock watering. Selenium concentrations in all five wells along San Mateo Creek and in one of the two wells (CON-3) on the Puerco River exceed the standard for public water supplies in the New Mexico Water Supply Regulations. The mean for CON-3, though, is essentially at the level of the standard. In addition, the three wells located farthest downstream on the San Mateo have selenium concentrations well above use criteria and thus are not suitable for livestock watering and irrigation. The molybdenum criterion for irrigation is exceeded at two wells in the Otero cluster along San Mateo Creek and at CON-3 on the Puerco River.

Gross alpha particle activity is generally elevated in ground waters influenced by dewatering effluents, but this increase is usually the result of natural uranium and thus does not constitute an exceedance of the livestock watering criterion and public water supply standard of 15 pCi/l. Only SAN-1 and SAN-2 had excess gross alpha activities of 34 and 39 pCi/l, respectively, not accounted for by natural uranium levels. Because of the difficulties involved in measuring gross alpha particle activity accurately and resulting errors associated with such measurements, these excess levels may be artifacts.

Comparison of ground water quality with use criteria and standards raises definite concerns about shallow alluvial aquifers along San Mateo Creek. The suitability of these ground waters for future use has already been affected. Unfortunately, sufficient data are not available to examine trends and to make predictions on future water quality.

Conclusions on ground waters along the Rio Puerco are not so clear-cut. The alluvium along the Rio Puerco is less permeable than along San Mateo Creek with the results that affected areas are more localized. Further, effects of the UNC tailings spills in local areas on the shallow aquifer has obscured possible effects related to dewatering. The levels of selenium and molybdenum, however, in CON-3, while lower than levels in wells along San Mateo Creek, indicate that there is a potential for sufficient degradation of ground water along the Puerco River to affect future water uses.

No current health standard for uranium is exceeded in alluvial ground waters. If the more stringent suggested limits discussed in section 9.5 are used for comparison, however, virtually none of the minewater affected ground waters would be suitable for potable water without further treatment. Because elevated levels of uranium may persist in alluvial aquifers for a decades, this treatment would have to be sustained for long period of time.

# X. LEGAL AND REGULATORY MECHANISMS

Uranium mine operations in New Mexico are subject or potentially subject to a number of federal and state laws and regulations. No single statute addresses all significant water quality impacts resulting from uranium mining. Therefore, in order to deal with the major water pollution problems discussed in this report, the full range of currently and potentially applicable laws and regulations is evaluated in order to determine the most effective means of control.

Applicable water pollution control statutes are the federal Clean Water Act and the New Mexico Water Quality Act. Other statutes that bear less directly on water quality, but are relevant to the overall effort to protect water resources are the New Mexico Radiation Protection Act, the New Mexico Abandoned Mine Reclamation Act, the federal Resource Conservation and Recovery Act, and the federal Comprehensive Environmental Response, Compensation and Liability Act.

## 10.1. CLEAN WATER ACT

The Clean Water Act is the cornerstone of federal water pollution control programs. The objective of the Act as stated in Section 101(a) is "... to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Among the national goals established by the Act to achieve this objective are elimination of the discharge of pollutants into navigable waters and prohibition of the discharge of toxic pollutants in toxic amounts (Sections 101(a)(1) and (3)).

Section 402 of the Act establishes the National Pollutant Discharge Elimination System (NPDES), to regulate discharges of pollutants into navigable waters through a permit program. Under Section 502(7) "navigable waters" are defined as "waters of the United States, including the territorial seas." The courts have broadly construed "navigable waters" to mean not only perennial rivers but also their tributaries, including intermittent streams flowing through normally dry arroyos. NPDES permits for discharges in New Mexico are issued by the EPA Region VI office in Dallas, Texas.

To implement the NPDES permit program, the EPA establishes effluent limitation guidelines for various categories of discharges. These serve as a basis for effluent limitations in specific NPDES permits. The effluent limitations guidelines specify both the pollutants and the allowable discharge concentrations or loads for a type of discharge.

Under the program, uranium mines are classed as part of the ore mining and dressing point source category. Effluent limitation guidelines, published in 40 CFR Part 440, have been established for the following constitutents of uranium mine discharges:

total suspended solids
chemical oxygen demand
uranium
zinc
total radium-226
dissolved radium-226
pH

While effluent limitation guidelines normally serve as the permit conditions, NPDES permits can be made more stringent than the guidelines as a consequence either of a case-specific analysis by the EPA or of more stringent permit conditions imposed through state certification. Section 401 of the Act requires the EPA to include effluent limitations, other limitations, and monitoring requirements certified by a state as necessary to meet Clean Water Act requirements and state law, regulations, and standards in a permit. In New Mexico, NPDES permits are certified by the EID as part of its responsibilites delegated by the New Mexico Water Quality Control Commission (WQCC). As a result of state certification, NPDES permits for uranium mines in New Mexico include monitoring and reporting requirements, but do not specify numeric limitations, for the following parameters:

barium
manganese
molybdenum
selenium
vanadium
lead-210
polonium-210

NPDES permit conditions for uranium minewater discharges in the Grants Mineral Belt are summarized in Table 10.1. The NPDES permit for Gulf Mineral Resources/Mt. Taylor does not include all the normal monitoring and reporting requirements because the omitted parameters are being regulated under the state Ground Water Regulations.

In practice, the NPDES permit program has not proved to be an effective means to regulate minewater discharges. Almost all NPDES permits issued to uranium mines in New Mexico have been legally challenged by the mine operators. Until these cases are finally resolved by the courts, NPDES regulations preclude EPA from taking enforcement action against the contesting permittees.

The mine operators have asserted that the EPA lacks jurisdiction because they are discharging into ephemeral streams which, they contend, are not "navigable waters" within the meaning of the Clean Water Act. This jurisdictional challenge has been rejected by every court decision thus far. In fact, in June, 1985, the U.S. Court of Appeals for the Tenth Circuit upheld an EPA administrative ruling affecting the Homestake Mining Company mines and the Kerr-McGee (Quivira Mining Company) Ambrosia Lake and Lee mines. In the August 5, 1983, order, EPA ruled that San Mateo Creek and Arroyo del Puerto can be considered waters of the United States that are subject to EPA regulation because a surface connection can exist between them and navigable waters during intense rainfalls. On January 13, 1986 the U.S. Supreme Court announced it would not review the Court of Appeals decision, thus indirectly upholding the decision. The Homestake Mining Company permit was stayed, and thus remained unenforceable, from 1972 through 1985.

## 10.2. NEW MEXICO WATER QUALITY ACT

In 1967 the New Mexico Legislature enacted the Water Quality Act. This Act created the WQCC and authorized the Commission to "adopt water quality standards as a guide to water pollution control" and also "adopt, promulgate and publish regulations to prevent or abate water pollution in the state." The Act defines water to include "water situated wholly or partly within or bordering upon the state,

TABLE 10 1 NPDES Permit Conditions for Uranium Minewater Discharges. An asterisk indicates that while the permit does not specify a numeric limitation, monitoring and reporting are required.

| URANIUM MINEWATER DISCHARGE (NPDES PERMIT NUMBER) | PERMIT CONDITION TIME FRAME | Flow (mgd) | Temperature (°F) | TSS (mg/l) | COD (mg/l) | U-total (mg/l) | Zn-total (mg/l) | Ra-226 (pCi/l) - total | - dissolved | Ba (mg/l) | Mn (mg/l) | Mo-total (mg/l) | Se-total (mg/l) | V-total (mg/l) | Pb-210 (pCi/l) | Po-210 (pCi/l) | pH Range | TDS (kg/day-lb/day) | BIOMONITORING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ambrosia Lake Mining District** | | | | | | | | | | | | | | | | | | | |
| Gulf Mineral Resources/Mt. Taylor (NM0028100) | Daily Ave. | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | | | * | * | * | | | 6.0- | | No |
| | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | | | * | * | * | | | 9.0 | | |
| Homestake Mining Company[1] (NM0020389) | Daily Ave. | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | | | * | * | * | * | * | 6.6- | | |
| | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | | | * | * | * | * | * | 8.6 | | No |
| Kerr-McGee (Quivira)/Ambrosia Lake[1] (NM0020532) | Daily Ave. | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | * | * | * | * | * | * | * | 6.0- | | Yes |
| | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | * | * | * | * | * | * | * | 9.0 | | Yes |
| Kerr-McGee (Quivira)/Lee Mine[1] (NM0028207) | Daily Ave. | * | * | 20 | 100 | 2.0 | 0.5 | 10.0 | 3.0 | * | * | * | * | * | * | * | 6.0- | | Yes |
| | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30.0 | 10.0 | * | * | * | * | * | * | * | 9.0 | | |
| **Church Rock Mining District** | | | | | | | | | | | | | | | | | | | |
| Kerr-McGee (Quivira)/Church Rock (NM002524) | Daily Ave. | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | * | * | * | * | * | * | * | 6.0- | * | Yes |
| | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | * | * | * | * | * | * | * | 9.0- | * | Yes |
| United Nuclear Corp./NE Church Rock Mine (NM0020401) | Daily Ave. | * | | 20 | 100 | 4.0 | 1.0 | 10 | * | * | * | * | * | * | * | * | 6.0- | 909 | Yes |
| | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | * | * | * | * | * | * | * | 9.0- | 2,000 | No |

TABLE 10.1 (Continued)

| URANIUM MINEWATER DISCHARGE (NPDES PERMIT NUMBER) | PERMIT CONDITION TIME FRAME | Flow (mgd) | Temperature (°F) | TSS (mg/l) | COD (mg/l) | U-total (mg/l) | Zn-total (mg/l) | Ra-226 (pCi/l) - total | - dissolved | Ba (mg/l) | Mn (mg/l) | Mo-total (mg/l) | Se-total (mg/l) | V-total (mg/l) | Pb-210 (pCi/l) | Po-210 (pCi/l) | pH RANGE | TDS (kg/day-lb/day) | BIOMONITORING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United Nuclear Corp./Old Church Rock Mine | Daily Ave. | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | | | * | * | * | | | 6.0- | * | No |
| (NM0028550) | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | | | * | * | * | | | 9.0 | | |
| **Other Mining Areas** | | | | | | | | | | | | | | | | | | | |
| Bokum Resources | Daily Ave. | * | | 20 | 100 | 2 | 0.5 | 10 | 3 | | | * | * | * | * | * | 6.8- | | |
| (NM002815) | Daily Max. | * | * | 30 | 200 | 4 | 1.0 | 30 | 10 | | | * | * | * | * | * | 8.6 | | Yes |
| Kerr-McGee (Quivira)/Marquez Mine | Daily Ave. | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | * | * | * | * | * | * | * | 6.0- | | |
| (NM0028754) | Daily Max. | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | * | * | * | * | * | * | * | 9.0 | | No |
| Kerr-McGee (Quivira)/Rio Puerco | Daily Ave. | * | | 20 | 100 | 2 | * | 10 | 3 | * | * | * | * | * | * | * | 6.0- | | Yes |
| NM0028169) | Daily Max. | * | * | 30 | 200 | 4 | * | 30 | 10 | * | * | * | * | * | * | * | 9.0 | | |
| Phillips Uranium Corp./Nose Rock Mine 1, 2 | Daily Ave | * | | 20 | 100 | 2.0 | 0.5 | 10 | 3 | * | * | * | * | * | * | * | 6.6- | | |
| (NM0028274) | Daily Max | * | * | 30 | 200 | 4.0 | 1.0 | 30 | 10 | * | * | * | * | * | * | * | 8.6- | * | No |

1 Permit is under ajudication.

2 Per mit also includes monitoring and reporting requirements for daily average and daily maximum concentrations of alkalinity, sulfate, total aluminum, fluoride, and phenols.

whether surface or subsurface, public or private except private waters that do not combine with other surface or subsurface water."

The WQCC has determined that the federal NPDES permit program should be the primary mechanism for controlling discharges of pollutants to surface waters in the state. Consequently, state Regulations for Discharges to Surface Waters, Part 2 of the Commission regulations (NM WQCC, 1984), include a mechanism to prevent dual regulation of NPDES permittees. Discharge limitations contained in these regulations are not applicable to an NPDES permittee unless the permittee has received written notification from the EPA of a violation and the violation has not been corrected within thirty days of receipt of the notice.

The Regulations for Discharges to Surface Waters, however, are not an effective means of regulating uranium minewater discharges even after the applicability provisions of EPA notification and non-correction of violations have been satisfied. The regulations need to be amended to include numeric discharge limitations for additional parameters. Currently, the regulations specify discharge limitations only for the following parameters:

biochemical oxygen demand
chemical oxygen demand
fecal coliform bacteria
settleable solids
pH

Of this list, only two (chemical oxygen demand and pH) are among the seven constituents of uranium minewater discharges with NPDES effluent limitation guidelines. The state regulations do not address any of the constituents for which monitoring and reporting is being required through state NPDES certification.

In its state certification of NPDES permits for uranium minewater discharges, the EID has used the general standards, Section 1-102 of the state surface water quality standards (NM WQCC, 1985), to incorporate conditions on monitoring and reporting and, when appropriate, on salinity into the permits. The general standards apply to all surface waters of the state which are "suitable for recreation and support of desirable aquatic life presently common in New Mexico waters". Among the contaminants addressed by the general standards are toxic substances and radioactivity (sections 1-102.F. and G.). The standard for toxic substances specifies that:

> Toxic substances... shall not be present in receiving waters in concentrations which will change the ecology of receiving waters to an extent detrimental to man or other organisms of direct or indirect commercial, recreational, or aesthetic value.

Under the standard, toxic concentrations are determined by appropriate bioassay techniques or by other accepted means, which may include use of established water quality criteria. Radioactivity is to "be maintained at the lowest practical level and in no case is to exceed" the numeric maximum permissible concentrations of the New Mexico Radiation Protection Regulations (NM EID, 1980).

The applicability of the general standards to ephemeral watercourses has been challenged. The uranium mine operators contend the stream standards do not apply because the watercourses to which they discharge do not support desirable aquatic life.

The EID has used the state Ground Water Regulations, Part 3 of the WQCC regulations, to regulate uranium minewater discharges, because the discharged constituents may move into ground water downstream from the discharge point. The regulations expressly exempt constituents covered by an effective and enforceable NPDES permit in order to avoid dual state and federal regulations. The regulations may be applied, however, to those constituents of a uranium minewater not covered by the NPDES for the discharge. The regulations may also be applied to all constituents of a discharge where the NPDES permit is stayed because of a legal challenge and thus is neither effective nor enforceable. Nevertheless, the Ground Water Regulations are designed specifically to protect ground water quality and the regulatory design places limitations on the effectiveness of these regulations for protecting surface water quality.

The state Ground Water Regulations establish numeric standards for the protection of ground water quality for present and potential use as agricultural and domestic water supply. The regulations require that a discharger demonstrate in a discharge plan that the discharger will not cause these standards to be violated in ground water at any place of present or foreseeable future use. Where ground water quality already exceeds a numeric standard, the ambient concentration of the constituent becomes the standard.

The design of the Ground Water Regulations makes the standards a measure of ground water quality and not discharge limitations. If a discharge plan can demonstrate that physio-chemical conditions will result in a constituent meeting its standard at any place of present or foreseeable future use of ground water, a discharger may release effluents with concentrations of a constituent in excess of its standard and still comply with the regulations.

The Ground Water Regulations have been used to regulate minewater discharges to surface watercourses at the Phillips Uranium Corporation Nose Rock mine and the Kerr-McGee Corporation (Quivira Mining Company) Lee mine because the NPDES permits were stayed because of legal challenges. In both cases the mine operators elected to comply with regulatory requirements by specifying that the mine dewatering effluents should meet the ground water standards at the point of discharge. The discussion in Chapter 8 of existing degradation of ground water by mine dewatering effluents and of physico-chemical attenuation mechanisms make it evident that dewatering effluents of much poorer quality than the ground water standards would still not result in violations of the standards for most constituents at any place of present or foreseeable future withdrawal. The exceptions are those constituents, such as selenium, which are not reduced in concentration by attenuation mechanisms.

With regard to the regulation of mine uranium waste piles, the regulatory provision of greatest potential significance is Section 2-201 of the Regulations for Discharges to Surface Waters. This section, titled 'Disposal of Refuse', states:

> No person shall dispose of any refuse into a watercourse or in a location and manner where there is a reasonable probability that the refuse will be moved into a natural watercourse by leaching or otherwise.

Under Section 1-101.00 of the WQCC regulations, "refuse" includes "all unwholesome material". There is precedent for defining mine and mill tailings as refuse. EID has used this regulatory provision to require removal of spilled copper tailings and molybdenum tailings from watercourses. This provision should also cover pond treatment sludges, which have high levels of radium-226.

The language of Section 2-201 clearly negates any argument that the refuse must have actually entered a watercourse before a violation occurs. The EID may require corrective action where there is a definitive likelihood that refuse will enter the watercourse at some future time and such action may be taken where the refuse is mine wastes, as well as in the case of other "unwholesome materials".

Leachate that results from the direct natural infiltration of precipitation through uranium mine wastes may be subject to regulation by the Ground Water Regulations if a hazard to public health exists. Results of leaching tests conducted for this study, however, suggest that the leachate would not be hazardous to public health and thus would be exempted from the discharge plan requirement.

## 10.3. NEW MEXICO RADIATION PROTECTION ACT

The New Mexico Radiation Protection Act was passed by the New Mexico Legislature in 1971. The Act empowers the New Mexico Environmental Improvement Board (EIB) to develop regulations for governing the health and environmental aspects of radiation. It authorizes regulation of all persons who receive, possess, use, transfer, or acquire any source of radiation, except where regulated by another agency or where the source is specifically exempted from these regulations.

The Radiation Protection Regulations promulgated by the Board (NM EID, 1980) establish rules for the transportation storage, handling, and disposal of a variety of radioactive materials. Among the materials licensed are the "wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content" (Section 1-102.G.). Wastes produced by milling (i.e., mill tailings) or by ion-exchange recovery facilities are thus covered by the regulations.

Uranium mining wastes (i.e., mine spoils piles), on the other hand, are not covered by the Radiation Protection Regulations. In fact, Section 3-110.B. specifically exempts "unrefined and unprocessed ore" from regulation. Nonetheless, this exemption is not required by the New Mexico Radiation Protection Act. The Act merely provides that the Act "shall not apply to mining [or] extraction of radioactive ores or uranium concentrates <u>that are regulated by the United States Bureau of Mines or any federal or state agency</u> having authority unless the authority is ceded by such agency to the board" (Section 74-3-10.c. NMSA 1978 [emphasis added]). To date, no federal or state agency regulates mine wastes in New Mexico. Consequently, the EIB is free to regulate mine wastes, should the EIB see fit to amend its regulations accordingly.

## 10.4. NEW MEXICO ABANDONED MINE RECLAMATION ACT

The New Mexico Abandoned Mine Reclamation Act establishes a state program to promote the reclamation of mined areas pursuant to Title 4 of the federal Surface Mining Control and Reclamation Act. To qualify, the mined areas must have been left without adequate reclamation prior to the enactment of the federal statute.

Further, in their present, unreclaimed state, the mined areas must continue to substantially degrade the quality of the environment, prevent or damage the beneficial use of land or water resources, or endanger the health or safety of the public. Funds received by New Mexico pursuant to Title 4 of the federal statute are placed in the Abandoned Mine Reclamation Fund, a special purpose fund created by the Abandoned Mine Reclamation Act.

While both state and federal acts have the primary purpose of providing for reclamation of coal mines, both acts do authorize reclamation expenditures for mines other than coal mines under certain conditions. Mirroring provisions of the federal statute, the New Mexico Abandoned Mine Reclamation Act states that "voids and open and abandoned tunnels, shafts and entryways resulting from <u>any previous mining operation</u> constitute a hazard to the public health or safety and... surface impacts of <u>any underground or surface mining operations</u> may degrade the environment" (Section 69-25B-6.B NMSA 1978 [emphasis added]). Upon prior approval by the Governor and the United States Secretary of the Interior, the director of the Mining and Minerals Division of the New Mexico Energy and Minerals Department is authorized to use the Abandoned Mine Reclamation Fund to correct structural and physical hazards and to reclaim surface impacts that could endanger life and property, constitute a hazard to public health and safety, or degrade the environment. Thus, the Abandoned Mine Reclamation Act allows expenditures of the Abandoned Mine Reclamation Fund for non-coal-mining reclamation, including uranium mine reclamation. It should be noted that the federal statute only allows the Secretary of the Interior to approve non-coal-mining reclamation where a request is made by the governor of a state and all coal-related reclamation has been completed in the state except when the requested non-coal-mining reclamation is related to the protection of public health and safety.

## 10.5. <u>RESOURCE CONSERVATION AND RECOVERY ACT</u>

A potentially significant statute for the regulation of solid wastes and sludges generated at uranium mines, is the Resource Conservation and Recovery Act (RCRA). The 1976 passage of RCRA by the U.S. Congress established a comprehensive framework for the management of municipal solid wastes and hazardous wastes. For this assessment, the most relevant feature of the Act is the Subtitle C program, which governs hazardous waste management. The most significant aspect of Subtitle C is an elaborate hazardous waste management program which guides the treatment, storage, and disposal of hazardous waste from "cradle to grave". This program has been delegated to the EID by the EPA and is governed by the New Mexico Hazardous Waste Management Regulations (NM EIB, 1984), which are equivalent to the RCRA regulations promulgated by the EPA. Under the memorandum of understanding between the EPA and the EID, the state regulations must be revised to conform when federal RCRA regulations are revised by the EPA.

In 1981 the U.S. Congress amended RCRA so as to suspend RCRA regulation of mine wastes (including uranium mine wastes) pending completion of a study by the EPA to determine whether mine wastes should be dealt with as other "hazardous wastes" are under RCRA. That EPA study (U.S. EPA, 1985) was recently submitted to Congress with preliminary recommendations on RCRA regulation of mining wastes. A recommendation whether to regulate uranium mine wastes has not been reached by EPA. The Agency is concerned that radioactive wastes may pose a threat to human health and the environment, but it does not have enough information to conclude that they do. EPA will continue to gather information to determine whether these wastes should be regulated by RCRA.

In the event that the EPA concludes that mine wastes should be covered by RCRA hazardous waste management regulations, some pre-1981 EPA actions suggest what may be expected from the EPA in regard to uranium mine waste regulation. In 1978 the EPA proposed that uranium mine wastes containing radium-226 concentrations greater than 5 pCi/g be listed as "hazardous wastes" under RCRA. At the same time the EPA also proposed special waste standards for the treatment, storage, and disposal of overburden and waste rock (see 43 Fed. Reg. 58946-59028, Dec. 18, 1978).

## 10.6. COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), signed into law in 1980, allows the federal government to respond to threats from uncontrolled abandoned or inactive hazardous waste sites. More specifically, CERCLA is designed for the cleanup of existing or potential contamination problems resulting from improper waste disposal practices which may present an imminent and substantial danger to public health or to the environment.

The remedial measures carried out by the federal government under CERCLA are financed by the Hazardous Substance Response Trust Fund, commonly referred to as "Superfund". Most of the Trust Fund (86.2 percent) is provided by industry through taxes, with the remaining portion appropriated from general revenues.

The guiding policy for the use of the Trust Fund is provided by CERCLA itself. In cases where the responsibility for wastes causing contamination can be traced to private parties with financial resources, CERCLA requires that the financial responsibility for cleanup be placed on those companies. This requirement helps assure that the Superfund will be available to clean up as many sites as possible where no solvent responsible party can be found.

Before a site is considered for Superfund action, each site must be quantitatively evaluated for relative ranking on the National Priorities List. Factors considered in the evaluation are the following: the population at risk, the hazard potential of hazardous substances at the facility, the potential for contamination of drinking-water supplies, the potential for direct human contact, and the potential for destruction of sensitive ecosystems. The CERCLA list of hazardous constituents includes a general radiation standard which may apply to uranium mine waste. The relative rankings of many sites in the Grants Mineral Belt, however, may be low due to sparse populations in the vicinity of uranium mining areas.
CERCLA additionally provides the EPA with authority to take enforcement actions against owners of sites not on the National Priorities List in order to compel the owners to clean up the sites. Moreover, CERCLA authorizes suits by a state against a site owner to recover response costs and damages to natural resources whether or not a site is on the National Priorities Lists.

# XI. RECOMMENDED ACTIONS

The analysis of water quality impacts of uranium mining presented in this report reveals three major water quality concerns that require administrative, regulatory, or court action. Comparison of the results of the regional assessment with established criteria and standards indicates that discharge of mine dewatering effluents into surface watercourses and runoff from uranium mine waste piles are major water quality concerns. In addition, the sludges generated by treatment of minewaters have high levels of radium-226 and other radionuclides; the potential for these to be introduced into watercourses is a major concern. The relationship of these water quality concerns to the various administrative, regulatory, and judicial mechanisms discussed previously is depicted in Figure 11.1. Specific recommendations are discussed below.

## 11.1. CONTROL OF MINE DEWATERING EFFLUENTS

### 11.1.1. Background

Comparison with established use criteria and standards indicates that the quality of uranium mine dewatering effluents is not consistent with the existing use of these discharged minewaters for livestock watering and irrigation, or for their potential use for domestic water supply. This conclusion applies to both Ambrosia Lake and Church Rock Mining Districts, despite significant differences in water quality between the two districts. The constituents that most often affect the suitability of the effluents are selenium, molybdenum, radium-226, sulfate, and total dissolved solids. Concentrations of arsenic, barium, and vanadium may also exceed criteria and standards (see section 9.6).

The overview of regulatory mechanisms indicates that there are three mechanisms currently available for regulation of the discharge of mine dewatering effluents into surface watercourses: the NPDES permit program, the New Mexico Regulations for Discharges to Surface Waters, and the New Mexico Ground Water Regulations. The WQCC has determined that the NPDES permit program should be the primary avenue for controlling discharges of pollutants to surface watercourses.

Of the eight constituents listed above as affecting the suitability of dewatering effluents for livestock watering, irrigation, and domestic water supply, only radium-226 is among the constituents of uranium minewater discharges with established NPDES effluent guidelines. While radium-226 is represented twice (both as total and as dissolved) among the seven constituents having NPDES effluent guidelines, the numeric effluent guidelines for radium-226 reflect radium-removal technology and may therefore not be sufficiently stringent for resultant in-stream flows to meet criteria and standards applicable to water uses in the Grants Mineral Belt. As was mentioned previously in the regulatory overview, numeric effluent guidelines may be made more stringent and the parameter coverage broadened for uranium

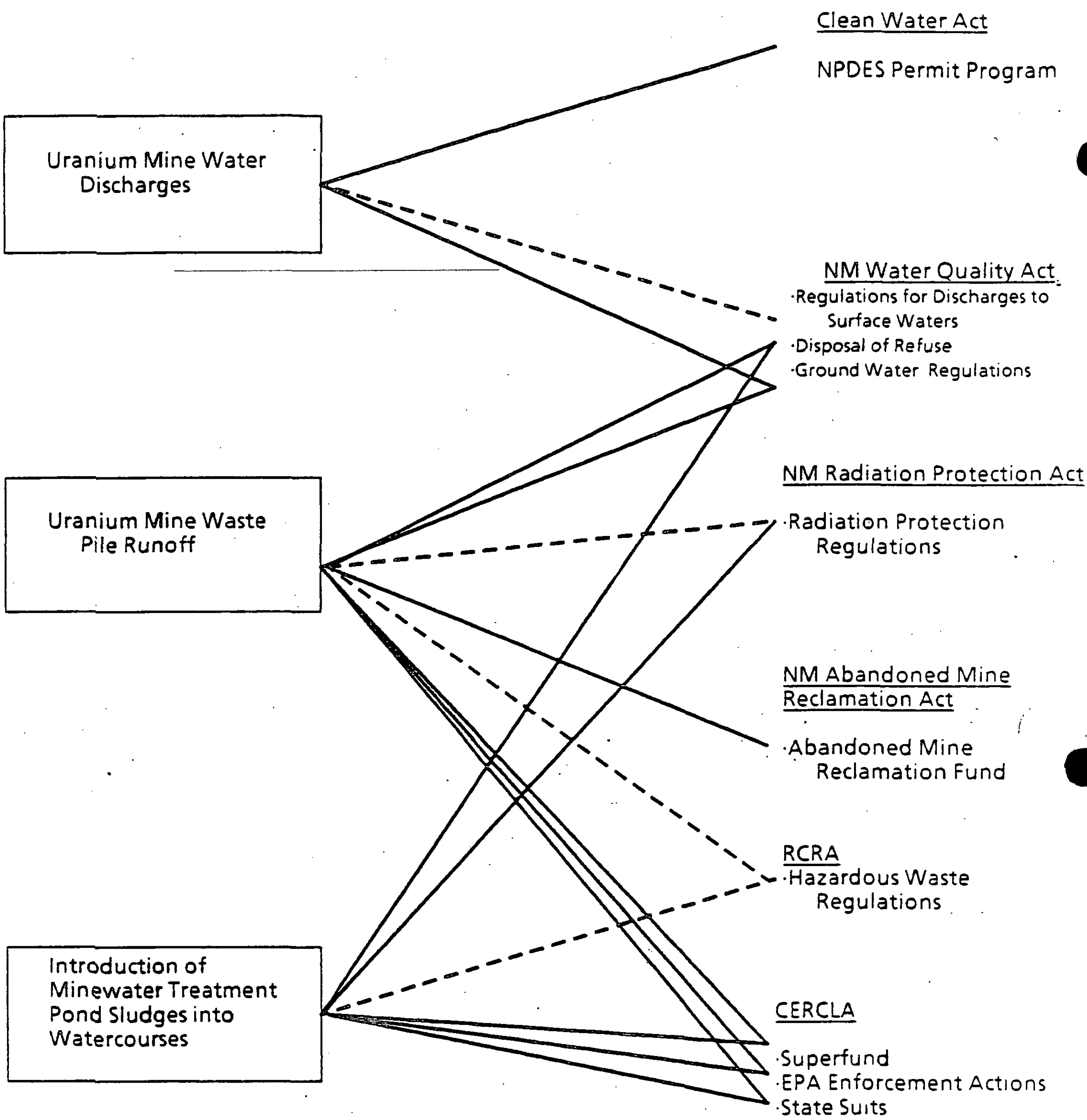



FIGURE 11.1. Legal and Regulatory Mechanisms for Controlling Major Water Quality Contaminants. Solid line indicates a currently applicable mechanism; dashed line indicates a potentially applicable mechanism.

minewater discharges in New Mexico as the result of case-specific analysis by the EPA or state certification by the EID.

Significant drawbacks currently exist, however, to the reliance on the NPDES permit program to regulate dewatering effluents. First, slightly more than one-fourth of the NPDES permits for uranium minewater discharges are under adjudication and hence, under EPA regulations, are not enforced. As noted earlier, one permit has been under adjudication for 13 years. Secondly, permits for new discharges are subject to the same legal challenge.

The New Mexico Regulations for Discharge to Surface Waters do not serve as an effective state alternative to the NPDES permit program for regulation of uranium minewater discharges for several reasons. First, a discharger with an NPDES permit is not subject to the state regulations until 30 days after the discharger has received notification of noncompliance from the EPA, provided that the discharge still remains noncompliant with permit conditions after the 30-day period. Of the 11 NPDES permits for uranium mine discharges, however, only seven are enforceable under EPA regulations. The remaining four are stayed pending resolution of adjudication. Further, the state regulations do not include discharge limitations for any trace element or radionuclide. In fact, of the seven constituents of minewater discharges for which the EPA has established numeric effluent guidelines, only two (chemical oxygen demand and pH) have discharge limitations in the state regulations. These discharge limitations are generally similar to, but not the same as, numeric effluent limitation for NPDES permits for uranium mine discharges (e.g., the state COD limitations of less than 125 mg/l compares to an NPDES daily average of 100 mg/l; and the state pH range is between 6.6 and 8.6, while the NPDES has pH ranges of 6.6 to 8.6 and 6.0 to 9.0, depending upon the specific permit).

The New Mexico Ground Water Regulations are designed to protect ground water quality for present and potential use as agricultural and domestic water supply. As was discussed earlier in this chapter, these regulations are not designed to protect surface water quality and therefore are not an effective means of regulating surface water quality.

The environmental consequences, however, of the current lack of effective regulation mine dewatering effluents are not so serious as they potentially could be. Some companies, while contesting their permits, have treated their minewaters so that discharges generally meet NPDES permit requirements. More importantly, since 1980 the uranium industry in New Mexico has experienced a major decline that is expected to continue for an indefinite period. The result is that of the 11 uranium mines with NPDES permits, seven have ceased discharging. Of the remaining four, two still have permits under adjudication. Nevertheless, the information presented in Chapters IV and VI clearly documents the impairment of water resources that occurred prior to 1980 and could resume if the industry revives while water pollution controls remain ineffective.

### 11.1.2. Recommendations

1. The EID should coordinate with the EPA so that new or renewal NPDES permits for uranium mine dewatering effluents in New Mexico include numeric effluent limitations for radium-226 and other parameters related to downstream uses of these waters. Factors to be considered in the development of these effluent limitations are present water uses, likelihood of future uses, and technology available for water treatment. At a minimum, the quality of the effluent should

meet the requirements specified in the "Hazardous Substances" and "Radioactivity" (1-102.G.) portions of Water Quality Standards for Interstate and Intrastate streams in New Mexico (WQCC, 1985). Such effluent limitations may be included in permits through state certification by the EID or case-specific analysis by the EPA.

2. The New Mexico Regulations for Discharges to Surface Waters should be substantially amended to serve as an effective means of regulating uranium mine dewatering effluents and other discharges to surface watercourses. Amendments should include comprehensive numeric discharge limits not only for those chemical constituents regulated by NPDES, but for other constituents necessary to protect water quality for agricultural or domestic use.

## 11.2. CONTROL OF RUNOFF FROM MINE WASTE PILES

### 11.2.1 Background

The extensive survey by Anderson (1980) provides a basis for estimating that 10 to 20 percent of all abandoned uranium mines and a few large active mines have waste piles that are eroding directly into surface drainage channels. Data developed for this report indicate that sediment carried by runoff from waste piles into surface watercourses has high levels of trace elements and radioactivity associated with it. Contaminated sediments are particularly evident in arroyos and drainage channels in close proximity to spoils piles. These sediments undergo recurring cycles of deposition on stream bottoms, resuspension, and transport further downstream. Eventually sediments from mine waste piles become so mixed and diluted with other sediments that they cannot be chemically differentiated on the basis of trace element and radioactivity levels. Nevertheless, these sediments do increase the total load of trace elements and radioactivity in affected drainages.

Moreover, turbid stream flows may be ingested by livestock. Levels of arsenic, cadmium, lead, selenium, vanadium, gross alpha particle activity, and radium-226 associated with mine waste pile runoff are not consistent with livestock watering.

Technical means for dealing with uranium mine waste piles, either by surface stabilization or by mine stope backfilling, are well known (e.g., EPA, 1973b; Maryland Department of Natural Resources 1983; New Mexico Coal Surface Mining Commission 1980; and Longmire 1985. Engineering options include backfill of abandoned mine workings with waste rock and low-grade ore; contouring waste piles to a slightly convex configuration; construction of berms upslope and downslope of the wastes to minimize runoff; and use of large boulders and waste rock to armor the contoured waste pile. Some Indian tribes and federal agencies (e.g., USDA Forest Service) do require contouring and stabilization of mine waste piles and disturbed mine sites, but those actions have affected only a few sites.

The economic impact of stabilization or removal of mine wastes is believed to be minor when prorated over the life of a mine. Relative to other uranium industry operations, the volume of potentially hazardous waste generated by uranium mines in New Mexico is quite low.

Legal mechanisms currently available for control of waste pile runoff include state regulations, the Abandoned Mine Reclamation Fund, and provisions of CERCLA. The provision in the WQCC regulations on disposal of refuse already has precedent for use as a means of requiring mine tailings stabilization. The New Mexico Ground

Water Regulations can be used to regulate leachates from mine waste piles that affect ground water quality, should a hazard to public health exist. However, the results of leaching tests conducted for this study suggest such conditions are this is unlikely.

The Abandoned Mine Reclamation Fund, while primarily intended for coal reclamation, can be used for non-coal-mining reclamation under special circumstances. Use of the fund for reclamation of uranium mine waste piles requires concurrence between the New Mexico Energy and Minerals Department, the Governor, and the U.S. Secretary of the Interior. In addition, use of the Fund is subject to federal statutory provisions that all coal-mining reclamation needs in the state have been addressed or, alternatively, that there are over-riding public health or safety considerations that justify dealing with non-coal-mining reclamation before coal-mining reclamation needs are met.

Superfund cleanup under CERCLA may potentially be useful for control of runoff from abandoned or inactive waste piles, but its availability will depend upon site-specific rankings of piles on the National Priorities List. Two other provisions of CERCLA, however, have definite potential for control of mine waste runoff. These are the authority given to the EPA to compel owners to clean up sites not on the National Priorities List, and the authorization of state suits to recover response costs and damages to natural resources.

In addition, the New Mexico Radiation Protection Regulations and RCRA are potential regulatory mechanisms for control of mine waste runoff. The former requires a decision by the EIB to amend these state regulations to extend their applicability to mine wastes. The latter requires a completion of a study by the EPA on uranium mine wastes.

### 11.2.2 Recommendations

1. The removal or stabilization of the largest uranium mine waste piles eroding directly into surface drainages should be pursued. Priority sites should include the Old San Mateo Mine near San Mateo Creek and the Jackpile-Paguate mine areas along the Rio Paguate. Technical criteria for stabilization or removal should be based on individual site conditions.

   a. The EID should require removal or stabilization actions based upon the provision of the WQCC regulations on Disposal of Refuse. Should the provision not be useful, the EID should then pursue reclamation through other available means. Such means include Superfund cleanup, EPA enforcement actions under CERCLA, and state-funded cleanup accompanied by state suits to recover cleanup costs and environmental damages.

   b. Where removal or stabilization cannot be accomplished through regulatory actions, the EID should consult with the Governor and the New Mexico Energy and Minerals Department on use of the Abandoned Mine Reclamation Fund for cleanup.

2. The EID should not take immediate action to regulate future uranium mine waste piles directly as it is anticipated that the EPA will present a recommendation to the U.S. Congress in 1986 on whether to control uranium mine wastes under RCRA. Should mine wastes be regulated under RCRA, it is unlikely that additional state regulations would be required.

3. Should uranium mine waste piles be excluded from RCRA regulation, the EID should recommend that the EIB amend the New Mexico Radiation Protection Regulations to extend their applicability to mine wastes.

## 11.3. CONTROL OF MINEWATER TREATMENT POND SLUDGES

### 11.3.1. Background

Minewater treatment pond sludges resulting from the settling, coagulation, and treatment of raw minewaters have high levels of radium-226 and other radionuclides. In fact, radium-226 concentrations probably average more than 200 pCi/gram. Therefore, the potential introduction of these sludges into surface watercourses through erosion is a matter of concern.

Management of sludges is widely performed, but not universal. In particular, mine operations that conduct ion-exchange removal of uranium from minewaters are usually required by New Mexico Radiation Protection Regulations to dispose of associated minewater treatment pond sludges properly. However, sludges resulting from coagulation and settling of radium-226 from raw minewaters remain unregulated.

Other legal mechanisms available for control of minewater treatment sludges are the provisions of the WQCC regulations on Disposal of Refuse and the provisions of CERCLA related to Superfund cleanup, EPA enforcement actions, and state suits for recovery of costs. In addition, as a result of the EPA uranium mine waste study, RCRA may regulate these sludges. RCRA is potentially the most effective regulatory mechanism for sludges generated in the future. Nonetheless, the state provision on Disposal of Refuse and CERCLA provisions on EPA enforcement actions and state suits appear to provide adequate means to deal with any cleanup or stabilization problems that may occur in the near future, but only on a case-specific ad hoc basis. Superfund cleanup should not be needed unless adequate provisions are not taken now to ensure proper stabilization or disposal of sludges.

### 11.3.2. Recommendation

The EID should rely on the same regulatory framework for minewater treatment pond sludges as for mine wastes. Therefore, EID should wait to see if RCRA will apply to uranium mine wastes, including these sludges, as RCRA regulation will probably obviate the need for additional state regulation. If such wastes are found to be exempt from RCRA regulation, the EID should recommend that the Environmental Improvement Board amend the New Mexico Radiation Protection Regulations to control these sludges fully and effectively.

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(2)

## Mayerson, David, NMENV

**From:** LucasKamat, Susan, EMNRD
**Sent:** Wednesday, August 08, 2007 09:35
**To:** Mayerson, David, NMENV
**Subject:** RE: Abandoned Uranium Mine Survey Draft SOW-07-25-07 (1).doc

David:
The attached metadata document provides information on all the data sources and a description of all the column headings. (The column headings are the longer versions in the original spreadsheet I sent you - importing into ArcGIS truncated the column headings.)

ACE_EPA_NA truncated ACE_EPA_NAMLP_Survey
indicates if the mine was included in the Navajo Nation AUM assessment (Terra Graphics documents)
does not imply a site was addresses, only that it was included in the inventory
includes non-Navajo lands in the checkerboard (Eastern region)
EAUM_No MineID No from Navajo AUM Inventory - Eastern Region
NAUM_No MineID form Navajo AUM Inventory - Northern Region
Producti_1 truncated Production_ore_ST
ore production credited to mine
Producti_2 truncated Production_U3O8_lbs
yellowcake production credited to mine
Other_Agen Other agency numbers (i.e. CERCLIS No, NMED DP, USFS claim No, etc)
In the Excel spreadsheet I've broken these out into a separate column, but the shapefile doesn't have them broken out yet.
Prod_rank Production rank

The production rank is a bit tricky due to the history of uranium production. The AEC (Atomic Energy Commission) purchased all uranium ore and yellowcake before 1968. Between 1968 and 1970 both the AEC and private industry purchased yellowcake. Post-1970 all uranium production went to private industry. Therefore, production figures only reflect production reported to the AEC; the AEC receipts are public information. Almost all production post-1970 is confidential. Chenoweth & McLemore devised the production category figure to account for post 1970 production. (Theoretically, production would have been submitted to the State Mine Inspector (SMI) in their annual reports. Unfortunately, when the SMI split form MMD back in the mid-80s, they retained ownership of the SMI annual reports and they have been destroyed. Those reports have been destroyed. So the only post-1970 production numbers are in the Mine Registration Program annual reports starting in 1989. SO essentially 10 years of production numbers are missing.)

MMD estimated production rank. We sorted first by production category (a,b,c,d,e) and then by production U3O8 within each production category. Mines with no production numbers were then ranked by looking at disturbance area - assuming greater disturbance=greater production. Mines whose production was credited to other mines (i.e. Anaconda's Laguna mines, the Dog-Flea Mines, Section 25, etc) were moved up in the rankings.

I haven't done anything further with documenting sources. The methods section of the metadata document gives the best information on data sources. For example, all radiation/hazards data comes from the Anderson report, BLM inventory, AML project files of MARP files. Reclamation data comes form those same sources. Ownership data is form BLM GIS coverages, augmented by AML realty and MARP realty files. Did you have particular column you need definitive sources for? Or particular mines?

Hope this answers your questions!

Susan A. Lucas Kamat
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2007-07-20_
data-NMED.d

**From:** Mayerson, David, NMENV
**Sent:** Wednesday, August 08, 2007 8:15 AM
**To:** LucasKamat, Susan, EMNRD
**Subject:** RE: Abandoned Uranium Mine Survey Draft SOW-07-25-07 (1).doc

Hi Susan: Could you tell me what the following fields mean in your mines database?

ACE_EPA_NA (Am I correct to presume this indicates whether the site was addressed under NAUM?)
EAUM_NO
PRODUCTI_1
PRODUCTI_2
MARP_STATU
OTHER_AGEN (Specifically, what does an entry here signify?)
PROD_RANK (I presume this means "production rank;" however the ranking doesn't appear to correspond to PRODUCTI_1 and PRODUCTI_2, so maybe I'm wrong here)

Also, you had indicated that you might work on documenting where various information comes from in your database; I was wondering if that was going forward. Thanks.


**David L. Mayerson**
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(1)

# DRAFT VERSION

**June 19, 2007**

## NEW MEXICO ABANDONED AND INACTIVE URANIUM MINES

**Mining and Minerals Division**

**New Mexico Energy, Minerals & Natural Resources Department**

Cautionary/Disclaimers

1. **Draft version. Data is still being collected, verified and added.**

2. Production numbers are from MINES database (McLemore 2007) and only reflect production before 1970. (Production pre-1970 was reported to AEC and is public information. Production after 1970 is confidential and/or unknown.) The production categories (a, b, c, d, e, f, no) correspond to ranges of production from McLemore 2007.

3. Production rank is estimated.

4. Realty/ownership has not been verified in deeds, claims and records at county courthouses and/or BLM.

5. Locations have not been field verified with GPS coordinates.

6. Legal descriptions represent mined areas. They do not reflect total areas of disturbance. Disturbed or affected areas may lie outside of the mined area boundaries. Areas mined underground may not have any surface disturbances.

7. Reclamation approval from one agency does not mean that all hazards have been abated. (Example – There may be remaining waste piles at sites that NM MMD-AML reclaimed that require further action under MMD-MARP or NMED.)

8. The EPA/ACE/Navajo inventory represents mines were included in the Navajo Nation inventory reports (Eastern & Northern). These sites were identified as mines that could potentially affect/impact the Navajo Nation. That inventory included, in addition to Navajo tribal lands, private, state and federal lands in the checkerboard.

9. Current regulating agency is the agency or agencies that currently have a mine property under their regulatory umbrella. Potential jurisdictional agency is an agency that might have jurisdiction over a mine property based on production dates or ownership.

10. NMED could be a potential jurisdictional agency for all mines.

11. Question marks in any column represent uncertainty or further research required.

Definition of columns, for MINES spreadsheets:

| | | |
|---|---|---|
| a. | Mine ID | NMBGMR Mine ID |
| b. | County | County primary shaft or disturbance mine is located in |
| c. | Mining District | Uranium mining district based on NMBGMR mining districts |
| d. | Mine_name | Popular name of mine |
| e. | Aliases | Alternate mine names |
| f. | Township | Township(s) |
| g. | Range | Range(s) |
| h. | Section | Section(s) |
| i. | Quarter Section | Quarter Section(s) |
| j. | UTM_easting | UTM coordinate, easting |
| k. | UTM_northing | UTM coordinate, northing |
| l, | UTM_zone | UTM zone |
| m. | Location_assurance | Location source, from McLemore 2007 |
| n. | Point_of_location_reference | How point was acquired, from McLemore 2007 |
| o. | Surface_land_status | |
| p. | Minerals_land_status | |
| q. | Surface_ownership | |
| r. | Mineral_ownership | |
| s. | ACE_EPA_NAMLP_Survey | Yes, if mine was included in Navajo Nation AUM Assessment (Note: assessment included non-Indian lands in the checkerboard)<br>No, if mine was not included in Navajo Nation AUM Assessment |
| t. | EAUM_No | Mine ID Navajo Nation Eastern Region AUM |
| u. | NAUM_No | Mine ID Navajo Nation Northern Region AUM |
| v. | Commodities_produced | Commodities mined/produced |
| | Commodities_present_not_produced | (on Mines no prod spreadsheet) |
| w. | Mining_methods | surface, underground and/or in situ leach |
| x. | Development | Mine development |
| y. | Depth_of_workings | Depth of workings |
| z. | Length_of_workings | Length of workings |
| aa | Year_of_initial_production | Year of first uranium production |
| ab | Year_of_last_production | Year of final uranium production<br>Note: Mining was not necessarily continuous between initial and last years. See Mining_history for specific details. |
| ac. | Mining_history | Years of operation and operating company. In some cases, mines were inactive/idle/on standby and not producing uranium |
| ad. | Production_category | NMBGMR production categories<br>e > 20 million lbs U3O8<br>d 2 - 20 million lbs U3O8<br>c 200,000 – 2 million lbs U3O8<br>b 20,000 – 200,000 lbs U3O8<br>a < 20,000 lbs U3O8<br>f included with another mine<br>u production unknown<br>no no production |
| ae. | Production_ore_ST | ore production in short tons (pre-1970, unless noted in Comments_on_production) |
| af. | Production_U3O8_lbs | yellowcake production in pounds (pre-1970, unless noted in Comments_on_production) |
| ag. | Comments_on_production | Comments about production, i.e. estimated, included in other mine, etc. |
| ah. | Disturbed_area_acres | Extent of disturbance in acres. |
| ai. | Disturbed_acres_source | Data source for acreage. Methods for determining acreage may not be the same across agencies. |

| | |
|---|---|
| aj. USGS Quad | |
| ak. Land_use | post-mining land use |
| al. Radiation_hazards | any known radiological measurements at the site |
| am. Potential_hazardous_materials | any known physical hazards like shafts, headframes, vents, foundations, debris/trash |
| an. Hydrology | if mine was wet or dry, pumping rate provided if known |
| ao. Receiving_stream | |
| ap. Reclamation_details | reclamation details, including dates, actions/abatement completed |
| aq. Rec_prim_co | company that performed reclamation activities |
| ar. Current_reg_agency | regulating agency that oversaw reclamation, is actively overseeing reclamation, or has permitted the mine/facility |
| as. Potential_reg_agency | agency that could potentially regulate site |
| at. MARP_status | MMD Mining Act Reclamation Program determination<br>Permitted, Released or exempt<br>Not exempt - mine that may fall under the program<br>No release - mine that has not met Prior Reclamation |
| au. MARP_Permit_No | RE = regular existing, PR = prior reclamation |
| av. NMED_DP | NMED discharge permit |
| aw. US_EPA_CERCLIS_No | EPA CERCLIS No. (from NMED list & EPA website) |
| ax. AML_Anderson_Report | MMD-AML record number of Anderson Report |
| ay. BLM_claim_no | BLM mineral claim numbers |
| az. BLM_Inventory | date of BLM field visit/report in BLM AUM inventory |
| ba. USFS_No | USFS mineral ID number |
| bb. MRDS_number | USGS MRDS number |
| bc. NRC_No | NRC license & docket numbers |
| bd. MSHA No | MSHA registration number |
| be. Comments | record of mines from McLemore 2007 database combined |
| bf. References | published references form McLemore 2007 |
| bg. Prod rank | MMD estimated production rank, based on sorting by production within production category. Mines whose production was credited to other mines were moved up in rankings (for example, Anaconda's Jackpile mines, the Dog-Flea mines). |

Methods:

1. MMD started with the most recent (McLemore 2007) version of the BGMR publication Database of the uranium mines, prospects, occurrences, and mills in New Mexico, called "MINES" database. The MINES database was created for resource analysis on a section and quarter section basis. MMD analyzed the database records and combined records to create one mine per shaft/pit complex.

2. Mining history (years and company) from McLemore, Chenoweth and Anderson sources was added.

3. Disturbance area, reclamation, radiological information and hazard information from the MMD-AML Anderson report was added.

4. Disturbance area, reclamation, mining history, mining production dates and ownership/realty information from AML project files was added.

5. Disturbance area, reclamation, mining history, mining production dates and ownership/realty information from MARP prior reclamation and permit files was added.

6. Reclamation, ownership and mining history from the MRRS program files was added.

7. Reclamation status, Navajo land status and disturbance area was added from the EPA/ACE abandoned uranium mine assessments for the Northern and Eastern Navajo Nation.

8. Disturbance area, reclamation, radiological information, mining history and hazard information from the BLM uranium inventory was added.

9. Operator information form the MSHA Data Retrieval System was added.

10. Mining history information from the SMI abandoned uranium mine card file was added.

11. Ownership data from BLM surface and mineral management GIS coverages was added.

12. Mines were sorted by production (largest to smallest) with the assumption that the largest producers of uranium have the potential for the largest disturbance.

13. Data from NMED was added. CERCLIS numbers from NMED Ground Water Quality Bureau – Superfund Oversight "Uranium Mine & Mill CERCLIS Summaries" and EPA website. NMED discharge permit numbers added.

Sources:


McLemore, V. T, 2007 (unpublished), Database of the uranium mines, prospects, occurrences, and mills in New Mexico: New Mexico Bureau of Geology and Mineral Resources.

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New Mexico Environment Department, Ground Water Quality Bureau, Superfund Oversight Section, Uranium Mine and Mill CERCLIS Summaries

| OBJECTID | MINE_ID | COUNTY | DISTRICT | MINE_NAME | ALIASES | TOWNSHIP | RANGE | SECTION | SUBSECTION |
|---|---|---|---|---|---|---|---|---|---|
| 6 | NMCI0009 | Cibola | Ambrosia Lake | Christmas Day | Pal, Christmas Day No. 1-4 | 12N | 9W | 4 | NE |
| 8 | NMCI0014 | Cibola | Ambrosia Lake | Gay Eagle | | 12N | 9W | 4 | SE |
| 11 | NMCI0022 | Cibola | Ambrosia Lake | Last Chance | Balloons | 12N | 9W | 4 | NE |
| 13 | NMCI0076 | Cibola | Ambrosia Lake | Tally | Bonanza No. 1, Trustee Corp | 12N | 9W | 11 | SW |
| 14 | NMCI0002 | Cibola | Ambrosia Lake | Tom | Tom No. 13, Tom Group, Vanadium | 11N | 9W | 4 | SE |
| 18 | NMMK0019 | McKinley | Ambrosia Lake | Hobrad | | 13N | 10W | 24 | NW |
| 20 | NMMK0032 | McKinley | Ambrosia Lake | Charlotte | Section 33, Fanny | 13N | 9W | 33 | S |
| 23 | NMMK0123 | McKinley | Ambrosia Lake | Pat | Dakota Mine, Grabwell, Black Rock, Section 4, Martinez Lease | 13N | 10W | 4 | SE NE |
| 24 | NMMK0041 | McKinley | Ambrosia Lake | Dakota | | 13N | 10W | 4 | NE |
| 25 | NMMK0164 | McKinley | Ambrosia Lake | Junior | Pat, Section 4 | 13N | 10W | 4 | NE |
| 26 | NMMK0137 | McKinley | Ambrosia Lake | Piedra Trieste | Section 30, Piedra Lisa | 13N | 9W | 30 | SE NE |
| 27 | NMMK0138 | McKinley | Ambrosia Lake | Red Point | R. M. Shaw | 13N | 10W | 10 | NW |
| 28 | NMMK0168 | McKinley | Ambrosia Lake | Section 5 | Westvaco, Frebo, Los Tres Mosqueteros | 13N | 10W | 5 | C |
| 29 | NMMK0244 | McKinley | Ambrosia Lake | Mesa No. 4 | Section 32 | 13N | 9W | 32 | C |
| 30 | NMMK0350 | McKinley | Ambrosia Lake | Red Bluff No. 1 | Rimrock, Haroot Scown, Section 30 | 13N | 10W | 30 | NE NE |
| 70 | NMCI0004 | Cibola | Ambrosia Lake | Black Hawk, Binney, Red Bluff | Section 4, Binney Group | 12N | 9W | 4 | S |
| 71 | NMCI0021 | Cibola | Ambrosia Lake | La Jara | Zia, La Jara No. 1-8 | 12N | 9W | 15 | S |
| 72 | NMCI0107 | Cibola | Ambrosia Lake | Zia | | 12N | 9W | 15 | SW |
| 73 | NMCI0039 | Cibola | Ambrosia Lake | Red Bluff No. 1, 2, 3, 4, 5, | Elkins and Jones | 12N | 9W | 4 | N |
| 75 | NMCI0057 | Cibola | Ambrosia Lake | Section 9 | Mark Elkins, Anaconda | 12N | 9W | 9 | N & SW |
| 77 | NMMK0007 | McKinley | Ambrosia Lake | Barbara J No. 1 | Whitecap, Dalco, Barbara Jean No. 1 | 13N | 9W | 30 | SW NW NE |
| 78 | NMMK0012 | McKinley | Ambrosia Lake | Beacon Hill Crosscut | Malpais No. 10 & 14; Section 19, Mon No. 3 | 13N | 9W | 19, 20 | NE, SW SW NW |
| 79 | NMMK0011 | McKinley | Ambrosia Lake | Beacon Hill | Mesa Top, Malpais, East Malpais, Davenport, Beacon Hill No. 17-23 | 13N | 9W | 20 | NW SW SW |
| 80 | NMMK0018 | McKinley | Ambrosia Lake | Blue Peak | Cliucie No. 1-5, Red Top No. 1-10, Section 24 | 13N | 10W | 24 | SE NE |
| 81 | NMMK0045 | McKinley | Ambrosia Lake | Davenport | Mon No. 2, Davenport Incline | 13N | 9W | 20 | NW NW SW |
| 82 | NMMK0052 | McKinley | Ambrosia Lake | Dysart No. 2 | Section 11, SE Shaft | 14N | 10W | 11, 12 | S2 & NW & SW |
| 83 | NMMK0059 | McKinley | Ambrosia Lake | Faith | Section 29, Westvaco | 13N | 9W | 29 | SW |
| 84 | NMMK0060 | McKinley | Ambrosia Lake | Flat Top | Fife and Betsy, Vesta Hyde | 13N | 9W | 30 | SE SE |
| 85 | NMMK0082 | McKinley | Ambrosia Lake | Hogan | Lucky Dooley, Fanny, Plen | 13N | 9W | 14 | W SE |
| 86 | NMMK0084 | McKinley | Ambrosia Lake | Hope | Section 10 | 13N | 9W | 10 | SE SW |
| 87 | NMMK0106 | McKinley | Ambrosia Lake | Mary No. 1 | Section 11 NWO, Dysart No. 3 | 14N | 10W | 11 | NW |
| 88 | NMMK0107 | McKinley | Ambrosia Lake | Mesa Top | Mesa Top No. 6, Malpais, Davenport, Malpais No. 13, Beacon Hill No. 18-20 | 13N | 9W | 20 | NW NE SW |
| 89 | NMMK0130 | McKinley | Ambrosia Lake | Velma | Double Jerry, Section 34, Fanny No. 1 | 12,13N | 9W | 3; 34 | NW; SW |
| 90 | NMMK0172 | McKinley | Ambrosia Lake | Spencer | Section 8, Cintorrial, State No. 1-27 claims | 13N | 9W | 8 | NW NW, ? |
| 91 | NMMK0155 | McKinley | Ambrosia Lake | Section 18 | Williams and Thompson, Bogan Vanadium, Federal Mesa | 13N | 10W | 18 | S |
| 92 | NMMK0207 | McKinley | Ambrosia Lake | Haystack Section 23 | Sec 23 & 29 Open Pit | 13N | 10W | 23, 29 | SE, NE |
| 93 | NMMK0210 | McKinley | Ambrosia Lake | Chil Wells | Hallo, Section 13, Section 24 | 13N | 9W | 24, 13 | NW, SW |
| 95 | NMMK0240 | McKinley | Ambrosia Lake | Haystack Section 31 | Santa Fe Railroad, Hunt Dole, Section 31 NWO | 13N | 9W | 31 | NW |
| 96 | NMMK0253 | McKinley | Ambrosia Lake | United Western | J and M, Section 36, Lease 60-187, VCA mine | 14N | 10W | 36 | NE, NE |
| 97 | NMMK0258 | McKinley | Ambrosia Lake | Febco | Silver Spur No. 1-5, Emmett-Elkins, Bond State | 14N | 10W | 31 | SW |
| 98 | NMMK0259 | McKinley | Ambrosia Lake | Silver Spur | Febco, Silver Spur No. 5 | 14N | 10W | 31 | NE |
| 101 | NMMK0181 | McKinley | Ambrosia Lake | Section 13 | Westwater Corp. | 14N | 10W | 13 | E |
| 102 | NMMK0105 | McKinley | Ambrosia Lake | Marquez | Marcus, Calumet | 13N | 9W | 23 | NE & S |
| 103 | NMMK0218 | McKinley | Ambrosia Lake | Diablo | Section 25 | 13N | 10W | 25 | NW NE |
| 104 | NMMK0061 | McKinley | Ambrosia Lake | Dysart No. 1 | Rio de Oro, Section 11 | 14N | 10W | 11 | SW |
| 105 | NMMK0048 | McKinley | Ambrosia Lake | Dog | Dog Incline, Five Incline, Dog-Five, S-G Group, BG Group, Section 20 | 13N | 9W | 20 | NW NW SW & NE |
| 106 | NMMK0218 | McKinley | Ambrosia Lake | Section 25 REO | Dresdoru, Anson, Operation Haystack, Rimrock No. 1 | 13N | 10W | 25 | SE |
| 107 | NMMK0133 | McKinley | Ambrosia Lake | Poison Canyon | Mon No. 1 | 13N | 9W | 10 | SE NE |
| 108 | NMMK0022 | McKinley | Ambrosia Lake | Buckey | Section 14, Jonp No. 1-0, Buckey, Buckly | 14N | 10W | 14 | SE |
| 110 | NMMK0175 | McKinley | Ambrosia Lake | Section 10 | Kermac, Hogamus, Ambrosia, Buffalo | 14N | 10W | 10 | E |
| 111 | NMMK0009 | McKinley | Ambrosia Lake | Barbara J No. 3 | Fife and Betsy, Barbara Jean No. 3 | 13N | 9W | 30 | NE NW NE |
| 112 | NMMK0235 | McKinley | Ambrosia Lake | Roundy - Marcel | Marcel, F. Marcel, Roundy Lease, Rimrock No. 3, Section 30 | 13N | 9W | 30 | SW |
| 113 | NMMK0086 | McKinley | Ambrosia Lake | Isabella | Section 7 | 13N | 9W | 7, 8 | NE NE, SE |
| 114 | NMMK0178 | McKinley | Ambrosia Lake | Section 12 | Dysart Group, Fane and Alle | 14N | 10W | 12 | SE |
| 115 | NMMK0084 | McKinley | Ambrosia Lake | Malpais | Malpais No. 13, Dog No. 10, East Malpais, Malpais using Mesa Top | 13N | 9W | 20 | SW NW NW |
| 116 | NMMK0008 | McKinley | Ambrosia Lake | Barbara J No. 2 | Whitecap, Dalco No. 1, Barbara Jean No. 2 | 13N | 9W | 30 | NE SE NW |
| 117 | NMCI0012 | Cibola | Ambrosia Lake | F-33 | Section 33, Anaconda, Forest Group, Hned & Kowly | 12N; 11N | 9W | 33, 34; 3 | SE, SW NW |
| 118 | NMMK0049 | McKinley | Ambrosia Lake | Dora | Section 21, Dora No. 1, Little Dora, Dora decline, Five-Dora extension | 13N | 9W | 21, 20 | SW, SE |
| 120 | NMMK0215 | McKinley | Ambrosia Lake | Section 25 shaft | | 13N | 10W | 25 | C N N |
| 121 | NMCI0027 | Cibola | Ambrosia Lake | Mount Taylor | Out, Chevron | 13N | 8W; 7W | 24; 30 | SE; NW |
| 122 | NMMK0007 | McKinley | Ambrosia Lake | Five | Five-Dora Extension | 13N | 9W | 20, 21, 18, | SE SE NE & NE NE SE, SW SE, NW SW |
| 123 | NMMK0217 | McKinley | Ambrosia Lake | Section 25 Decline | Ten claims, Red Rock | 13N | 10W | 24, 25 | SE SE, NE NE |
| 124 | NMMK0219 | McKinley | Ambrosia Lake | Section 25 Open Pit | Dosallno, Anson | 13N | 10W | 25 | NW NW |
| 125 | NMMK0144 | McKinley | Ambrosia Lake | Roundy Strip | Rimrock No. 1, Marcel, Section 30, H-H-60, Mono No. 1, Golden P. Roundy | 13N | 9W | 30 | SW |
| 126 | NMMK0264 | McKinley | Ambrosia Lake | T-20 | T-Westbaly, Rimrock No. 2, T-20 shaft, G-32 | 13N | 9W | 30 | C SE |
| 128 | NMCI0063 | Cibola | Ambrosia Lake | San Mateo | Section 30, Haas Mesa | 13N | 8W | 20, 30, 31, | ?, SE NE, ?, ? |
| 129 | NMMK0003 | McKinley | Ambrosia Lake | Ann Lee | Phillips No. 1, Section 28, Spider Rock | 14N | 9W | 28 | C |
| 130 | NMMK0035 | McKinley | Ambrosia Lake | Cliffside | Section 36, Section 1 | 13N; 14N | 9W | 1; 36 | NE; SE |
| 131 | NMMK0087 | McKinley | Ambrosia Lake | Johnny M | Ranchers | 13N | 8W | 7, 18 | |
| 132 | NMMK0131 | McKinley | Ambrosia Lake | John Bully | John Bully shaft, Barnsdow | 14N | 9W | 34 | |
| 133 | NMMK0149 | McKinley | Ambrosia Lake | Barnsdow | Section 34, John Bully shaft | 14N | 9W | 34 | SE NW |
| 134 | NMMK0183 | McKinley | Ambrosia Lake | Section 16 | Homestake Sapin Mine No. 15 | 14N | 10W | 16 | SE |
| 135 | NMMK0190 | McKinley | Ambrosia Lake | Section 17 | Jerry Wayne No. 1-38, Carlos, Section 18, Rhode No. 1-38 | 14N | 9W | 17, 18, 20 | N & SW, E, NW |
| 136 | NMMK0199 | McKinley | Ambrosia Lake | Section 19 | Section 20 | 14N | 9W | 19, 20 | NW SE, SW |
| 137 | NMMK0200 | McKinley | Ambrosia Lake | Section 22 | | 14N | 10W | 22 | S |
| 138 | NMMK0208 | McKinley | Ambrosia Lake | Section 23 | | 14N | 10W | 23 | NW |
| 139 | NMMK0214 | McKinley | Ambrosia Lake | Section 24 | Section 24 and 20, Mine No. 24 | 14N | 10W | 24, 20 | SW NE, NE |
| 140 | NMMK0220 | McKinley | Ambrosia Lake | Section 25 | Homestake Sapin No. 25 | 14N | 10W | 25 | C |
| 141 | NMMK0221 | McKinley | Ambrosia Lake | Section 26 | Hanosh, Indian Allotment, Deuslare | 13N | 10W | 26 | NE |
| 142 | NMMK0226 | McKinley | Ambrosia Lake | Section 27 | United Nuclear | 14N | 9W | 27 | S |
| 143 | NMMK0230 | McKinley | Ambrosia Lake | Section 30 West | | 14N | 10W | 30 | NW |
| 144 | NMMK0237 | McKinley | Ambrosia Lake | Section 30 | Carlos 1-38, Section 20, Mining Unit 30 | 14N | 9W | 30, 20, 29 | E, NE & SW, NW |
| 145 | NMMK0246 | McKinley | Ambrosia Lake | Section 32 | United Western, UP-HP, Section 29, Section 31 | 14N | 9W | 32, 29, 31 | |
| 146 | NMMK0248 | McKinley | Ambrosia Lake | Section 33 | Mesa Unit 33, Branch, Section 23 | 14N | 9W | 33, 29 | NE, SE |
| 147 | NMMK0250 | McKinley | Ambrosia Lake | Section 35 | Elizabeth, Section 28 | 14N | 9W | 35, 28 | NE, NE |

| REC_AMATIO | REC_PRIMAR | REGULATORY | JURISDICT | TU | MAIN_PERM | | BLM_INVENT | OTHER_AGCN | COMMENTS | PROD_RANK | Number |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MMD - AML | [illegible] | NA | [illegible] | | | | 128.00000000000 | 1.00000000000 |
| | | | MMD - AML | [illegible] | NA | [illegible] | | | | 117.00000000000 | 2.00000000000 |
| | | | MMD - AML | [illegible] | NA | [illegible] | | | | 129.00000000000 | 3.00000000000 |
| | | | USFS | [illegible] | NA | [illegible] | | | | 176.00000000000 | 4.00000000000 |
| | | | MMD - AML | Exempt - [illegible] | NA | NM-173-1-2 | | | | 147.00000000000 | 5.00000000000 |
| | | | BLM | Exempt - [illegible] | NA | No | | | | 146.00000000000 | 6.00000000000 |
| | | | MMD - AML | Exempt - [illegible] | NA | NM-140-4-25 | | | | 170.00000000000 | 7.00000000000 |
| | | | Navajo Nation | Exempt - Navajo Allotee | NA | NM-140-2-6 | | | | 124.00000000000 | 8.00000000000 |
| | | | Navajo Nation | Exempt - Navajo Allotee | NA | NM-140-2-7 | | | | 125.00000000000 | 9.00000000000 |
| | | | Navajo Nation | Exempt - Navajo Allotee | NA | NM-140-2-8 | | | combined NMMK0050 Junior | 120.00000000000 | 10.00000000000 |
| [illegible] | NM AMLP - Grants Uranium Phase 1 MMD-00-4 | BLM, MMD - AML | BLM, MMD - AML | ?? Not Exempt | NA | No | 8 14 1986 | | | 115.00000000000 | 11.00000000000 |
| | | SLO | SLO | Exempt - Prod Dates | NA | NM-140-3-1 | | | | 153.00000000000 | 12.00000000000 |
| | | MMD - AML | MMD - AML | Exempt - Prod Dates | NA | NM-140-2-8 | | | | 208.00000000000 | 13.00000000000 |
| | | SLO | SLO | Exempt - Prod Dates | NA | NM-140-4-24 | | | | 127.00000000000 | 14.00000000000 |
| | | SLO | SLO | Exempt - Prod Dates | NA | NM-140-4-22 | | | | 130.00000000000 | 15.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-20 | 8 26 1987 | | combined NMC30014 Gay Ernest, NMC10042 Red Bluff No. 7, NMC10043 Red Bluff No. 8, NMC10044 Red Bluff No. 10, NMC20050 Section 4, NMC30 | 74.00000000000 | 16.00000000000 |
| | | | USFS | Exempt - Prod Dates | NA | NM-140-4-33 | | USFS 05 03 07 1000, USFS 03 03 02 1130 | | 75.00000000000 | 17.00000000000 |
| | | | USFS | Exempt - Prod Dates | NA | NM-140-4-34 | | USFS 05 03 02 1139 | | 76.00000000000 | 18.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-28 | | | combined NMC30040 Red Bluff No. 2, 4 & NMC30041 Red Bluff No. 3, 5, 9 | 77.00000000000 | 19.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-31 | | | combined NMC30048, NMC30049, NMC30070 Section 9 | 79.00000000000 | 20.00000000000 |
| [illegible] | NM AMLP - Grants Uranium Phase 2 MMD-02-5 | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-11 | 8 9 1986 | | | 82.00000000000 | 21.00000000000 |
| [illegible] | NM AMLP - Grants Uranium Phase 2 MMD-02-5 | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-4 | 8 21 1986 | | | 83.00000000000 | 22.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | No | 8 17 1986 | | | 84.00000000000 | 23.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-5 | 8 22 1986 | | | 85.00000000000 | 24.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-6 | 8 17 1986 | | | 86.00000000000 | 25.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-1-3 | | | combined NMMK0?? [illegible] | 87.00000000000 | 26.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 28 1995 - Young | MK012PR | NM-140-4-9 | | | | 80.00000000000 | 27.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-14 | 8 13 1986 | | | 90.00000000000 | 28.00000000000 |
| [illegible] | [illegible] | | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-3 | | | | 81.00000000000 | 29.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 27 1995 - Young | MK002PR | No | | | | [illegible] | 30.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-1-1 | | | | [illegible] | 31.00000000000 |
| [illegible] | | | BLM | Exempt - Prod Dates | NA | NM-140-4-8 | 8 20 86, 8 14 92 | | | [illegible] | 32.00000000000 |
| | | | USFS | Exempt - Prod Dates | NA | NM-140-4-26 | | | | 87.00000000000 | 33.00000000000 |
| | | | BLM | Exempt - Prod Dates | NA | NM-140-4-2 | | | combined with NMMK0054 Section 8, corrected to R13N | 89.00000000000 | 34.00000000000 |
| | | | Navajo Nation | Exempt - Navajo Allotee | NA | NM-140-3-2 | | | combined NMMK0100 Section 18 SEQ | 99.00000000000 | 35.00000000000 |
| | | | Navajo Nation | Exempt - Navajo Allotee - 1 mi | | NM-140-4-21 | | | | 100.00000000000 | 36.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-150-3-1 | | | | 101.00000000000 | 37.00000000000 |
| [illegible] | [illegible] | | ??? MMD - MARP and or AML | ?? Not Exempt | MK020PR | NM-140-4-23 | | | combined NMMK0238 Section 31 NWO, NMMK0273 [illegible] | 103.00000000000 | 38.00000000000 |
| [illegible] | [illegible] | | SLO, MMD - AML | Exempt - Prod Dates | NA | NM-140-1-4 | | | | 104.00000000000 | 39.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-4 | | CERCLIS # [illegible] | combined NMMK0258 [illegible] | 105.00000000000 | 40.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-3-5 | | | | [illegible] | 41.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 28 1995 - Young | MK004PR | No | | | combined NMMK0180 Section 13 | 41.00000000000 | 42.00000000000 |
| [illegible] | [illegible] | | MMD - AML | Exempt - Prod Dates | MK015PR | NM-140-4-8 | | | | 40.00000000000 | 43.00000000000 |
| | | | ??? MMD- MARP | ?? Not Exempt | | No | | | | 47.00000000000 | 44.00000000000 |
| | | | ??? MMD - MARP and or MMD - AML | ?? Not Exempt | | NM-140-1-2 | | | | 39.00000000000 | 45.00000000000 |
| | | | BLM, ??? MMD - AML, and or ??? MMD - MARP | ?? Not Exempt | MK01?PR (Sec 17) | NM-140-4-7 | 8 20 1986 | | combined NMMK0013 [illegible] Group | 52.00000000000 | 46.00000000000 |
| | | | ??? MMD- MARP | ?? Not Exempt | | NM-140-4-17 | | | | 40.00000000000 | 47.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 8 8 2000 - [illegible] | MK012PR | No | | EPA [illegible] | | 46.00000000000 | 48.00000000000 |
| [illegible] | | | ??? MMD- MARP | ?? Not Exempt | | No | | | | 54.00000000000 | 49.00000000000 |
| [illegible] | | | ??? MMD- MARP | ?? Not Exempt | | NM-140-2-1 | | | | [illegible] | 50.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-10 | 8 10 1986 | | | 57.00000000000 | 51.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-15 | | | combined NMMK0144 [illegible], part of Todilto Exploration [illegible] lease | 58.00000000000 | 52.00000000000 |
| | [illegible] | | ??? MMD - MARP | No release - [illegible] | MK014PR | NM-140-4-1 | | | | 60.00000000000 | 53.00000000000 |
| | | | ??? MMD- MARP | ?? Not Exempt | | No | | | | 65.00000000000 | 54.00000000000 |
| [illegible] | [illegible] | MMD - AML | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-0 | 8 21 1986 | | combined Last Marquez & NMMK0060 Marquez | 66.00000000000 | 55.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | No | 8 10 1986 | | combined with NMMK0042 Whitecap | 67.00000000000 | 56.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 7 26 1995 - [illegible] | C001PR | NM-175-1-1 | | | combined with NMC0017 [illegible] Group | 63.00000000000 | 57.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 29 1995 - Young | MK001PR | No | | | combined with NMMK0060 [illegible] Extension | 70.00000000000 | 58.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | | NM-140-4-18 | | | | 59.00000000000 | 59.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | CI002RE | No | | NMED DP-61, DP-117; NRC Docket No. 40-8084 40-[illegible] | combined NMMK0110 Mt Taylor | 36.00000000000 | 60.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | ?? Not Exempt | NA | No | 8 17 1986 | | combined NMMK0176 Homestake UNC Section 16; NMMK0181 Homestake UNC Section 17, MARP [illegible] | 53.00000000000 | 61.00000000000 |
| | | | MMD - AML | Exempt - Prod Dates | | No | | | | 44.00000000000 | 62.00000000000 |
| | [illegible] | | ??? MMD- MARP | ?? Not Exempt | MK01?PR | NM-140-4-19 | | | | 49.00000000000 | 63.00000000000 |
| | | MMD - AML | MMD - AML | Exempt - Prod Dates | NA | NM-140-4-16 | | | | 50.00000000000 | 64.00000000000 |
| [illegible] | [illegible] | BLM, MMD - AML | BLM, MMD - AML | Exempt - Prod Dates | NA | NM-140-4-13 | 8 15-16 86, 8 16 | | combined NMMK0044 K-C shaft | 72.00000000000 | 65.00000000000 |
| [illegible] | [illegible] | USFS | USFS | Exempt - Prod Dates | NA | NM-150-3-7 | | US EPA CERCLIS # [illegible] | | 30.00000000000 | 66.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | No Release - Young | MK027PR | No | | | | 73.00000000000 | 67.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP, SLO | Released 9 28 1995 | MK017PR, MK0??PR | No | | | combined NMMK0015 Section 1 & NMMK0251 Section 36 | 17.00000000000 | 68.00000000000 |
| [illegible] | [illegible] | NRC | NRC | Exempt - NRC license | MK000PR | No | | NRC Source Mat License [illegible] | combined NMMK0183 [illegible] Group | 32.00000000000 | 69.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | No Release - Young | MK026PR | No | | | | 23.00000000000 | 70.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | No Release - Young | MK025PR | No | | | | 28.00000000000 | 71.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 28 1995 - Young | MK006PR | No | | | | 27.00000000000 | 72.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | MK002RE | No | | NMED DP-362 | combined NMMK0180 Section 17, NMMK0187 Section 18, NMMK0201 Section 20 | 21.00000000000 | 73.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 10 10 2000 - [illegible] | MK022PR | No | | | combined NMMK0202 Section 20 | 34.00000000000 | 74.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | MK001RE | No | | NMED DP-362 | | 13.00000000000 | 75.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 10 1 1997 - Young | MK023PR | No | | | | 15.00000000000 | 76.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | MK000RE | No | | NMED DP-362 | combined NMMK0224 Section 20 | 16.00000000000 | 77.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 28 1995 - Young | MK000PR | No | | | | 18.00000000000 | 78.00000000000 |
| | [illegible] | | Navajo Nation | Exempt - Navajo Allotee | NA | NM-140-4-20 | | | combined NMMK0038 [illegible] | 37.00000000000 | 79.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | MK006RE | No | | | combined NMMK0225 Section 27 | [illegible] | 80.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 10 30 1998 - [illegible] | MK025PR | No | | | | 35.00000000000 | 81.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 10 30 1998 - [illegible] | MK024PR | No | | | combined NMMK0257 Section 28, NMMK0231 Section 29 & NMMK0241 Section 31 | 12.00000000000 | 82.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Released 9 28 1995 - Young | MK007PR | NM-140-1-6 | | | | 30.00000000000 | 83.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | MK000RE | No | | NMED DP-362 | combined NMMK0233 Section 23 | 22.00000000000 | 84.00000000000 |
| [illegible] | [illegible] | MMD - MARP | MMD - MARP | Permitted | MK002RE, MK000RE | No | | NMED DP-[illegible], DP-[illegible] | combined NMMK0223 Section 26 | 19.00000000000 | 85.00000000000 |

| MINE_ID | COUNTY | DISTRICT | MINE_NAME | ALIASES | UTM_EASTIN | UTM_NORTHI | UTM_ZONE | LOCATION_A | POINT_OF_L | SURFACE_LA | MINERALS_L | COMMODITIE | MILL_PROCE | YEAR_OF_IN | YEAR_OF_LA | MINING_HIS | ST_ORE_PRO | PROCESSING | PRODUCTION | CAPACITY__ | DISTURBED_ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NMMK0349 | McKinley | Ambrosia Lake | Ambrosia Lake mill | Kerr McGee | 242458 | 3921045 | 13 | topo | map symbo | private | private | U, Mo, V | 2 mills, | 1958 | 2002 | 1957 cons | | | e | 7000 | 370 |
| NMCI0109 | Cibola | | Bluewater mill | Anaconda | 231602 | 3905475 | 13 | topo | map symbo | private | private | U, V, Mo | carbonate | 1953 | 1982 | 1953 (Sep | | | e | 6000 | 386 |
| NMMK0353 | McKinley | Ambrosia Lake | Phillips mill | Ambrosia Lake | 246492 | 3921758 | 13 | topo | map symbo | federal | federal | U, V | alkaline | 1958 | 1982 | 1957 Sept | 3000000 | DOE | u | 1725 | 288 |
| NMCI0110 | Cibola | | Homestake mill | United Nuclear- | 240267 | 3903208 | 13 | topo | map symbol | private | private | U, Mo, V | alkaline-leach | 1957 | 1990 | 1957-1962 H | | | e | 3500 | 170 |

# REFERENCES

# 13-16

| MATERIALS LICENSE SUPPLEMENTARY SHEET | License Number SUA-1471 |
|---|---|
| | Docket or Reference Number 40-8903 |
| | Amendment No. 40 |

B. The following ground water protection standards are established for each designated aquifer/zone as described in Ground-Water Hydrology for Support of Background Concentration at the Grants Reclamation Site (Hydro-Engineering, December 2001) and Background Water Quality Evaluation of the Chinle Aquifers (Homestake Mining Company and Hydro-Engineering, October 2003):

| Constituents | Alluvial Aquifer | Chinle Mixing Zone | Upper Chinle Non-Mixing Zone | Middle Chinle Non-Mixing Zone | Lower Chinle Non-Mixing Zone |
|---|---|---|---|---|---|
| Selenium (mg/L) | 0.32 | 0.14 | 0.06 | 0.07 | 0.32 |
| Uranium (mg/L) | 0.16 | 0.18 | 0.09 | 0.07 | 0.03 |
| Molybdenum (mg/L) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Sulfate (mg/L) | 1500 | 1750 | 914 | 857 | 2000 |
| Chloride (mg/L) | 250 | 250 | 412 | 250 | 634 |
| TDS (mg/L) | 2734 | 3140 | 2010 | 1560 | 4140 |
| Nitrate (mg/L) | 12 | 15 | * | * | * |
| Vanadium (mg/L) | 0.02 | 0.01 | 0.01 | * | * |
| Thorium-230 (pCi/L) | 0.3 | * | * | * | * |
| Ra-226 + Ra-228 | 5 | * | * | * | * |
| * - ground-water protection standards not necessary for the constituents in the indicated zones | | | | | |

The constituents listed above for the alluvial aquifer must not exceed the specified concentration limit at compliance monitoring wells (former point of compliance wells) D1, X, and S4. At present, no compliance monitoring wells have been designated for the Chinle Mixing Zone or the Upper, Middle or Lower Chinle Non-Mixing Zones for the purpose of implementing the ground water protection standards listed above for these zones. The licensee shall propose compliance monitoring wells for the Chinle Mixing Zone and the Upper, Middle and Lower Chinle Non-Mixing Zones in a revised Corrective Action Plan to be submitted to the NRC no later than December 31, 2006. NRC will evaluate the proposed compliance monitoring wells and, if acceptable, will incorporate them into the license as compliance locations for the ground water protection standards listed above. NRC will notify the licensee and request new proposed compliance monitoring well locations from the licensee, if any of the well locations are determined to be unacceptable.

C. Implement the corrective action program described in the September 15, 1989 submittal, as modified by the reverse osmosis system described in the January 15, 1998 submittal with the objective of returning the concentrations of molybdenum, selenium, thorium-230, uranium, and vanadium to the site standards as listed in LC 35B. In addition, the reverse osmosis system will include the addition of Sample Point 2 downstream of the Mixing Tank. Composite samples from Sample Point 2 will be taken monthly and analyzed for U and Mo.

NRC FORM 374

U.S. NUCLEAR REGULATORY COMMISSION

# MATERIALS LICENSE

...uant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and the applicable parts ... itle 10, Code of Federal Regulations, Chapter I, Parts 19, 20, 30, 31, 32, 33, 34, 35, 36, 39, 40, 51, 70, and 71, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

| Licensee | |
|---|---|
| 1. Homestake Mining Company | 3. License Number SUA-1471 Amendment No. 40 |
| 2. P.O. Box 98<br>Grants, New Mexico 87020 | 4. Expiration Date Until terminated<br>5. Docket No. 40-8903<br>Reference No. |

| 6. Byproduct Source, and/or Special Nuclear Material | 7. Chemical and/or Physical Form | 8. Maximum amount that Licensee May Possess at Any One Time Under This License |
|---|---|---|
| Uranium | Any | Unlimited |

Authorized Place of Use: The licensee's uranium mill located in Cibola County, New Mexico.

[Applicable Amendments: 12, 29]

10. This license authorizes only the possession of residual uranium and byproduct material in the form of uranium waste tailings and other byproduct waste generated by the licensee's past milling operations in accordance with Tables 1 and 3 and the procedures submitted by letter dated September 2, 1993, as modified by letter dated March 7, 1996.

Anywhere the word "will" is used, it shall denote a requirement.

[Applicable Amendments: 2, 6, 12, 16, 24]

11. DELETED by Amendment No. 21.

12. Periodic embankment inspections of the large and small tailings embankment shall be conducted by knowledgeable individuals who are familiar with the site and the embankment design. An annual embankment status report shall be included in the Annual Report (see LC 42).

[Applicable Amendments: 2, 12, 14, 24, 34]

13. DELETED by Amendment No. 27.

Release of equipment or packages from the restricted area shall be in accordance with the attachment to SUA-1471 entitled, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984.

[Applicable Amendments: 21, 31]

Enclosure

DEC 1 4 2001

GROUND WATER BUREAU

# GROUND-WATER HYDROLOGY FOR SUPPORT OF BACKGROUND CONCENTRATION AT THE GRANTS RECLAMATION SITE

**FOR:**

**HOMESTAKE MINING COMPANY OF CALIFORNIA**

**BY:**

**HYDRO-ENGINEERING, L.L.C.**
**CASPER, WYOMING**

**DECEMBER, 2001**

George L. Hoffman

**GEORGE L. HOFFMAN, P.E.**
**HYDROLOGIST**

The Chinle Formation, which is a massive shale (approximately 800 feet thick) at the tailings site, exists below the alluvium. The Chinle shale is a very good aquitard and greatly restricts movement vertically from the alluvial aquifer. A few sandstones exist within the Chinle shale, which form bedrock aquifers in this area. The cross section shows the Upper Chinle sandstone in blue and shows where the Upper Chinle sandstone subcrops against the alluvial aquifer forming a direct connection between these two ground-water systems. The second major sandstone in the Chinle Formation has been named the Middle Chinle sandstone. This sandstone is shown in magenta in the cross section and also subcrops against the alluvium further south. In this cross section a third permeable zone within the Chinle shale has been defined and is called the Lower Chinle aquifer. This zone consists mainly of fractured shale and is therefore highly variable depending on secondary permeability developed in the shale. The Lower Chinle aquifer is not used very much in this area due to its depth and naturally poor water quality. A few wells are completed in the Lower Chinle aquifer due to the lack of existence of the alluvial, Upper or Middle Chinle aquifers in some areas. The San Andres aquifer exists below the Chinle Formation as is the regional aquifer in this area. The San Andres is not discussed in this report because it has not been impacted by Homestake tailings seepage.

## 2.1 ALLUVIAL AQUIFER

This subsection presents the geologic setting and well completions for the alluvial aquifer. The basic well data for the background alluvial wells at the Grants site are presented in Tables 2-1 and Tables 2-2. The annual reports present the basic well data for all other wells at the site. Annual reports are not presented in this submittal because they were previously submitted to the NRC and are not required for this analysis. Figures 2-2A and 2-2B show the location of the alluvial wells that have been used to define the ground-water conditions in the alluvial aquifer at the Grants site. Figure 2-2B shows the locations of the nine alluvial background wells, which are listed in Table 2-1 north of the Large Tailings. Figure 5-1 also presents the locations of the nine background wells and locations

## 2.0 GEOLOGIC SETTING AND AQUIFER CONNECTIONS

Tailings at the Grants site are located on top of the alluvium and therefore the alluvial aquifer is the most important ground-water system relative to the Grants site. The surface geology and structure contours are presented on United States Geological Survey (USGS) quadrangle topographic maps. Geologic maps and other geologic information were compiled and presented by New Mexico Bureau of Mines and Mineral Resources (NMBM) and USGS reports on the area. These reports have been used in defining the geologic setting at this site but are not necessary for the background review.

The uranium ore bearing rocks that have been mined in this area outcrop in the San Mateo drainage system and contain significant natural concentrations of uranium and selenium. Therefore, the alluvial material would be expected to contain above normal concentrations of uranium and selenium that are typically present in uranium deposits. The Chinle Formation forms the base of the alluvial aquifer at the Grants site. The Chinle Formation also contains some natural uranium and selenium concentrations. Therefore, the geologic setting has significantly affected the background water quality at this site.

The hydrologic conditions in this area have been defined by New Mexico State Engineer (NMSE), USGS and NMBM reports on the area. Ground-water conditions for the Grants site have been defined in previous documents submitted to the NRC and typically referenced in the annual reports on the site. These hydrologic reports have been used in developing the hydrologic conditions presented in this report at the Grants site and are not necessary for the background review and therefore not included in this submittal. The Grants project site exists on the San Mateo alluvial system. The San Mateo alluvial system follows the San Mateo alluvium and drainage system and extends from northeast of the site to the south and west. Bedrock material exists on the surface to the northeast and southeast sides of the alluvial material. Figure 2-1 shows a typical cross section at the Grants site with saturated alluvium shown in red.

**SME PREPRINT ANNUAL MEETING 2007**

# URANIUM RESOURCES IN NEW MEXICO

Virginia T. McLemore, NM Bureau of Geology and Min. Res., NM Inst. of Mining and Tech., Socorro, NM 87801

## ABSTRACT

New Mexico ranks 2nd in uranium reserves in the U. S., which amounts to 15 million tons ore at 0.277% $U_3O_8$ (84 million lbs $U_3O_8$) at $30/lb (EIA, 2006). The most important deposit in the state is sandstone within the Morrison Formation (Jurassic) in the Grants district. More than 340 million pounds of $U_3O_8$ have been produced from these deposits from 1948-2002, accounting for 97% of the total production in New Mexico and more than 30% of the total production in the United States. Sandstone uranium deposits are defined as epigenetic concentrations of uranium in fluvial, lacustrine, and deltaic sandstones. Three types of sandstone uranium deposits are recognized: tabular (primary, trend, blanket, black-band), roll-front (redistributed, post-fault, secondary), and fault-related (redistributed, stack, post-fault). Several companies are planning to mine these deposits by in-situ leaching.

## INTRODUCTION

During a period of nearly three decades (1951-1980), the Grants uranium district in northwestern New Mexico (Fig. 1) yielded more uranium than any other district in the United States (Table 1). Although there are no producing operations in the Grants district today, numerous companies have acquired uranium properties and plan to explore and develop deposits in the district in the near future. The Grants uranium district is one large area in the San Juan Basin, extending from east of Laguna to west of Gallup and consists of eight subdistricts (Fig. 1; McLemore and Chenoweth, 1989). The Grants district is probably 4th in total world production behind East Germany, Athabasca Basin in Canada, and South Africa (Tom Pool, General Atomics, Denver, Colorado, written communication, December 3, 2002). Most of the uranium production in New Mexico has come from the Morrison Formation in the Grants uranium district in McKinley and Cibola (formerly Valencia) Counties, mainly from the Westwater Canyon Member in the San Juan Basin (Table 2; McLemore, 1983).

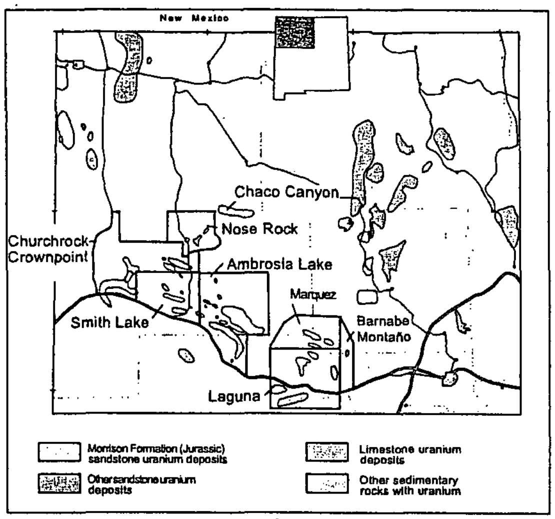


**Figure 1.** Grants uranium district, San Juan Basin, New Mexico. Polygons outline approximate areas of known uranium deposits.

The purpose of this report is to briefly describe the general types of uranium deposits (Table 2, 3) and their production, geology, resources, and future potential in New Mexico. Much of this report is summarized from McLemore (1983), McLemore and Chenoweth (1989, 2003), McLemore et al. (2002), and other reports as cited. This report also presents an update of the uranium industry in New Mexico since 2003. Information on specific mines and deposits in New Mexico can be found in cited references, McLemore (1983), and McLemore et al. (2002).

**Table 1.** Uranium production by type of deposit from the San Juan Basin, New Mexico 1947-2002 (McLemore and Chenoweth, 1989, 2003; production from 1988-2002 estimated by the senior author). Type of deposit refers to Table 3. Total U.S. production from McLemore and Chenoweth (1989) and Energy Information Administration (2006). [1] approximate figures rounded to the nearest 1000 pounds. There hasn't been any uranium production from New Mexico since 2002.

| Type of deposit | Production (pounds $U_3O_8$) | Period of production (years) | Production per total in New Mexico (%) |
|---|---|---|---|
| Primary, redistributed, remnant sandstone uranium deposits (Morrison Formation, Grants district) | 330,453,000 [1] | 1951-1988 | 95.4 |
| Mine-water recovery | 9,635,869 | 1963-2002 | 2.4 |
| Tabular sandstone uranium deposits (Morrison Formation, Shiprock district) | 493,510 | 1948-1982 | 0.1 |
| Other Morrison sandstone uranium deposits | 991 | 1955-1959 | — |
| Other sandstone uranium deposits | 503,279 | 1952-1970 | 0.1 |
| Limestone uranium deposits (Todilto Formation) | 6,671,798 | 1950-1985 | 1.9 |
| Other sedimentary rocks with uranium deposits | 34,889 | 1952-1970 | — |
| Vein-type uranium deposits | 226,162 | 1953-1966 | — |
| Igneous and metamorphic rocks with uranium deposits | 69 | 1954-1956 | — |
| Total in New Mexico | 348,019,000[1] | 1948-2002 | 100 |
| Total in United States | 927,917,000[1] | 1947-2002 | 37.5 of total U.S. |

## MINING AND MILLING HISTORY AND PRODUCTION

Interest in uranium as a commodity began in the early 1900s, and several deposits in New Mexico were discovered and mined for radium. Radium was produced from the White Signal district in Grant County (Gillerman, 1964) and the Scholle district in Torrance, Socorro, and Valencia Counties (McLemore, 1983). Exact production figures are unknown, but probably very small.

John Wade of Sweetwater, Arizona first discovered uranium and vanadium minerals in the Carrizo Mountains in the northwestern San Juan Basin about 1918 (Fig. 1; Chenoweth, 1993, 1997). At that time, the Navajo Reservation was closed to prospecting and mining, but on June 30, 1919, a Congressional Act opened the reservation to prospecting and locating mining claims in the same manner as prescribed by the Federal mining law. The locator of the claim could then lease the claim under contract with the Office of Indian Affairs. By 1920, Wade, operating as the Carriso Uranium Co., had located 40 claims in the eastern Carrizo Mountains, near Milepost 16. The area remained inactive from 1927 to 1942, at which time the Vanadium Corp. of America (VCA) was the highest bidder on a 104 sq mi exploration lease for vanadium in the east Carrizo Mountains. The lease was known as the East Reservation Lease (no. I-149-IND-5705) and was subsequently reduced to 12 plots or claims. When production began, ore from the East Reservation Lease was shipped to Monticello, Utah, where VCA operated the mill for the Metals Reserve Co. Uranium in the vanadium ore was secretly recovered via a uranium circuit at the Monticello mill for the Manhattan Project in 1943-1945. The total amount of recovered uranium is estimated as 44,000 lbs $U_3O_8$, mostly from King Tutt Mesa (Chenoweth, 1985b).

The U. S. Atomic Energy Commission (AEC) was created in 1947, and soon after, the VCA began exploring their East Reservation Lease for uranium. This led to the first uranium ore shipments in March 1948. Mining ceased in the east Carrizo Mountains in 1967.

**Table 2.** Classification of uranium deposits in New Mexico (modified from McLemore and Chenoweth, 1989; McLemore, 2001). Deposit types in bold are found in the Grants uranium district.

I. Peneconcordant uranium deposits in sedimentary host rocks
- **A. Morrison Formation (Jurassic) sandstone uranium deposits**
    - **Primary, tabular sandstone uranium-humate deposits in the Morrison Formation**
    - **Redistributed sandstone uranium deposits in the Morrison Formation**
    - **Remnant sandstone uranium deposits in the Morrison Formation**
    - Tabular sandstone uranium-vanadium deposits in the Salt Wash and Recapture Members of the Morrison Formation
- **B. Other sandstone uranium deposits**
    - **Redistributed uranium deposits in the Dakota Sandstone (Cretaceous)**
    - **Roll-front sandstone uranium deposits in Cretaceous and Tertiary sandstones**
    - Sedimentary uranium deposits
    - Sedimentary-copper deposits
    - **Beach placer, thorium-rich sandstone uranium deposits**
- **C. Limestone uranium deposits**
    - **Limestone uranium deposits in the Todilto Formation (Jurassic)**
    - Other limestone deposits
- **D. Other sedimentary rocks with uranium deposits**
    - **Carbonaceous shale and lignite uranium deposits**
    - Surficial uranium deposits

II. Fracture-controlled uranium deposits
- **E. Vein-type uranium deposits**
    - Copper-silver (uranium) veins (formerly Jeter-type, low-temperature vein-type uranium deposits and La Bajada, low-temperature uranium-base metal vein-type uranium deposits)
    - **Collapse-breccia pipes (including clastic plugs)**
    - Volcanic epithermal veins
    - Laramide veins

III. Disseminated uranium deposits in igneous and metamorphic rocks
- F. Igneous and metamorphic rocks with disseminated uranium deposits
    - Pegmatites
    - Alkaline rocks
    - Granitic rocks
    - Carbonatites
    - Miscellaneous

**Table 3.** Uranium production and types of deposits by district or subdistrict in the San Juan Basin, New Mexico (McLemore and Chenoweth, 1989, production from 1988-2002 estimated by the senior author). Districts have reported occurrences of uranium or thorium (>0.005% $U_3O_8$ or > 100 ppm Th). Some district names have been changed from McLemore and Chenoweth (1989) to conform to McLemore (2001). District number refers to number on map and Table 3 in McLemore and Chenoweth (1989). See McLemore (1983), McLemore and Chenoweth (1989, table 3), and McLemore et al. (2002) for more details and locations of additional minor uranium occurrences. Types of deposits defined in Table 2.

| DISTRICT | PRODUCTION (lbs $U_3O_8$) | GRADE ($U_3O_8$%) | PERIOD OF PRODUCTION | TYPES OF DEPOSITS |
|---|---|---|---|---|
| **Grants district** | | | | |
| 1. Laguna | >100,600,000 | 0.1-1.3 | 1951-1983 | A, C, E |
| 2. Marquez | 28,000 | 0.1-0.2 | 1979-1980 | A |
| 3. Bernabe Montaño | None | | | A |
| 4. Ambrosia Lake | >211,200,000 | 0.1-0.5 | 1950-2002 | A, B, C, E |
| 5. Smith Lake | >13,000,000 | 0.2 | 1951-1985 | A, C |
| 6. Church Rock-Crownpoint | >16,400,000 | 0.1-0.2 | 1952-1986 | A, B |
| 7. Nose Rock | None | | | A |
| 8. Chaco Canyon | None | | | A |
| **Shiprock district** | | | | |
| 9. Carrizo Mountains | 159,850 | 0.23 | 1948-1967 | A |
| 10. Chuska | 333,685 | 0.12 | 1952-1982 | A, C, B |
| 11. Tocito Dome | None | | | A |
| 12. Toadlena | None | | | B |
| **Other areas and districts** | | | | |
| 13. Zuni Mountains | None | | | B, E, F |
| 14. Boyd prospect | 74 | 0.05 | 1955 | B |
| 15. Farmington | 3 | 0.02 | 1954 | B |
| 18. Chama Canyon | None | | | B |
| 19. Gallina | 19 | 0.04 | 1954-1956 | B |
| 20. Eastern San Juan Basin | None | | | B |
| 21. Mesa Portales | None | | | B |
| 22. Dennison Bunn | None | | | A |
| 23. La Ventana | 290 | 0.63 | 1954-1957 | D |
| 24. Collins-Warm Springs | 989 | 0.12 | 1957-1959 | A |
| 25. Ojito Spring | None | | | A |
| 26. Coyote | 182 | 0.06 | 1954-1957 | B, C |
| 27. Nacimiento | None | | | B |
| 28. Jemez Springs | None | | | B |

From 1948 through 1966, the AEC purchased all of the uranium concentrate produced in New Mexico. During the last few years of the AEC program (1967-1970), the AEC allowed mill operators to sell uranium to electric utilities. In New Mexico this amounted to over 17 million pounds of $U_3O_8$ (USAEC unpublished records). The price schedules, bonuses, and other incentives offered by the AEC created a prospecting boom that spread across the Four Corners area to all parts of New Mexico. Discoveries were made in the Chuska Mountains near Sanostee and in the Todilto Limestone near Grants. The announcement of Paddy Martinez's discovery of uranium in the Todilto Limestone at Haystack Butte in 1950 brought uranium prospectors to the Grants area. It was Lewis Lothman's discovery in March 1955 at Ambrosia Lake that created the uranium boom in that area. These discoveries led to a significant exploration effort in the San Juan Basin between Laguna and Gallup and ultimately led to the development of the Grants uranium district. Production from the Todilto Limestone deposits began in 1950, with a shipment of ore to the AEC ore-buying station at Monticello, Utah. Mills were soon built and operated in the San Juan Basin of New Mexico.

The Anaconda Bluewater mill was built at Bluewater, west of Grants in 1953 to process ores from the Jackpile mine and closed in 1982. ARCO Coal Company (formerly Anaconda) completed encapsulation of the tailings in 1995 and the U. S. Department of Energy (DOE) monitors the site as part of the Legacy Management program (formerly the Long-Term Surveillance and Maintenance, LTSM program).

The Homestake mill, 5.5 mi north of Milan, actually consisted of two mills. The southern mill, built in 1957, was known as the Homestake-New Mexico Partners mill and was closed in 1962 (Chenoweth, 1989b; McLemore and Chenoweth, 2003). The Homestake-Sapin Partners, a partnership between Homestake and Sabre Pinon Corp., in 1957 built a second, larger mill north of the first facility. In 1962, United Nuclear Corp. merged with Sabre Pinon Corp., but maintained the United Nuclear Corp. name. United Nuclear Corp. became the limited partner with Homestake forming the United Nuclear-Homestake partnership and continued operating the mill. In March 1981, the United Nuclear-Homestake Partnership was dissolved and Homestake became the sole owner. The Homestake mill ceased production in 1981, but reopened in 1988 to process ore from the Section 23 mine and Chevron's Mount Taylor mine. The mill closed soon after and was decommissioned and demolished in 1990. In 2001, Homestake Corp. merged with Barrick Gold Corp. Homestake completed reclamation of the Homestake mill at Milan in 2004.

Kerr-McGee Oil Industries, Inc. built the Shiprock (Navajo) mill at Shiprock in 1954. It processed ore from their mines in the Lukachukai Mountains in Arizona and non-Vanadium Corporation of America (VCA) controlled mines on the Navajo Indian Reservation. It also processed ores from the Gallup and Poison Canyon areas in the Grants district. The mill was acquired by VCA in 1963 and closed in May 1968, one year after VCA merged into Foote Mineral Company. The DOE began cleanup of the site in 1968 as part of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978. Cleanup was achieved in 1996 and the site turned over to the Legacy Management program of the DOE for monitoring.

Kermac Nuclear Fuels Corp., a partnership of Kerr-McGee Oil Industries, Inc., Anderson Development Corp., and Pacific Uranium Mines Co., built the Kerr-McGee mill at Ambrosia Lake in 1957-58. In 1983, Quivira Mining Co., a subsidiary of Kerr-McGee Corp. (later Rio Algom Mining LLC, currently BHP-Billiton) became the operator. The mill began operating in 1958 and from 1985-2002, the mill produced only from mine waters from the Ambrosia Lake underground mines. Quivira Mining Co. is no longer producing uranium and the Ambrosia Lake mill and mines will be reclaimed in 2007.

Phillips Petroleum Co. also built a mill at Ambrosia Lake in 1957-58. Ore was from the Ann Lee, Sandstone, and Cliffside mines. Production began in 1958. United Nuclear Corp. acquired the property in 1963, when the mill closed. The DOE remediated the site between 1987 and 1995 as part of the UMTRCA of 1978. DOE monitors the site as part of the Legacy Management program.

Additional mills were built in the Laguna and Church Rock areas and are currently being reclaimed (McLemore and Chenoweth, 2003, table 5).

Annual uranium production in New Mexico increased steadily from 1948 to 1956, from 1957 to 1960, from 1965 to 1968, and from 1973 to 1979. Peak production was attained in 1978, with a record yearly production of 9,371 tons of $U_3O_8$ that was shipped to mills and buying stations (McLemore, 1983; McLemore and Chenoweth, 1989, 2003).

All of the conventional underground and open-pit mines in New Mexico closed by 1989 for several reasons:

- The Three Mile Island incident resulted in finalizing a growing public perception in the U.S. that nuclear power was dangerous and costly, and, subsequently nuclear power plants became unpopular.
- There was an overproduction of uranium in the 1970s-early 1980s that led to large stockpiles of uranium. In addition, the dismantling of nuclear weapons by the U.S. and Russia also increased these stockpiles, reducing the need for mining uranium.
- At the same time, New Mexico uranium deposits in production were decreasing in grade by nearly half.
- The cost of mine and mill reclamation was increasing in cost and was not accounted for in original mine plans.
- Higher grade, more attractive uranium deposits were found elsewhere in the world.
- Large coal deposits were found throughout the U.S. that could meet the nation's energy needs.

Uranium was produced from 1966-2002 by mine-water recovery from underground mines by Quivira Mining Co., formerly Kerr McGee Corp. The decline in the price of uranium during 1989-2005 resulted in no uranium production (except mine water recovery), exploration, or development in the district. Many companies reclaimed and/or sold their properties. However, today with the recent increase in price and demand for uranium, numerous companies are acquiring new and old properties and exploring for uranium in the Grants district. The Grants district is once again an attractive area for uranium exploration, because:

- Major companies abandoned properties in the district after the last cycle leaving advanced uranium projects.
- Current property acquisition costs are inexpensive and include millions of dollars worth of exploration and development expenditures.
- Data and technical expertise on these properties are available.
- Recent advances in in-situ leaching technology allow for the Grants district sandstone uranium deposits to be economically attractive.

## TYPES OF URANIUM DEPOSITS IN NEW MEXICO

The types of uranium deposits in New Mexico are summarized in Table 2, many of which are found in the Grants district. The most important type of deposit in terms of production (Table 3) and resources (Table 4, 5) is sandstone uranium deposits in the Morrison Formation (Jurassic).

### Sandstone uranium deposits in the Morrison Formation (Jurassic)

Sandstone uranium deposits account for the majority of the uranium production from New Mexico (McLemore and Chenoweth, 1989; 2003). The most significant deposits are those in the Morrison Formation, specifically the Westwater Canyon Member, where more than 340,565,370 pounds of $U_3O_8$ were produced from the Morrison from 1948 to 2002 (Table 2). In contrast, production from other sandstone uranium deposits in New Mexico amounts to 503,279 pounds of $U_3O_8$ (Table 2, 1952-1970; McLemore and Chenoweth, 1989). There are three types of deposits in the Westwater Canyon Member of the Morrison Formation: primary (trend or tabular), redistributed (stack), and remnant-primary sandstone uranium deposits (Fig. 2, 3).

Primary sandstone-hosted uranium deposits, also known as prefault, trend, blanket, and black-band ores, are found as blanket-like, roughly parallel ore bodies along trends, mostly in sandstones of the Westwater Canyon Member. These deposits are characteristically less than 8 ft thick, average more than 0.20% $U_3O_8$, and have sharp ore-to-waste boundaries (Fig. 2). The largest deposits in the Grants uranium district contain more than 30 million lbs of $U_3O_8$.

Redistributed sandstone-hosted uranium deposits, also known as post-fault, stack, secondary, and roll-type ores, are younger than the primary sandstone-hosted uranium deposits. They are discordant, asymmetrical, irregularly shaped, characteristically more than 8 ft thick, have diffuse ore-to-waste contacts, and cut across sedimentary structures. The average deposit contains approximately 18.8 million lbs $U_3O_8$ with an average grade of 0.16%. Some redistributed uranium deposits are vertically stacked along faults (Fig. 2, 3).

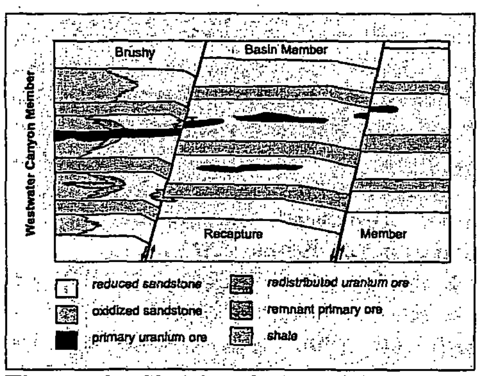


**Figure 2.** Sketch of the different types of uranium deposits in the Morrison Formation. See text for description.

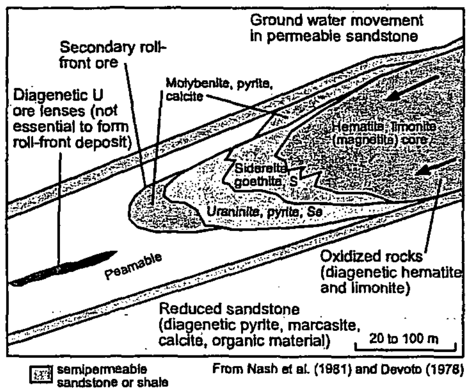


**Figure 3.** Sketch of the formation of redistributed sandstone uranium deposits. See text for description.

**Table 4.** Estimated uranium resources for New Mexico. All of these resources are in sandstone uranium deposits in the Morrison Formation (Jurassic). Mine id refers to Mine identification number in McLemore et al. (2002). Most deposits are delineated on maps by McLemore and Chenoweth (1991) and described in more detail by McLemore et al. (2002).

| Mine id | Mine name | Latitude N | Longitude W | Year of resource estimate | Quantity of ore (pounds) | Grade ($U_3O_8$%) | Comments and Reference |
|---|---|---|---|---|---|---|---|
| NMCI0019 | J. J. | 35.17546 | 107.3266 | 1981 | 13,900,000 | 0.16 | close out plan pending approval by state |
| NMCI0020 | La Jara Mesa | 35.28014 | 107.7449 | 1983 | 7,133,310 | 0.3 | exploration permit approved |
| NMMK0245 | Melrich (Section 32) | 35.394462 | 107.7081 | | 3,217,000 | 0.15 | Laramide Resources |
| NMMK0210 | Treeline (Section 24) | 35.343556 | 107.7366 | | ? | ? | Western Energy Dev. |
| NMCI0027 | Mount Taylor | 35.33498 | 107.6356 | 1982 | 121,000,000 | 0.25 | http://www.gat.com/riogrande/index.html (1/9/03) |
| NMMK0025 | Canyon | 35.65699 | 108.2069 | 1983 | 5,000,000 | 0.12 | |
| NMMK0043 | Dalton Pass | 35.67849 | 108.2650 | 1983 | 5,000,000 | 0.12 | |
| NMMK0044 | Dalton Pass | 35.68130 | 108.2783 | 1983 | 20,000,000 | 0.10 | |
| NMMK0065 | Fernandez-Main Ranch | 35.34861 | 107.6646 | 1970 | 8,500,000 | 0.10 | Holmquist (1970) |
| NMMK0087 | Johnny M | 35.36244 | 107.7222 | 1983 | 3,500,000 | 0.10 | |
| NMMK0102 | Mariano Lake | 35.54708 | 108.2780 | 1983 | 35,000,000 | 0.24 | |
| NMMK0103 | Marquez Canyon | 35.31919 | 107.3243 | 1983 | 10,700,000 | 0.112 | |
| NMMK0104 | Marquez Canyon | 35.32425 | 107.3300 | 1983 | 6,800,000 | 0.10 | |
| NMMK0111 | Narrow Canyon | 35.64484 | 108.2984 | 1983 | 6,900,000 | 0.12 | |
| NMMK0112 | NE Church Rock No. 1 | 35.66650 | 108.5027 | 1983 | 2,868,700 | 0.247 | |
| NMMK0114 | NE Church Rock No. 2 | 35.67663 | 108.5262 | 1979 | 15,000,000 | 0.19 | Perkins (1979) |
| NMMK0115 | NE Church Rock No. 3 | 35.69756 | 108.5487 | 1983 | 21,000,000 | 0.20 | |
| NMMK0117 | NE Church Rock | 35.65841 | 108.5085 | 1969 | 15,000,000 | 0.15 | Hazlett (1969) |
| NMMK0128 | Church Rock (Section 8) | 35.630313 | 108.55064 | 2002 | 6,529,000 | | Odell (2002), Pelizza and McCarn (2002, 2003a) |
| NMMK0034 | Church Rock (Section 17) | 35.622209 | 108.552728 | 2002 | 8,443,000 | | Odell (2002), Pelizza and McCarn (2002, 2003a) |
| NMMK0100, NMMK0101 | Mancos | 35.628936 | 108.580547 | 2002 | 4,164,000 | | Pelizza and McCarn (2002, 2003a) |
| NMMK0346, NMMK0036, NMMK0039 | Crownpoint | 35.684585 | 108.16769 | 2002 | 38,959,000 | 0.16 | Odell (2002), Pelizza and McCarn (2002, 2003a) |
| NMMK0040 | Crownpoint (Unit 1) | 35.706678 | 108.22052 | 2002 | 27,000,000 | | Pelizza and McCarn (2002, 2003a) |
| NMMK0119 | Nose Rock | 35.88436 | 107.9916 | 1983 | 9,700,000 | 0.167 | |
| NMMK0120 | Nose Rock No. 1 | 35.83556 | 108.0553 | 1983 | 25,000,000 | 0.10 | |
| NMMK0122 | Nose Rock | 35.83036 | 108.0641 | 1983 | 36,200,000 | 0.10 | |
| NMMK0020 | Borrego Pass | 35.620119 | 107.943617 | 1983 | 15,000,000 | 0.15 | Tom Pool (WC, 12/3/02) |
| NMMK0245 | Section 32 (Melrich) | 35.394462 | 107.708055 | | 5,000,000 | 0.25 | Tom Pool (WC, 12/3/02) |
| NMMK0338 | Vanadium | 35.33339 | 107.8563 | 1983 | 25,000,000 | 0.10 | |
| NMMK0340 | West Largo | 35.52570 | 107.9215 | 1983 | 15,000,000 | 0.15 | |
| NMMK0350 | Nose Rock | 35.84497 | 108.0501 | 1983 | 12,400,000 | 0.167 | |
| NMSA0023 | Bernabe | 35.22761 | 107.0109 | 1971 | 15,000,000 | 0.10 | |
| NMSA0057 | Marquez Grant | 35.30514 | 107.2908 | 1981 | 751,000 | 0.09 | |
| NMCI0046 | Saint Anthony | 35.159088 | 107.306139 | 1982 | 8,000,000 | 0.10 | close out plan pending approval |
| NMCI0050 | San Antonio Valley | 35.256361 | 107.258444 | | 3,500,000 | 0.10 | Tom Pool (WC, 12/3/02) |
| NMMK0143 | Roca Honda | 35.363139 | 107.699611 | Late 1980s | 3,000,000 | 0.19 | Tom Pool (WC, 12/3/02) |

Remnant sandstone-hosted uranium deposits were preserved in sandstone after the oxidizing waters that formed redistributed uranium deposits had passed. Some remnant sandstone-hosted uranium deposits were preserved because they were surrounded by or found in less permeable sandstone and could not be oxidized by the oxidizing ground waters. These deposits are similar to primary sandstone-hosted uranium deposits, but are difficult to locate because they occur sporadically within the oxidized sandstone. The average size is approximately 2.7 million lbs $U_3O_8$ at a grade of 0.20%.

There is no consensus on details of the origin of the Morrison primary sandstone uranium deposits (Sanford, 1992). The source of the uranium and vanadium is not well constrained. It could be derived from alteration of volcanic detritus and shales within the Morrison Formation (Thamm et al., 1981; Adams and Saucier, 1981) or from ground water derived from a volcanic highland to the southwest. The majority of the proposed models for their formation suggest that deposition occurred at a ground water interface between two fluids of different chemical compositions and/or oxidation-reduction states. Deposition involving two fluids was proposed many years ago during the early stages of exploration and production of uranium (Fischer, 1947; Shawe, 1956).

Subsequent models, such as the lacustrine-humate and brine-interface models, have refined or incorporated portions of these early theories. In the lacustrine-humate model, ground water was expelled by compaction from lacustrine muds formed by a large playa lake into the underlying fluvial sandstones where humate or secondary organic material precipitated as a result of flocculation into tabular bodies. During or after precipitation of the humate bodies, uranium was precipitated from ground water (Turner-Peterson, 1985; Fishman and Turner-Peterson, 1986). This model proposes the humate bodies were formed prior to uranium deposition. In the brine-interface model, uranium and humate were deposited during diagenesis by reduction at the interface of meteoric fresh water and ground water brines (Granger and Santos, 1986). In another variation of the brine-interface model, ground water flow is driven by gravity, not compaction. Ground water flowed down dip and discharged in the vicinity of the uranium deposits. Uranium precipitated in the presence of humates at a gravitationally stable interface between relatively dilute, shallow meteoric water and saline brines that migrated up dip from deeper in the basin (Sanford, 1982, 1992). Modeling of the regional ground water flow in the Colorado Plateau during Late Jurassic and Early Cretaceous times supports the brine-interface model (Sanford, 1982). The ground-water flow was impeded by up-thrown blocks of Precambrian crust and forced upwards. These zones of upwelling are closely associated with uranium-vanadium deposits throughout the Colorado Plateau (Sanford, 1982).

In the Grants district, the bleaching of the Morrison sandstones and the geometry of tabular uranium-vanadium bodies floating in sandstone beds supports the reaction of two chemically different waters, most likely a dilute meteoric water and saline brine from deeper in the basin. The intimate association of uranium-vanadium minerals with organic material, further indicates that they were deposited at the same time. Cementation and replacement of feldspar and quartz grains with uranium-vanadium minerals are consistent with deposition during early diagenesis.

During the Tertiary, after formation of the primary sandstone uranium deposits, oxidizing ground waters migrated through the uranium deposits and remobilized some of the primary sandstone uranium deposits (Saucier, 1981). Uranium was reprecipitated ahead of the oxidizing waters forming redistributed sandstone uranium deposits. Where the sandstone host surrounding the primary deposits was impermeable and the oxidizing waters could not dissolve the deposit, remnant-primary sandstone uranium deposits remain (Fig. 2, 3).

Sandstone uranium deposits occur in other formations in New Mexico, but were insignificant compared to the Morrison deposits (McLemore and Chenoweth, 1989); some companies are once again exploring in these units. Uranium reserves and resources remain in the Grants uranium district that could be mined in the future by conventional underground techniques and by in-situ leaching technologies (Table 6; Holen and Hatchell, 1986, McLemore and Chenoweth, 1991, 2003).

**Table 5.** Uranium reserves by forward-cost category by state as of 2003 (Energy Information Administration, 2006). The DOE classifies uranium reserves into forward cost categories of $30 and $50 per pound. Forward costs are operating and capital costs (in current dollars) that are still to be incurred to produce uranium from estimated reserves. Modern regulatory costs yet to be incurred would have to be added.

| STATE | $30 per pound | | | $50 per pound | | |
|---|---|---|---|---|---|---|
| | ORE (million tons) | GRADE (% $U_3O_8$) | $U_3O_8$ (million pounds) | ORE (million tons) | GRADE (% $U_3O_8$) | $U_3O_8$ (million pounds) |
| New Mexico | 15 | 0.28 | 84 | 102 | 0.167 | 341 |
| Wyoming | 41 | 0.129 | 106 | 238 | 0.076 | 363 |
| Arizona, Colorado, Utah | 8 | 0.281 | 45 | 45 | 0.138 | 123 |
| Texas | 4 | 0.077 | 6 | 18 | 0.063 | 23 |
| Other | 6 | 0.199 | 24 | 21 | 0.094 | 40 |
| Total | 74 | 0.178 | 265 | 424 | 0.105 | 890 |

**Tabular sandstone uranium-vanadium deposits in the Salt Wash and Recapture Members**

Tabular sandstone uranium-vanadium deposits in the Salt Wash and Recapture Members of the Morrison Formation are restricted to the east Carrizo (including the King Tutt Mesa area) and Chuska Mountains subdistricts of the Shiprock district, western San Juan Basin, where production totals 493,510 pounds of $U_3O_8$ (Table 2). The Salt Wash Member is the basal member of the Morrison Formation and is overlain by the Brushy Basin Member (Anderson and Lucas, 1992, 1995; McLemore and Chenoweth, 1997). It unconformably overlies the Bluff-Summerville Formation, using older stratigraphic nomenclature (Anderson and Lucas, 1992), or the Wanakah Formation as proposed by Condon and Peterson (1986). The Salt Wash Member consists of 190-220 ft of interbedded fluvial sandstones and floodplain mudstones, shales, and siltstones. The mudstone and siltstone comprise approximately 5-45% of the total thickness of the unit (Masters et al., 1955; Chenoweth, 1993).

The tabular uranium deposits are generally elongated parallel to paleostream channels and are associated with carbonized fossil plant material. A cluster of small ore bodies along a trend could contain as much as 4000 tons of ore averaging 0.23% $U_3O_8$ (Hilpert, 1969; Chenoweth and Learned, 1984; McLemore and Chenoweth, 1989, 1997). They tend to form subhorizontal clusters that are elongated and blanket-like. Ore bodies in the King Tutt Mesa area are small and irregular and only a few ore bodies have yielded more than 1000 lbs of $U_3O_8$. A typical ore body in the King Tutt Mesa area is 150-200 ft long, 50-75 ft wide, and approximately 5 ft thick (McLemore and Chenoweth, 1989, 1997). The deposits are typically concordant to bedding, although discordant lenses of uranium-vanadium minerals cross-cut bedding planes locally. The ore bodies typically float in the sandstone; locally, they occur at the interface between sandstone and less permeable shale or siltstone. However, unlike uranium deposits in the Grants district, the deposits at King Tutt Mesa are high in vanadium. The U:V ratio averages 1:10 and ranges 1:1 to 1:16.

The deposits are largely black to red, oxidized, and consist of tyuyamunite, meta-tyuyamunite, uranium/organic compounds, and a variety of vanadium minerals, including vanadium clay (Corey, 1958). Uranium and vanadium minerals are intimately associated with detrital organic material, such as leaves, branches, limbs, and trunks, derived from adjacent sandbar, swamp, and lake deposits, and humates. Small, high-grade ore pods (>0.5% $U_3O_8$) were associated with fossil wood. The uranium-vanadium minerals form the matrix of the mineralized sandstones and locally replace detrital quartz and feldspar grains. Mineralized beds are associated with coarser-grained sandstone, are above calcite-cemented sandstone or mudstone-siltstone beds, are associated locally with mudstone galls, and are near green to gray mudstone lenses. Limonite is commonly associated with the ore bodies (Masters et al., 1955). Field and petrographic data suggests that the uranium-vanadium deposits formed shortly after deposition of the host sediments (Hilpert, 1969).

Modeling of the regional ground-water flow in the Colorado Plateau during Late

Jurassic and Early Cretaceous times supports the brine-interface model and indicates that the regional ground-water flow was to the northeast in the King Tutt Mesa area (Sanford, 1982). In the King Tutt Mesa area, the bleaching of the sandstones and the geometry of tabular uranium-vanadium bodies floating in sandstone beds supports the reaction of two chemically different waters, most likely a dilute meteoric water and saline brine from deeper in the basin (McLemore and Chenoweth, 1997). The intimate association of uranium-vanadium minerals with organic material, further indicates that they were deposited at the same time.

**Other sandstone uranium deposits**

***Redistributed uranium deposits in the Dakota Sandstone (Cretaceous)***

A total of 501,169 pounds of $U_3O_8$ has been produced from redistributed uranium deposits in the Dakota Sandstone in the southern part of the San Juan Basin (Table 2; Chenoweth, 1989a). These deposits are similar to redistributed uranium deposits in the Morrison Formation and are found near primary and redistributed deposits in the Morrison Formation. Deposits in the Dakota Sandstone are typically tabular masses that range in size from thin pods a few feet long and wide to masses as much as 2500 ft long and 1000 ft wide. The larger deposits are only a few feet thick, but a few are as much as 25 ft thick (Hilpert, 1969). Ore grades ranged from 0.12 to 0.30% $U_3O_8$ and averaged 0.21% $U_3O_8$. Uranium is found with carbonaceous plant material near or at the base of channel sandstones or in carbonaceous shale and lignite and is associated with fractures, joints, or faults and with underlying permeable sandstone of the Brushy Basin or Westwater Canyon Members.

The largest deposits in the Dakota Sandstone are found in the Old Church Rock mine in the Church Rock subdistrict of the Grants district, where uranium is associated with a major northeast-trending fault. More than 188,000 lbs of $U_3O_8$ have been produced from the Dakota Sandstone in the Old Church Rock mine (Chenoweth, 1989a).

***Roll-front sandstone uranium deposits***

Roll-front sandstone uranium deposits are found in Tesuque Formation (San Jose) and Ojo Alamo Sandstone (Farmington, Mesa Portales) areas of the San Juan Basin, where production totals 60 pounds of $U_3O_8$ (Table 2; McLemore and Chenoweth, 1989). Roll-front uranium deposits typically are found in permeable fluvial channel sandstones and are associated with carbonaceous material, clay galls, sandstone-shale interfaces, and pyrite at an oxidation-reduction interface (Nash et al., 1981). Although only a few minor and unverified uranium occurrences have been reported at Mesa Portales (McLemore, 1983), radiometric anomalies are detected by water, stream-sediment, and aerial-radiometric studies (Green et al., 1980a, b). Past drilling at Mesa Portales indicated that low-grade uranium is found in blanket-like bodies in several horizons. The lack of a clear mineralization pattern suggests that these deposits are modified roll-type or remnant ore bodies (Green et al., 1980a, b).

***Sedimentary sandstone uranium deposits***

Sedimentary sandstone uranium deposits are stratabound deposits associated with syngenic organic material or iron oxides, or both, such as at the Boyd deposit near Farmington and in the Chinle Formation throughout northern New Mexico. Uranium contents vary, but average grades of shipments from these deposits rarely exceeded 0.1% $U_3O_8$. These deposits tend to be small, containing only a few tons of ore, and the potential for future production is low.

***Sedimentary-copper deposits***

Stratabound, sedimentary-copper deposits containing Cu, Ag, and locally Au, Pb, Zn, U, V, and Mo are found throughout New Mexico. These deposits also have been called "red-bed" or "sandstone" copper deposits by previous workers (Soulé, 1956; Phillips, 1960; Cox and Singer, 1986). They typically occur in bleached gray, pink, green, or tan sandstones, siltstones, shales, and limestones within or marginal to typical thick red-bed sequences of red, brown, purple, or yellow sedimentary rocks deposited in fluvial, deltaic or marginal-marine environments of Pennsylvanian, Permian, or Triassic age (Coyote, Gallina). The majority of sedimentary-copper deposits in New Mexico are found at or near the base of these sediments; some deposits such as those in the Zuni Mountains and Nacimiento districts (Fig. 4), are in sedimentary rocks that unconformably overlie mineralized Proterozoic granitic rocks. The mineralized bodies typically form as lenses or blankets of disseminated and/or fracture coatings of copper minerals, predominantly chalcopyrite, chalcocite, malachite, and azurite with minor to trace uranium minerals. Copper and uranium minerals in these sedimentary-copper deposits are commonly associated with organic debris and other carbonaceous material.

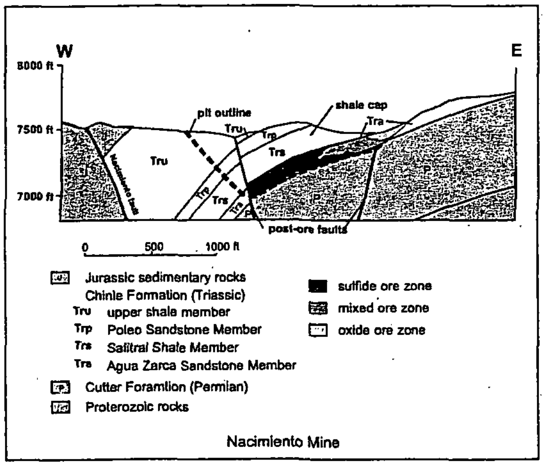


**Figure 4.** Cross section through Naciemento open pit mine exposing a sedimentary copper deposit (modified from Talbot, 1974).

***Beach placer, thorium-rich sandstone uranium deposits***

Heavy mineral, beach-placer sandstone deposits are concentrations of heavy minerals that formed on beaches or in longshore bars in a marginal-marine environment (Fig. 5; Houston and Murphy, 1970, 1977). Many beach-placer sandstone deposits contain high concentrations of Th, REE (rare earth elements), Zr, Ti, Nb, Ta, and Fe; U is rare, but only one deposit yielded minor uranium production (McLemore, 1983). Detrital heavy minerals comprise approximately 50-60% of the sandstones and typically consist of titanite, zircon, magnetite, ilmenite, monazite, apatite, and allanite, among others. These deposits in New Mexico are found in Cretaceous rocks, mostly in the San Juan Basin and are small (<3 ft thick), low tonnage, and low grade. They rarely exceed for more than several hundred feet in length, are only tens of feet wide, and 3-5 ft thick. However, collectively, the known deposits in the San Juan Basin contain 4,741,200 tons of ore containing 12.8% $TiO_2$, 2.1% Zr, 15.5% Fe and less than 0.10% $ThO_2$ (Dow and Batty, 1961). The small size and difficulty in recovering economic minerals will continue to discourage development of these deposits in the future.

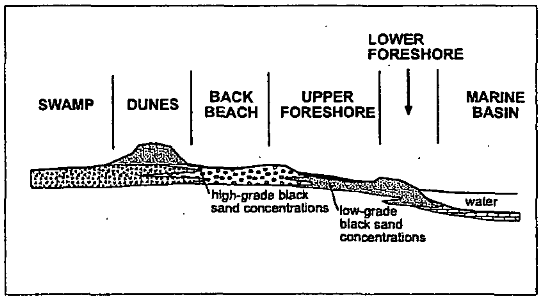


**Figure 5.** Idealized cross-section of formation of beach placer sandstone deposits (Houston and Murphy, 1970).

**Limestone uranium deposits in the Todilto Formation (Jurassic)**

Uranium is found only in a few limestones in the world, but the deposits in the Jurassic Todilto Limestone are some of the largest and most productive (Chenoweth, 1985a; Gabelman and Boyer, 1988). Uranium minerals were found in the Todilto Limestone in the early 1920s, although it was Paddy Martinez's discovery in 1950 that resulted in development of the Grants district. From 1950 through 1981, mines in the Grants district yielded 6,671,798 lbs of $U_3O_8$ from the Todilto Limestone, amounting to approximately 2% of the total uranium produced from the Grants district (Table 2; Chenoweth, 1985a; McLemore and Chenoweth, 1989, 1991).

Limestone is typically an unfavorable host rock for uranium because of low permeability and porosity and lack of precipitation agents, such as organic material. However, a set of unusual geological circumstances allowed the formation of uranium deposits in the Todilto Limestone. The organic-rich limestones were deposited in a sabkha environment on top of the permeable Entrada Sandstone. The overlying sand dunes of the Summerville or Wanakah Formation locally deformed the Todilto muds, producing the intraformational folds in the limestone. Uraniferous waters derived from a highland to the southwest migrated through the Entrada Sandstone. Ground water migrated into the Todilto Limestone by evapotranspiration or evaporative pumping. Uranium precipitated in the presence of organic material within the intraformational folds and associated fractures in the limestone (Fig. 6; Rawson, 1981; Finch and McLemore, 1989). The Todilto uranium deposits are 150-155 Ma, based on U-Pb isotopic dating, and are older than the 130 Ma Morrison sandstone uranium deposits (Berglof, 1989).

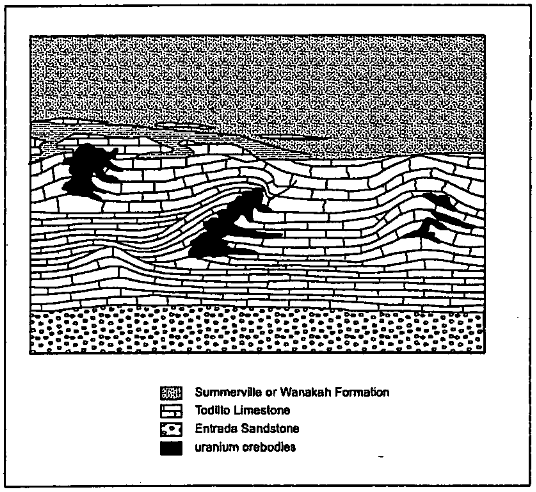


**Figure 6.** Control of Todilto uranium deposits by intraformational folds and fractures (modified from Finch and McLemore, 1989).

More than 100 uranium mines and occurrences are found in the Todilto Limestone in New Mexico; 42 mines have documented uranium production (McLemore, 1983; McLemore and Chenoweth, 1989; McLemore et al., 2002). Most of these are in the Grants uranium district, although minor occurrences are found in the Chama Basin (Abiquiu, Box Canyon), Nacimiento district, and Sanostee in the Chuska subdistrict of the Shiprock district. Minor mineralization extends into the underlying Entrada Sandstone or overlying Summerville Formation in some areas. Uranium is found in the Todilto Limestone only where gypsum-anhydrite beds are absent (Hilpert, 1969).

**Other sedimentary rocks with uranium deposits**

***Carbonaceous shale and lignite uranium deposits***

Some uranium has been produced from shale and lignite in the Dakota Sandstone in the Grants uranium district. Concentrations as high as 0.62% $U_3O_8$ are found in coal, whereas the coal ash has uranium concentrations as high as 1.34% $U_3O_8$ (Bachman et al., 1959; Vine et al., 1953). Mineralized zones are thin and range in thickness from a few inches to 1.5 ft. Most of these occurrences are isolated, small, and low grade, and do not have any significant uranium potential.

**Vein-type uranium deposits**

***Collapse-breccia pipe and clastic plug deposits***

Uraniferous collapse-breccia pipe deposits were mined in northern Arizona for uranium beginning in 1951 and continuing into the1980s; average production grades of 0.5-0.7% $U_3O_8$ were common. Similar deposits are found in the Grants uranium district. Uraniferous collapse-breccia pipes are vertical or steeply dipping cylindrical features bounded by ring fractures and faults and filled with a heterogeneous mixture of brecciated country rocks containing uranium minerals. The pipes were probably formed by solution collapse of underlying limestone or evaporites (Hilpert and Moench, 1960; McLemore, 1983; Wenrich, 1985).

More than 600 breccia-pipes are found in the Ambrosia and Laguna subdistricts, but only a few are uranium bearing (Hilpert, 1969; Nash, 1968; Moench, 1962). Pipe structures in the Cliffside (Clark and Havenstrite, 1963), Doris (Granger and Santos, 1963), and Jackpile-Paguate mines (Hilpert and Moench, 1960) have yielded ore as part of mining adjacent sandstone deposits; the exact tonnage attributed to these breccia-pipes is not known. Very little brecciation has occurred at the Cliffside and Doris pipes, however, these pipes appear to be related to other breccia pipes in the area. The Woodrow deposit is the largest uranium producer from a breccia-pipe in New Mexico (McLemore, 1983) and is 24 to 34 ft in diameter and at least 300 ft high. In Arizona, the mineralized Orphan Lode breccia-pipe is 150 to 500 ft in diameter and at least 1500 ft long (Gornitz and Kerr, 1970). More than 134,000 lbs of $U_3O_8$ at a grade of 1.26% $U_3O_8$ was produced from the Woodrow deposit. However, the New Mexico uraniferous collapse-breccia pipes are uncommon and much smaller in both size and grade than the Arizona uraniferous collapse-breccia pipes. Future mining potential of New Mexico breccia pipes is minimal.

**Surficial uranium deposits**

Ground-water anomalies and locally remote sensing data suggest that surficial or calcrete uranium deposits may exist in the Lordsburg Mesa area in southwestern New Mexico (Carlisle et al., 1978; Raines et al., 1985) and in the Ogalalla Formation in eastern New Mexico (Otton, 1984). However, mineralized zones high in uranium have not been found in these areas.

Uranium minerals, typically carnotite, are found in voids and fractures within lenticular deposits of alluvium, soil, or detritus that have been cemented by carbonate forming calcretes (Nash et al., 1981).

## FUTURE POTENTIAL

New Mexico ranks 2nd in uranium reserves in the U.S. (behind Wyoming), which amounts to 15 million tons ore at 0.28% $U_3O_8$ (84 million lbs $U_3O_8$) at a forward cost of $30/lb and 238 million tons of ore at 0.076% $U_3O_8$ at a forward cost of $50/lb (Table 6, 7). The DOE classifies uranium reserves into forward cost categories of $30 and $50 $U_3O_8$ per pound. Forward costs are operating and capital costs (in current dollars) that are still to be incurred to produce uranium from estimated reserves. All of New Mexico's uranium reserves in 2006 are in the Morrison Formation in the San Juan Basin (Table 7); although uranium exploration is occurring elsewhere in New Mexico.

Only one company in New Mexico, Quivira Mining Co. (successor to Kerr McGee Corp., owned now by BHP-Billiton Plc.), produced uranium in 1989-2002, from waters recovered from inactive underground operations at Ambrosia Lake (mine-water recovery). Quivira Mining Co. is no longer producing uranium and the Ambrosia Lake mill and mines will be reclaimed in 2007. Any conventional mining of uranium in New Mexico will require a new mill or the ore would have to be shipped to the White Mesa mill in Blanding, Utah.

Rio Grande Resources Co. is maintaining the closed facilities at the flooded Mt. Taylor underground mine in Cibola County, where primary sandstone-hosted uranium deposits were mined as late as 1989 (Table 6). Reserves are estimated as 121 million pounds $U_3O_8$ at 0.25% $U_3O_8$, which includes 7.5 million pounds of $U_3O_8$ at 0.50% $U_3O_8$. Depths to ore average 3,300 ft.

The La Jara Mesa uranium deposit in Cibola County was originally owned by Homestake Mining Co and in 1997 was transferred to Anaconda and subsequently to Laramide Resources Ltd. This primary sandstone-hosted uranium deposit, discovered in the Morrison Formation in the late 1980s, contains approximately 8 million pounds of ore averaging 0.25% $U_3O_8$ (Table 6). It is above the water table and is not suited to current in situ leaching technologies. New Mexico Mining and Minerals Division has approved an exploration permit for Laramide Resources and a permit is pending for Urex Energy Corp., who also owns adjacent properties on Jara Mesa to Laramide. Laramide Resources also controls the nearby Melrich deposit (Table 6). Lakeview Ventures also acquired adjacent properties (press release, April 19, 2006).

Hydro Resources, Inc. (subsidiary of Uranium Resources Inc.) is waiting for final permit approvals and an increase in the price of uranium before mining uranium by in-situ leaching at Church Rock and Crownpoint. Production costs are estimated as $13.54 per pound of $U_3O_8$ (Pelizza and McCarn, 2002, 2003 a, b). Reserves at Church Rock (Section 8, 17) and Mancos mines are estimated as 19 million pounds of $U_3O_8$ (Table 6; Pelizza and McCarn, 2002, 2003 a, b). Hydro Resources, Inc. estimates production costs at Crownpoint to be $11.46-12.71 per pound $U_3O_8$ (Pelizza and McCarn, 2002, 2003 a, b). Hydro Resources, Inc. also owns the Santa Fe Railroad properties in the Ambrosia Lake subdistrict.

Strathmore Minerals Corp. has acquired numerous properties in the Grants district, including Roca Honda (33,300,000 pounds $U_3O_8$), Church Rock (15,300,000 pounds $U_3O_8$; Fitch, 2005), and Nose Rock. Strathmore hopes to mine uranium by both in situ leaching and conventional mining and milling. An exploration permit is pending for the Roca Honda deposit.

Quincy Energy Corp. merged with Energy Metals Corp in July 2006, and acquired properties in Crownpoint (section 24 contains 9.966 million pounds of $U_3O_8$ and sections 19 and 29 contains 13.672 million pounds of $U_3O_8$; Myers, 2006a, b) and Hosta Butte (14.822 million pounds of $U_3O_8$; Myers, 2006c). Quincy Energy Corp. is examining the uranium resource potential in northeastern New Mexico.

An exploration permit was approved by New Mexico Mining and Minerals Division for Western Energy Development to drill at the Treeline project, Ambrosia Lake subdistrict, McKinley County. An exploration permit is pending for Urex to explore for uranium on their properties in the Grants district.

Max Resources Corp. has filed for drilling permits for the C de Baca property in the Riley area, Socorro County, where Occidental Minerals in 1981-1982 identified 1.67 million tons of $U_3O_8$ grading 0.18% $U_3O_8$, found in sandstones of the Cretaceous Crevasse Canyon and Tertiary Baca Formations (press release June 8, 2006).

## SUMMARY

Sandstone uranium deposits in New Mexico have played a major role in historical uranium production. Although other types of uranium deposits in the world are higher in grade and larger in tonnage, the Grants uranium district could soon become a significant source of uranium:

- As in situ leaching technologies improve, decreasing production costs.
- As demand for uranium increases worldwide, increasing the price of uranium.

However, several challenges need to be overcome by the companies before uranium could be produced once again from the Grants uranium district:

- There are no conventional mills remaining in New Mexico to process the ore, which adds to the cost of producing uranium in the state. New infrastructure will need to be built before conventional mining can resume.
- Permitting for new in situ leaching and especially for conventional mines and mills will possibly take years to complete.
- Closure plans, including reclamation must be developed before mining or leaching begins. Modern regulatory costs will add to the cost of producing uranium in the U.S.
- Some communities, especially the Navajo Nation communities, do not view development of uranium properties as favorable. The Navajo Nation has declared that no uranium production will occur on Navajo lands.
- High-grade, low-cost uranium deposits in Canada and Australia are sufficient to meet current international demands; but additional resources will be required to meet near-term future requirements.

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U.S. Census Bureau
American FactFinder

FACT SHEET

## McKinley County, New Mexico

**2006 American Community Survey**
**Data Profile Highlights:**

NOTE. Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

| Social Characteristics - show more >> | Estimate | Percent | U.S. | Margin of Error |
|---|---|---|---|---|
| Average household size | 3.44 | (X) | 2.61 | +/-0.21 |
| Average family size | 4.29 | (X) | 3.20 | +/-0.42 |
| Population 25 years and over | 38,579 | | | +/-487 |
| High school graduate or higher | (X) | 68.9 | 84.1% | (X) |
| Bachelor's degree or higher | (X) | 11.5 | 27.0% | (X) |
| Civilian veterans (civilian population 18 years and over) | N | N | 10.4% | N |
| Disability status (population 5 years and over) | 10,192 | 15.7 | 15.1% | +/-1,688 |
| Foreign born | 2,097 | 2.9 | 12.5% | +/-902 |
| Male, Now married, except separated (population 15 years and over) | 10,043 | 41.8 | 52.4% | +/-1,301 |
| Female, Now married, except separated (population 15 years and over) | 10,262 | 37.3 | 48.4% | +/-1,182 |
| Speak a language other than English at home (population 5 years and over) | N | N | 19.7% | N |
| Household population | 69,791 | | | +/-226 |
| Group quarters population | (X) | (X) | (X) | (X) |

| Economic Characteristics - show more >> | Estimate | Percent | U.S. | Margin of Error |
|---|---|---|---|---|
| In labor force (population 16 years and over) | 24,918 | 50.0 | 65.0% | +/-1,699 |
| Mean travel time to work in minutes (workers 16 years and over) | 21.6 | (X) | 25.0 | +/-2.6 |
| Median household income (in 2006 inflation-adjusted dollars) | 27,261 | (X) | 48,451 | +/-3,708 |
| Median family income (in 2006 inflation-adjusted dollars) | 32,402 | (X) | 58,526 | +/-6,279 |
| Per capita income (in 2006 inflation-adjusted dollars) | 11,272 | (X) | 25,267 | +/-1,043 |
| Families below poverty level | (X) | 36.8 | 9.8% | (X) |
| Individuals below poverty level | (X) | 44.0 | 13.3% | (X) |

| Housing Characteristics - show more >> | Estimate | Percent | U.S. | Margin of Error |
|---|---|---|---|---|
| Total housing units | 27,580 | | | +/-69 |
| Occupied housing units | 20,283 | 73.5 | 88.4% | +/-1,247 |
| Owner-occupied housing units | 15,657 | 77.2 | 67.3% | +/-1,234 |
| Renter-occupied housing units | 4,626 | 22.8 | 32.7% | +/-1,112 |
| Vacant housing units | 7,297 | 26.5 | 11.6% | +/-1,259 |
| Owner-occupied homes | 15,657 | | | +/-1,234 |
| Median value (dollars) | 67,400 | (X) | 185,200 | +/-7,144 |
| Median of selected monthly owner costs | | | | |
| With a mortgage (dollars) | 734 | (X) | 1,402 | +/-112 |
| Not mortgaged (dollars) | 201 | (X) | 399 | +/-25 |

| ACS Demographic Estimates - show more >> | Estimate | Percent | U.S. | Margin of Error |
|---|---|---|---|---|
| Total population | 71,875 | | | ***** |
| Male | 33,969 | 47.3 | 49.2% | +/-935 |

| | | | | |
|---|---|---|---|---|
| Female | 37,906 | 52.7 | 50.8% | +/-935 |
| Median age (years) | 28.6 | (X) | 36.4 | +/-0.7 |
| Under 5 years | 7,025 | 9.8 | 6.8% | +/-441 |
| 18 years and over | 46,996 | 65.4 | 75.4% | ***** |
| 65 years and over | 6,417 | 8.9 | 12.4% | +/-550 |
| One race | 70,322 | 97.8 | 98.0% | +/-1,080 |
| White | 14,599 | 20.3 | 73.9% | +/-1,638 |
| Black or African American | 784 | 1.1 | 12.4% | +/-748 |
| American Indian and Alaska Native | 53,114 | 73.9 | 0.8% | +/-1,149 |
| Asian | 293 | 0.4 | 4.4% | +/-326 |
| Native Hawaiian and Other Pacific Islander | 0 | 0.0 | 0.1% | +/-279 |
| Some other race | 1,532 | 2.1 | 6.3% | +/-905 |
| Two or more races | 1,553 | 2.2 | 2.0% | +/-1,080 |
| Hispanic or Latino (of any race) | N | N | 14.8% | N |

Source: U.S. Census Bureau, 2006 American Community Survey

Explanation of Symbols:
'****' - The median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
'*****' - The estimate is controlled. A statistical test for sampling variability is not appropriate.
'N' - Data for this geographic area cannot be displayed because the number of sample cases is too small.
'(X)' - The value is not applicable or not available.

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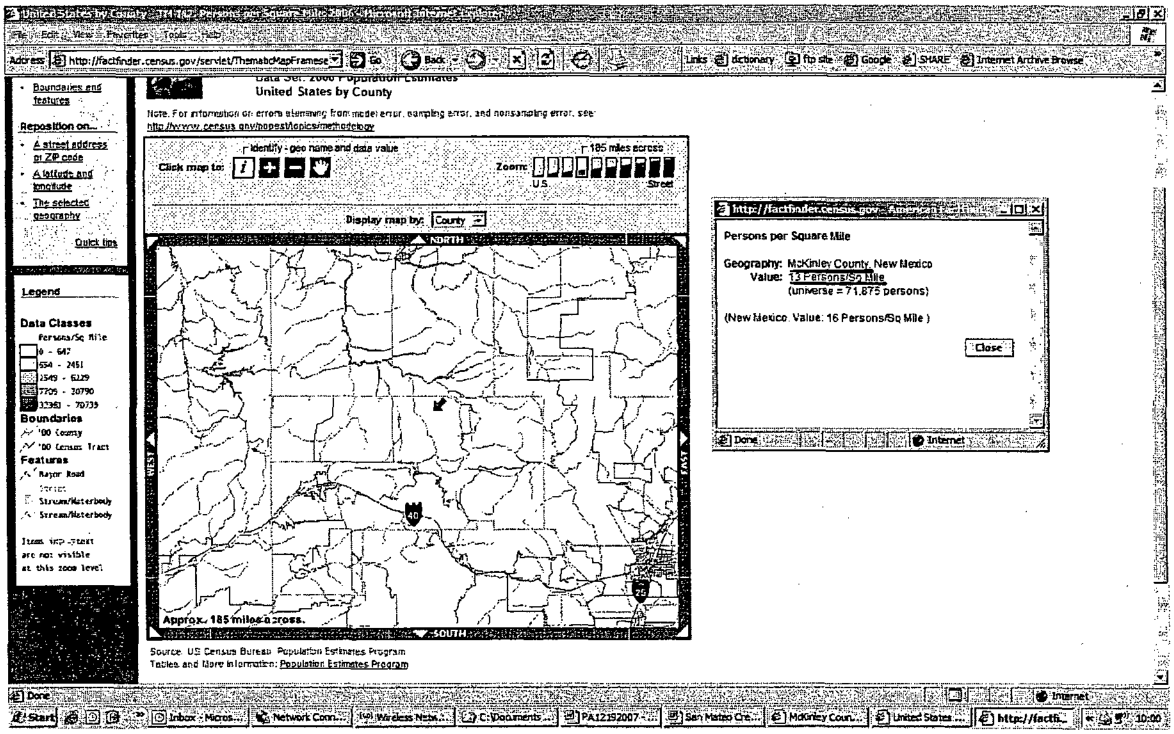
The letters PDF or symbol indicate a document is in the Portable Document Format (PDF). To view the file you will need the Adobe® Acrobat® Reader, which is available for **free** from the Adobe web site.

# REFERENCES

# 17-20


United States by County
Note: For information on errors stemming from model error, sampling error, and nonsampling error, see http://www.census.gov/popest/topics/methodology
Boundaries and features
Reposition on...
A street address or ZIP code
A latitude and longitude
The selected geography
Quick tips
Identify - geo name and data value
Click map to:
185 miles across
Zoom:
U.S.
Street
Display map by: County
NORTH
SOUTH
WEST
EAST
Approx. 185 miles across.
Legend
Data Classes
Boundaries
Features
Source: US Census Bureau, Population Estimates Program
Tables and More Information: Population Estimates Program
Persons per Square Mile
Geography: McKinley County, New Mexico
Value: 13 Persons/Sq Mile
(universe = 71,875 persons)
(New Mexico Value: 16 Persons/Sq Mile)
Close

1

**Persons per Square Mile**

**Geography:** Cibola County, New Mexico
**Value:** 6 Persons/Sq Mile
(universe = 27,481 persons)

(New Mexico: Value: 16 Persons/Sq Mile )

Close

U.S. Census Bureau
American FactFinder

FACT SHEET

## Cibola County, New Mexico

View a Fact Sheet for a **race, ethnic, or ancestry group**

**Census 2000 Demographic Profile Highlights:**

| **General Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| Total population | 25,595 | | | map | brief |
| Male | 12,505 | 48.9 | 49.1% | map | brief |
| Female | 13,090 | 51.1 | 50.9% | map | brief |
| Median age (years) | 33.1 | (X) | 35.3 | map | brief |
| Under 5 years | 2,031 | 7.9 | 6.8% | map | |
| 18 years and over | 17,750 | 69.3 | 74.3% | | |
| 65 years and over | 2,734 | 10.7 | 12.4% | map | brief |
| One race | 24,767 | 96.8 | 97.6% | | |
| White | 10,138 | 39.6 | 75.1% | map | brief |
| Black or African American | 246 | 1.0 | 12.3% | map | brief |
| American Indian and Alaska Native | 10,319 | 40.3 | 0.9% | map | brief |
| Asian | 98 | 0.4 | 3.6% | map | brief |
| Native Hawaiian and Other Pacific Islander | 14 | 0.1 | 0.1% | map | brief |
| Some other race | 3,952 | 15.4 | 5.5% | map | |
| Two or more races | 828 | 3.2 | 2.4% | map | brief |
| Hispanic or Latino (of any race) | 8,555 | 33.4 | 12.5% | map | brief |
| Household population | 24,529 | 95.8 | 97.2% | map | brief |
| Group quarters population | 1,066 | 4.2 | 2.8% | map | |
| Average household size | 2.95 | (X) | 2.59 | map | brief |
| Average family size | 3.41 | (X) | 3.14 | map | |
| Total housing units | 10,328 | | | map | |
| Occupied housing units | 8,327 | 80.6 | 91.0% | | brief |
| Owner-occupied housing units | 6,414 | 77.0 | 66.2% | map | |
| Renter-occupied housing units | 1,913 | 23.0 | 33.8% | map | brief |
| Vacant housing units | 2,001 | 19.4 | 9.0% | map | |

| **Social Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| Population 25 years and over | 15,273 | | | | |
| High school graduate or higher | 11,461 | 75.0 | 80.4% | map | brief |
| Bachelor's degree or higher | 1,835 | 12.0 | 24.4% | map | |
| Civilian veterans (civilian population 18 years and over) | 2,633 | 14.9 | 12.7% | map | brief |
| Disability status (population 5 years and over) | 4,817 | 21.3 | 19.3% | map | brief |
| Foreign born | 583 | 2.3 | 11.1% | map | brief |
| Male, Now married, except separated (population 15 years and over) | 4,787 | 52.5 | 56.7% | | brief |
| Female, Now married, except separated (population 15 years and over) | 4,802 | 48.4 | 52.1% | | brief |
| Speak a language other than English at home (population 5 years and over) | 10,363 | 43.9 | 17.9% | map | brief |

| **Economic Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| In labor force (population 16 years and over) | 9,848 | 53.0 | 63.9% | | brief |
| Mean travel time to work in minutes (workers 16 years and over) | 23.5 | (X) | 25.5 | map | brief |
| Median household income in 1999 (dollars) | 27,774 | (X) | 41,994 | map | |
| Median family income in 1999 (dollars) | 30,714 | (X) | 50,046 | map | |
| Per capita income in 1999 (dollars) | 11,731 | (X) | 21,587 | map | |
| Families below poverty level | 1,365 | 21.5 | 9.2% | map | brief |
| Individuals below poverty level | 6,054 | 24.8 | 12.4% | map | |

| **Housing Characteristics - show more >>** | **Number** | **Percent** | **U.S.** |
|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Single-family owner-occupied homes | 3,742 | | | | brief |
| Median value (dollars) | 62,600 | (X) | 119,600 | map | brief |
| Median of selected monthly owner costs | (X) | (X) | | | brief |
| With a mortgage (dollars) | 654 | (X) | 1,088 | map | |
| Not mortgaged (dollars) | 179 | (X) | 295 | | |

(X) Not applicable.
Source: U.S. Census Bureau, Summary File 1 (SF 1) and Summary File 3 (SF 3)

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# Drinking Water Bureau

## Links

Water System Facilities

Sample Schedules

Coliform Sample Results

Coliform Sample Summary Results

Lead And Copper Sample Summary Results

Non-Coliform Samples/Results

Non-Coliform Samples/Results by Analyte

Violations/Enforcement Actions

Site Visits

Milestones

## Return Links

Water Systems

Water System Search

County Map

Glossary

## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| ORTEGA, LLOYD | null | AC | 505-287-8108 | PO Box 3228, MILAN, NM-87021 | Not Available |
| GRIEGO, ALEX | | OP | 505-287-8277 | PO Box 3228, MILAN, NM-87021 | Not Available |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | R | 192 |

### Service Connections

| Type | Count |
|---|---|
| CB | 61 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL #1 | WL | I |
| WELL #2 | WL | A |

### Service Areas

| Code | Name |
|---|---|
| R | RESIDENTIAL AREA |

### Water Purchases

| Seller Water System No. | Water System Name | Seller Water Type | Purchase Date | Seller Facility Type | Seller State Asgn ID No. | Buyer Facility Type | Buyer State Asgn ID No. |
|---|---|---|---|---|---|---|---|

# Drinking Water Bureau

## Non-Coliform Samples

:turn Links

\nalyte List

Vater System
:tail

Vater Systems

Vater System
arch

Ċounty Map

ary

| Water System No. : | NM3525733 | Federal Type : | C |
|---|---|---|---|
| Water System Name : | SAN MATEO MDWCA | State Type : | C |
| Principal County Served : | CIBOLA | Primary Source : | GW |
| Status : | A | Activity Date : | 06-01-1977 |

This list displays Non-Coliform Samples for the last 2 years by default. If you need to search for a specific date range, use the following date fields (you can also pick a date from the pop-up calendar next to the field) and click on Search.

**Sample Collection Date From** **To**

SEARCH

| Lab Sample No. | Type | Collection Date & Time | Sampling Point | Sample Location | Laboratory |
|---|---|---|---|---|---|
| 0607731-0002A | RT | 07-31-2006 11:10:00 | SP257330001 | DISTRIBUTION SYSTEM | ASSAGAI ANALYTICAL LABORATORIES INC |
| HM200302138 | RT | 10-08-2003 null | SP257330011 | WELL #1 | SCIENTIFIC LABORATORY DIVISION |
| HM200300038 | RT | 01-22-2003 14:53:00 | SP257330021 | WELL #2 | SCIENTIFIC LABORATORY DIVISION |
| HM200300038 | RT | 01-22-2003 null | SP257330021 | WELL #2 | SCIENTIFIC LABORATORY DIVISION |
| HM200102180 | RT | 09-18-2001 10:16:00 | SP257330021 | WELL #2 | SCIENTIFIC LABORATORY DIVISION |
| HM199802280 | RT | 11-17-1998 14:16:00 | SP257330021 | WELL #2 | SCIENTIFIC LABORATORY DIVISION |
| HM963196 | RT | 11-19-1996 12:25:00 | SP257330021 | WELL #2 | SCIENTIFIC LABORATORY DIVISION |

**Total Number of Records Fetched = 7**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

- Non-Coliform Samples
- Analyte List
- Water System Detail
- Water Systems
- Water System Search
- County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | 0607731-0002A | **Collection Date :** | 07-31-2006 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | Y | MRL | 0.001 MG/L | | | | 0.01 MG/L |
| 1010 | BARIUM | 200.8 | N | MRL | 0.0025 MG/L | 0.426 MG/L | | | 2 MG/L |
| 1015 | CADMIUM | 200.8 | Y | MRL | 0.0005 MG/L | | | | 0.005 MG/L |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | | | | 0.1 MG/L |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.2 UG/L | | | | 0.002 MG/L |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.0005 MG/L | | | | 0.1 MG/L |
| 1045 | SELENIUM | 200.8 | Y | MRL | 0.005 MG/L | | | | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.005 MG/L | | | | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.0005 MG/L | | | | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.0005 MG/L | | | | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

Water System Detail

Water Systems

Water System Search

County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200302138 | **Collection Date :** | 10-08-2003 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | Y | MRL | 0.001 MG/L | MG/L | | | 0.01 MG/L |
| 1010 | BARIUM | 200.8 | Y | MRL | 0.1 MG/L | null | | | 2 MG/L |
| 1015 | CADMIUM | 200.8 | Y | MRL | 0.001 MG/L | MG/L | | | 0.005 MG/L |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | MG/L | | | 0.1 MG/L |
| 1035 | MERCURY | 200.8 | Y | MRL | 0.0002 MG/L | null | | | 0.002 MG/L |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | | | 0.1 MG/L |
| 1045 | SELENIUM | 200.8 | Y | MRL | 0.005 MG/L | null | | | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | N | MRL | 0.001 MG/L | 0.002 MG/L | | | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | | | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | | | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

Water System Detail

Water Systems

Water System Search

County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200300038 | **Collection Date :** | 01-22-2003 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-2004 | 0.01 MG/L |
| 1010 | BARIUM | 200.8 | N | | 0.1 MG/L | .4 MG/L | 01-01-2002 | 12-31-2004 | 2 MG/L |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-2004 | 0.005 MG/L |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-2004 | 0.1 MG/L |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null | 01-01-2002 | 12-31-2004 | 0.002 MG/L |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | 01-01-2002 | 12-31-2004 | 0.1 MG/L |
| 1045 | SELENIUM | 200.9 | Y | MRL | 0.005 MG/L | null | 01-01-2002 | 12-31-2004 | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-2004 | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-2004 | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-2004 | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

Water System Detail

Water Systems

Water System Search

County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200300038 | **Collection Date :** | 01-22-2003 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2004 | 0.01 MG/L |
| 1010 | BARIUM | 200.8 | N | MRL | 0.1 MG/L | 0.4 MG/L | 01-01-2002 | 12-31-2004 | 2 MG/L |
| 1015 | CADMIUM | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2004 | 0.005 MG/L |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2004 | 0.1 MG/L |
| 1035 | MERCURY | 200.8 | Y | MRL | 0.0002 MG/L | null | 01-01-2002 | 12-31-2004 | 0.002 MG/L |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | 01-01-2002 | 12-31-2004 | 0.1 MG/L |
| 1045 | SELENIUM | 200.8 | Y | MRL | 0.005 MG/L | null | 01-01-2002 | 12-31-2004 | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2004 | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2004 | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2004 | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

- Non-Coliform Samples
- Analyte List
- Water System Detail
- Water Systems
- Water System Search
- County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200102180 | **Collection Date :** | 09-18-2001 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | Y | MRL | 0.001 MG/L | null | | | 0.01 MG/L |
| 1010 | BARIUM | null | N | | 0.1 MG/L | .4 MG/L | | | 2 MG/L |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | | 0.005 MG/L |
| 1020 | CHROMIUM | null | N | | 0.001 MG/L | .002 MG/L | | | 0.1 MG/L |
| 1035 | MERCURY | null | Y | MRL | 0.0002 MG/L | null | | | 0.002 MG/L |
| 1036 | NICKEL | null | Y | MRL | 0.01 MG/L | null | | | 0.1 MG/L |
| 1045 | SELENIUM | null | Y | MRL | 0.005 MG/L | null | | | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

- Non-Coliform Samples
- Analyte List
- Water System Detail
- Water Systems
- Water System Search
- County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM199802280 | **Collection Date :** | 11-17-1998 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | Y | MRL | 0.001 MG/L | null | | | 0.01 MG/L |
| 1010 | BARIUM | 200.8 | N | | 0.1 MG/L | .4 MG/L | | | 2 MG/L |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | | 0.005 MG/L |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | null | | | 0.1 MG/L |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null | | | 0.002 MG/L |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | | | 0.1 MG/L |
| 1045 | SELENIUM | 200.9 | Y | MRL | 0.005 MG/L | null | | | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

Water System Detail

Water Systems

Water System Search

County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM963196 | **Collection Date :** | 11-19-1996 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | Y | MRL | 0.001 MG/L | null | | | 0.01 MG/L |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | | 2 MG/L |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | | 0.005 MG/L |
| 1020 | CHROMIUM | null | Y | MRL | 0.001 MG/L | null | | | 0.1 MG/L |
| 1035 | MERCURY | null | Y | MRL | 0.0005 MG/L | null | | | 0.002 MG/L |
| 1036 | NICKEL | null | Y | MRL | 0.01 MG/L | null | | | 0.1 MG/L |
| 1045 | SELENIUM | null | Y | MRL | 0.005 MG/L | null | | | 0.05 MG/L |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | | 0.006 MG/L |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | | 0.004 MG/L |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | | 0.002 MG/L |

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

Water System Detail

Water Systems

Water System Search

County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | 8291DW1 | **Collection Date :** | 11-30-2005 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date | MCL |
|---|---|---|---|---|---|---|---|---|---|
| 4006 | COMBINED URANIUM | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2004 | 12-31-2007 | 30 UG/L |

**Total Number of Records Fetched = 1**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

Water System Detail

Water Systems

Water System Search

County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC200100576 | **Collection Date :** | 09-18-2001 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitoring Period End Date |
|---|---|---|---|---|---|---|---|---|
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .21 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .21 PCI/L | | |

**Total Number of Records Fetched = 2**

# Drinking Water Bureau

## Non-Coliform Sample Results

:turn Links

Non-Coliform
mples

Analyte List

Water System
:tail

Water Systems

Water System
arch

..unty Map

lossary

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525733 | **Federal Type :** | C |
| **Water System Name :** | SAN MATEO MDWCA | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | 10500974 | **Collection Date :** | 11-30-2005 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | 900 | Y | MRL | 1.96 PCI/L | 0 PCI/L | 01-01-2004 | 12-31-20( |
| 4000 | GROSS ALPHA, EXCL. RADON & U | 900 | Y | MRL | 1.96 PCI/L | 0 PCI/L | 01-01-2004 | 12-31-20( |
| 4010 | COMBINED RADIUM (-226 & -228) | null | Y | MRL | 1.36 PCI/L | 0 PCI/L | | |
| 4010 | COMBINED RADIUM (-226 & -228) | null | Y | MRL | 1.36 PCI/L | 0 PCI/L | | |
| 4020 | RADIUM-226 | 903.1 | Y | MRL | 1.36 PCI/L | 0.17 PCI/L | 01-01-2004 | 12-31-20( |
| 4020 | RADIUM-226 | 903.1 | Y | MRL | 1.36 PCI/L | 0.17 PCI/L | 01-01-2004 | 12-31-20( |
| 4030 | RADIUM-228 | 904.0 | Y | MRL | 0.81 PCI/L | 0 PCI/L | 01-01-2004 | 12-31-20( |
| 4030 | RADIUM-228 | 904.0 | Y | MRL | 0.81 PCI/L | 0 PCI/L | 01-01-2004 | 12-31-20( |
| 4100 | GROSS BETA PARTICLE ACTIVITY | 900 | N | MRL | 1.8 PCI/L | 1.90 PCI/L | 01-01-2004 | 12-31-20( |
| 4100 | GROSS BETA PARTICLE ACTIVITY | 900 | N | MRL | 1.8 PCI/L | 1.90 PCI/L | 01-01-2004 | 12-31-20( |

**Total Number of Records Fetched = 10**

U.S. Census Bureau
American FactFinder

FACT SHEET

## Grants city, New Mexico

View a Fact Sheet for a **race, ethnic, or ancestry group**

**Census 2000 Demographic Profile Highlights:**

| **General Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| Total population | 8,806 | | | map | brief |
| Male | 4,053 | 46.0 | 49.1% | map | brief |
| Female | 4,753 | 54.0 | 50.9% | map | brief |
| Median age (years) | 34.4 | (X) | 35.3 | map | brief |
| Under 5 years | 715 | 8.1 | 6.8% | map | |
| 18 years and over | 6,270 | 71.2 | 74.3% | | |
| 65 years and over | 1,085 | 12.3 | 12.4% | map | brief |
| One race | 8,420 | 95.6 | 97.6% | | |
| White | 4,947 | 56.2 | 75.1% | map | brief |
| Black or African American | 143 | 1.6 | 12.3% | map | brief |
| American Indian and Alaska Native | 1,054 | 12.0 | 0.9% | map | brief |
| Asian | 81 | 0.9 | 3.6% | map | brief |
| Native Hawaiian and Other Pacific Islander | 11 | 0.1 | 0.1% | map | brief |
| Some other race | 2,184 | 24.8 | 5.5% | map | |
| Two or more races | 386 | 4.4 | 2.4% | map | brief |
| Hispanic or Latino (of any race) | 4,611 | 52.4 | 12.5% | map | brief |
| Household population | 8,353 | 94.9 | 97.2% | map | brief |
| Group quarters population | 453 | 5.1 | 2.8% | map | |
| Average household size | 2.61 | (X) | 2.59 | map | brief |
| Average family size | 3.06 | (X) | 3.14 | map | |
| Total housing units | 3,626 | | | map | |
| Occupied housing units | 3,202 | 88.3 | 91.0% | | brief |
| Owner-occupied housing units | 2,145 | 67.0 | 66.2% | map | |
| Renter-occupied housing units | 1,057 | 33.0 | 33.8% | map | brief |
| Vacant housing units | 424 | 11.7 | 9.0% | map | |

| **Social Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| Population 25 years and over | 5,356 | | | | |
| High school graduate or higher | 4,119 | 76.9 | 80.4% | map | brief |
| Bachelor's degree or higher | 718 | 13.4 | 24.4% | map | |
| Civilian veterans (civilian population 18 years and over) | 970 | 15.5 | 12.7% | map | brief |
| Disability status (population 5 years and over) | 1,362 | 17.7 | 19.3% | map | brief |
| Foreign born | 383 | 4.4 | 11.1% | map | brief |
| Male, Now married, except separated (population 15 years and over) | 1,728 | 59.3 | 56.7% | | brief |
| Female, Now married, except separated (population 15 years and over) | 1,832 | 49.0 | 52.1% | | brief |
| Speak a language other than English at home (population 5 years and over) | 3,107 | 38.4 | 17.9% | map | brief |

| **Economic Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| In labor force (population 16 years and over) | 3,801 | 58.3 | 63.9% | | brief |
| Mean travel time to work in minutes (workers 16 years and over) | 17.1 | (X) | 25.5 | map | brief |
| Median household income in 1999 (dollars) | 30,652 | (X) | 41,994 | map | |
| Median family income in 1999 (dollars) | 33,464 | (X) | 50,046 | map | |
| Per capita income in 1999 (dollars) | 14,053 | (X) | 21,587 | map | |
| Families below poverty level | 446 | 19.4 | 9.2% | map | brief |
| Individuals below poverty level | 1,810 | 21.9 | 12.4% | map | |

| **Housing Characteristics - show more >>** | **Number** | **Percent** | **U.S.** |
|---|---|---|---|

# REFERENCES

# 21-24

U.S. Census Bureau
American FactFinder

FACT SHEET

## Milan village, New Mexico

View a Fact Sheet for a **race, ethnic, or ancestry group**

### Census 2000 Demographic Profile Highlights:

| **General Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| Total population | 1,891 | | | map | brief |
| Male | 941 | 49.8 | 49.1% | map | brief |
| Female | 950 | 50.2 | 50.9% | map | brief |
| Median age (years) | 29.8 | (X) | 35.3 | map | brief |
| Under 5 years | 163 | 8.6 | 6.8% | map | |
| 18 years and over | 1,274 | 67.4 | 74.3% | | |
| 65 years and over | 194 | 10.3 | 12.4% | map | brief |
| One race | 1,800 | 95.2 | 97.6% | | |
| White | 965 | 51.0 | 75.1% | map | brief |
| Black or African American | 25 | 1.3 | 12.3% | map | brief |
| American Indian and Alaska Native | 264 | 14.0 | 0.9% | map | brief |
| Asian | 0 | 0.0 | 3.6% | map | brief |
| Native Hawaiian and Other Pacific Islander | 0 | 0.0 | 0.1% | map | brief |
| Some other race | 546 | 28.9 | 5.5% | map | |
| Two or more races | 91 | 4.8 | 2.4% | map | brief |
| Hispanic or Latino (of any race) | 989 | 52.3 | 12.5% | map | brief |
| Household population | 1,891 | 100.0 | 97.2% | map | brief |
| Group quarters population | 0 | 0.0 | 2.8% | map | |
| Average household size | 2.81 | (X) | 2.59 | map | brief |
| Average family size | 3.33 | (X) | 3.14 | map | |
| Total housing units | 806 | | | map | |
| Occupied housing units | 673 | 83.5 | 91.0% | | brief |
| *Owner-occupied housing units* | 498 | 74.0 | 66.2% | map | |
| Renter-occupied housing units | 175 | 26.0 | 33.8% | map | brief |
| Vacant housing units | 133 | 16.5 | 9.0% | map | |

| **Social Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| Population 25 years and over | 1,051 | | | | |
| High school graduate or higher | 712 | 67.7 | 80.4% | map | brief |
| Bachelor's degree or higher | 58 | 5.5 | 24.4% | map | |
| Civilian veterans (civilian population 18 years and over) | 156 | 12.5 | 12.7% | map | brief |
| Disability status (population 5 years and over) | 471 | 27.6 | 19.3% | map | brief |
| Foreign born | 40 | 2.1 | 11.1% | map | brief |
| Male, Now married, except separated (population 15 years and over) | 321 | 50.6 | 56.7% | | brief |
| Female, Now married, except separated (population 15 years and over) | 349 | 50.7 | 52.1% | | brief |
| Speak a language other than English at home (population 5 years and over) | 643 | 37.7 | 17.9% | map | brief |

| **Economic Characteristics - show more >>** | **Number** | **Percent** | **U.S.** | | |
|---|---|---|---|---|---|
| In labor force (population 16 years and over) | 761 | 58.6 | 63.9% | | brief |
| Mean travel time to work in minutes (workers 16 years and over) | 22.4 | (X) | 25.5 | map | brief |
| Median household income in 1999 (dollars) | 24,635 | (X) | 41,994 | map | |
| Median family income in 1999 (dollars) | 26,776 | (X) | 50,046 | map | |
| Per capita income in 1999 (dollars) | 10,463 | (X) | 21,587 | map | |
| Families below poverty level | 103 | 21.9 | 9.2% | map | brief |
| Individuals below poverty level | 538 | 28.2 | 12.4% | map | |

| **Housing Characteristics - show more >>** | **Number** | **Percent** | **U.S.** |
|---|---|---|---|

Back to:

State Map | Western U.S. map | Home Page

**NOTE:**
**To print data frame (right side), click on right frame before printing.**

### 1971 - 2000

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1971-2000 Normals (~3 KB)

### 1961 - 1990

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1961-1990 Normals (~3 KB)

### Period of Record

- Station Metadata
- Station Metadata Graphics

**General Climate Summary Tables**
- Temperature
- Precipitation
- Heating Degree Days

# GRANTS AIRPORT, NEW MEXICO (293682)

## Period of Record Monthly Climate Summary

**Period of Record : 5/ 1/1953 to 6/30/2007**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Max. Temperature (F) | 46.4 | 51.5 | 58.4 | 67.5 | 76.5 | 86.5 | 88.4 | 85.1 | 79.8 | 69.4 | 56.4 | 47.3 | 67.8 |
| Average Min. Temperature (F) | 14.5 | 18.7 | 24.0 | 30.3 | 39.0 | 47.6 | 55.1 | 53.1 | 44.6 | 32.8 | 22.1 | 14.4 | 33.0 |
| Average Total Precipitation (in.) | 0.50 | 0.44 | 0.55 | 0.47 | 0.53 | 0.56 | 1.71 | 2.03 | 1.31 | 1.11 | 0.58 | 0.63 | 10.40 |
| Average Total SnowFall (in.) | 2.6 | 2.2 | 1.7 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 1.0 | 4.1 | 12.3 |
| Average Snow Depth (in.) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Percent of possible observations for period of record.
Max. Temp.: 96.2% Min. Temp.: 96.3% Precipitation: 96.1% Snowfall: 93.2% Snow Depth: 91.7%
Check Station Metadata or Metadata graphics for more detail about data completeness.

---

*Western Regional Climate Center, wrcc@dri.edu*

Back to:

State Map | Western U.S. map | Home Page

**NOTE:**
*To print data frame (right side), click on right frame before printing.*

## 1971 - 2000

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1971-2000 Normals (~3 KB)

## 1961 - 1990

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1961-1990 Normals (~3 KB)

## Period of Record

- Station Metadata
- Station Metadata Graphics

### General Climate Summary Tables

- Temperature
- Precipitation
- Heating Degree Days

# SAN MATEO, NEW MEXICO (297918)

## Period of Record Monthly Climate Summary

**Period of Record : 4/ 1/1918 to 2/29/1988**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Max. Temperature (F) | 40.6 | 44.6 | 51.6 | 60.9 | 70.7 | 81.0 | 83.1 | 79.6 | 73.1 | 62.9 | 50.9 | 41.4 | 61.7 |
| Average Min. Temperature (F) | 16.0 | 19.1 | 25.2 | 30.7 | 40.5 | 50.0 | 55.3 | 53.3 | 46.5 | 35.9 | 25.3 | 17.0 | 34.6 |
| Average Total Precipitation (in.) | 0.34 | 0.28 | 0.37 | 0.31 | 0.48 | 0.48 | 1.68 | 2.11 | 1.12 | 0.76 | 0.45 | 0.28 | 8.66 |
| Average Total SnowFall (in.) | 2.2 | 1.5 | 1.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.4 | 3.1 | 9.7 |
| Average Snow Depth (in.) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Percent of possible observations for period of record.
Max. Temp.: 30.1% Min. Temp.: 31.1% Precipitation: 42.3% Snowfall: 27.1% Snow Depth: 26%
Check Station Metadata or Metadata graphics for more detail about data completeness.

---

*Western Regional Climate Center, wrcc@dri.edu*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BOZEMAN-BELGRADE AP, MT (KBZ | S | SSE | SSE | W | SE | W | SSE | SSE | SE | SE | SSE | SSE | SSE |
| BUTTE AP, MT (KBTM). WIND R | S | S | S | N | N | N | N | S | S | S | S | S | S |
| CUT BANK AP, MT (KCTB). WIN | WSW | WSW | WSW | W | W | W | W | W | W | WSW | WSW | WSW | WSW |
| DILLON AP, MT (KDLN). WIND | S | S | S | S | S | S | S | S | S | S | S | S | S |
| GLASGOW AIRPORT, MT (KGGW). | ESE | ESE | E | E | E | E | E | E | E | ESE | E | ESE | E |
| GLENDIVE AIRPORT, MT (KGDV). | S | S | S | NW | NW | W | NW | S | NW | S | S | S | S |
| GREAT FALLS AP, MT (KGTF). | SW | SW | SW | SW | SW | SW | SW | SW | SW | SW | SW | SW | SW |
| GREAT FALLS-MALSTROM AFB, MT | SW | SW | SW | SW | SW | W | W | W | SW | SW | SW | SW | SW |
| HAVRE AIRPORT, MT (KHVR). W | SW | SW | SW | E | E | E | E | E | SW | SW | SW | SW | SW |
| HELENA AIRPORT, MT (KHLN). | W | W | W | W | W | W | W | W | W | W | W | W | W |
| JORDAN AIRPORT, MT (KJDN). | W | W | W | W | W | W | W | W | W | W | W | W | W |
| KALISPELL AP, MT (KFCA). WI | S | S | SSE | SSE | SSE | SSE | SSE | S | S | S | S | S | S |
| LEWISTOWN AIRPORT, MT (KLWT) | SW | W | W | WNW | E | ESE | ESE | ESE | ESE | W | SW | SW | W |
| LIVINGSTON AP, MT (KLVM). W | WSW | WSW | W | W | W | W | W | W | W | W | WSW | WSW | W |
| MILES CITY AP, MT (KMLS). W | S | S | NW | NW | NW | NW | NW | SSE | NW | S | S | S | NW |
| MISSOULA AIRPORT, MT (KMSO). | ESE | ESE | N | NW | N | NW | N | N | N | W | ESE | ESE | NW |
| SIDNEY MUNI AP, MT (KSDY). | SSW | S | S | N | S | S | S | S | S | S | SSW | SSW | S |
| WOLF POINT AP, MT (KOLF). W | W | W | ENE | E | W | W | E | E | E | W | W | W | W |

## NEVADA

PREVAILING WIND DIRECTION

| STATION | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALIENTE AP, NV (KP38). WIN | NNE | S | S | S | S | S | S | S | S | S | NNE | NNE | S |
| DESERT ROCK-MERCURY, NV (KDR | NNE | NNE | NNE | NNE | SW | SW | SW | SSW | SSW | NNE | NNE | NNE | SSW |
| ELKO AIRPORT, NV (KEKO). WI | E | E | W | W | W | W | W | W | W | W | E | E | W |
| ELY AIRPORT, NV (KELY). WIN | S | S | S | S | S | S | S | S | S | S | S | S | S |
| EUREKA AIRPORT, NV (KP68). | SSE | SSE | S | S | S | S | S | S | S | S | S | S | S |
| FALLON NAS, NV (KNFL). WIND | S | S | S | N | W | N | W | WNW | N | N | S | S | S |
| LAS VEGAS AIRPORT, NV (KLAS) | W | W | W | SW | SW | S | S | S | S | W | W | W | S |
| LAS VEGAS-NELLIS AFB, NV (KL | NE | NE | S | S | S | S | S | S | S | NNE | NNE | NE | S |
| LOVELOCK AIRPORT, NV (KLOL). | NNE | NNE | NNE | N | W | W | S | S | NE | NNE | E | NE | NNE |
| NORTH LAS VEGAS AP, NV (KVGT | NW | NW | NNW | SSW | S | S | S | S | NW | NW | NNW | NW | NW |
| RENO-TAHOE AP, NV (KRNO). W | S | S | W | W | W | W | W | W | W | S | S | S | W |
| TONOPAH AIRPORT, NV (KTPH). | N | N | N | N | N | N | S | N | N | N | N | N | N |
| WINNEMUCCA AP, NV (KWMC). W | S | S | S | W | W | W | W | W | W | S | S | S | S |

## NEW MEXICO

PREVAILING WIND DIRECTION

| STATION | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALAMOGORDO-HOLLOMAN AFB, NM | S | S | S | S | S | S | S | S | S | S | SSE | N | S |
| ALBUQUERQUE-DOUBLE EAGLE II | NNW | NW | W | W | W | S | S | S | NNW | S | NNW | NNW | W |
| ALBUQUERQUE INT'L AP, NM (KA | N | N | N | W | W | E | E | E | E | N | N | N | N |
| ARTESIA AP, NM (KATS). WIND | WSW | SSE | SSE | SSE | SSE | SSE | SSE | SSE | SSE | SSE | SSE | N | SSE |
| CARLSBAD AP, NM (KCNM). WIN | W | W | W | W | W | SSE | S | SSE | S | S | W | W | S |
| CLAYTON MUNI AP, NM (KCAO). | W | N | N | N | S | S | S | S | S | S | W | WSW | S |
| CLINES CORNERS, NM (KCQC). | WNW | WNW | W | W | W | W | W | W | W | W | WNW | WNW | W |
| CLOVIS MUNI AP, NM (KCVN). | W | W | W | W | S | S | S | S | S | S | W | W | S |
| CLOVIS-CANNON AFB, NM (KCVS) | W | W | W | W | S | S | S | S | S | W | W | W | W |
| DEMING AP, NM (KDMN). WIND | W | W | W | W | W | W | E | E | E | W | W | W | W |
| FARMINGTON AP, NM (KFMN). W | E | E | W | W | W | E | E | E | E | E | E | E | E |
| GALLUP AIRPORT, NM (KGUP). | WSW | WSW | WSW | WSW | WSW | WSW | WSW | S | WSW | WSW | WSW | SW | WSW |
| GRANTS AIRPORT, NM (KGNT). | NW | NW | NW | W | W | W | SE | SE | NW | NW | NW | NW | NW |
| HOBBS AIRPORT, NM (KHOB). W | WSW | S | S | S | S | S | S | S | S | S | S | S | S |
| LAS CRUCES AP, NM (KLRU). W | W | W | W | W | W | W | SE | W | SE | W | W | W | W |
| LAS VEGAS AP, NM (KLVS). WI | S | S | S | S | S | S | S | SSW | S | S | S | S | S |
| LOS ALAMOS AP, NM (KLAM). W | S | S | S | S | S | S | S | S | S | S | S | S | S |
| RATON MUNI AP, NM (KRTN). W | ENE | NE | N | W | S | S | N | N | N | S | ENE | NE | N |
| ROSWELL AIRPORT, NM (KROW). | N | SSE | SSE | S | S | SSE | SSE | SSE | SSE | SSE | N | N | SSE |
| RUIDOSO AIRPORT, NM (KSRR). | W | W | W | SSW | SSW | SSW | ESE | ESE | ESE | W | W | W | W |
| SANTA FE AIRPORT, NM (KSAF). | N | N | N | N | WSW | N | N | N | N | N | N | N | N |
| SILVER CITY AP, NM (KSVC). | W | W | W | W | W | W | WNW | NNW | W | NNW | NNW | NNW | W |
| TAOS MUNI AIRPORT, NM (KSKX) | N | N | N | W | W | W | N | N | N | N | N | N | N |
| TRUTH OR CONSEQUENCES AP, NM | NW | S | S | S | S | S | S | WNW | S | S | NW | N | S |

## OREGON

### PREVAILING WIND DIRECTION

| STATION | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASTORIA AIRPORT, OR (KAST). | E | E | E | S | W | W | NW | NW | NW | E | E | E | E |
| AURORA AIRPORT, OR (KUAO). | S | S | S | S | S | S | N | N | N | S | S | S | S |
| BAKER CITY AP, OR (KBKE). W | ESE | ESE | ESE | N | N | NNW | NNW | NNW | NNW | N | ESE | ESE | NNW |
| BURNS MUNI AP, OR (KBNO). W | E | E | WNW | NW | NW | WNW | WNW | WNW | WNW | WNW | E | E | WNW |
| CORVALLIS AP, OR (KCVO). WI | S | S | S | S | WNW | NW | NW | NW | WNW | S | S | S | S |
| EUGENE AIRPORT, OR (KEUG). | S | S | S | S | N | N | N | N | N | S | S | S | N |
| HERMISTON MUNI AP, OR (KHRI) | WSW | S | WSW | WSW | WSW | WSW | WSW | WSW | SW | WSW | S | WSW | WSW |
| KLAMATH FALLS AP, OR (KLMT). | SSE | SSE | W | W | W | W | W | W | NNW | W | SSE | SSE | W |
| LA GRANDE AP, OR (KLGD). WI | S | S | S | NW | NW | NW | NW | NW | NW | S | S | S | S |

Prevailing wind direction is based on the hourly data from 1992-2002 and is defined as the direction with the highest percent of frequency. Many of these locations have very close secondary maximum which can lead to noticeable differences month to month.

Click on a State: Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

**All directions are where the wind blows FROM.**

## ALASKA

PREVAILING WIND DIRECTION

| STATION | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AMBLER AIRPORT, AK. (PAFM) | NNE | NNE | NNE | NNE | NNE | W | NNE | NNE | NNE | NNE | NNE | NNE | NNE |
| ANAKTUVUK PASS AP, AK (PAKP) | NE | S | NNE | NE | NE | NE | NE | NE | NE | NE | S | NE | NE |
| ANCHORAGE INT'L AP, AK (PANC) | N | N | N | S | S | S | S | S | S | N | N | N | N |
| ANIAK, AK. (PANI) | N | ESE | N | ESE | W | SE | SE | SE | ESE | ESE | ESE | N | ESE |
| ANNETTE AP, AK (PANT). WIND | ESE | ESE | ESE | SE | SE | SE | SE | SE | SE | ESE | ESE | ESE | ESE |
| ANVIK AP, AK (PANV). WIND R | NE | NE | NNE | NNE | W | W | W | W | W | NNE | NE | NE | NE |
| ARCTIC VILLAGE AP, AK (PARC) | NE | E | ENE | E | E | NE | WSW | WSW | NE | E | E | E | E |
| BARROW, AK. (PABR) | ENE | E | E | E | E | E | E | E | E | E | E | ENE | E |
| BARTER ISLAND, AK. (PABA) | W | E | W | E | E | E | E | E | E | E | E | W | E |
| BETHEL AIRPORT, AK. (PABE) | NNE | NE | NNE | N | S | S | S | S | S | N | NNE | NNE | NNE |
| BETTLES AP, AK. (PABT) | N | NNW | N | N | N | SW | S | S | N | N | N | N | N |
| BIRCHWOOD, AK. (PABV) | S | S | SSW | W | W | W | W | W | SSW | SSW | S | S | SSW |
| BUCKLAND AP, AK. (PABL) | WNW | E | E | W | WNW | WNW | SE | W | SE | SE | SE | E | SE |
| CANTWELL AP, AK (PATW). WIN | | | | | | Incomplete Data | | | | | | | |
| CAPE LISBURNE AP, AK (PALU). | E | E | E | E | E | E | SSW | SSW | E | ENE | E | E | E |
| CAPE NEWENHAM, AK (PAEH). W | ESE | ESE | ESE | N | S | S | S | S | N | N | ESE | N | N |
| CAPE ROMANZOF, AK. (PACZ) | NE | NNE | NE | NNE | S | NNE | SSW | N | N | NNE | NE | N | NNE |
| CHIGNIK AP, AK (PAJC). WIND | W | W | W | W | W | W | W | W | W | W | W | W | W |
| COLD BAY, AK. (PACD) | SE | SE | SE | SE | SE | SE | SE | W | W | N | SE | N | SE |
| CORDOVA, AK. (PACV) | E | E | E | E | E | E | ENE | ENE | E | E | E | E | E |
| DEADHORSE AP, AK (PASC). WI | WSW | ENE | ENE | E | E | E | ENE | E | E | E | E | WSW | E |
| DEERING AIRPORT, AK. (PADE) | W | E | W | W | W | W | W | SSW | SW | SW | E | W | W |
| DELTA JCT/FT GREELEY,(PABI) | ESE | ESE | E | S | W | W | W | W | E | E | ESE | ESE | ESE |
| DILLINGHAM AIRPORT, AK. (PADL | N | N | N | N | N | S | S | S | N | N | N | N | N |
| EAGLE AP, AK (PAEG). WIND R | ESE | ESE | SE | SE | NE | N | W | ESE | SE | ESE | ESE | ESE | ESE |
| EGEGIK AP, AK (PAII). WIND | N | ESE | ESE | ESE | W | ESE | SE | W | W | N | N | N | ESE |
| EIELSON AFB-FAIRBANKS,AK-PAEI | S | S | NNW | W | W | W | W | W | S | S | S | S | S |
| ELMENDORF AFB-ANCH, AK-PAED | NE | N | N | N | W | W | W | W | N | N | NNE | NE | N |
| EMMONAK, AK (PAEM). WIND RO | ENE | ENE | ENE | N | N | N | S | S | N | N | ESE | N | N |

# REFERENCES

# 25-28

## Mayerson, David, NMENV

| | |
|---|---|
| **From:** | Cox, Al (Grants) [ACox@barrick.com] |
| **Sent:** | Monday, December 31, 2007 11:37 |
| **To:** | Mayerson, David, NMENV |
| **Cc:** | Mercer, Lena (Grants); Venable, Adrian (Grants); Kump, Dan (Grants) |
| **Subject:** | RE: Request for information |
| **Follow Up Flag:** | Follow up |
| **Flag Status:** | Red |

Dave,
Yes, we do collect that data at the site, but it is in raw data form. There is also historic information for the Anaconda Bluewater site - the Grants airport met data is not representative of what conditions are at the Grants site itself.
We can discuss if you like - I will be back in office on Jan 2-4 and then on travel for all of the following week.

Have a great New Year's!!...........Al

---

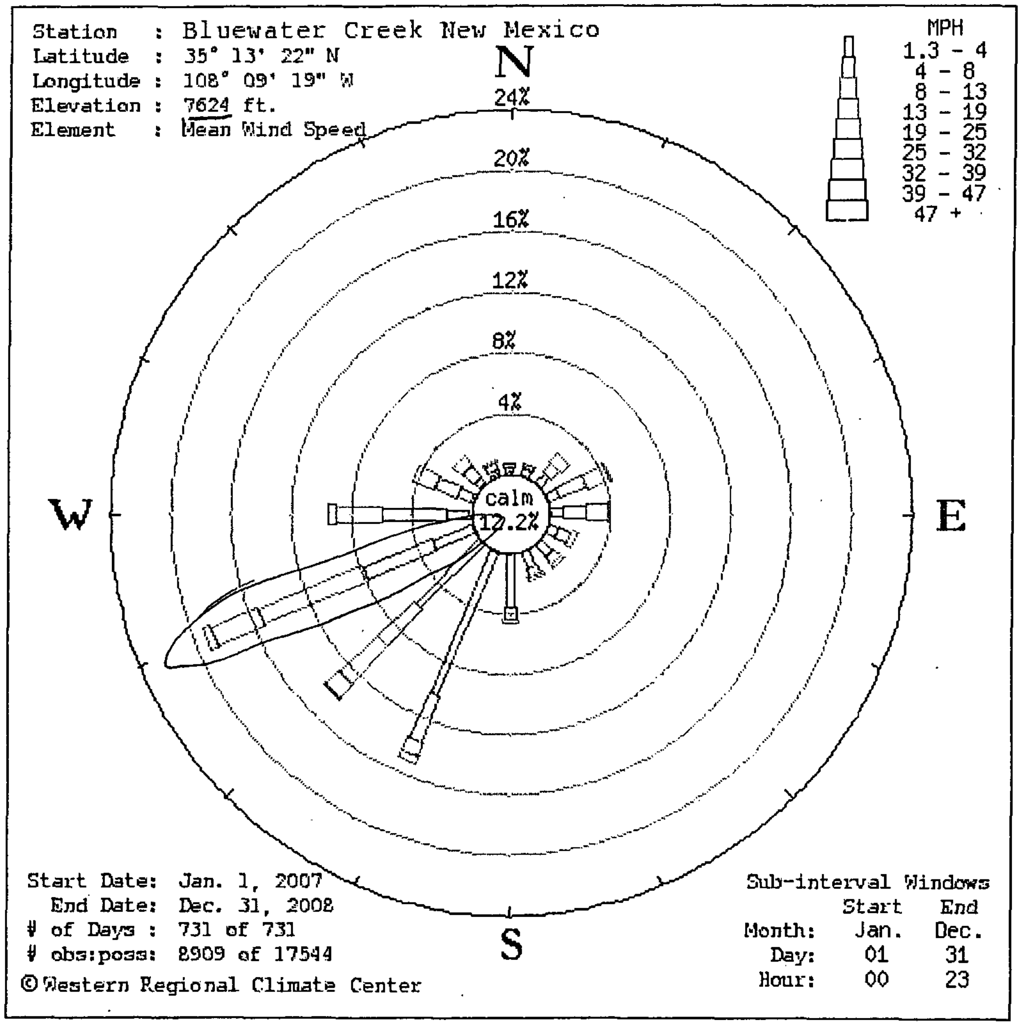
**From:** Mayerson, David, NMENV [mailto:David.Mayerson@state.nm.us]
**Sent:** Friday, December 28, 2007 4:10 PM
**To:** Cox, Al (Grants)
**Subject:** Request for information

Hi Al: I hope that you had a good holiday.

I am looking for some historical wind direction data for your area. Do you collect that type of data at your site?
Thanks.

**David L. Mayerson**
New Mexico Environment Department
Water and Waste Management Division
Ground Water Quality Bureau
Superfund Oversight Section
1190 St. Francis Drive
Suite N2312
POB 26110
Santa Fe, NM 87505
(505) 476-3777
(505) 827-2965
*david.mayerson@state.nm.us*
**Normal work hours:** Monday-Thursday 0700-1730

# Bluewater Creek New Mexico




## Bluewater Creek New Mexico - Wind Frequency Table (percentage)

Sub Interval Windows
Start End

Latitude : 35° 13' 22" N
Longitude : 108° 09' 19" W

Start Date : Jan. 1, 2007
End Date : Dec. 31, 2008

Elevation : 7624 ft.
Element :

# of Days : 731 of 731
# obs : poss : 8909 of 17544

| | Start | End |
|---|---|---|
| Month | Jan. | Dec. |
| Day | 01 | 31 |
| Hour | 00 | 23 |

(Greater than or equal to initial interval value and Less than ending interval value.)

| Range (mph) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.3 - 4 | 0.4 | 0.4 | 0.8 | 0.8 | 0.9 | 0.7 | 1.0 | 1.1 | 3.5 | 10.2 | 5.9 | 2.7 | 1.6 | 0.9 | 0.4 | 0.3 | 31.6 |
| 4 - 8 | 0.3 | 0.3 | 0.8 | 1.9 | 1.4 | 0.9 | 0.6 | 0.6 | 0.8 | 3.4 | 3.3 | 5.0 | 4.2 | 1.7 | 0.9 | 0.4 | 26.3 |
| 8 - 13 | 0.0 | 0.0 | 0.7 | 1.6 | 1.5 | 0.4 | 0.3 | 0.3 | 0.4 | 0.9 | 3.5 | 7.5 | 3.1 | 1.5 | 0.8 | 0.2 | 22.7 |
| 13 - 19 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 1.2 | 3.4 | 0.6 | 0.1 | 0.0 | 0.0 | 6.2 |
| 19 - 25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.8 |
| 25 - 32 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| 32 - 39 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 39 - 47 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 47 - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total(%) | 0.7 | 0.8 | 2.3 | 4.4 | 3.9 | 2.0 | 2.0 | 2.0 | 4.7 | 15.0 | 14.1 | 19.1 | 9.5 | 4.2 | 2.2 | 0.9 | 87.8 |
| Calm (<1.3) | | | | | | | | | | | | | | | | | 12.2 |
| Ave Speed | 3.9 | 4.4 | 5.7 | 6.8 | 6.7 | 5.4 | 4.6 | 4.5 | 3.8 | 4.0 | 6.3 | 9.0 | 7.1 | 6.5 | 6.7 | 5.4 | 5.6 |

# Bluewater Creek New Mexico - Hourly Wind Statistics Table

Latitude : 35° 13' 22" N
Longitude : 108° 09' 19" W
Elevation : 7624 ft.
Element :

Start Date : Jan. 1, 2007
End Date : Dec. 31, 2008
# of Days : 731 of 731
# obs : poss : 8909 of 17544

Sub Interval Windows

| | Start | End |
|---|---|---|
| Month | Jan. | Dec. |
| Day | 01 | 31 |
| Hour | 00 | 23 |

| | |
|---|---|
| Time | - Time of Day (L.S.T.) |
| Speed | - Average (Scalar) Speed in MPH |
| U-Vel | - East-West Velocity, Positive to East |
| V-Vel | - North-South Velocity, Positive to North |

Elevation : 8289 ft.
Element :

# of Days : 365 of 365
# obs : poss : 8748 of 8760

| | | |
|---|---|---|
| Month | Jan. | Dec. |
| Day | 01 | 31 |
| Hour | 00 | 23 |

(Greater than or equal to initial interval value and Less than ending interval value.)

| Range (mph) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.3 - 4 | 1.4 | 1.4 | 1.2 | 0.7 | 0.8 | 1.0 | 1.7 | 2.4 | 5.5 | 8.2 | 5.6 | 2.4 | 1.9 | 1.6 | 1.7 | 1.4 | 38.6 |
| 4 - 8 | 1.0 | 1.2 | 0.7 | 0.5 | 0.6 | 0.8 | 1.7 | 2.9 | 2.8 | 5.1 | 7.9 | 5.6 | 3.4 | 2.4 | 2.0 | 1.3 | 40.1 |
| 8 - 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.6 | 1.0 | 1.5 | 1.1 | 0.6 | 0.3 | 0.1 | 0.0 | 0.0 | 5.3 |
| 13 - 19 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| 19 - 25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25 - 32 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 32 - 39 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 39 - 47 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 47 - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total(%) | 2.4 | 2.5 | 2.0 | 1.3 | 1.4 | 1.8 | 3.5 | 5.9 | 9.5 | 14.9 | 14.7 | 8.5 | 5.7 | 4.0 | 3.7 | 2.7 | 84.3 |
| Calm (<1.3) | | | | | | | | | | | | | | | | | 15.6 |
| Ave Speed | 3.5 | 3.6 | 3.5 | 3.7 | 3.9 | 4.1 | 4.1 | 4.6 | 4.3 | 4.3 | 4.5 | 4.7 | 4.5 | 4.2 | 3.8 | 3.7 | 3.6 |

# Bluewater Ridge New Mexico - Hourly Wind Statistics Table

Latitude : 35° 11' 39" N
Longitude : 108° 09' 47" W
Elevation : 8289 ft.
Element :

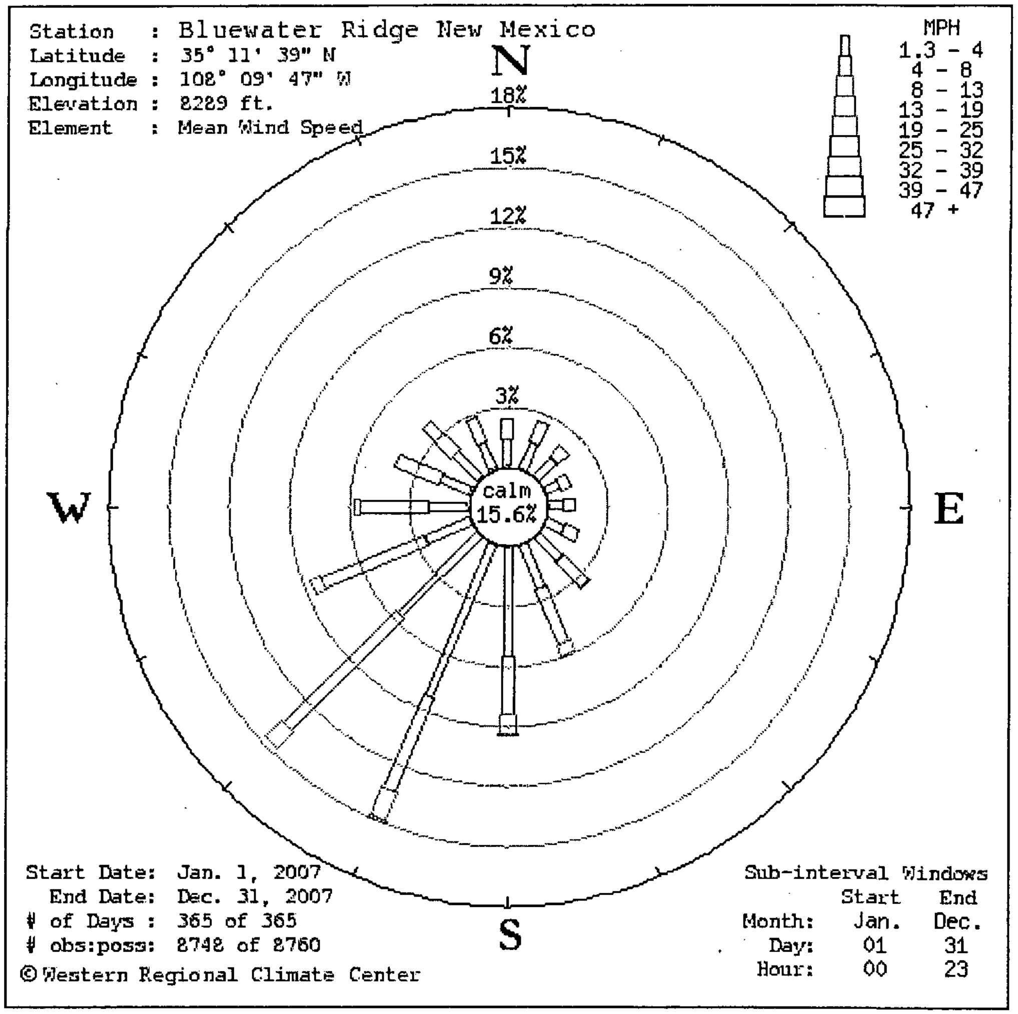
Start Date : Jan. 1, 2007
End Date : Dec. 31, 2007
# of Days : 365 of 365
# obs : poss : 8748 of 8760

Sub Interval Windows

| | Start | End |
|---|---|---|
| Month | Jan. | Dec. |
| Day | 01 | 31 |
| Hour | 00 | 23 |

| | |
|---|---|
| Time | - Time of Day (L.S.T.) |
| Speed | - Average (Scalar) Speed in MPH |
| U-Vel | - East-West Velocity, Positive to East |
| V-Vel | - North-South Velocity, Positive to North |

# Bluewater Ridge New Mexico




## Bluewater Ridge New Mexico - Wind Frequency Table (percentage)

Sub Interval Windows
Start End

Latitude : 35° 11' 39" N
Longitude : 108° 09' 47" W

Start Date : Jan. 1, 2007
End Date : Dec. 31, 2007

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# REFERENCES

# 29-32

# Bluewater, New Mexico, Disposal Site

## FACT SHEET

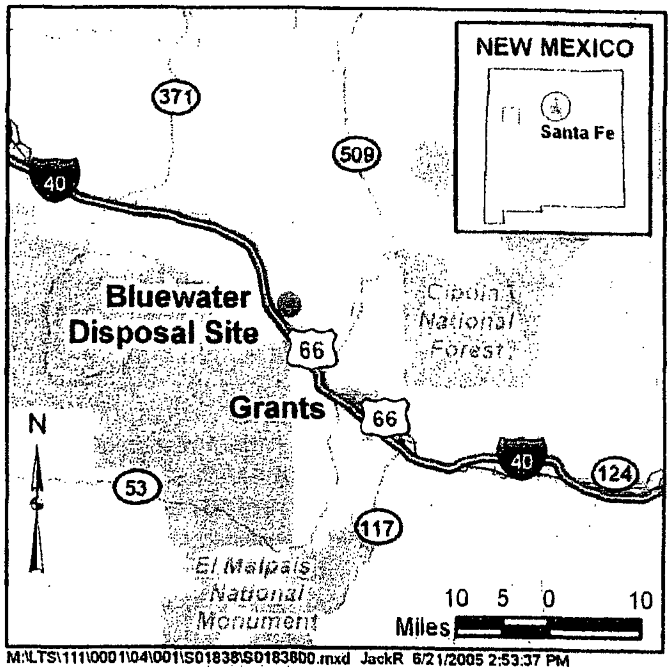
*This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title II disposal site at Bluewater, New Mexico. This site is managed by the U.S. Department of Energy Office of Legacy Management.*

## Site Description and History

The Bluewater Disposal Site is in Cibola County in west-central New Mexico. Anaconda Copper Company constructed the original carbonate-leach mill at the site in 1953 to process uranium ore. The mill had a production capacity of 300 tons of ore per day. A discovery of sandstone uranium ores in the area led to construction of an acid-leach mill at the site that began operations in 1957. The carbonate-leach mill closed in 1959, and production in the acid-leach mill was reduced for economic reasons. The acid-leach mill resumed full operations in 1967, and the capacity of the mill had increased to 6,000 tons of ore per day by 1978. Milling operations at the site ended on February 14, 1982. In 1986, the Anaconda Copper Company became the Atlantic Richfield Company (ARCO).

Uranium-ore processing at the Bluewater mill produced radioactive tailings, a predominantly sandy material. The tailings were conveyed in slurry from the mill to two locations, depending on the milling method. The acid-leach tailings were segregated from the carbonate-leach tailings to prevent chemical reactions from occurring as a result of mixing acidic and basic compounds. Process water in the tailings slurry leached into the underlying San Andres aquifer and contaminated the ground water; the main constituents of concern are molybdenum, selenium, and uranium.

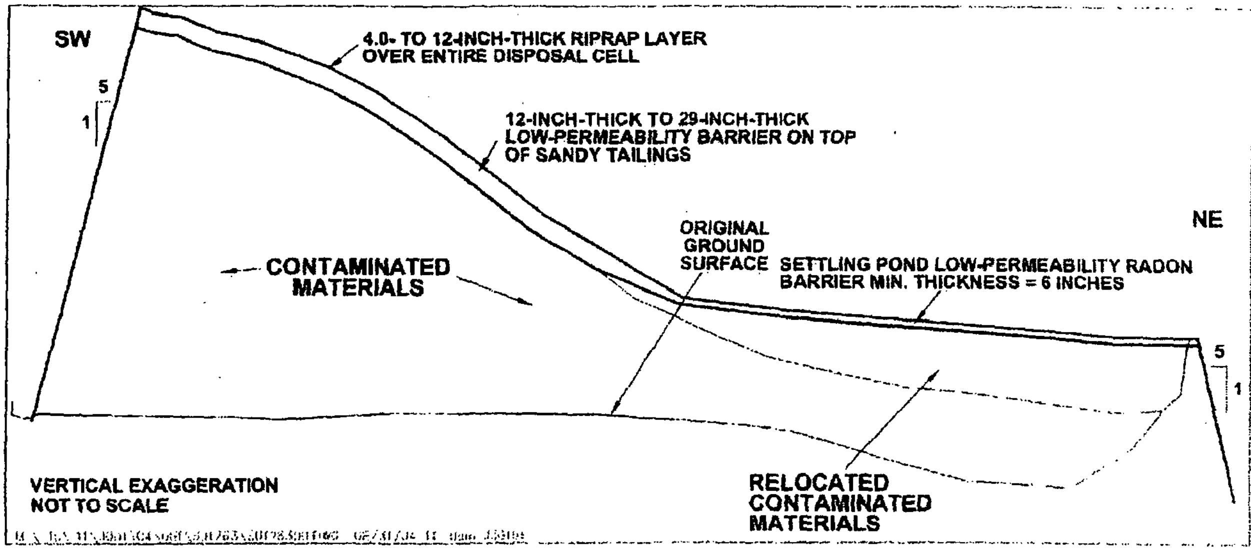
ARCO began decommissioning the mill in 1989 and began site reclamation in 1991. By 1995, all mill tailings, contaminated soils, demolished mill structures, and contaminated vicinity property materials were encapsulated in three on-site disposal areas. These areas are the main disposal cell, which comprises the acid tailings and the contiguous south bench disposal area; the carbonate tailings cell and a contiguous asbestos disposal area; and the polychlorinated biphenyl (PCB) disposal cell, which contains uranium mill tailings and soils mixed with PCBs. More than 80 percent of the total tailings material is encapsulated n the main disposal cell.




*Location of the Bluewater Disposal Site*

## Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604). The Bluewater site is under the jurisdiction of Title II of UMTRCA, which applies to uranium millsites that were under active U.S. Nuclear Regulatory Commission (NRC) license when UMTRCA was passed. Title II of the legislation specifies that after reclamation is completed, long-term custody of the site is the responsibility of either the federal government or the host state, at the option of the state. New Mexico declined to become the long-term custodian of the Bluewater site, and the U.S. Department of Energy (DOE) assumed custodial responsibility. Under Title II of UMTRCA, the licensee, ARCO, was responsible for remedial action. NRC's cleanup and reclamation standards are promulgated in Title 10 *Code of Federal Regulations* (CFR) Part 40, Appendix A. These standards conform to U.S. Environmental Protection Agency (EPA) standards in 40 CFR 192. The site was




*Southwest-Northeast Cross Section of the Main Disposal Cell at the Bluewater Disposal Site*

included under NRC's general license for long-term custody in 1997. At that time, title to the site transferred from ARCO to DOE.

## Disposal Site

The site comprises 3,300 acres; about one-third of which (the southern and western parts) is covered by basalt that may have flowed as recently as 2,000 to 4,000 years ago. Much of the remainder of the site is covered with fine-grained material deposited by wind and water. The region around the disposal site is sparsely populated, and the main land use near the site is grazing. A barbed-wire perimeter fence encloses the entire site.

### *Compliance Strategy*

Several years of active treatment by pumping contaminated ground water from the aquifer produced no significant reduction in concentrations of molybdenum, selenium, and uranium. In 1990, ARCO applied to NRC for alternate concentration limits. Alternate concentration limits may be adopted within specified areas when established maximum concentration limits are unattainable, providing the alternate concentration limits do not pose a present or potential future hazard to human health or the environment. NRC approved the application in 1996.

PCB-contaminated waste was discovered during reclamation of the mill. At the time of the discovery, no commercial waste disposal facility in the United States was licensed to accept radioactive waste contaminated with PCBs. These wastes were regulated under the Toxic Substances Control Act, which is under EPA's jurisdiction. ARCO proposed encapsulating the wastes on site in a separate disposal cell. After resolution of several issues, EPA agreed to issue a permit for the proposed disposal approach, provided that ARCO conducted ground water monitoring and maintained the appropriate records. DOE concurred with the disposal subject to an indemnification agreement whereby ARCO agreed to cover future costs that may result from the PCB disposal.

The compliance strategy includes annual ground water monitoring at nine monitor wells located inside the site boundary. Samples are analyzed annually for PCBs and every 3 years for molybdenum, selenium, and uranium.

### *Disposal Cell Design*

The main disposal cell covers about 320 acres and contains an estimated 23 millions tons (16 million cubic yards) of tailings and other contaminated materials having a total activity of about 11,200 curies of radium-226. The cover of the main disposal cell is a two-layer system designed to encapsulate and protect the contaminated materials. The cover consists of a low-permeability radon barrier (first layer placed over compacted tailings) and a rock (riprap) erosion protection layer.

The carbonate tailings cell covers about 65 acres and contains an estimated 1.3 million tons (930,000 cubic yards) of contaminated materials having a total activity of about 1,130 curies of radium-226. Layers of barrier material and riprap similar to those on the main disposal cell also cover the carbonate tailings cell to protect the cover from erosion.

The PCB disposal cell is less than 1 acre and contains PCB-contaminated material sealed in 144 drums placed on a 3-foot-thick clay liner. Voids between the drums were filled with a soil-cement mixture to prevent

# 2008 ANNUAL MONITORING REPORT / PERFORMANCE REVIEW FOR HOMESTAKE'S GRANTS PROJECT PURSUANT TO NRC LICENSE SUA-1471 AND DISCHARGE PLAN DP-200

FOR:

U.S. NUCLEAR REGULATORY COMMISSION
AND
NEW MEXICO ENVIRONMENT DEPARTMENT

BY:


HOMESTAKE MINING COMPANY OF CALIFORNIA
GRANTS, NEW MEXICO

AND

HYDRO-ENGINEERING, LLC
CASPER, WYOMING


MARCH, 2009


GEORGE L. HOFFMAN, P.E.
5831 N.M. HYDROLOGIST

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## GROUND WATER MONITORING
## FOR HOMESTAKE'S GRANTS PROJECT



## APPENDICES



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## 1.0 EXECUTIVE SUMMARY AND INTRODUCTION

### 1.1 EXECUTIVE SUMMARY

Homestake Mining Company of California manages a ground water restoration program as defined by Nuclear Regulatory Commission (NRC) License SUA-1471, and New Mexico Environment Department (NMED), DP-200 permit. The restoration program is a dynamic on-going strategy based on a restoration plan, which began in 1977, and is scheduled to be completed in 2015.

Homestake's long-term goal is to restore the ground water aquifer to levels as close as practicable to the up-gradient background levels. A ground water collection area (see shaded area on Figure 2.1-1, Page 2.1-11) has been established and is bounded by a down-gradient perimeter of injection/infiltration wells and trenches. Alluvial ground water that flows beneath the tailings enters this collection area. All ground water in the alluvial aquifer that is within the collection area is eventually captured by the collection well system. Once ground water quality restoration within the zone is complete and approved by the agencies, the site is to be transferred to the U.S. Department of Energy, which will have the responsibility for long-term site care and maintenance.

The data reported within this document represent the results of the monitoring program during 2008. This is a yearly reporting requirement. A similar report has been submitted to the agencies each year since 1983 (see list in Section 1.2).

The restoration program is designed to remove target contaminants from the ground water by flushing the alluvial aquifer with deep-well supplied fresh water or water produced from the reverse osmosis (R.O.) plant. A series of collection wells is used to collect the contaminated water, which is pumped to the R.O. plant for treatment or, alternatively, reported to the evaporation ponds.

Historically, the contaminants are found in two different aquifer systems. The aquifer system of primary concern is the alluvial system, which averages approximately 100 feet in depth, and extends generally north to south encompassing the San Mateo alluvial aquifer. In addition, a second aquifer system is found within the Chinle formation underlying the San Mateo alluvium. It is comprised of three separate aquifers designated as the Upper, Middle and Lower Chinle aquifers. The Hydro-Engineering 2003b report should be reviewed for details of the geologic setting and aquifer conditions on the site. The Upper and Middle Chinle aquifers subcrop beneath the alluvial system near the project site. Slight to moderately elevated concentrations of constituents of concern

## TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS. (cont'd.)

| WELL NAME | NORTH. COORD. | EAST. COORD. | WELL DEPTH (FT-MP) | CASING DIAM (IN) | WATER LEVEL DATE | WATER LEVEL DEPTH (FT-MP) | WATER LEVEL ELEV. (FT-MSL) | MP ABOVE LSD (FT) | MP ELEV. (FT-MSL) | DEPTH TO BASE OF ALLUVIUM (FT-LSD) | ELEV. TO BASE OF ALLUVIUM (FT-MSL) | CASING PERFOR-ATIONS (FT-LSD) | SATURATED THICKNESS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 0870 | 1532680 | 484906 | 93.0 | 5.0 | 1/11/1996 | 68.56 | 6475.60 | 1.9 | 6544.16 | 95 | 6447.3 A | 69-89 | 28.3 |
| 0871 | 1533603 | 485400 | 100.0 | 5.0 | 1/11/1996 | 66.86 | 6477.85 | 2.4 | 6544.71 | 93 | 6449.3 A | 60-100 | 28.5 |
| * 0872 | 1533092 | 485407 | 100.0 | 5.0 | 1/11/1996 | 65.80 | 6477.51 | 1.8 | 6543.31 | 96 | 6445.5 A | 55-100 | 32.0 |
| * 0873 | 1533286 | 484505 | 100.0 | 5.0 | 1/11/1996 | 67.55 | 6475.46 | 1.9 | 6543.01 | 96 | 6445.1 A | 60-100 | 30.3 |
| * 0874 | 1533968 | 484925 | 105.0 | 5.0 | 1/11/1996 | 68.68 | 6476.66 | 2.2 | 6545.34 | 110 | 6433.1 A | 55-105 | 43.5 |
| * 0875 | 1532785 | 483634 | 125.0 | 5.0 | 1/11/1996 | 69.85 | 6472.99 | 1.7 | 6542.84 | 116 | 6425.1 A | 65-125 | 47.9 |
| 0876 | 1532853 | 486088 | 95.0 | 5.0 | 12/4/2008 | 86.20 | 6458.06 | 1.9 | 6544.26 | 85 | 6457.4 A | 58-88 | 0.7 |
| 0877 | 1533068 | 488067 | 70.0 | 5.0 | 8/18/1998 | 63.58 | 6489.50 | 1.9 | 6553.08 | 65 | 6486.2 A | 58-68 | 3.3 |
| 0879 | 1532401 | 486104 | 70.0 | 5.0 | 12/4/2008 | 69.17 | 6475.38 | 2.2 | 6544.55 | 62 | 6480.4 A | 48-68 | 0.0 |
| 0881 | 1542034 | 481478 | 96.0 | 4.5 | 12/8/2008 | 73.85 | 6491.19 | 2.0 | 6565.04 | 103 | 6460.0 A | 76-96 | 31.2 |
| 0882 | 1541404 | 482396 | 110.0 | 4.5 | 11/18/2008 | 68.21 | 6492.95 | 2.0 | 6561.16 | 98 | 6461.2 A | 70-110 | 31.7 |
| 0883 | 1540097 | 483039 | 100.0 | 5.0 | 11/18/2008 | 62.61 | 6494.52 | 1.9 | 6557.13 | 96 | 6459.3 A | 60-90 | 35.2 |
| 0884 | 1542677 | 481498 | 90.0 | 5.0 | 11/19/2008 | 74.76 | 6491.34 | 1.0 | 6566.10 | 85 | 6480.2 A | 58-88 | 11.2 |
| 0885 | 1541919 | 483474 | 100.0 | 5.0 | 12/8/2008 | 67.79 | 6496.85 | 1.5 | 6564.64 | 95 | 6468.1 A | 70-100 | 28.7 |
| 0886 | 1542327 | 482487 | 90.0 | 5.0 | 12/8/2008 | 70.31 | 6494.24 | 1.5 | 6564.55 | 87 | 6476.1 A | 60-90 | 18.2 |
| 0887 | 1543063 | 482469 | 67.0 | 5.0 | 4/1/2008 | 54.54 | 6513.19 | 1.5 | 6567.73 | 60 | 6506.2 A | 42-67 | 7.0 |
| 0888 | 1542285 | 479335 | 105.0 | 5.0 | 12/8/2008 | 76.00 | 6481.33 | 1.1 | 6557.33 | 90 | 6466.2 A | 75-105 | 15.1 |
| 0889 | 1540047 | 480222 | 65.0 | 5.0 | 10/24/1996 | 63.31 | 6486.32 | 1.5 | 6549.63 | 60 | 6488.2 A | 35-65 | 0.0 |
| 0890 | 1541365 | 480088 | 101.0 | 5.0 | 12/8/2008 | 73.90 | 6484.53 | 1.7 | 6558.43 | 93 | 6463.7 A | 81-101 | 20.8 |
| 0893 | 1541934 | 482244 | 98.0 | 4.5 | 12/8/2008 | 70.10 | 6493.87 | 2.1 | 6563.97 | 93 | 6468.9 A | 78-98 | 25.0 |
| 0894 | 1541976 | 478317 | 78.0 | 4.5 | 11/16/2005 | 77.40 | 6476.89 | 3.0 | 6554.29 | 97 | 6454.3 A | 58-78 | 22.6 |
| 0895 | 1541521 | 476222 | 104.0 | 5.0 | 11/19/2008 | 87.11 | 6466.73 | 2.4 | 6553.84 | 116 | 6435.4 A | 61-101 | 31.3 |
| 0896 | 1542246 | 476237 | 113.0 | 5.0 | 11/19/2008 | 88.09 | 6467.52 | 2.0 | 6555.61 | 117 | 6436.6 A | 73-113 | 30.9 |
| 0897 | 1543819 | 478237 | 93.0 | 4.0 | 9/27/1998 | 83.28 | 6478.97 | 2.0 | 6562.25 | 70 | 6490.3 A | 63-93 | 0.0 |
| 0899 | 1543801 | 477288 | 110.0 | 4.0 | 6/2/2008 | 100.30 | 6470.54 | 2.0 | 6570.84 | 120 | 6448.8 A | 70-110 | 21.7 |
| 0905 | 1532700 | 480850 | 120.0 | 5.0 | 11/13/2006 | 0.00 | 6545.00 | 0.0 | 6545.00 | 120 | 6425.0 A | 100-120 | 120.0 |
| 0906 | 1532900 | 480450 | — | — | 8/29/1995 | 74.65 | 6462.75 | 0.0 | 6537.40 | — | — A | - | — |
| 0909 | 1531900 | 483400 | 140.0 | 4.0 | 11/20/2007 | 92.60 | 6446.30 | 0.0 | 6538.90 | 112 | 6426.9 A | 80-135 | 19.4 |
| 0910 | 1528800 | 481150 | 138.0 | 5.0 | — | — | — | 0.0 | 6535.00 | 132 | 6403.0 A | 120-134 | — |
| 0912 | 1471000 | 478250 | — | — | — | — | — | 0.0 | 6530.00 | — | — A | - | — |
| 0913 | 1555800 | 500950 | — | 8.0 | 1/24/1996 | 38.40 | 6604.60 | 0.3 | 6643.00 | — | — A | - | — |
| 0914 | 1555500 | 500850 | 93.0 | 6.0 | 5/6/2008 | 42.30 | 6599.70 | 1.4 | 6642.00 | — | — A | - | — |
| 0915 | 1552650 | 499650 | 100.0 | 4.0 | 6/19/2006 | 30.00 | 6595.00 | 0.0 | 6625.00 | 70 | 6555.0 A | 55-85 | 40.0 |
| 0916 | 1552350 | 499600 | 160.0 | 4.0 | 4/26/1994 | 40.00 | 6585.00 | 0.0 | 6625.00 | — | — A | 45-70 | — |
| 0917 | 1542200 | 514600 | — | — | — | — | — | 0.0 | 6800.00 | — | — A | - | — |
| 0920 | 1555800 | 496900 | — | 7.0 | 5/11/1994 | 33.40 | 6594.20 | 0.7 | 6627.60 | — | — A | - | — |

## TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS. (cont'd.)

| WELL NAME | NORTH. COORD. | EAST. COORD. | WELL DEPTH (FT-MP) | CASING DIAM (IN) | WATER LEVEL DATE | WATER LEVEL DEPTH (FT-MP) | WATER LEVEL ELEV. (FT-MSL) | MP ABOVE LSD (FT) | MP ELEV. (FT-MSL) | DEPTH TO BASE OF ALLUVIUM (FT-LSD) | ELEV. TO BASE OF ALLUVIUM (FT-MSL) | CASING PERFOR-ATIONS (FT-LSD) | SATURATED THICKNESS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0921 | 1555400 | 495800 | 73.0 | 5.0 | 5/6/2008 | 38.83 | 6585.17 | 1.9 | 6624.00 | — | — A | - | — |
| 0922 | 1555200 | 492500 | 96.0 | 6.0 | 5/6/2008 | 50.90 | 6570.80 | 1.7 | 6621.70 | — | — A | - | — |
| 0924 | 1547500 | 438900 | 135.0 | 4.0 | — | — | — | 0.0 | 6592.90 | 112 | 6480.9 A | 94-114 | — |
| 0925 | 1548600 | 480800 | 150.0 | 4.0 | — | — | — | 0.0 | 6601.40 | 140 | 6461.4 A | 126-141 | — |
| 0926 | 1547500 | 472700 | 134.0 | 4.0 | — | — | — | 0.0 | 6596.90 | 132 | 6464.9 A | 123-132 | — |
| 0935 | 1540115 | 476629 | 300.0 | 16.0 | 11/24/2008 | 95.31 | 6462.81 | 2.6 | 6558.12 | 125 | 6430.5 A | 95-132 | 32.3 |
| 0936 | 1543621 | 472978 | 160.0 | 5.0 | — | — | — | 0.0 | 6573.38 | 160 | 6413.4 A | 100-160 | — |
| 0939 | 1539766 | 483191 | 97.0 | 8.0 | 7/25/1996 | 59.31 | 6497.69 | 2.3 | 6557.00 | — | — A | - | — |
| 0940 | 1538651 | 483040 | 70.0 | — | 7/24/1996 | 57.30 | 6495.70 | 8.8 | 6553.00 | — | — A | - | — |
| 0942 | 1538300 | 483710 | 102.0 | 6.0 | — | — | — | 0.0 | 6550.20 | 95 | 6455.2 A | 85-95 | — |
| 0947 | 1536206 | 491841 | 100.0 | 4.0 | 7/27/1994 | 54.63 | 6520.55 | 0.0 | 6575.18 | 95 | 6480.2 A | 70-100 | 40.4 |
| 0950 | 1560400 | 498300 | 81.0 | 5.0 | 7/12/2000 | 25.70 | 6631.30 | 0.5 | 6657.00 | — | — A | - | — |
| 0952 | 1534550 | 477800 | 140.0 | — | — | — | — | 0.0 | 6550.00 | — | — A | - | — |
| 0975 | 1539780 | 482880 | — | — | — | — | — | 0.0 | 6556.00 | — | — A | - | — |
| 0976 | 1539750 | 483100 | 115.0 | — | — | — | — | 0.0 | 0.00 | — | — A | - | — |
| 0977 | 1539400 | 482730 | — | — | 12/9/1995 | 61.47 | 6495.53 | 1.0 | 6557.00 | — | — A | - | — |
| 0979 | 1539180 | 483340 | 105.0 | 5.0 | 7/10/2002 | 57.56 | 6593.44 | 0.0 | 6651.00 | 100 | 6551.0 A | 90-100 | 42.4 |
| 0980 | 1539260 | 483080 | — | — | 11/8/1995 | 57.70 | 6497.30 | 0.0 | 6555.00 | — | — A | - | — |
| 0981 | 1538970 | 482820 | — | — | — | — | — | 0.0 | 6554.00 | — | — A | - | — |
| 0982 | 1538570 | 483400 | 110.0 | 5.0 | — | — | — | 0.0 | 6651.00 | 105 | 6546.0 A | 90-105 | — |
| 0983 | 1538820 | 483250 | — | — | — | — | — | 0.0 | 6552.00 | — | — A | - | — |
| 0984 | 1538990 | 483100 | 103.0 | 5.0 | — | — | — | 0.0 | 6651.00 | 98 | 6553.0 A | 88-98 | — |
| 0985 | 1539000 | 483260 | 115.0 | 5.0 | 7/18/1996 | 58.75 | 6592.25 | 0.0 | 6651.00 | 102 | 6549.0 A | 90-110 | 43.3 |
| 0989 | 1538185 | 482813 | — | — | 11/2/1995 | 58.10 | 6494.90 | 1.0 | 6553.00 | — | — A | - | — |
| 0992 | 1539460 | 483800 | 100.0 | 5.0 | — | — | — | 0.0 | 6652.00 | 95 | 6557.0 A | 85-95 | — |
| 0993 | 1537860 | 483680 | 102.0 | 5.0 | — | — | — | 0.0 | 6650.00 | 98 | 6552.0 A | 85-98 | — |
| 0994 | 1539700 | 476240 | 144.0 | 6.0 | 11/14/2008 | 96.20 | 6458.80 | 0.0 | 6555.00 | — | — A | 95-110 | — |
| 0996 | 1537621 | 477989 | 138.0 | 5.0 | 12/4/2008 | 105.00 | 6447.52 | 1.7 | 6552.52 | 136 | 6414.8 A | 126-136 | 32.7 |
| 0997 | 1539821 | 473807 | — | — | 3/12/1996 | 76.90 | 6491.40 | 0.0 | 6568.30 | — | — A | - | — |
| 0999 | 1524230 | 480187 | 185.0 | — | — | — | — | 0.0 | 6527.00 | — | — A | - | — |
| 1012 | — | — | — | 6.0 | — | — | — | 0.0 | 0.00 | — | — A | - | — |
| 1013 | — | — | — | 4.0 | — | — | — | 0.0 | 0.00 | — | — A | - | — |
| 1014 | — | — | — | 9.0 | — | — | — | 0.0 | 0.00 | — | — A | - | — |
| 1015 | — | — | — | 6.0 | — | — | — | 0.0 | 0.00 | — | — A | - | — |
| 1018 | — | — | — | 5.0 | — | — | — | 0.0 | 0.00 | — | — A | - | — |
| 1020 | — | — | — | 5.0 | 1/18/1996 | 15.17 | -15.17 | 0.0 | 0.00 | — | — A | - | — |

# TABLE 8.0-1. WELL DATA FOR THE SAN ANDRES WELLS.

| WELL NAME | NORTH. COORD. | EAST. COORD. | WELL DEPTH (FT-MP) | CASING DIAM (IN) | WATER LEVEL | | | MP ABOVE LSD (FT) | MP ELEV. (FT-MSL) | DEPTH TO TOP OF SAN ANDRES (FT-LSD) | ELEV. TO TOP OF SAN ANDRES (FT-MSL) | CASING PERFOR-ATIONS (FT-LSD) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DATE | DEPTH (FT-MP) | ELEV. (FT-MSL) | | | | | | |
| #1 Deep | 1543307 | 493633 | 1000.0 | 10.0 | 12/12/2007 | 99.0800 | 6484.68 | 0.0 | 6583.76 | 130 | 6454 | A | — |
| | | | | | | | | | | 303 | 6281 | U | — |
| | | | | | | | | | | 433 | 6151 | M | — |
| | | | | | | | | | | 597 | 5987 | L | — |
| | | | | | | | | | | 955 | 5629 | S | 919-999 |
| #2 Deep | 1542424 | 490972 | 870.0 | — | 5/4/2005 | 208.800 | 6366.86 | 0.0 | 6575.66 | 110 | 6466 | A | — |
| | | | | | | | | | | 800 | 5776 | S | - |
| 0534 | 1534589 | 476549 | 1000.0 | 16.0 | 12/4/2008 | 118.120 | 6434.45 | 0.0 | 6552.57 | — | — | S | - |
| 0535 | 1530100 | 478450 | 198.0 | 12.0 | 12/4/2008 | 114.800 | 6425.20 | 0.0 | 6540.00 | — | — | S | - |
| 0545 | 1540200 | 476600 | 0.0 | 8.0 | — | — | — | — | 6560.00 | — | — | S | - |
| 0806 | 1541120 | 486320 | 584.0 | 16.0 | — | — | — | 0.0 | 6567.00 | 90 | 6477 | A | — |
| | | | | | | | | | | 520 | 6047 | S | - |
| 0806R | 1541180 | 486320 | 600.0 | 16.0 | 3/5/2008 | 134.710 | 6432.29 | — | 6567.00 | — | — | S | 504-600 |
| 0822 | 1538920 | 488630 | 980.0 | 7.0 | 2/13/2008 | 135.600 | 6432.40 | 0.0 | 6568.00 | 790 | 5778 | S | 790-875 |
| 0907 | 1534250 | 480800 | 360.0 | 16.0 | 12/4/2008 | 116.900 | 6428.70 | 0.0 | 6545.60 | 123 | 6423 | A | — |
| | | | | | | | | | | 262 | 6284 | S | 295-360 |
| 0911 | 1534350 | 476800 | 188.0 | — | — | — | — | 0.0 | 6552.60 | — | — | S | - |
| 0918 | — | — | 725.0 | 4.0 | — | — | — | 0.0 | 6702.40 | 620 | 6082 | S | 635-655 |
| 0919 | — | — | 628.0 | 5.0 | — | — | — | 0.0 | 6684.00 | 35 | 6649 | A | — |
| | | | | | | | | | | 356 | 6328 | S | 364-571 |
| 0923 | 1552400 | 477900 | 330.0 | 5.0 | 4/6/1994 | 6464.97 | 157.63 | 0.0 | 6622.60 | 60 | 6563 | A | — |
| | | | | | | | | | | 229 | 6394 | S | 234-330 |
| 0928 | 1548250 | 491700 | 864.0 | — | 12/22/2008 | 169.300 | 6428.30 | 1.2 | 6597.60 | 138 | 6458 | A | — |
| | | | | | | | | | | 801 | 5795 | S | - |
| 0938 | 1539500 | 473040 | — | — | 12/17/2008 | 136.5 | 6432.30 | 0.0 | 6568.80 | 95 | 6474 | A | — |
| | | | | | | | | | | 120 | 6449 | S | - |
| 0943 | 1537222 | 487407 | 978.0 | 18.0 | 12/29/2008 | 133.300 | 6422.61 | 0.0 | 6555.91 | 704 | 5852 | S | 703-978 |
| 0949 | 1540350 | 483600 | 551.0 | 6.0 | 2/13/2008 | 130.600 | 6431.70 | 0.0 | 6562.30 | 112 | 6450 | A | — |
| | | | | | | | | | | 460 | 6102 | S | 505-551 |
| 0951 | 1545500 | 473200 | 275.0 | 10.0 | 12/29/2008 | 150.279 | 6423.42 | 0.9 | 6573.70 | 110 | 6463 | A | — |
| | | | | | | | | | | 227 | 6346 | S | 241-275 |
| 0955 | 1537300 | 483700 | 498.0 | 5.0 | 11/3/1995 | 78.0500 | 6471.95 | 0.2 | 6550.00 | 40 | 6510 | A | — |
| | | | | | | | | | | 420 | 6130 | S | 385-498 |
| 0986 | 1538008 | 483745 | 467.0 | 5.0 | 8/23/2008 | 124 | 6426.00 | 0.8 | 6550.00 | 65 | 6484 | A | — |
| | | | | | | | | | | 85 | 6464 | L | — |
| | | | | | | | | | | 415 | 6134 | S | 420-467 |
| 0987 | 1538240 | 483360 | 500.0 | 5.0 | 11/3/1995 | 54.4799 | 6495.52 | 1.0 | 6550.00 | 70 | 6479 | A | — |
| | | | | | | | | | | 385 | 6164 | S | 425-470 |
| 0991 | 1538880 | 483630 | 500.0 | — | 8/26/2008 | 126.819 | 6424.18 | 1.4 | 6551.00 | — | — | S | - |

program has shown that any low levels of nitrate, radium-226, radium-228, vanadium and thorium-230 are also reduced when the key constituents are restored in a particular area.

Data relating to key constituents currently being restored at the site have been reviewed and statistically evaluated to determine upgradient background water quality. These background water quality levels have been accepted by NRC, EPA and NMED; the NRC has set site standards based on the background water quality and accordingly amended the Radioactive Material license to reflect those standards. It should be noted that these site standards are utilized throughout this report for comparison purposes in discussing restoration progress.

Observed alluvial background concentrations of key constituents at the Grants site were similar to those in previous years. The only areas where sulfate, TDS and chloride concentrations exceed the alluvial site standard are small localized areas east of Valle Verde plus the large area in close proximity to the Large and Small Tailings Piles in the Grants Project area.

Uranium concentrations exceed the alluvial site standard of 0.16 mg/l within the collection area near the tailings. There are also three wells in Felice Acres and one well in Murray Acres subdivision that contain concentrations of uranium exceeding the site standard. Ground water withdrawal for irrigation is being used to further reduce uranium levels that exceed the standard in an area southwest of Felice Acres in Section 3 and in the western half of Section 27 and Section 28. Collection of water from one well in Murray Acres is being used to reduce uranium concentrations in that area.

Selenium concentrations also exceed the relevant site standard in the collection area near the Large Tailings Pile and southeast of the Small Tailings Pile. None of the sampled subdivision wells contained selenium concentrations above the site standard.

Molybdenum concentrations above the site standard of 0.1 mg/l are not present in the sampled subdivision wells. The wells exhibiting elevated molybdenum concentrations are all located near the Large and Small Tailings Piles, to the southeast of the Small Tailings Pile, and in an area in central Section 27. Migration of this constituent has been limited due to natural retardation within the alluvial aquifer.

Nitrate concentrations are compared to the alluvial site standard of 12 mg/l. Areas to the west of the Large Tailings Pile contain higher nitrate concentrations above the site standard, but these levels are likely natural given their location. Nitrate concentrations in the area of the Large only requires restoration with respect to TDS, chloride and sulfate in a localized area near the Large Tailings Pile.

Uranium concentrations in twelve Upper Chinle wells exceeded the Upper Chinle site standard in 2008. Restoration of these elevated values should result from CE2, CE5, CE6, CE11 and CE12 well collection and the CW4R, CW5 and CW25 well injection efforts.

Selenium concentrations in the Upper Chinle aquifer exceed the site standard in five wells in the mixing zone. The site standards for selenium for the Upper Chinle mixing zone and the Upper Chinle non-mixing zone are 0.14 and 0.06 mg/l, respectively.

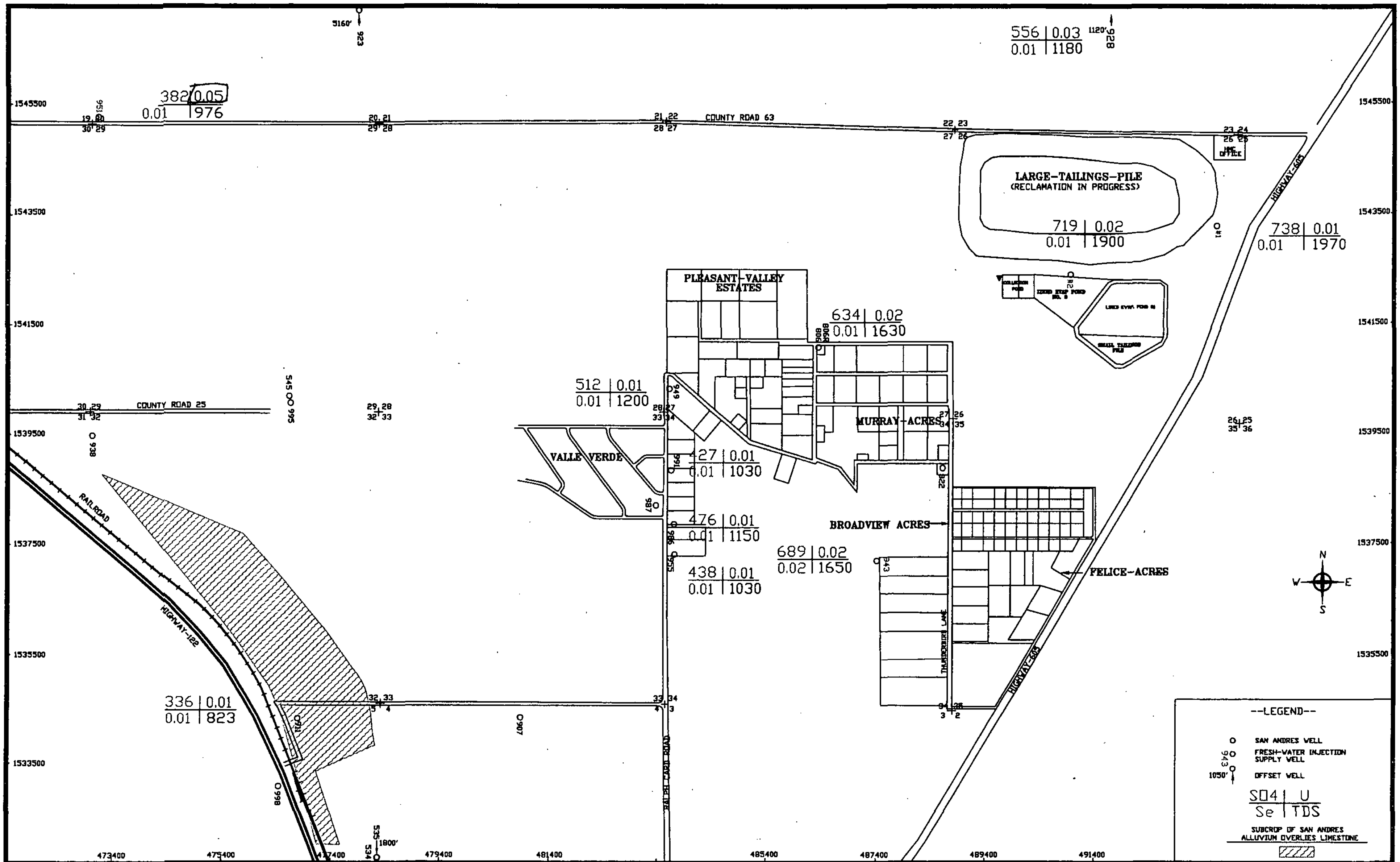
The concentrations of molybdenum exceeded the site standard in four wells near the tailings in the Upper Chinle aquifer and six more to the south of the Collection Ponds during 2008. Restoration for these locations should occur from continued CE2, CE5, CE6, CE11 and CE12 well collection and CW4R, CW5 and CW25 well injection activities.

All nitrate concentrations observed in 2008 for the Upper Chinle mixing zone were less than the nitrate site standard. This indicates that nitrate is not a constituent of concern in this aquifer.

None of the Upper Chinle wells contain a radium-226 plus radium-228 value above 5 pCi/l. Two wells near the Large Tailings Pile exceeded the site standard for vanadium concentrations from the 2008 sampling in the Upper Chinle aquifer. Two of the measured thorium-230 concentrations near the Large Tailings Pile in the Upper Chinle aquifer wells during 2008 were 0.3 and 0.4 pCi/l at CE13 and CE7 respectively. This is consistent with the low observed concentrations in the overlying alluvial aquifer.

The direction and rate of ground water flow in the Middle Chinle aquifer in 2008 is very similar to that of past years. Fresh-water injection into well CW14 started in December of 1997. Fresh-water injection into wells CW30 and CW46 started in 2004. The fresh water is building up a mound of ground water in this area, which will result in a reversal of the flow of Middle Chinle water back toward the alluvial subcrop. Wells 493, 498, CW44 and CW45 are being used for irrigation supply, which will increase the flow in the Middle Chinle aquifer from Broadview and Felice Acres to the south. Additionally, well CW28 was added as a supply well for fresh-water injection in 2002 but has not been used for the last few years.

Concentrations of selenium do not exceed the standards in the two zones for the Lower Chinle aquifer. All molybdenum concentrations in the Lower Chinle aquifer are less than the site standard. None of the Lower Chinle nitrate concentrations exist at a significant level. All radium, vanadium and thorium-230 concentrations in the Lower Chinle aquifer in 2008 were at low levels for these constituents.

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DATE: 3/23/09

FIGURE 8.0-2. WATER QUALITY FOR THE SAN ANDRES AQUIFER, 2008 mg/l

# Rio Algom - Ambrosia Lake

## 1.0 Site Identification

| | |
|---|---|
| Location: | Grants, NM |
| License No.: | SUA-1473 |
| Docket No.: | 40-8905 |
| License Status: | Possession Only License |
| Project Manager: | Tom McLaughlin |

## 2.0 Site Status Summary

This is a uranium mill tailings site in the Ambrosia Lake uranium district of New Mexico. It is location approxin miles north of Grants, New Mexico. The tailings impoundment contains 33 million tons of uranium ore and cov approximately 370 acres.

The site status changed from standby to reclamation in August 2003 to reflect the licensee's intent to begin fu and reclamation of the site leading to termination of the specific license. The mill was demolished and dispose tailings impoundment in late 2003. The demolition was completed in accordance with a mill demolition plan a NRC in October 2003. The staff issued a license amendment for alternate concentration limits (ACLs) at the si 2006. Consequently, all groundwater corrective actions have been discontinued, and Rio Algom is finalizing th reclamation. A portion of the tailings impoundment is still open for disposal of Atomic Energy Act, Section 11e material. A final soil DP entitled, Closure Plan - Lined Evaporation Ponds (Relocation Plan) was submitted to t November of 2004, and partially approved. A portion of the report, pertinent to the "Section 4" and Pond 9 ev pond sediment material is still under review. It is estimated that that portion of the review will be completed l 2007. The cost for decommissioning is estimated to be approximately $18 million.

## 3.0 Major Technical or Regulatory Issues

Rio Algom has notified NRC that they intend to sell the property and that the license will be transferred.

## 4.0 Estimated Date For Closure

01/01/2010

# Ambrosia Lake, New Mexico, Disposal Site

## FACT SHEET

*This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title I disposal site located at Ambrosia Lake, New Mexico. The site is managed by the U.S. Department of Energy Office of Legacy Management.*

## Site Description and History

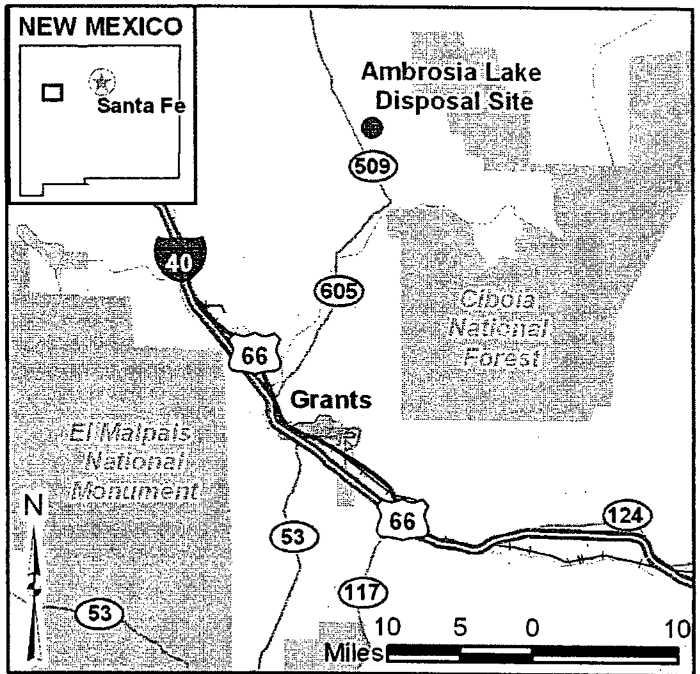
The Ambrosia Lake Disposal Site is a former uranium ore processing facility in McKinley County, approximately 25 miles north of Grants, New Mexico. The site is in the Ambrosia Lake Valley, a broad, elongate valley dominated by desert grassland plant communities and basalt-capped mesas to the north. The site is within the Ambrosia Lake Mining District, near the center of the Grants Mineral Belt. Decommissioned uranium mills, abandoned underground mines, mine shafts and vents, ore piles, tailings piles, and heap leach piles are close to the site. The area surrounding the millsite is sparsely populated.

The former mill processed more than 3 million tons of uranium ore between 1958 and 1963 and provided uranium for U.S. Government national defense programs. Phillips Petroleum Company built the original mill at the Ambrosia Lake site in 1957 to process ore from nearby mines. United Nuclear Corporation purchased and operated the mill for a brief period in 1963, then ceased milling operations but retained ownership of the site. In the late 1970s to early 1980s, United Nuclear Corporation operated an ion exchange system, extracting uranium from mine water. All mill operations ceased in 1982, leaving radioactive mill tailings, a predominantly sandy material, on approximately 111 acres. Wind and water erosion spread some of the tailings across a 230-acre area.

The U.S. Department of Energy (DOE) remediated the Ambrosia Lake site and local contaminated vicinity properties between 1987 and 1995. Surface remediation consisted of consolidating and encapsulating all contaminated material on site in an engineered disposal cell. The disposal cell occupies 91 acres of a 290-acre tract of land.

## Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604), which required the cleanup of 24 inactive uranium ore-processing sites. DOE remediated these sites under the Uranium Mill Tailings Remedial Action Project in accordance with standards promulgated by the U.S. Environmental Protection Agency in Title 40 *Code of Federal Regulations* (CFR) Part 192. Subpart B of



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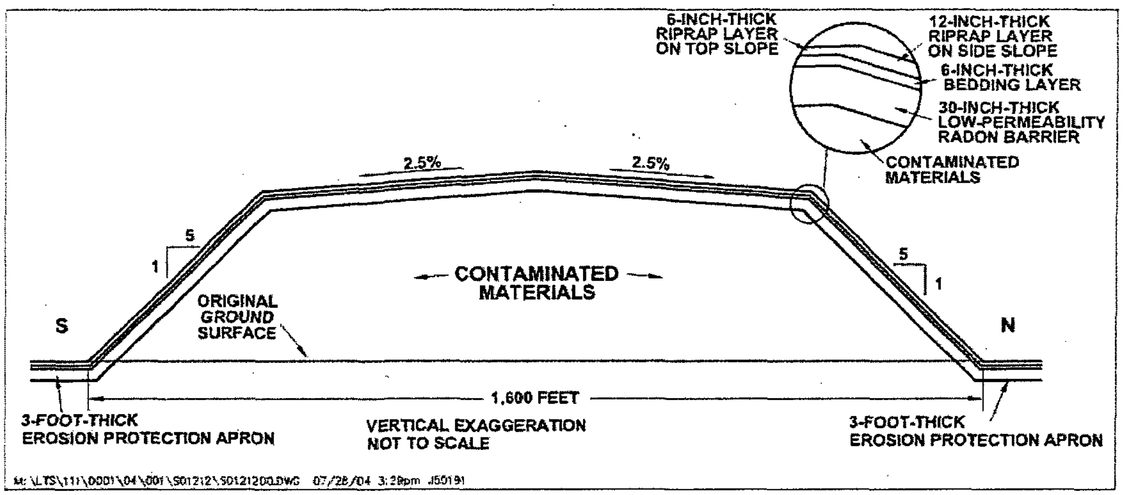
*Location of the Ambrosia Lake Disposal Site*

40 CFR 192 regulated cleanup of contaminated ground water at the processing sites. The radioactive materials were encapsulated in U.S. Nuclear Regulatory Commission-approved disposal cells. The U.S. Nuclear Regulatory Commission general license for UMTRCA Title I sites is established in 10 CFR 40.27. The Ambrosia Lake Disposal Site was included under the general license in 1998.

## Disposal Site

The disposal cell was closed in 1995 upon encapsulation of the tailings and completion of the cell cover. The cell contains 6.9 million dry tons (about 5.2 million cubic yards) of contaminated material, with a total activity of 1,850 curies of radium-226.

The uppermost aquifer beneath the site consists of alluvium (river deposits), sandstone, and weathered shale. The maximum thickness of the aquifer is approximately 175 feet; the maximum saturated thickness is 25 feet. This uppermost aquifer is not a current or potential source of drinking water because of low yield.




*South-North Cross Section of the Ambrosia Lake Disposal Site*

### *Compliance Strategy*

The ground water compliance strategy for the Ambrosia Lake Disposal Site is no remediation and the application of supplemental standards. The strategy of supplemental standards may be applied at UMTRCA sites where ground water in the uppermost aquifer is classified as limited use because it meets any of several criteria. Ground water at the Ambrosia Lake site meets the criterion of low yield, that is, the quantity of water reasonably available for sustained continuous use is less than 150 gallons per day (40 CFR 192.11[e]). Past milling operations, such as wastewater disposal and seepage from the tailings pile, supplied most of the water that recharged the aquifer. Those sources no longer exist, and the tailings and other contaminated materials are encapsulated in an engineered disposal cell. The alluvium is expected to return to the conditions of little to no saturation that prevailed before milling and mining began in the area. Because ground water is not a present or potential resource, no monitoring is required at the site. However, at the request of the New Mexico Environment Department, DOE samples two monitor wells every 3 years to monitor cell performance.

### *Disposal Cell Design*

The rectangular disposal cell measures approximately 2,500 feet by 1,600 feet, including the toe apron. The cell rises approximately 50 feet above the surrounding terrain.

The cover of the Ambrosia Lake disposal cell is a multicomponent system designed to encapsulate and protect the contaminated materials. The disposal cell cover comprises (1) a low-permeability radon barrier (first layer placed over compacted tailings) consisting of compacted clayey soil, (2) a bedding layer of granular bedding material, and (3) a rock (riprap) erosion-protection layer for the top and side slopes.

A rock apron of larger diameter riprap surrounds the toe of the disposal cell. The ground immediately adjacent to the cell perimeter has been graded away from the cell to protect the site from storm water runoff. Disturbed areas have been successfully revegetated.

## Legacy Management Activities

DOE manages the disposal site according to a site-specific Long-Term Surveillance Plan to ensure that the disposal cell systems continue to prevent release of contaminants to the environment. Under provisions of this plan, DOE conducts annual inspections of the site to evaluate the condition of surface features, performs site maintenance as necessary, and samples two monitor wells every 3 years. The encapsulated materials will remain potentially hazardous for thousands of years.

In accordance with 40 CFR 192.32, the disposal cell is designed to be effective for 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years. However, the general license has no expiration date, and DOE's responsibility for the safety and integrity of the Ambrosia Lake Disposal Site will last indefinitely.

## Contacts

Site-specific documents related to the Ambrosia Lake Disposal Site are available on the DOE Office of Legacy Management website at http://www.LM.doe.gov/land/sites/nm/amb/amb.htm.

For more information about the DOE Office of Legacy Management activities at the Ambrosia Lake Disposal Site, contact

U.S. Department of Energy
Office of Legacy Management
2597 B¾ Road, Grand Junction, CO 81503

(970) 248-6070 (monitored continuously), or
(877) 695-5322 (toll-free)

# REFERENCES

# 33-36

# Evaluation of Impacts from Section 35 and 36 Mine Dewatering

## Ambrosia Lake Valley, New Mexico



*Prepared by:*

**INTERA Incorporated**
6000 Uptown Blvd., Ste 100
Albuquerque, New Mexico 87110

*Submitted To:*

**Rio Algom Mining, LLC**
5 Miles North of Hwy 509 & Hwy 605 Intersection
Ambrosia Lake Valley, New Mexico 87020

**October 26, 2007**

## 1.0 INTRODUCTION

This ***Evaluation of Impacts from Section 35 and 36 Mine Dewatering*** (Report), prepared by INTERA Incorporated (INTERA), is being submitted pursuant to two letters from the New Mexico Environment Department (NMED) dated May 17, 2005 (NMED, 2005) and December 14, 2006 (NMED, 2006b). These letters require compliance with 20.6.2.1203 New Mexico Administrative Code (NMAC) for reporting of soil contamination related to mine dewatering activities at the Rio Algom Mining Company's (Rio Algom's) Section 35 and 36 mines along the eastern edge of Ambrosia Lake Valley (the Site) and require appropriate corrective action to address impacts resulting from unpermitted discharges. The field investigations described in this Report were completed in accordance with the Rio Algom corrective action work plan dated September 29, 2006 (Appendix A) and a conditional approval letter from the NMED dated December 14, 2006 (NMED, 2006b).

## 2.0 HISTORICAL OPERATIONS-RELEVANT BACKGROUND

In a letter to the NMED dated April 12, 2005 (Rio Algom, 2005), Rio Algom reported that dewatering activities associated with the Section 35 and 36 mines had affected the land surface. The Section 35 and 36 mines were continuously dewatered for the removal of ore from 1957 to 1990 and large volumes of water were discharged to the land surface, resulting in the accumulation of radionuclides in the soil.

The dewatering activities, which ceased in 1990, were originally regulated under a federal National Pollutant Discharge Elimination System (NPDES) permit (NM 0028118); however, from September 1976 until August 1978, and thereafter starting in 1980, the activities were regulated under NMED discharge permit (DP) 67. Prior to construction of the Section 35 ponds association with the IX mine water treatment facility, which became operational in 1976 under a permit from the New Mexico Radiation Protection Bureau, discharges from the two mines were separate, largely untreated, and was discharged directly into the natural drainage. Groundwater pumped to dewater the Section 35 Mine was discharged to settling ponds near the mine shaft and then allowed to discharge following the natural drainage pattern to the south and southwest. The rate of this discharge after mining began in late 1970 was approximately 370 gallons per minute (gpm) in 1971, approximately 500 gpm in 1972, and averaged between 900 and 1,000 gpm from 1973 through 1977. From 1960 to 1984, the groundwater discharged from the adjacent Section 36 Mine was first ponded near the shaft and then diverted through an incised arroyo to an area in the southwest corner of Section 35 for settling prior to overflow. The water was then released into the natural drainage pattern across the contiguous T13N R9W Section 2. The average discharge rate from the Section 36 Mine was 1,400 gpm between 1960 and 1977. The discharged water was collected for stock watering in ditches, diverted for irrigation use by local ranchers, lost to evapotranspiration processes, or infiltrated alluvial sediments, particularly in areas subject to natural or manmade ponding.

By 1978, as both surface water and groundwater discharges came under additional regulatory scrutiny, plans for more efficient management of the mine water discharge were implemented by maximizing its distribution and conveyance off-site for beneficial use in irrigation. This new water management strategy was initiated in part as a result of an assertion by the U.S. Environmental Protection Agency (EPA) that the discharge should be regulated under an NPDES permit. Kerr-McGee disputed EPA's determination, but nonetheless undertook controlled spreading and irrigation which resulted in EPA terminating the NPDES permit. The water management strategy involved greater spreading of the discharge through enhanced distribution to guide the treated mine water runoff into areas outside of, but adjacent to, natural drainage channels or watercourses. This was accomplished through a system of distribution ditches and diversionary structures that accounted for the local topography.

By 1984, the Section 36 Mine closed and discharges ceased. After acquiring the site from Kerr-McGee in 1989, Rio Algom also closed the Section 35 IX facility and in early 1990 started piping Section 35 water to the Rio Algom Mill. At this time, all further surface discharges and irrigation uses of the water ceased.

## 3.0 REGULATORY SETTING

In 1979-80, Kerr-McGee obtained a groundwater discharge permit, DP-67, for the Section 35 and 36 mines, covering the IX treatment facility, the associated pond facilities, and the final outfall. The permit was thereafter renewed every five years and was an active discharge permit through June 2002. At this time, DP-67 remains in a 'stand-by' active status pending application for renewal and/or completion of drainage area corrective actions which are the subject of this Report.

In 2005, on the basis of an internal review, Rio Algom determined there likely was contamination of the mine sites and adjacent lands by virtue of the dewatering and historical discharge practices of Kerr-McGee at the Section 35 and 36 mines. Rio Algom conducted a gamma radiation field survey of the area to preliminarily assess probable lateral extent of radiological contamination in surface soils associated with the Section 35 and Section 36 mines discharge. As a result of the preliminary assessment, Rio Algom determined it was necessary to report it's findings, and did so by letter dated April 12, 2005 (Rio Algom, 2005).

NMED treated the preliminary assessment as a notification under Section 20.6.3.1203, which mandates Rio Algom to take prescribed steps and appropriate corrective action in response to the discharge. Since discharges after 1979 were regulated under the discharge permit, NMED's phase (Phase 1) from May through July 2005 and reported its findings to the NMED in *Characterization Report for the Section 35 and 36 Mine Drainage* (ERG, 2005).

ERG performed the following tasks for the Phase 2 investigation:

- Soil samples were collected up to 12 feet bgs, using a Geoprobe®.
- A global positioning system-based gamma survey was conducted in a previously uncharacterized area.

Details of this investigation are provided in Appendix B. Key observations and conclusions from this work are summarized as follows:

- The range of radionuclide concentrations in all samples was 0.2 to 18 pCi/g with the average radium-226 concentrations decreasing with increasing depth: 5.4 pCi/g (0-1 feet), 2.2 pCi/g (1-2 feet), 0.9 pCi/g (2-4 feet), 2.9 pCi/g (4-6 feet), and 0.3 pCi/g (10-12 feet).
- Radium-226 concentrations exceed assumed background concentrations at their respective depths in 69 of the 78 samples.
- Average uranium concentrations also decrease with depth in the soil layers: 11.59 milligrams per kilogram (mg/kg) (0-1 feet), 16.10 mg/kg (1-2 feet), 11.79 mg/kg (2-4 feet), 8.99 mg/kg (4-6 feet), and 2.50 mg/kg (10-12 feet).
- Uranium concentrations exceed assumed background concentrations at their respective depths in 77 of the 78 samples. The leachable fraction of uranium exceeds the New Mexico Water Quality Control Commission (WQCC) standard in several samples, predominantly at 1 to 6 feet bgs, but not at 10 to 12 feet bgs.
- Trends in the average ratios of leachable to total concentrations indicate that the leachable fractions of radium and uranium in the soils are essentially constant with depth. The leachable fraction of selenium increases with depth, but the dissolved leachable concentrations are below the WQCC standard at 10-12 feet bgs and total concentrations are below the NMED Soil Screening Levels (SSL) in all soil samples.
- With the exception of arsenic, total metals concentrations were below the NMED SSL in all Phase 2 soil samples; ERG notes that background level for arsenic may be higher than the SSL.
- With the exception of selenium, leachable metals concentrations were below respective WQCC standards in all Phase 2 soil sample results.

- The concentrations of leachable major ions (nitrate/nitrite, chloride, and sulfate) and TDS are below their respective NMWQCC standards in all soil samples.
- Radium-226 concentrations in the soil samples indicate no significant changes in the soil removal volume estimates presented in the 2005 characterization report (ERG, 2005).
- The Phase 2 gamma survey revealed new areas where the radium-226 concentrations are likely to exceed Uranium Mill Tailings Radiation Control Act standards, adding an estimated 2.1 percent to the best volume estimate provided in the 2005 characterization report (ERG, 2005).

# 6.0 GROUNDWATER SAMPLING

This section summarizes the groundwater sampling field activities conducted by Rio Algom and INTERA staff during May 2007 and September 2007. The samples taken by Rio Algom staff in May 2007 were obtained during well purging activities and were considered screening-level samples as the wells were not yet stabilized. The September 2007 field sampling completed by INTERA and Rio Algom staff was conducted according to procedures described in the U.S. Geological Survey Book 9, *Techniques of Water-Resource Investigations, and National Field Manual for the Collection of Water Quality Data*, Chapter A4. Collection of Water Samples, Revised 2006 (USGS, 2006).

Site-specific health and safety training was conducted for INTERA personnel by Rio Algom management and on-site tailgate safety meetings were held by INTERA each day in accordance with Rio Algom's site-specific Summary Health and Safety Plan, dated September 7, 2007 (Appendix C).

Field notes were recorded in a dedicated, bound field notebook and are provided as Appendix D. Water Purging and Sampling Data Forms were used to record well specifications, field parameters, and related sampling notes and are provided as Appendix E. The sampling was conducted in general accordance with the work plan developed by Rio Algom (Appendix A). Well diagrams sketched in the field notebook were based on the assumption that each well contained a 10-foot screen that spanned the distance from the well's total depth to 10 feet above total depth. INTERA has since learned that the actual screen length is 20 feet.

## 6.1. Field Investigation Activities and Results

### *6.1.1. Field Equipment*

The field equipment and supplies used to conduct the water sampling are listed below.

Though some constituents in the groundwater at this Site do exceed WQCC standards, we do not believe there is a threat to human health or the environment for the following reasons:

- As demonstrated in ERG's Phase I and Phase 2 Characterization Reports, radionuclides and metals attributable to impacts from mine dewatering operations are being effectively attenuated in the upper few feet of the alluvial sediments.

- The source for the groundwater present in the alluvium is the mine dewatering activities which have been terminated since 1984. The supporting evidence for this water source is the low yield, turbid character, and poor water quality of the alluvial groundwater.

- The alluvial groundwater in the vicinity of the Section 4 ponds is from the same mine-dewatering source. Investigation activities in this area have definitively shown that water levels are dropping and the shallow alluvial groundwater is drying up, thus groundwater will not migrate very far.

- The water levels measured in these monitoring wells indicate a groundwater flow direction to the south. A search of the Office of the State Engineer records for domestic wells in the area revealed only three down-gradient wells, all of which are screened between 300 and 500 feet bgs (Table 4). (The fact that the only wells in the area are drilled to depths of 300 feet or greater further indicates that the alluvium was not a groundwater source). Thus, there are no groundwater receptors in the area that could be impacted by the Section 35 and 36 mine discharges.

- Radium is not present in groundwater and is being attenuated effectively in the shallow alluvial sediments.

- Uranium and selenium exceed WQCC standards in some samples; however, it has been demonstrated that natural attenuation will reduce the concentration of these constituents in groundwater.

- Although more mobile constituents of concern such as sulfate and TDS exceed WQCC standards in the groundwater samples, there are no water supply wells in the alluvium in this area, and it has been demonstrated that the alluvial groundwater will dissipate with time now that mine dewatering activities have ceased.

- Nitrate concentrations are in excess of the WQCC standards, however, this constituent was not present at significant concentrations in the mine water discharge and it is likely that concentrated cattle grazing in this area of water and heavy vegetation is responsible for these elevated nitrate concentrations.

United States Nuclear Regulatory Commission
Office of Public Affairs
Washington, DC 20555
Phone 301-415-8200 Fax 301-415-2234
Internet:opa@nrc.gov

No. 97-146

FOR IMMEDIATE RELEASE
(Friday, October 3, 1997)

# NRC TRANSFERS RESPONSIBILITY FOR NEW MEXICO URANIUM MILL TAILINGS DISPOSAL SITE TO DOE

The Nuclear Regulatory Commission has granted the request of Atlantic Richfield Company (ARCO) to terminate its license for a uranium mill site near Grants, New Mexico, and has placed the site under the custody and long-term care of the Department of Energy, which is now the licensee for the site.

The tailings represent a long-term potential health hazard to public health and safety because they contain radium, which generates radon gas. Therefore the NRC requires that the tailings be stabilized and covered with a clay barrier that prevents release of the gas.

The ARCO mill began operation in 1953 and operated until 1982. During that period, approximately 24 million tons of uranium mill tailings were produced as a byproduct of the uranium milling.

The Uranium Mill Tailings Radiation Control Act of 1978 requires cleanup of soil contamination, long-term stabilization and control of tailings, and cleanup of groundwater at uranium mill sites. Before terminating the ARCO license, the NRC verified that the Bluewater site had been cleaned up in accordance with applicable standards and that stabilization of the tailings was in accordance with regulations and a previously approved design. The NRC also reviewed DOE's plan for long-term care of the site and concluded that the plan satisfied the requirements of the Act.

The ARCO mill site is the second commercially operated uranium mill to be cleaned up satisfactorily in conformance with NRC requirements. ARCO transferred $635,165 to DOE to cover the costs of annual inspections to ensure that the site is maintained.

Any person whose interest may be affected by the licensing action may file a request for a hearing. The request should be filed within 30 days after the publication of a Federal Register notice on this subject, which is expected shortly. Procedures for filing the request will be described in the Federal Register notice.

###

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 22, 1996

RECEIVED

MAY 17

Mr. R. S. Ziegler, Project Manager
Atlantic Richfield Company
Bluewater Mill
P.O. Box 638
Grants, New Mexico 87020

SUBJECT: APPROVAL OF GROUNDWATER ALTERNATE CONCENTRATION LIMITS, AMENDMENT 30 TO SOURCE MATERIAL LICENSE SUA-1470

Dear Mr. Ziegler:

By letters dated June 20, 1990 and August 27, 1991, Atlantic Richfield Company (ARCO) requested amendment of Source Material License SUA-1470 to approve groundwater alternate concentration limits (ACLs) for the Bluewater Uranium Mill near Grants, New Mexico. The staff requested additional information by letter dated January 20, 1995, and met with ARCO on February 9, 1995, to discuss the NRC's comments. Information in response to the NRC's letter and the subsequent meeting was submitted by ARCO on April 25, 1995. The NRC staff has reviewed this information and has concluded that the ACLs proposed in the April 25, 1995, submittal are acceptable.

Therefore, pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Part 40 Source Material License SUA-1470 is hereby amended by modifying License Condition No. 34 to incorporate the ACLs based on the staff's Technical Evaluation Report for the license amendment (Enclosure 1). LC No. 34.C has been revised to require ARCO to propose a new corrective action program in the event the ACLs are exceeded in the future. Since the revised concentration limits in 34.B (the ACLs) have been met, no further corrective action is required at this time.

The license is being reissued to incorporate the above modifications (Enclosure 2). These changes to the license were discussed and agreed to via telecon between Ken Hooks of the NRC and Nat Patel of ARCO. All other conditions of the license shall remain the same. An environmental review was not performed, since this action is categorically excluded under 10 CFR 51.22(c)(11), and an environmental report from the licensee is not required by 10 CFR 51.60(b)(2).

1

# MATERIALS LICENSE

2

ant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of al Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made ne licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear aterial designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to rsons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions ecified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the uclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

| Licensee | |
|---|---|
| Atlantic Richfield Company<br>[Applicable Amendments: 7, 14] | 3. License Number SUA-1470, Amend. No. 30 |
| Bluewater Mill<br>P. O. Box 638<br>Grants, New Mexico 87020<br>[Applicable Amendments: 2, 7, 14] | 4. Expiration Date Until NRC determines ~~reclamation is adequate~~ |
| | 5. Docket or Reference No. ~~40-8902~~ |

| . Byproduct, Source, and/or Special Nuclear Material | 7. Chemical and/or Physical Form | 8. Maximum Amount that Licensee May Possess at Any One Time Under This License |
|---|---|---|
| Uranium Byproducts | Any | Unlimited |

9. Authorized place of use: The licensee's uranium milling facilities located near Grants, New Mexico.

10. The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings and other byproduct wastes generated by the licensee's past milling operations. The licensee is not authorized to produce uranium concentrate without a license amendment approved by the NRC. [Applicable Amendment: 25]

11. DELETED by Amendment 27.

12. The results of all effluent and environmental monitoring required by this license shall be reported in accordance with 10 CFR 40, Section 40.65 with copies of the report sent to the NRC. Monitoring data shall be reported in the format shown in Regulatory Guide 4.14 and enclosed as the attachment to SUA-1470 entitled, "Sample Format for Reporting Monitoring Data." [Applicable Amendment: 25]

13. Before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment.

14. Prior to termination of this license, the licensee shall provide for transfer of title to byproduct material and land, including any interests therein (other than land owned by the United States or the State of New Mexico), which is used for the disposal of such byproduct material or is essential to ensure the long term stability of such disposal site to the United States or the State of New Mexico, at the State's option.

ARCO's currently approved surety instrument, Performance Bond No. U-8001407, issued by the Reliance Insurance Company and United Pacific Insurance Company in favor of the NRC, shall be continuously maintained in an amount no less than $3,500,000 for the purposes of complying with 10 CFR 40, Appendix A, Criteria 9 and 10, until a replacement is authorized by the NRC. [Applicable Amendments: 11, 14, 17, 21, 25, 29]

26. Operation of evaporation ponds 1-A, 1-B, 2-A, 2-B, 3-A, 3-B and 3-C is authorized in accordance with submittals dated July 18, 1977 and September 29, 1977 for ponds 1-A and 1-B; August 1, 1978 for ponds 2A and 2B; and April 10, 1980 and May 2, 1980 for ponds 3A, 3B, and 3C.

27. DELETED by Amendment No. 27.

28. DELETED by Amendment No. 3.

29. DELETED by Amendment No. 3.

30. The licensee shall conduct an inspection of the tailings impoundment area using trained personnel at least once every 24 hours, excluding weekends and holidays.

31. The licensee shall decommission the Bluewater Uranium Mill in accordance with the decommissioning plan submitted by letter dated December 29, 1987, as revised by submittals dated August 9, September 26, and November 17, 1988; February 27 and June 16, 1989; March 6, 1990; and January 19, 1994. [Applicable Amendments: 8, 10, 15, 23]

32. The licensee shall implement the radiation safety and environmental monitoring programs specified in its letters dated February 20, 1995 and February 22, 1995. Notwithstanding the groundwater monitoring specified in Attachment 39 and revisions thereof, the licensee shall perform the compliance monitoring described in License Condition No. 34. Whenever the word "will" is used in the documents referenced above, it shall denote a requirement.

[Applicable Amendments: 3, 25, 27]

33. The licensee shall conduct an annual survey of land use (grazing, residence, wells, etc.) in the area within two miles of the mill and submit a report of this survey annually to the NRC. This report shall indicate any differences in land use from that described in the licensee's previous annual report. The report shall be submitted by July 1 of each year. [Applicable Amendments: 3, 25]

34. The licensee shall implement a groundwater compliance monitoring program containing the following:

A. Sample on a semiannual frequency, wells E(M), T(M) and F(M) for molybdenum, natural uranium and selenium, and wells S(SG), L(SG) and OBS#3 for natural uranium and selenium.

B. Comply with the following Alluvial aquifer groundwater protection standards (alternate concentration limits proposed in licensee submittal dated July 25, 1995) at point of compliance wells T(M) and F(M), with background being recognized in well E(M):

molybdenum = 0.10 mg/l, U-nat = 0.44 mg/l (300 pCi/l) and selenium = 0.05 mg/l.

Comply with the following San Andres aquifer groundwater protection standards (alternate concentration limits proposed in licensee submittal dated July 25, 1995) at point of compliance wells OBS#3 and S(SG), with background being recognized in well L(SG):

selenium = 0.05 mg/l and U-nat = 2.15 mg/l

C. In the event the limits in Subsection (B) are exceeded, the licensee will propose a new corrective action program with the objective of returning concentrations of molybdenum, U-nat and selenium to the concentration limits specified in Subsection (B).

The licensee shall, on a semiannual frequency, submit a groundwater monitoring report as well as submit a corrective action program review, by December 31 of each year, that describes the progress towards attaining groundwater protection standards.

[Applicable Amendments: 4, 6, 7, 20, 30]

35. The licensee is authorized to dispose of byproduct waste from the Tucson Research Center in accordance with the submittal dated, August 24, 1989. In addition, the licensee shall comply with the following:

A. Solid waste shall be disposed in trenches constructed in the main tailings pile. The licensee shall take steps to minimize void space in the disposed material.

B. Empty drums shall be disposed in accordance with the decommissioning plan specified in Condition No. 31 of this license.

C. All waste disposal shall be documented. [Applicable Amendment: 9]

36. The licensee shall reclaim the tailings disposal area as stated in its March 21, 1990, reclamation plan as revised by submittals dated July 12, July 19, July 23, August 2, and August 8, 1990; November 25, 1991, with the exception of Section 7.0, December 22, 1993, and July 28 and August 31, 1994; and March 6 and May 15, 1995. In addition, the licensee shall:

A. Construct the radon barrier for the main tailings pile to minimum average thicknesses of 73 cm. for the sands area, 30.5 cm. for the mixed tailings area, and 73 cm. for contaminated outslopes. The radon barrier will be a minimum thickness of 15 cm. for the slimes area.

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B. Submit for NRC review and approval the correlation of nuclear

U.S. ENVIRONMENTAL PROTECTION AGENCY

# Superfund Information Systems





# Superfund Site Information

## BROWN VANDEVER MINE

### Site Information



**This site has been archived from the inventory of active sites.**

**Site Name**: BROWN VANDEVER MINE
**Street**: 4 MILES EAST OF PREWITT
**City / State / ZIP**: PREWITT, NM 87045

**NPL Status**: Not on the NPL
**Non-NPL Status**: NFRAP

**EPA ID**: NND986669117
**EPA Region**: 09
**County**: MCKINLEY

**Federal Facility Flag**: Not a Federal Facility

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# Superfund Information Systems

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# Superfund Site Information

## BROWN VANDEVER MINE

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 03/01/1990 |
| 00 | PRELIMINARY ASSESSMENT | H | F | | 07/17/1990 |
| 00 | ARCHIVE SITE | | EP | | 12/10/1992 |
| 00 | SITE INSPECTION | N | S | | 12/10/1992 |

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# Superfund Site Information

## ANACONDA CO BLUEWATER URANIUM MILL

### Site Information

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

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**Site Name**: ANACONDA CO BLUEWATER URANIUM MILL
**Street**: T12N R11W
**City / State / ZIP**: GRANTS, NM 87020

**NPL Status**: Not on the NPL
**Non-NPL Status**: NFRAP

**EPA ID**: NMD007106891
**EPA Region**: 06
**County**: CIBOLA

**Federal Facility Flag**: Not a Federal Facility

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# Superfund Site Information

## ANACONDA CO BLUEWATER URANIUM MILL

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 01/01/1980 |
| 00 | ARCHIVE SITE | | EP | | 04/01/1980 |
| 00 | PRELIMINARY ASSESSMENT | N | F | 04/01/1980 | 04/01/1980 |

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## ANACONDA CO BLUEWATER URANIUM MILL

### Actions

**Site Info | Aliases | Operable Units | Contacts**
**Actions | Contaminants | Site-Specific Documents**

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 01/01/1980 |
| 00 | ARCHIVE SITE | | EP | | 04/01/1980 |
| 00 | PRELIMINARY ASSESSMENT | N | F | 04/01/1980 | 04/01/1980 |
| 00 | SITE UNARCHIVED | | EP | | 04/04/2008 |
| 00 | SITE REASSESSMENT | L | S | 04/06/2008 | 06/21/2008 |

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# Superfund Site Information

## HAYSTACK BUITE MINING DISTRICT

### Site Information

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

**This site has been archived from the inventory of active sites.**

Site Name: HAYSTACK BUITE MINING DISTRICT
Street: 12 MI N GRANTS,6 MI S AMBROSIA
City / State / ZIP: MILAN, NM 87005

NPL Status: Not on the NPL
Non-NPL Status: NFRAP

EPA ID: NMD980878771
EPA Region: 06
County: CIBOLA

Federal Facility Flag: Not a Federal Facility

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# Superfund Site Information

## HAYSTACK BUITE MINING DISTRICT

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 09/01/1984 |
| 00 | PRELIMINARY ASSESSMENT | L | S | 11/01/1984 | 11/01/1984 |
| 00 | ARCHIVE SITE | | EP | | 12/01/1985 |
| 00 | SITE INSPECTION | N | S | 12/01/1985 | 12/01/1985 |

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# Superfund Information Systems





# Superfund Site Information

## KERR-MCGEE NUCLEAR CORP

### Site Information



**This site has been archived from the inventory of active sites.**

**Site Name**: KERR-MCGEE NUCLEAR CORP
**Street**: AMBROSIA LAKE
**City / State / ZIP**: GRANTS, NM 87020

**NPL Status**: Not on the NPL
**Non-NPL Status**: NFRAP

**EPA ID**: NMD005570015
**EPA Region**: 06
**County**: CIBOLA

**Federal Facility Flag**: Not a Federal Facility
**Incident Category**: Other

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# Superfund Site Information

## KERR-MCGEE NUCLEAR CORP

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 02/01/1980 |
| 00 | ARCHIVE SITE | | EP | | 02/01/1981 |
| 00 | PRELIMINARY ASSESSMENT | N | F | 02/01/1981 | 02/01/1981 |

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# Superfund Site Information

## MT TAYLOR URANIUM MINE

### Site Information

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

**This site has been archived from the inventory of active sites.**

Site Name: MT TAYLOR URANIUM MINE
Street: SR334,1.0 MIS NE OF CITY
City / State / ZIP: SAN MATEO, NM 87050

NPL Status: Not on the NPL
Non-NPL Status: NFRAP

EPA ID: NMD000778605
EPA Region: 06
County: CIBOLA

Federal Facility Flag: Not a Federal Facility

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# Superfund Site Information

## MT TAYLOR URANIUM MINE

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | PRELIMINARY ASSESSMENT | L | F | 04/01/1981 | 04/01/1981 |
| 00 | DISCOVERY | | F | | 05/01/1981 |
| 00 | SITE INSPECTION | N | S | 04/01/1986 | 04/01/1986 |
| 00 | ARCHIVE SITE | | EP | | 09/26/1994 |

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## POISON CANYON MINING DISTRICT

### Site Information

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

**This site has been archived from the inventory of active sites.**

Site Name: POISON CANYON MINING DISTRICT
Street: 10.5MI N JNCT ST RTE 53 & US66
City / State / ZIP: MILAN, NM 87021

NPL Status: Not on the NPL
Non-NPL Status: NFRAP

EPA ID: NMD981600489
EPA Region: 06
County: CIBOLA

Federal Facility Flag: Not a Federal Facility

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# Superfund Site Information

## POISON CANYON MINING DISTRICT

### Actions



| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | S | | 12/01/1986 |
| 00 | PRELIMINARY ASSESSMENT | N | S | 08/01/1987 | 08/01/1987 |
| 00 | ARCHIVE SITE | | EP | | 10/01/1989 |
| 00 | SITE INSPECTION | N | F | 10/01/1989 | 10/01/1989 |

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# Superfund Site Information

## UNC SAN MATEO MINE

### Site Information

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

**This site has been archived from the inventory of active sites.**

Site Name: UNC SAN MATEO MINE
Street: 2 1/2 MI.SE OF SR53
City / State / ZIP: SAN MATEO, NM 87050

NPL Status: Not on the NPL
Non-NPL Status: Deferred to RCRA

EPA ID: NM1223075515
EPA Region: 06
County: CIBOLA

Federal Facility Flag: Federal Facility
Incident Category: Mines/Tailings

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# Superfund Site Information

## UNC SAN MATEO MINE

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | S | | 06/30/1988 |
| 00 | PRELIMINARY ASSESSMENT | D | FF | | 01/20/1989 |
| 00 | ARCHIVE SITE | | EP | | 12/07/1995 |
| 00 | SITE INSPECTION | D | S | | 12/07/1995 |

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# Superfund Site Information

## FEBCO URANIUM MINE

### Site Information

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

**Site Name**: FEBCO URANIUM MINE
**Street**: NAVAJO NATION
**City / State / ZIP**: PREWITT, NM 87045

**NPL Status**: Not on the NPL
**Non-NPL Status**: NFRAP

**EPA ID**: NND986669166
**EPA Region**: 09
**County**: MCKINLEY

**Federal Facility Flag**: Not a Federal Facility
**Incident Category**: Mines/Tailings

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# Superfund Site Information

## FEBCO URANIUM MINE

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 07/16/1991 |
| 00 | PRELIMINARY ASSESSMENT | N | TR | 04/30/2001 | 06/11/2001 |

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# Superfund Information Systems

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## Cleanup Activities at HOMESTAKE MINING CO. (EPA ID: NMD007860935)

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There are many stages of cleanup including site study, remedy selection, remedy design, remedy construction, and post-construction. Activities undertaken early in the cleanup process focus on understanding problems at the site while those taken later in the cleanup process focus on physically addressing those problems identified. This tab provides a detailed list of cleanup activities at this site. Sometimes, these cleanup activities are called "actions".

| Activity | Leading Organization | Area of Site Addressed (OU) | Start Date | Completion Date |
|---|---|---|---|---|
| FIVE-YEAR REVIEW (see glossary) | EPA Fund-Financed | (01) | 02/15/2006 | 09/26/2006 |
| View Documentation [2.91MB] | | | | |
| FIVE-YEAR REVIEW (see glossary) | EPA In-House | (01) | Not Available | 09/27/2001 |
| View Documentation [1.38MB] | | | | |
| COMMUNITY INVOLVEMENT (see glossary) | EPA Fund-Financed | (01) | 05/05/1987 | 12/21/1999 |
| PRELIMINARY CLOSE-OUT REPORT PREPARED (see glossary) | EPA Fund-Financed | (01) | Not Available | 09/23/1996 |
| POTENTIALLY RESPONSIBLE PARTY REMEDIAL ACTION (see glossary) | Responsible Party | (01) | 12/31/1992 | 12/14/1993 |
| Technologies Used: Alternate Drinking Water, Permanent Replacement; Cap; Disposal; Engineering Control, Not Specified; Evaporation; Excavation; and Pump And Treat. | | | | |
| COST RECOVERY NEGOTIATIONS (see glossary) | Federal Enforcement | SITEWIDE (00) | 09/01/1992 | 09/30/1993 |
| ADMINISTRATIVE RECORDS (see glossary) | Federal Enforcement | (01) | 07/17/1989 | 10/01/1992 |
| Outcome: Admin Record Compiled for a Remedial Event | | | | |
| REMOVAL ASSESSMENT (see glossary) | EPA Fund-Financed | SITEWIDE (00) | 06/18/1991 | 12/13/1991 |

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| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| REMOVAL ASSESSMENT (see glossary) | EPA Fund-Financed | SITEWIDE (00) | 05/01/1990 | 06/01/1990 |
| RECORD OF DECISION (see glossary) | Federal Enforcement | (01) | Not Available | 09/27/1989 |
| Outcome: Final Remedy Selected at Site<br>Technology Used: No Further Action.<br>View Documentation [35KB] | | | | |
| POTENTIALLY RESPONSIBLE PARTY REMEDIAL INVESTIGATION/FEASIBILITY STUDY (see glossary) | Responsible Party | (01) | 06/30/1987 | 09/27/1989 |
| ADMINISTRATIVE ORDER ON CONSENT (see glossary) | Federal Enforcement | SITEWIDE (00) | Not Available | 06/30/1987 |
| REMEDIAL INVESTIGATION/FEASIBILITY STUDY NEGOTIATIONS (see glossary) | Federal Enforcement | SITEWIDE (00) | 03/30/1987 | 06/30/1987 |
| Notice Letters Issued (see glossary) | EPA Fund-Financed | SITEWIDE (00) | Not Available | 03/31/1987 |
| Special Notice Issued (see glossary) | Federal Enforcement | SITEWIDE (00) | Not Available | 03/30/1987 |
| Special Notice Issued (see glossary) | Federal Enforcement | SITEWIDE (00) | Not Available | 03/30/1987 |
| FORWARD PLANNING (see glossary) | State, Fund Financed | (01) | 04/01/1984 | 03/23/1987 |
| REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORKPLAN APPROVAL BY HQ (see glossary) | State, Fund Financed | (01) | Not Available | 03/15/1987 |
| INITIAL REMEDIAL MEASURE (see glossary) | Responsible Party | SITEWIDE (00) | 10/01/1984 | 04/01/1985 |
| NATIONAL PRIORITIES LIST RESPONSIBLE PARTY SEARCH (see glossary) | Federal Enforcement | SITEWIDE (00) | Not Available | 10/01/1984 |
| REMOVAL ASSESSMENT (see glossary) | EPA Fund-Financed | SITEWIDE (00) | 10/01/1984 | 10/01/1984 |
| CONSENT DECREE (see glossary) | Federal Enforcement | SITEWIDE (00) | Not Available | 11/29/1983 |
| SECTION 106 107 LITIGATION (see glossary) | Federal Enforcement | SITEWIDE (00) | 11/15/1980 | 11/23/1983 |
| FINAL LISTING ON NATIONAL PRIORITIES LIST (see glossary) | EPA Fund-Financed | SITEWIDE (00) | Not Available | 09/08/1983 |
| HAZARD RANKING SYSTEM PACKAGE | EPA Fund- | SITEWIDE | Not | 09/01/1983 |

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# Search Superfund Site Information

## AMBROSIA LAKE - PHILLIPS MILL DISPOSAL SITE

### Site Information



**Site Name**: AMBROSIA LAKE - PHILLIPS MILL DISPOSAL SITE
**Street**: S1/2 OF SECTION 18, T14N, R9W
**City / State / ZIP**: AMBROSIA LAKE, NM

**NPL Status**: Not on the NPL
**Non-NPL Status**: PA Start Needed

**EPA ID**: NMN000606875
**EPA Region**: 06
**County**: MCKINLEY

**Federal Facility Flag**: Not a Federal Facility

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Superfund

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# Search Superfund Site Information

## AMBROSIA LAKE - PHILLIPS MILL DISPOSAL SITE

### Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

| OU | Action Name | Qualifier | Lead | Actual Start | Actual Completion |
|---|---|---|---|---|---|
| 00 | DISCOVERY | | F | | 12/19/2007 |

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# REFERENCES

# 37-40

DOE/AL/62350-211
REV. 1

United States Department of Energy

# LONG-TERM SURVEILLANCE PLAN FOR THE AMBROSIA LAKE, NEW MEXICO DISPOSAL SITE



July 1996

Uranium Mill Tailings Remedial Action Project

# PRELIMINARY REASSESSMENT REPORT
# THE ANACONDA COMPANY BLUEWATER URANIUM MILLSITE

**CERCLIS ID NMD007106891**
**CIBOLA COUNTY, NEW MEXICO**

**July 2008**

**New Mexico Environment Department**
**Ground Water Quality Bureau**
**Superfund Oversight Section**

**Prepared by David L. Mayerson**

Preliminary reassessment of the Anaconda Company Bluewater uranium millsite (CERCLIS ID NMD007106891)
New Mexico Environment Department Superfund Oversight Section
July 2008

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# SITE INVESTIGATION REPORT
# THE ANACONDA COMPANY BLUEWATER URANIUM MILLSITE

**CERCLIS ID NMD007106891**
**CIBOLA COUNTY, NEW MEXICO**

**August 2009**

**New Mexico Environment Department**
**Ground Water Quality Bureau**
**Superfund Oversight Section**

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Site Investigation report for the Anaconda Company Bluewater uranium millsite
New Mexico Environment Department
August 2009

[Table 4 continued]

| Sample ID | LATITUDE (NAD83) | LONGITUDE (NAD83) | OSE well permit no. | Well Depth (ft) | screened depth (ft) | lithology opposite perforations | Depth to water at completion (ft)/ Comments | Ref. 45 record no. | HMC well no. | Well depth (ft) | Completion interval depth (ft) | SA top elevation (Ref. | Latest water level elevation | Date | Ref. 3 page | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BWSI-21 | 35.203787 | -107.908264 | B-18 | 275 | | | 152 | 17 | | | | | | | | |
| BWSI-22 | 35.203835 | -107.915436 | B-19 | 275 | | | 152 | 18 | | | | | | | | |
| BWSI-23 | 35.234271 | -107.888866 | B-44 | 542 | | | 96 | 13 | 949 | 551 | 505-551 | 6102 | 6431.7 | 02/13/2008 | 8.0-6 | |
| BWSI-24 | 35.261930 | -107.974420 | B-637 | 587 | | | 137 | 19 | | | | | | | | |
| BWSI-25 | 35.271106 | -107.957824 | | | | | | | | | | | | | | Site monitor well L(SG) |
| BWSI-26 | 35.268777 | -107.938559 | B-876/B-410-0-14 | 400 | 159-280 | | | 4 | | | | | | | | Site monitor well S(SG) |
| BWSI-27 | 35.271529 | -107.938604 | B-410-0-22 | 355 | 152-350 | limestone and sandstone | 147.6 | 3 | | | | | | | | Site monitor well OBS-3 |
| BWSI-28 | 35.266163 | -107.907318 | B-410-0-10 | 330 | 234-333? | fine grained sandstone, dolomite, limestone, claystone | Lost circulation precluded completion through entire San Andres | 2 | | | | | | | | Site monitor well I(SG) |
| BWSI-29 | 35.242032 | -107.855229 | B-28 | 1000 | | | 137 | 23 | #1 Deepwell | 1000 | 919-999 | 5629 | 6484.68 | 12/12/2007 | 8.0-6 | |
| BWSI-30 | 35.239529 | -107.864253 | B-28-S | 980 | | | 135 | 24 | #2 Deepwell | 870 | | 5776 | 6366.86 | 05/04/2005 | 8.0-6 | |
| BWSI-32 | 35.255295 | -107.861760 | | | | | | | 928 | 864 | | 5795 | 6428.3 | 12/22/2008 | 8.0-6 | |
| BWSI-33 | 35.225191 | -107.876176 | B-28-S-329 | 978 | 703-978 | | 113 | 21 | 943 | 978 | 703-978 | 5852 | 6422.61 | 12/29/2008 | 8.0-6 | |
| BWSI-34 | 35.247480 | -107.923981 | B-28-S-247 | 275 | | | 152 | 22 | 951 | 275 | 241-275 | 6346 | 6423.42 | 12/29/2008 | 8.0-6 | |
| BWSI-35 | 35.279927 | -107.831931 | B-1458 | 702 | 682-702 | red shale & clay, limestone | 156 | 10 | | | | | | | | |
| BWSI-38 | | | | | | | | | | | | | | | | Field blank |
| BWSI-39 | | | | | | | | | | | | | | | | Field duplicate associated with BWSI-09 |

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# PRELIMINARY ASSESSMENT REPORT
Ambrosia Lake – Phillips Mill
CERCLIS # NMN000606875

March 2009

New Mexico Environment Department
Ground Water Quality Bureau
Superfund Oversight Section

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NEW MEXICO
ENVIRONMENT DEPARTMENT

*Ground Water Quality Bureau*

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1190 St. Francis Drive, P. O. Box 26110
Santa Fe, NM 87502-6110
Phone (505)827-2918 Fax (505) 827-2965
www.nmenv.state.nm.us

BILL RICHARDSON
Governor
DIANE DENISH
Lieutenant Governor

RON CURRY
Secretary
JON GOLDSTEIN
Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Response and Prevention Branch**
**U.S. Environmental Protection Agency, Region VI**

**Date:** **January 17, 2008**

**From:** **Dana Bahar, Manager**
**New Mexico Environment Department, Ground Water Quality Bureau.**
**Superfund Oversight Section,**

**Subject:** **Pre-CERCLIS Screening Assessment of the San Mateo Creek basin legacy uranium sites, Cibola and McKinley counties, New Mexico: Further action under CERCLA is recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | San Mateo Creek basin legacy uranium sites | **Street address** | Not applicable | | |
| **City** | Not applicable | **State** | New Mexico | **Zip code** | Not applicable |
| **County** | Cibola and McKinley | | | | |
| **Latitude** | 35 19' 10.60" N | **Longitude** | 107 52' 04.50" W | | |

**Site physical description:** Ground water plume(s) possibly associated with former uranium millsites and abandoned uranium minesites within the San Mateo Creek basin are the predominant contaminant migration pathway associated with this site. Additionally, surface water could be impacted by contaminated mine and mill site runoff. The air pathway may also be relevant through airborne particulates derived from mine waste dumps.

**Site identification:** The proposed Site was identified because ground water protection standards for ongoing remedial action (i.e., background) for the contaminants of concern associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of this site, and found that the majority had one or more contaminant concentrations exceeding MCLs. Additionally, contamination has been detected in the San Andres aquifer, from which the municipal water supplies for the communities of Grants and Milan are sourced, during monitoring for the Homestake site; these occurrences are not readily attributable hydrologically to this site.

**Site summary:** Background concentrations for uranium, selenium, sulfate, nitrate, chloride, and total dissolved solids (TDS) at the Homestake uranium mill NPL site exceed Federal and State drinking water standards in most aquifers affected by site-derived contamination. Bedrock aquifers beneath the Alluvial aquifer subcrop south of this site, and thus are impacted by contamination from the Alluvial aquifer. In addition to the Homestake site, three other former uranium millsites are located within this basin. Two of these sites (i.e., Bluewater and Ambrosia Lake/Philips disposal sites) have been accepted by the Department of Energy (DOE) for long-term stewardship; the other site (i.e., Ambrosia Lake/Rio Algom) is still in reclamation under the authority of the Nuclear Regulatory Commission (NRC). Uranium concentrations in excess of the uranium MCL within the San Andres aquifer occur hydrologically downgradient of the Bluewater Disposal site, and nitrate concentrations in excess of the MCL have been detected in the Alluvial aquifer downgradient of this site. The Bluewater site is documented to have contaminated both of these aquifers.

The State of New Mexico has identified approximately 85 legacy uranium minesites upgradient of the Homestake site within this basin; these mines comprise both underground and surface workings, many of which operated within bedrock aquifers and discharged large volumes of water to the surface over a long timeperiod. Little characterization or reclamation has been performed at the majority of these sites. Recent preliminary ground water characterization in the Alluvial aquifer downgradient from two minesites in the northernmost part of the basin indicates regulatory standard exceedances for nitrate, selenium, sulfate, uranium, and TDS may be attributable to these mines.

**Targets:** Potential targets for this proposed Site include the populations of Grants and Milan, whose municipal water systems are sourced from the San Andres aquifer. Other communities located near or within the area of this proposed Site whose water supplies may be impacted by contamination from this proposed Site include Haystack, San Mateo and Bluewater. NMED sampled 57 residential wells within subdivisions in Cibola county in the vicinity of the Homestake site between 2005 and 2007; these wells are completed in aquifers that occur within the Alluvium, three separate Chinle sandstones, and the San Andres Formation. Results from this sampling indicate that ground water in 45 of these residential wells has one or more exceedances of regulatory standards. As previously noted, most background contaminant concentrations for aquifers affected by contamination from the Homestake site exceed MCLs, and may be attributable in part to contamination from mine and millsites within the proposed Site.

**Site ownership and Potential Responsible Parties:** The surface ownership of mine and millsites within this proposed Site includes Federal, State, and Native American governments, and private entities.

**File review:** Review of available information and documentation was performed.

**Site reconnaissance:** Limited Site reconnaissance has been conducted. Recently NMED split samples at the two millsites that are under DOE long-term stewardship.

**Recommendation:** Further investigation under CERCLA is recommended.

# Preliminary Assessment Report

# San Mateo Creek Legacy Uranium Sites

**CERCLIS ID NMN00060684**
**McKinley and Cibola counties, New Mexico**

**March 2008**


New Mexico Environment Department
Ground Water Quality Bureau
Superfund Oversight Section

Text by David L. Mayerson
Graphics by Suzan Arfman

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# Southwestern Region Environmental Compliance and Protection Program & Abandoned Mine Lands Program

# PRELIMINARY REASSESSMENT REPORT
# THE ANACONDA COMPANY BLUEWATER URANIUM MILLSITE

**CERCLIS ID NMD007106891**
**CIBOLA COUNTY, NEW MEXICO**

**July 2008**


**New Mexico Environment Department**
**Ground Water Quality Bureau**
**Superfund Oversight Section**

**Prepared by David L. Mayerson**

# Future CERCLA Projects

*2008*

- Coronado – Pena Blanca, $1.6M
- Lincoln – High Rolls, $675k
- Tonto – Workman Creek, $1.5M
- Cibola – San Mateo, $800k

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**Mayerson, David, NMENV**

| | |
|---|---|
| **From:** | Schoeppner, Jerry, NMENV |
| **Sent:** | Thursday, August 06, 2009 10:55 |
| **To:** | Mayerson, David, NMENV |
| **Subject:** | FW: Compiled San Mateo Well Data |
| **Attachments:** | Regional_Well_Contacts.xls; Elevated.pdf; No_Elevated.pdf |

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**Jerry**

---

**From:** Dan Kapostasy [mailto:dkapostasy@strathmoreminerals.com]
**Sent:** Tuesday, February 10, 2009 9:38 AM
**To:** Schoeppner, Jerry, NMENV
**Subject:** RE: Compiled San Mateo Well Data

Jerry,

I've attached a contact list, the well ID in the first column corresponds to Well ID in the analytical data table.

I've also attached a copy of our letters, there are two (only the first page is different), one if we identified elevated constituents in the well, and one if there were no elevated constituents.

Dan

---

**From:** Schoeppner, Jerry, NMENV [mailto:jerry.schoeppner@state.nm.us]
**Sent:** Tuesday, February 10, 2009 8:33 AM
**To:** Dan Kapostasy
**Subject:** FW: Compiled San Mateo Well Data

Dan:
One other thing – could you also send me a copy of one of the letters you plan to send to wells owners that have exceedences? As I mentioned in an earlier email, we have sent notifications to well owners' downgradient of the Homestake mill following our sampling work over the last couple of years and recently issued a Health Advisory for the entire San Mateo Creek watershed. Therefore, we anticipate many of the folks you notify will contact us for more information and we want to have as much information as possible
Thanks for your help.

Jerry

---

**From:** Schoeppner, Jerry, NMENV
**Sent:** Tuesday, February 10, 2009 7:39 AM
**To:** 'Dan Kapostasy'
**Cc:** Bahar, Dana, NMENV; Mayerson, David, NMENV
**Subject:** RE: Compiled San Mateo Well Data

(505) 827-0652, fax (505) 827-2965
jerry.schoeppner@state.nm.us
www.nmenv.state.nm.us

---

**From:** Dan Kapostasy [mailto:dkapostasy@strathmoreminerals.com]
**Sent:** Monday, January 12, 2009 3:23 PM
**To:** Schoeppner, Jerry, NMENV
**Subject:** Compiled San Mateo Well Data

Jerry,

Attached is the data in excel for your viewing. All of our 1st quarter data is entered. Second quarter data is being entered as it arrives and should be complete by month's end.

Dan

**Dan Kapostasy**
Development Geologist
Strathmore Resources, US Ltd.
4001 Office Court Dr. Suite 102
Santa Fe, NM 87507
505-428-6372 (office)
505-474-6066 (fax)
dkapostasy@strathmoreminerals.com

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(50)

| 1st Sample | 2nd Sampl | Stoller ID | Well | Title | First Name | Last Name | Company | Address | City | State | Zip Code | Phone | Well Depth | Casing Size | Material | Pump | Treatment | Date Drilled | Driller | Original Owner | Use | Sample Point |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RH-0001 | | 12 | Sec. 17 Shaft | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | | | | | | | | | | |
| RH08-0050 | | 27 | House Well | Ms. | Diana | Romero | | 90021 San Mateo | Grants | NM | 87020 | 505-287-2951 | 305 | 8 | Steel | Elbi | None | 1970 | | Isodoro Barella | Domestic | Hose Bibb |
| RH08-0051 | | 120 | Pre 1993 Well | Mr. | Jon | Schmitt | | 4080 San Mateo | Grants | NM | 87020 | 505-287-2194 | | | | Submersible | None | | | | | Hose Bibb |
| RH08-0052 | | 47 | Cyote 2002 Well | Mr. | Jon | Schmitt | | 4080 San Mateo | Grants | NM | 87020 | 505-287-2194 | 220 | 5 | Steel | Submersible | None | 2002 | Cyote | Schmitt | Domestic | Hose Bibb |
| RH08-0053 | | 90 | San Mateo Com. Well Pump House | | | | San Mateo Mutual Domestic Water Assoc. | | Grants | NM | 87020 | 505-287-8108 | 340 | 8 | Steel | Grundfrus 15HP | Chlorination | 1975 | | San Mateo | Community Water | Pump House |
| RH08-0054 | | 87 | House Well | Ms. | Ethel | Sandoval | | 90037 San Mateo | Grants | NM | 87020 | 505-876-5979 | 200 | 6 | PVC | Submersible | None | 1976 | Fred Salazar | Ethel Sandoval | Domestic | Hose Bibb |
| RH08-0055 | | 111 | House Well | Mr. | Melvin | Marquez | | 4064 San Mateo | Grants | NM | 87020 | 505-287-7251 | 478 | 4 | PVC | Submersible 1.5HP | None | 1982 | Freeman | Melvin Marquez | Domestic | Hose Bibb |
| RH08-0056 | - | 106 | Stock Well | Mr. | Melvin | Marquez | | 4064 San Mateo | Grants | NM | 87020 | 505-287-7251 | 400 | 6 | PVC | Franklin 1.5HP | None | 1985 | Garner | Melvin Marquez | Livestock | Spigot at Well |
| RH08-0057 | - | 121 | Out of Use Well | Mr. | Jon | Schmitt | | 4080 San Mateo | Grants | NM | 87020 | 505-287-2194 | 80 | 6 | Steel | None | None | | | Calumet Hecla | Not in Use | Bailing |
| RH08-0058 | | 62 | House Well | Mr. | Sonny | Marquez | | 94022 San Mateo | Grants | NM | 87020 | 505-285-5004 | 130 | 6 | Steel | Submersible | None | 1965 | | | Domestic | Side of Pump Hose |
| RH08-0059 | | 116 | Well Behind Jay's Bar | Mr. | Michael | Garcia | | P.O. Box 622 | Grants | NM | 87020 | 505-287-4972 | | 6 | Steel | Submersible | None | | | | Domestic | Inside Jay's Bar |
| RH08-0060 | | 83 | Community Well (Not in Use) | Mr. | Frank | Trujillo | Community Well | 90038 San Mateo | Grants | NM | 87020 | 505-287-2066 | | | | Submersible | None | | | San Mateo | Not in Use | Side of Pump Hose |
| RH08-0061 | - | 32 | Sec. 23 Pivot | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | 1170 | 8.625 | Steel | Hermit 3000 | None | 2002 | Stewart Bros. | Fernandez Company | Irrigation | Pivot |
| RH08-0062 | | 22 | Ranch Headquarter's Well | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | 476 | 8 | Steel | Grundfrus 15HP | None | 1920 | | Fernandez Company | Domestic | Hose Bibb |
| RH08-0063 | | 100 | Water Inventory ID # 257 | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | 210 | 6 | Steel | None | None | 1947 | H. Sheets | Fernandez Company | Not in Use | Bailing |
| RH08-0064 | | 21 | New Mexico EIA well south of Rt 605 | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | 32 | 4 | PVC | None | None | 1978 | | New Mexico E.I.A. | Not in Use | Bailing |
| RH08-0065 | | 16 | Water Inventory ID # 219 | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | 280 | 8 | Steel | Grundfrus 3/4HP | None | 1962 | | Fernandez Company | Stock | Bailing |
| RH08-0069 | | 115 | Well South of Rt. 605 (Not in Use) | Ms. | Mary | Sandoval | | P.O. Box 622 | Grants | NM | 87020 | 505-287-4972 | 88 | 6 | PVC | Submersible | None | | | C. Sandoval | Not in Use | Pipe from Well to Pond |
| RH08-0070 | | 7 | Well in T13N, R08W, Sec. 11 | Mr. | Joe | Lister | Rio Grande Resources | | Grants | NM | 87020 | | 123.8 | 3 | Carbon Steel | None | None | | | Cattleman's Assoc. | Not in Use | Bailing |
| RH08-0071 | - | 114 | Well below ground surface (East of Bar) | Mr. | Michael | Garcia | | P.O. Box 622 | Grants | NM | 87020 | 505-287-4972 | | 5 | PVC | None | None | | | | Not in Use | Bailing |
| RH08-0072 | | 113 | Well West of Rt. 509 | Mr. | Melvin | Marquez | | 4064 San Mateo | Grants | NM | 87020 | 505-287-7251 | 297 | 8 | Steel | None | None | | | Ingersoll-Rand | Not in Use | Bailing |
| RH08-0073 | | 33 | Fire Dept. Well | Mr. | Joey | Baca | San Mateo Fire Dept. | | Grants | NM | 87020 | 505-287-4704 | | 6.5 | Steel | Submersible | None | | | Ramon Marquez | Not in Use | Pump House |
| RH08-0074 | - | 138 | House Well | Mr. | Michael | Garcia | | P.O. Box 622 | Grants | NM | 87020 | 505-287-4972 | | | | | | | | | | |
| RH08-0075 | | 102 | Well servicing cabin | Mr. | Harry | Lee | Fernandez Company, Ltd. | 500 San Mateo | Grants | NM | 87020 | 505-290-7233 | | | Steel | Submersible | None | | | Fernandez Company | Domestic | Hose Bibb |
| RH08-0076 | - | 5 | Well north of Mt. Taylor Mine befor discharge of Pipeline | Mr. | Joe | Lister | Rio Grande Resources | | Grants | NM | 87020 | | | 5 | Steel | None | None | | | | Not in Use | Bailing |

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| Well ID | 27 | 12 | 120 | | 47 | 90 | 87 | 111 | 106 | 121 | 62 | 116 | 83 | 32 | 22 | 100 | 21 | 16 | 115 | 7 | 114 | 113 | 33 | 138 | 102 | 5 | UNITS | R.L. | METHOD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID (2nd Quarter) RH08- | 0090 | 0094 | 0097 | 0098 | 0099 | 0084 | 0089 | 0085 | - | - | 0087 | 0093 | 0083 | - | 0091 | 0080 | 0081 | 0088 | 0092 | 0095 | - | 0086 | 0096 | - | 0082 | - | | | |
| Collection Date | 11/13/08 | 11/13/08 | 11/18/08 | 11/18/08 | 11/18/08 | 11/10/08 | 11/12/08 | 11/10/08 | - | - | 11/11/08 | 11/13/08 | 11/10/08 | - | 11/13/08 | 11/8/08 | 11/8/08 | 11/11/08 | 11/13/08 | 11/16/08 | - | 11/10/08 | 11/17/08 | - | 11/8/08 | - | | | |
| Collection Time | 10:10 | 15:30 | 15:05 | 15:35 | 16:10 | 10:05 | 10:15 | 14:00 | - | - | 12:10 | 12:55 | 09:15 | - | 11:15 | 07:55 | 09:05 | 13:45 | 14:05 | 16:05 | - | 15:10 | 09:25 | - | 11:55 | - | | | |
| Formation of Completion | Kmf | Kd/Jmw | Qal | Qal | Unk. | Kpl | Kmf | Unk. | Qal/Jmw | Qal | Kmf | Jmw | Kmf/Kpl | Kg | Kpl | Kmf | Qal | Kg | Qal | Kmf | Jmw | Jmw | Qal | Jmw | Kpl | Kmf/Kpl | | | |
| **FIELD MEASUREMENTS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water Level (Altitude) | 7131 | - | 6832 | - | - | 6963 | 7277 | 6641 | - | - | 7229 | - | 7106 | - | 6920 | 7047 | 7061 | 6944 | 6722 | 7067 | - | 6733 | 7132 | - | 6974 | - | ft. | | HANNA Multi-meter |
| pH | 7.38 | 7.43 | 7.71 | - | 7.68 | 8.92 | 8.54 | 7.61 | - | - | 8.03 | 6.89 | 9.91 | - | 8.53 | 7.81 | 7.78 | 8.61 | 7.71 | 9.53 | - | 7.42 | 7.52 | - | 8.82 | - | s.u. | | HANNA Multi-meter |
| Conductivity | 498 | 832 | 1206 | - | 1233 | 430 | 643 | 718 | - | - | 893 | 3374 | 859 | - | 316 | 404 | 669 | 961 | 875 | 4789 | - | 3665 | 1309 | - | 706 | - | umhos/cm | | HANNA Multi-meter |
| Temperature | 56.39 | 52.58 | 53.52 | - | 52.82 | 56.07 | 53.70 | 54.80 | - | - | 58.55 | 51.51 | 53.49 | - | 57.97 | 50.93 | 54.45 | 56.10 | 57.50 | 55.35 | - | 52.34 | 54.98 | - | 52.53 | - | degrees F | | HANNA Multi-meter |
| Dissolved Oxygen | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | % | | HANNA Multi-meter |
| Total Dissolved Solids, TDS | 249 | 416 | 603 | - | 616 | 215 | 322 | 351 | - | - | 446 | 1687 | 429 | - | 249 | 202 | 334 | 481 | 437 | 2377 | - | 1833 | 655 | - | 353 | - | mg/l | | HANNA Multi-meter |
| Turbidity | 0 | 210 | 0 | - | 0 | 0 | 0 | 0 | - | - | 0 | 0.2 | 4.6 | - | 0 | 68 | 9.14 | 28.47 | 0 | 253 | - | 38.12 | 121 | - | 0 | - | t.u. | | HANNA Multi-meter |
| ***MAJOR IONS*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Total as CaCO3 | 249 | 267 | 329 | 324 | 321 | 230 | 329 | 260 | - | - | 328 | 176 | 466 | - | 174 | 187 | 328 | 215 | 286 | 1220 | - | 173 | 421 | - | 389 | - | mg/l | 1.0 | A2320 B |
| Carbonate as CO3 | ND | ND | ND | ND | ND | 11 | ND | ND | - | - | ND | ND | 79 | - | 6 | ND | ND | 6 | ND | 280 | - | ND | ND | - | 15 | - | mg/l | 1.0 | A2320 B |
| Bicarbonate as HCO3 | 304 | 326 | 401 | 395 | 392 | 259 | 402 | 317 | - | - | 400 | 213 | 408 | - | 200 | 228 | 401 | 250 | 349 | 918 | - | 212 | 514 | - | 443 | - | mg/l | 1.0 | A2320 B |
| Hydroxide as OH | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 1.0 | A2320 B |
| Calcium | 63 | 51 | 54 | 67 | 68 | 4 | 36 | 87 | - | - | 30 | 518 | ND | - | 6 | 29 | 56 | 24 | 47 | 8 | - | 539 | 71 | - | 3 | - | mg/l | 1 | E200.7 |
| Chloride | 6 | 8 | 24 | 24 | 24 | ND | 5 | 16 | - | - | 45 | 52 | 2 | - | ND | 8 | 7 | 6 | 15 | 82 | - | 50 | 34 | - | 3 | - | mg/l | 1 | E300.0 |
| Fluoride | 0.4 | 0.8 | 1.6 | 1.4 | 1.4 | 1.0 | 1.5 | 0.2 | - | - | 0.6 | 0.7 | 4.2 | - | 0.6 | 0.3 | 1.1 | 0.4 | 1.1 | 2.8 | - | 0.5 | 0.7 | - | 3.5 | - | mg/l | 0.1 | A4500-F C |
| Magnesium | 10 | 15 | 20 | 25 | 25 | 1 | 11 | 15 | - | - | 9 | 144 | ND | - | 2 | 9 | 16 | 28 | 9 | 4 | - | 148 | 17 | - | 1 | - | mg/l | 1 | E200.7 |
| Nitrogen, Ammonia as N | ND | ND | 0.1 | 0.1 | ND | ND | ND | ND | - | - | ND | ND | 0.2 | - | ND | 0.5 | ND | 0.3 | ND | 0.3 | - | ND | ND | - | 0.1 | - | mg/l | 0.1 | E350.1 |
| Nitrogen, Kjeldahl, Total as N | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | 0.8 | ND | ND | ND | 0.9 | - | ND | ND | - | ND | - | mg/l | 0.5 | E351.2 |
| Nitrogen, Nitrate as N | ND | ND | ND | ND | ND | ND | 0.5 | 1.0 | - | - | 0.1 | 21.3 | ND | - | 0.2 | [illegible] | [illegible] | ND | 5.6 | ND | - | 19.8 | 2.7 | - | ND | - | mg/l | 0.1 | E353.2 |
| Nitrogen, Nitrate + Nitrite as N | ND | ND | ND | ND | ND | ND | 0.5 | 1.0 | - | - | 0.1 | 21.3 | ND | - | 0.20 | ND | ND | ND | 5.6 | ND | - | 19.8 | 2.7 | - | ND | - | mg/l | 0.05 | E353.2 |
| Nitrogen, Nitrite as N | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.1 | A4500-NO2 B |
| Nitrogen, Total | ND | ND | ND | ND | ND | ND | 0.5 | 1.0 | - | - | ND | 21.3 | ND | - | ND | 0.8 | ND | ND | 5.6 | 0.9 | - | 19.8 | 2.8 | - | ND | - | mg/l | 0.5 | A4500-N A |
| Potassium | 4 | 4 | 3 | 3 | 3 | 1 | 2 | 5 | - | - | 1 | 6 | ND | - | 1 | 11 | 1 | 5 | 8 | 5 | - | 6 | 12 | - | 2 | - | mg/l | 1 | E200.7 |
| Silica | 55.9 | 22.3 | 17.1 | 18.7 | 18.7 | 14.2 | 29.3 | 17.4 | - | - | 13.8 | 16.9 | 1.9 | - | 14.4 | 3.2 | 70.9 | 6.8 | 20.6 | 14.0 | - | 20.0 | 27.7 | - | 15.5 | - | mg/l | 0.2 | E200.7 |
| Sodium | 34 | 143 | 279 | 232 | 229 | 104 | 129 | 59 | - | - | 183 | 240 | 249 | - | 78 | 39 | 86 | 172 | 157 | 1260 | - | 274 | 264 | - | 195 | - | mg/l | 1 | E200.7 |
| Sulfate | 20 | 177 | 364 | 334 | 335 | 3 | 26 | 93 | - | - | 67 | 1970 | 2 | - | 6 | 6 | 26 | 265 | 129 | 1250 | - | 2030 | 264 | - | ND | - | mg/l | 1 | E300.0 |
| **NON-METALS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Organic Carbon, Total (TOC) | 1.8 | 1.5 | 2.7 | 2.5 | 2.4 | 1.2 | 1.4 | 1.9 | - | - | 1.9 | 3.3 | 4.6 | - | 0.8 | 3.2 | 2.4 | 0.8 | 1.8 | 31.7 | - | 3.9 | 2.2 | - | 12 | - | mg/l | 0.5 | A5310 C |
| Carbon, Total | 46.5 | 52 | 57.6 | 58.2 | 60.6 | 34.0 | 69.9 | 36.8 | - | - | 56.0 | 32.5 | 65.2 | - | 17.3 | 27.4 | 47.4 | 42 | 48.2 | 206.0 | - | 36.5 | 47.0 | - | 56.8 | - | mg/l | 9.7 | SW9060 |
| Phenolics, Total Recoverable | 0.02 | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | 0.02 | ND | - | ND | 0.02 | - | 0.05 | - | mg/l | 0.0 | E420.1 |
| Cyanide, Total | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.005 | Kelada mod |
| **PHYSICAL PROPERTIES** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Color | 5.0 | ND | 20.0 | 15.0 | 10.0 | ND | ND | ND | - | - | ND | ND | 5.0 | - | 5.0 | 20.0 | 5.0 | 40.0 | 5.0 | 263 | - | 5.0 | 118 | - | 10.0 | - | cu | 5.0 | A2120 B |
| Conductivity | 507 | 894 | 1440 | 1350 | 1350 | 378 | 665 | 722 | - | - | 909 | 3590 | 900.0 | - | 327 | 337 | 662 | 993 | 911 | 4860 | - | 3820 | 1410 | - | 723 | - | umhos/cm | 1 | A2510 B |
| Corrosivity | 0.5 | 0.6 | 0.8 | 0.7 | 0.8 | 0.1 | 0.7 | 0.6 | - | - | 0.3 | 0.8 | 0.4 | - | 0.1 | 0.1 | 0.5 | 0.6 | 0.7 | 1.8 | - | 0.8 | 0.6 | - | 0.1 | - | unitless | | Calc |
| *Hardness as CaCO3* | *196* | *189* | *218* | *270* | *273* | *16* | *118* | *279* | - | - | *110* | *1890* | *2* | - | *22* | *108* | *204* | *173* | *153* | *37* | - | *1960* | *249* | - | *12* | - | *mg/l* | 1 | A2340 B |
| Odor | NOO | NOO | NOO | NOO | NOO | NOO | NOO | NOO | - | - | NOO | NOO | NOO | - | NOO | NOO | NOO | NOO | NOO | NOO | - | NOO | NOO | - | NOO | - | T.O.N | 1 | A2150 B |
| pH | 7.71 | 7.90 | 8.05 | 7.91 | 7.97 | 8.52 | 8.04 | 7.69 | - | - | 7.82 | 7.56 | 9.34 | - | 8.49 | 7.79 | 7.70 | 8.37 | 8.04 | 9.54 | - | 7.54 | 7.70 | - | 8.52 | - | s.u. | 0.01 | A4500-H B |
| Solids, TDS @ 180 C | 330 | 567 | 919 | 859 | 868 | 258 | 424 | 435 | - | - | 520 | 3330 | 508 | - | 212 | 229 | 452 | 610 | 575 | 3320 | - | 3280 | 894 | - | 446 | - | mg/l | 10 | A2540 C |
| **METALS-DISSOLVED** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.1 | E200.7 |
| Antimony | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.05 | E200.8 |
| Arsenic | ND | ND | 0.001 | 0.001 | ND | ND | 0.002 | ND | - | - | ND | ND | ND | - | ND | ND | 0.003 | ND | ND | 0.009 | - | ND | ND | - | 0.001 | - | mg/l | 0.001 | E200.8 |
| Barium | 0.2 | ND | ND | ND | ND | 0.4 | 0.1 | ND | - | - | ND | ND | ND | - | 0.3 | ND | 0.1 | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.1 | E200.8 |
| Beryllium | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.01 | E200.7 |
| Boron | ND | 0.2 | 0.3 | 0.2 | 0.2 | 0.1 | 0.4 | ND | - | - | 0.1 | 0.2 | 0.7 | - | ND | ND | 0.1 | 0.5 | 0.2 | 0.5 | - | 0.2 | 0.3 | - | 0.5 | - | mg/l | 0.1 | E200.7 |
| Cadmium | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.01 | E200.8 |
| *Chromium* | *ND* | *ND* | *ND* | *ND* | *ND* | *ND* | *ND* | *ND* | - | - | *ND* | *ND* | *ND* | - | *ND* | *ND* | *ND* | *ND* | *ND* | *ND* | - | *ND* | *ND* | - | *ND* | - | *mg/l* | *0.05* | *E200.8* |
| Cobalt | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.01 | E200.8 |
| Copper | 0.08 | ND | ND | ND | ND | ND | 0.04 | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.01 | E200.8 |
| Iron | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | 0.03 | ND | ND | ND | ND | 0.51 | - | ND | ND | - | 0.25 | - | mg/l | 0.03 | E200.8 |
| Lead | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.05 | E200.8 |
| Manganese | ND | ND | 0.07 | 0.08 | 0.08 | ND | ND | 0.07 | - | - | ND | ND | ND | - | ND | 0.30 | ND | ND | ND | 0.01 | - | ND | 0.14 | - | ND | - | mg/l | 0.01 | E200.8 |
| Mercury | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.001 | E245.1 |
| Molybdenum | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.1 | E200.8 |
| Nickel | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.05 | E200.8 |
| Selenium | ND | ND | 0.002 | 0.002 | 0.002 | ND | ND | 0.074 | - | - | ND | 0.061 | ND | - | ND | ND | ND | ND | 0.026 | ND | - | 0.024 | 0.002 | - | ND | - | mg/l | 0.001 | E200.8 |
| Silver | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.01 | E200.8 |
| Thallium | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.10 | E200.8 |
| Uranium | 0.0041 | ND | 0.0027 | 0.0032 | 0.0033 | ND | 0.0015 | 0.0576 | - | - | 0.0027 | 0.0106 | ND | - | ND | ND | 0.0053 | ND | 0.166 | 0.0009 | - | 0.0155 | 0.0080 | - | ND | - | mg/l | 0.0003 | E200.8 |
| Vanadium | ND | ND | ND | ND | ND | ND | ND | ND | - | - | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | - | ND | ND | - | ND | - | mg/l | 0.1 | E200.8 |
| Zinc | 0.26 | 0.10 | 0.01 | 0.02 | ND | ND | 0.02 | 0.01 | - | - | 0.03 | 0.07 | 0.04 | - | 0.03 | ND | ND | ND | ND | 0.08 | - | 0.02 | ND | - | 0.05 | - | mg/l | 0.01 | E200.8 |
| **METALS-TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Uranium | 0.0049 | ND | 0.0027 | 0.0031 | 0.0032 | ND | 0.0018 | 0.0570 | - | - | 0.0029 | 0.0107 | ND | - | ND | 0.0009 | 0.0060 | ND | 0.169 | 0.0004 | - | 0.0158 | 0.0074 | - | ND | - | mg/l | 0.0003 | E200.8 |
| **RADIONUCLIDES-TOTAL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gross Alpha | 5.8 | 2.1 | 11.8 | 8.2 | 6.2 | 6.0 | 8.4 | 75.0 | - | - | 5.5 | 17.9 | 2.4 | - | 0.8 | 6.6 | 7.4 | 15.7 | 228 | 48.9 | - | 28.2 | 13.7 | - | 0.4 | - | pCi/L | | E900.0 |
| Gross Alpha precision (+/-) | 1.4 | 1.6 | 3.5 | 3.1 | 3.0 | 1.5 | 2.0 | 5.0 | - | - | 2.2 | 7.6 | 2.1 | - | 0.8 | 1.6 | 2.2 | 2.4 | 8.6 | 16.2 | - | 11.0 | 5.2 | - | 1.5 | - | pCi/L | | E900.0 |

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| SYNTHETIC ORGANIC COMPOUNDS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trichlorobenzene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2,4,6-Trichlorophenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2,4-Dichlorophenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2,4-Dimethylphenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2,4-Dinitrophenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 50 | E625 |
| 2,4-Dinitrotoluene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2,6-Dinitrotoluene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2-Chloronaphthalene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 2-Chlorophenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| *2-Nitrophenol* | - | - | - | - | - | - | - | - | - | - | - | *ND* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *ug/l* | *10* | *E625* |
| 3,3'-Dichlorobenzidine | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 20 | E625 |
| 4,6-Dinitro-2-methylphenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 50 | E625 |
| 4-Bromophenyl phenyl ether | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 4-Chloro-3-methylphenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 4-Chlorophenyl phenyl ether | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| 4-Nitrophenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 50 | E625 |
| Acenaphthene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Acenaphthylene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Anthracene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Azobenzene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Benzidine | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 20 | E625 |
| Benzo(a)anthracene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Benzo(a)pyrene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Benzo(b)fluoranthene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Benzo(g,h,i)perylene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| *Benzo(k)fluorathene* | - | - | - | - | - | - | - | - | - | - | - | *ND* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *ug/l* | *10* | *E625* |
| bis(-2-chloroethoxy)Methane | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| bis(-2-chloroethyl)Ether | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| bis(2-chloroisopropyl)Ether | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| bis(2-ethylhexyl)Phthalate | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Butylbenzylphthalate | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Chrysene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Dibenzo(a,h)anthracene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Diethyl phthalate | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Dimethyl phthalate | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Di-n-butyl phthalate | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Di-n-octyl phthalate | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Fluoranthene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Fluorene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Hexachlorobenzene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Hexachlorobutadiene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 20 | E625 |
| Hexachlorocyclopentadiene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Hexachloroethane | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Ideno(1,2,3-cd)pyrene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Isophorone | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Naphthalene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| n-Nitrosodimethylamine | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| n-Nitroso-di-n-propylamine | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| n-Nitrosodiphenylamine | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Pentachlorophenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 50 | E625 |
| Phenanthrene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Phenol | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Pyrene | - | - | - | - | - | - | - | - | - | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ug/l | 10 | E625 |
| Surr: 2,4,6-Tribromophenol | - | - | - | - | - | - | - | - | - | - | - | 46.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | % REC | 26-116 | E625 |
| Surr: 2-Fluorobiphenyl | - | - | - | - | - | - | - | - | - | - | - | 40.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | % REC | 25-94 | E625 |
| Surr: 2-Fluorophenol | - | - | - | - | - | - | - | - | - | - | - | 30.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | % REC | 11-67 | E625 |
| Surr: Nitrobenzene-d5 | - | - | - | - | - | - | - | - | - | - | - | 53.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | % REC | 19-102 | E625 |
| *Surr: Phenol-d5* | - | - | - | - | - | - | - | - | - | - | - | *31.0* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *% REC* | *15-54* | *E625* |
| Surr: Terphenyl-d14 | - | - | - | - | - | - | - | - | - | - | - | 36.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | % REC | 39-106 | E625 |

| Definition of Abbreviations |
|---|
| ND - Not detected at the reporting limit |
| R.L. - Analyte reporting limit |
| mg/l - milligrams per liter |
| ug/l - micrograms per liter |
| pCi/l - picocuries per liter |
| c.u. - color units |
| umhos/cm - micromhos per centimeter |
| T.O.N. - Threshold Odor Number |
| NOO - No Odor Observable |
| % - percent |
| meq/l - milliequivalents per liter |
| % REC - percent recovery |

| Well ID - Location ID Correlation Chart | | | |
|---|---|---|---|
| Well ID | Location ID | Well ID | Location ID |
| 27 | NMMMR-HR2-MF04 | 22 | B-01085 |
| 120 | NMBEIS-13 | 100 | B-01086 |
| 47 | B-01429 | 21 | B-00415 O-4 |
| 90 | NMBEIS-11a | 16 | B-01084 |
| 87 | B-00829 | 115 | NMMMR-HR2-A11 |
| 111 | B-01115 | 7 | CattlemansAssoc_T13R8S11Q3Q2Q1 |
| 106 | B-01190 | 114 | NMMMR-HR2-W08 |
| 121 | NMMMR-HR2-A03 | 113 | NMMMR-HR2-W06 |
| 62 | Metric-Corp-25 | 33 | B-00544 |
| 116 | B-01636 | 138 | |
| 83 | GMRC-ER-S-15 | 102 | Metric-Corp-41 |
| 32 | B-01442 EXPL-2 | 5 | RG 33107 -0EXPL |

7

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bromodichloromethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Bromoform | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Bromomethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Carbon tetrachloride | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Chlorobenzene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Chlorodibromomethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Chloroethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Chloroform | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Chloromethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| cis-1,2-Dichloroethene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| cis-1,3-Dichloropropene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Dibromomethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Dichlorodifluoromethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Ethylbenzene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| m+p-Xylenes | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Methyl ethyl ketone | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 20 | E624 |
| Methylene chloride | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| o-Xylene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Styrene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Tetrachloroethene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Toluene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| trans-1,2-Dichloroethene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| trans-1,3-Dichloropropene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Trichloroethene | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Trichlorofluoromethane | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Vinyl chloride | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Xylenes, Total | ND | - | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 1.0 | E624 |
| Surr: 1,2-Dichlorobenzene-d4 | 100.0 | - | 100.0 | 100.0 | 95.0 | 98.0 | 101.0 | 92.0 | 101.0 | - | 87.0 | 105.0 | 99.0 | 98.0 | 92.0 | 101.0 | 95.0 | 102.0 | 101.0 | 102.0 | 104.0 | 102.0 | 102.0 | 96.0 | 102.0 | % REC | 80-120 | E624 |
| Surr: Dibromofluormethane | 92.0 | - | 99.0 | 98.0 | 110.0 | 98.0 | 90.0 | 102.0 | 103.0 | - | 88.0 | 98.0 | 95.0 | 98.0 | 95.0 | 103.0 | 106.0 | 96.0 | 99.0 | 101.0 | 110.0 | 102.0 | 102.0 | 118.0 | 122.0 | % REC | 80-120 | E624 |
| Surr: p-Bromofluorobenzene | 90.0 | - | 91.0 | 98.0 | 97.0 | 93.0 | 98.0 | 94.0 | 99.0 | - | 99.0 | 109.0 | 96.0 | 98.0 | 93.0 | 100.0 | 102.0 | 99.0 | 101.0 | 103.0 | 102.0 | 99.0 | 100.0 | 105.0 | 116.0 | % REC | 80-120 | E624 |
| Surr: Toluene-d8 | 96.0 | - | 101.0 | 96.0 | 92.0 | 92.0 | 91.0 | 96.0 | 95.0 | - | 113.0 | 98.0 | 92.0 | 100.0 | 97.0 | 100.0 | 100.0 | 100.0 | 98.0 | 99.0 | 100.0 | 99.0 | 100.0 | 107.0 | 108.0 | % REC | 80-120 | E624 |

| SYNTHETIC ORGANIC COMPOUNDS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trichlorobenzene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2,4,6-Trichlorophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2,4-Dichlorophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2,4-Dimethylphenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2,4-Dinitrophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 50 | E625 |
| 2,4-Dinitrotoluene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2,6-Dinitrotoluene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2-Chloronaphthalene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2-Chlorophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 2-Nitrophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 3,3'-Dichlorobenzidine | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 20 | E625 |
| 4,6-Dinitro-2-methylphenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 50 | E625 |
| 4-Bromophenyl phenyl ether | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 4-Chloro-3-methylphenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 4-Chlorophenyl phenyl ether | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| 4-Nitrophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 50 | E625 |
| Acenaphthene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Acenaphthylene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Anthracene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Azobenzene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Benzidine | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 20 | E625 |
| Benzo(a)anthracene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Benzo(a)pyrene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Benzo(b)fluoranthene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Benzo(g,h,i)perylene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Benzo(k)fluorathene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| bis(-2-chloroethoxy)Methane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| bis(-2-chloroethyl)Ether | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| bis(2-chloroisopropyl)Ether | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| bis(2-ethylhexyl)Phthalate | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Butylbenzylphthalate | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Chrysene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Dibenzo(a,h)anthracene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Diethyl phthalate | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Dimethyl phthalate | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Di-n-butyl phthalate | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Di-n-octyl phthalate | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Fluoranthene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Fluorene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Hexachlorobenzene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Hexachlorobutadiene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 20 | E625 |
| Hexachlorocyclopentadiene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Hexachloroethane | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Ideno(1,2,3-cd)pyrene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Isophorone | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Naphthalene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| n-Nitrosodimethylamine | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| n-Nitroso-di-n-propylamine | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| n-Nitrosodiphenylamine | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Pentachlorophenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 50 | E625 |
| Phenanthrene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Phenol | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Pyrene | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ug/l | 10 | E625 |
| Surr: 2,4,6-Tribromophenol | 47.0 | - | 44.0 | 41.0 | 45.0 | 55.0 | 50.0 | 49.0 | 51.0 | 45.0 | - | 31.0 | 42.0 | 54.0 | 44.0 | 41.0 | 45.0 | 52.0 | 34.0 | 48.0 | 56.0 | 42.0 | 53.0 | 46.0 | 34.0 | % REC | 26-116 | E625 |
| Surr: 2-Fluorobiphenyl | 57.0 | - | 53.0 | 43.0 | 54.0 | 61.0 | 53.0 | 52.0 | 60.0 | 50.0 | - | 47.0 | 50.0 | 60.0 | 50.0 | 49.0 | 51.0 | 54.0 | 45.0 | 52.0 | 58.0 | 48.0 | 55.0 | 48.0 | 41.0 | % REC | 25-94 | E625 |
| Surr: 2-Fluorophenol | 33.0 | - | 28.0 | 28.0 | 30.0 | 34.0 | 34.0 | 31.0 | 24.0 | 34.0 | - | 19.0 | 28.0 | 32.0 | 27.0 | 27.0 | 25.0 | 34.0 | 21.0 | 32.0 | 38.0 | 31.0 | 36.0 | 32.0 | 23.0 | % REC | 11-67 | E625 |
| Surr: Nitrobenzene-d5 | 60.0 | - | 59.0 | 51.0 | 51.0 | 54.0 | 56.0 | 54.0 | 64.0 | 57.0 | - | 44.0 | 55.0 | 62.0 | 49.0 | 46.0 | 52.0 | 52.0 | 49.0 | 54.0 | 64.0 | 45.0 | 48.0 | 47.0 | 39.0 | % REC | 19-102 | E625 |
| Surr: Phenol-d5 | 29.0 | - | 26.0 | 22.0 | 28.0 | 31.0 | 31.0 | 29.0 | 29.0 | 32.0 | - | 25.0 | 26.0 | 31.0 | 25.0 | 25.0 | 23.0 | 32.0 | 23.0 | 32.0 | 36.0 | 27.0 | 27.0 | 29.0 | 25.0 | % REC | 15-54 | E625 |
| Surr: Terphenyl-d14 | 50.0 | - | 52.0 | 53.0 | 51.0 | 71.0 | 50.0 | 53.0 | 65.0 | 51.0 | - | 49.0 | 59.0 | 66.0 | 45.0 | 54.0 | 51.0 | 44.0 | 39.0 | 51.0 | 66.0 | 44.0 | 67.0 | 60.0 | 37.0 | % REC | 39-106 | E625 |

| Definition of Abbreviations |
|---|
| ND - Not detected at the reporting limit |
| R.L. - Analyte reporting limit |
| mg/l - miligrams per liter |
| ug/l - micrograms per liter |
| pCi/l - picocuries per liter |
| c.u. - color units |
| umhos/cm - micromhos per centimeter |
| T.O.N. - Threshold Odor Number |
| NOO - No Odor Observable |
| % - percent |
| meq/l - miliequivalents per liter |
| % REC - percent recovery |

**Well ID - Location ID Correlation Chart**

| Well ID | Location ID | Well ID | Location ID |
|---|---|---|---|
| 27 | NMMMR-HR2-MF04 | 22 | B-01085 |
| 120 | NMBEIS-13 | 100 | B-01086 |
| 47 | B-01429 | 21 | B-00415 O-4 |
| 90 | NMBEIS-11a | 16 | B-01084 |
| 87 | B-00829 | 115 | NMMMR-HR2-A11 |
| 111 | B-01115 | 7 | CattlemansAssoc_T13R8S11Q3Q2Q1 |
| 106 | B-01190 | 114 | NMMMR-HR2-W08 |
| 121 | NMMMR-HR2-A03 | 113 | NMMMR-HR2-W06 |
| 62 | Metric-Corp-25 | 33 | B-00544 |
| 116 | B-01636 | 138 | |
| 83 | GMRC-ER-S-15 | 102 | Metric-Corp-41 |
| 32 | B-01442 EXPL-2 | 5 | RG 33107 -0EXPL |

12

| Well ID | Q1 Sample ID | Q2 Sample ID | Easting (X) | Northing (Y) | Depth | Water Level | Formation |
|---|---|---|---|---|---|---|---|
| 5 | RH08-0076 | | 260472 | 3918850 | 394 | 75.8 | Kmf/Kpl |
| 7 | RH08-0070 | | 258448 | 3917141 | 192.3 | 123.8 | Kmf |
| 12 | NM-RH-0001 | | 254181 | 3916271 | | | Jmw |
| 16 | RH08-0065 | | 254400 | 3916182 | 320 | 228 | Kg |
| 21 | RH08-0064 | | 255985 | 3912134 | 32 | 13.1 | Qal |
| 22 | RH08-0062 | | 257869 | 3914335 | 476 | 179 | Kpl |
| 27 | RH08-0050 | | 258494 | 3913488 | 305 | 37.5 | Kmf |
| 32 | RH08-0061 | | 258027 | 3913768 | 1170 | 179.1 | Kg |
| 33 | RH08-0073 | | 258482 | 3913329 | 68 | 41.4 | Qal |
| 47 | RH08-0052 | | 251265 | 3915077 | 245 | NA | |
| 62 | RH08-0058 | | 259780 | 3913271 | 200 | 63.695 | Kmf |
| 83 | RH08-0060 | | 260007 | 3913026 | | 269 | Kmf/Kpl |
| 87 | RH08-0054 | | 259734 | 3912847 | 200 | 60 | |
| 90 | RH08-0053 | | 259076 | 3913133 | 336 | 280 | Kpl |
| 100 | RH08-0063 | | 255186 | 3911838 | 210 | 25.6 | Kmf |
| 102 | RH08-0075 | | 255672 | 3910856 | 600 | 213 | Kpl |
| 106 | RH08-0056 | | 248396 | 3916879 | 400 | 63.5 | Qal/Jmw |
| 111 | RH08-0055 | | 247388 | 3915301 | 478 | 200 | |
| 113 | RH08-0072 | | 247073 | 3915087 | 297 | 95 | Jmw |
| 114 | RH08-0071 | | 246947 | 3914996 | 330 | 98 | Jmw |
| 115 | RH08-0069 | | 247765 | 3915022 | 130 | 88 | Qal |
| 116 | RH08-0059 | | 246805 | 3914885 | 260 | NA | |
| 120 | RH08-0051 | | 251150 | 3915047 | 56.5 | 80 | Qal |
| 121 | RH08-0057 | | 251092 | 3915090 | 52.3 | 80 | Qal |
| 138 | RH08-0074 | | 246874 | 3914825 | 170 | 86 | |
| S1 | RH08-0066 | RH08-0079 | 256307.1 | 3916346 | 2108 | 879.1 | Jmw |
| S3 | RH08-0068 | RH08-0078 | 256046 | 3915710 | 2043 | 837.69 | Jmw |
| S4 | RH08-0067 | RH08-0077 | 255415.8 | 3916176.2 | 1919 | 870.8 | Jmw |

# REFERENCES

# 45-48

(8)

(1)

# ABANDONED MINE INVENTORY PILOT PROJECT REPORT



Prepared by:

Dave Sitzler
Mining Engineer

Don Zoss
Mining Engineer

Bureau of Land Management

Albuquerque District Office

September 20, 1985

2

## Executive Summary

This project was a pilot study to determine time and costs associated with the inventorying of abandoned uranium mines located on Federal surface over Federal minerals within the Grants Uranium Belt. The pilot project identified all mines present as having potential problems with physical and radiological hazards. Hazards identified were erosion of waste piles; livestock and wildlife having access to water ponded in waste areas; improper or no abandonment of mine openings and structures; and no reclamation evident on any site other than removal of buildings and equipment.

Options for this study would be as follows:

1. Continue the study as outlined in this study.

2. Continue the study, but at a higher or lower level of funding.

3. Discontinue the study.

The District Office will propose a continuation of the study as outlined in the FY86 PAWP unless otherwise directed.

## Introduction

The purpose of this pilot project is to determine time and costs associated with the inventorying of abandoned uranium mines located on Federal rface over Federal minerals within the Grants Uranium Belt. This inventory is needed to determine any mining hazards located on the public domain. Uranium mines were chosen to be inventoried first because they not only possessed physical safety problems due to open shafts, declines, vent holes, etc., but they also possess radialogical problems due to radon exhalation and emissions of gamma radiation. This inventory will also provide a compliance check of the reclamation required by the 3809 regulations for the post FLPMA mines.

Currently, the only requirements for reclamation of mines for locatable minerals on the public domain is contained within the 3809 regulations, and these cover only operations occurring after the passage of FLPMA in 1976. There are no reclamation requirements for pre-FLPMA mines and no requirements for the control of radiation from mines. Environmental laws like Resource Conservation and Recovery Act of 1976 and Comprehensive Environmental Response, Compensation and Liability Act of 1980 specifically exclude mine wastes.

The objective of this inventory is to identify any hazardous mine sites and take remedial acton. To reach this goal a three phase program is envisioned. Phase I, of which this pilot is part, is a physical inspection of the mine sites for potential physical safety and gamma radiation hazards. These sites will then be prioritized and Phase II begun. Phase II will involve detailed study of mine sites, including a radon exhalation survey, samples of any ponded water, detailed mapping, and possibly soil samples. ase III will consist of remedial action of the hazards indentified in Phase . For post-FLPMA mines the operators will be required to do what work is necessary to satisfy the 3809 regulations. For pre-FLPMA mines that require remedial action, a management decision on how to proceed will be needed.

showing the area's township, range and section lines. The mine locations and the areas of Federal surface and mineral ownership were shown. Other ownership and split estate ownership were left white. The maps were produced at the same scale as 7½ minute U.S.G.S. quadrangle maps to facilitate their use as overlays for the field inspection phase.

An inspection form was also developed that was to be filled out for each mine. The form was designed to be a narrative type report where each mine would be extensively described in several different catagories. Each form was to be a stand alone report of each site. This aspect was changed by the geologist doing the field inspections, to a checklist form supplemented with photos and limited narrative. During the rest of the project the original forms will be used. The field inspection consisted of visiting each site on the ground; filling out the form; taking photos; and taking random gamma radiation readings. This information was then compiled into a field report which is attached to this report.

Results of Pilot Project

Of the 23 mines initially identified to be inspected only 14 were inspected. The remaining nine were deleted since they had been mined from another mine (no surface disturbance) or they had been conveyed via patent from Federal control. All of the mines inspected have potential physical and radialogical hazards present. At the mines inspected seven shafts, nine declines, five adits, and seven ventilation holes were found. Most of these have been covered with steelplate, drill steel, or boards. However, none have been back filled and all can be entered with minimal effort. Subsidence has been identified at three of the mines, of which one subsidence feature has been identified as the cause of death of one cow.

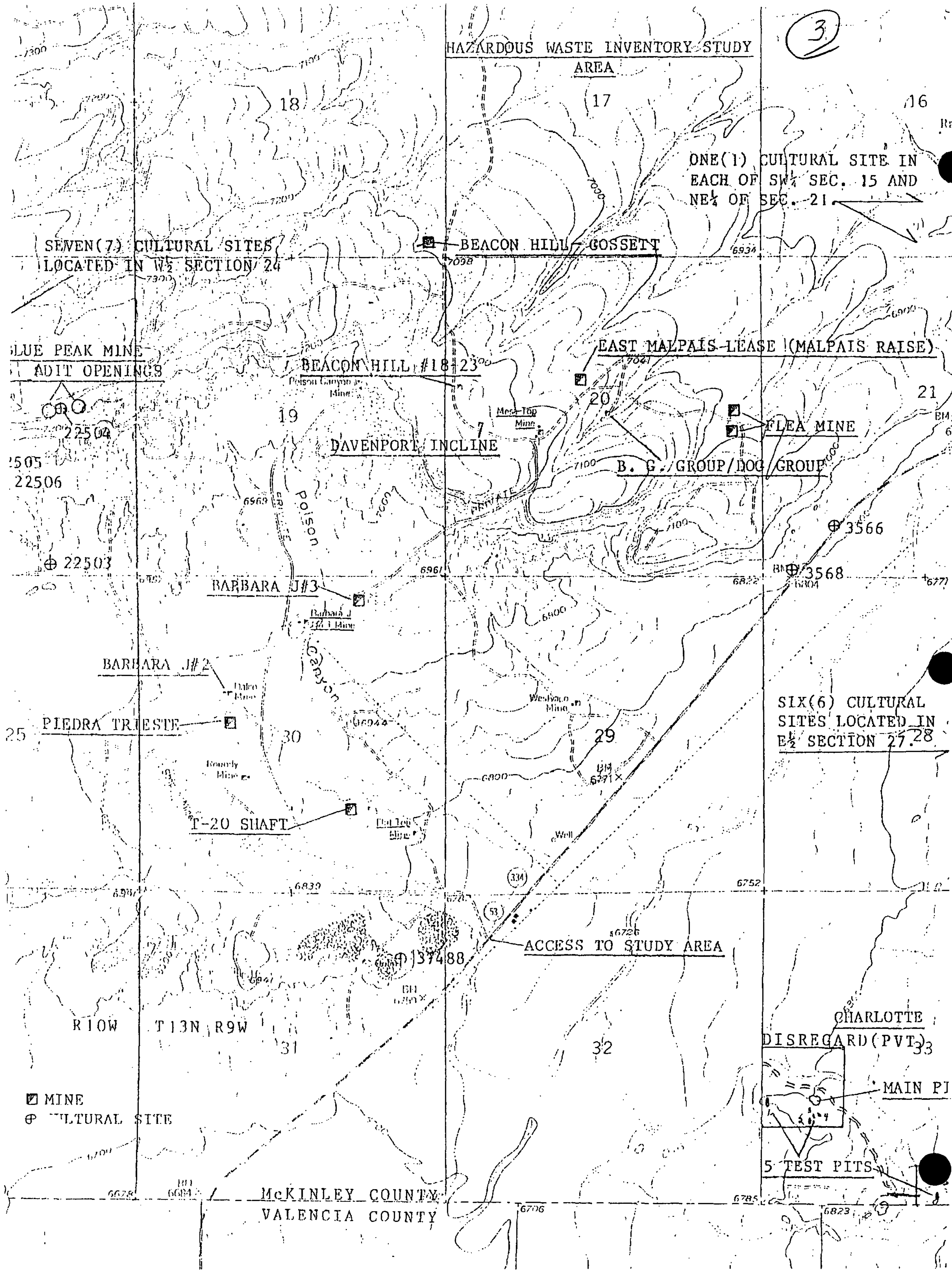
Gamma radiation at the mines range from 6 microroentgens/hour (MR/hr) to 888 MR/hr with the "waste" piles and mine openings giving the highest readings. Though no standards exists for gamma radiation from mines, the Rio Puerco Resource Area has established guidelines for use on uranium mines on Indian lands. This guideline is based on the standards required by Nuclear Regulatory Commission ~~(10 CRF 209.105(a))~~ for uncontrolled access to reclaimed uranium mill tailings. The guideline calculates to 57 MR/hr above background. Background at the pilot area ranged from 9 to 12 MR/hr with an average of 10 MR/hr. This means that the reclamation standard would be 67 MR/hr or below. The gamma radiation present at the mines inspected range from 3 to 13 times the reclamation standards.

SHOULD BE 10 CFR PART 20.105 (a)

In most cases erosion is spreading waste material from the mine site. Of the 14 mines inspected only one was not being eroded, the other 13 were being eroded in one fashion or another (three of these mines are located in arroyos). It should be noted that this inspection did not identify excessive gamma radiation downstream from the eroding mine sites.

All mine sites have wild life in residence or signs of their transitory use. One mine has owls living in a decline. Four of the mines have evidence of transitory use by domesticated animals (sheep, goats and cattle). As noted above, a dead cow was found in a subsidence feature of one of the mines.

Only one of the mines in is proximity to an archaeological site.



3
HAZARDOUS WASTE INVENTORY STUDY AREA
18
17
16
ONE(1) CULTURAL SITE IN EACH OF SW¼ SEC. 15 AND NE¼ OF SEC. 21
SEVEN(7) CULTURAL SITES LOCATED IN W½ SECTION 24
BEACON HILL - GOSSETT
BLUE PEAK MINE ADIT OPENINGS
BEACON HILL #18-23
EAST MALPAIS LEASE (MALPAIS RAISE)
20
21
19
22504
FLEA MINE
DAVENPORT INCLINE
B. G. GROUP/DOG GROUP
22505
22506
Poison
3566
22503
3568
BARBARA J#3
BARBARA J#2
Canyon
SIX(6) CULTURAL SITES LOCATED IN E½ SECTION 27.
PIEDRA TRIESTE
25
30
29
28
T-20 SHAFT
ACCESS TO STUDY AREA
37488
R10W
T13N R9W
31
32
33
CHARLOTTE
DISREGARD(PVT)
MAIN PI
MINE
CULTURAL SITE
5 TEST PITS
McKINLEY COUNTY
VALENCIA COUNTY

New Mexico Health and Environment Department → 6H-MA

10/2

Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

RECEIVED
89 SEP 25 PM 3:57
SUPERFUND BRANCH

September 19, 1989

Mark Satterwhite, 6H-SS
US EPA
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Mark:

Enclosed for EPA review is the Screening Site Inspection report for Poison Canyon Mining District, prepared by Cora Halason and Mike Sanders. Although a release to surface water is likely and a release to ground water possible, targets are few in number. We project a low HRS score and we believe such a score accurately depicts the relatively low degree of hazard at the site. EID recommends no further action under Superfund at this site. Please direct questions to Ms. Halasan at (505) 827-2892 or to Mr. Sanders at 827-2951.

Sincerely,

NMD981600487

XSA VOL I

Steve

Steven J. Cary
Program Manager, Superfund

SJC:to

Enclosure

SUPERFUND FILE

MAR 25 1992

REORGANIZED

**SCREENING SITE INSPECTION REPORT**
**POISON CANYON MINING DISTRICT SITE**

**DATE:** September 30, 1989

**PREPARED BY:** Mike Sanders and Cora Halasan, N.M. Environmental Improvement Division, Superfund Section

**SITE NAME:** Poison Canyon Uranium Mining District

**SITE LOCATION:** T 13 N, R 9 W, Sections 19 and 30; and T 13 N, R 10 W, Sections 24 and 25, N.M. Principal Meridian, Dos Lomas 7.5 minute topographic map

**SITE COUNTY:** McKinley

**SITE STATE:** New Mexico

**EPA ID #:** NMD 981 600 489

TABLE 1: POISON CANYON MINING DISTRICT
CHEMICAL DATA -- SOLIDS/INORGANICS
JULY 1989 SAMPLING

| SAMPLE LOCATION | SAMPLE NUMBER | BETA/GAMMA EMISSIONS (ur/hr) | RADIONUCLIDES (pCi/g) U-238 | U-234 | Th-232 | Th-230 | Ra-226 | Pb-210 | HEAVY METALS (ug/g) Vanadium | Lead | Chromium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BACKGROUND: | | | | | | | | | | | |
| Background A | 1505 | 24 | 5.53 | 6.80 | 0.50 | 6.86 | 6.30 | 6.60 | 6 | <5 | <5 |
| Background B | 0840 | 14 | 4.24 | 4.43 | 0.81 | 4.88 | 4.50 | 2.20 | 6 | 7 | <5 |
| BJ #3A | 1300 | 15 - 20 | 1.29 | 1.22 | 0.40 | 3.23 | 3.92 | 2.00 | 12 | 6 | <5 |
| STREAM/POND SEDIMENTS: | | | | | | | | | | | |
| BJ Stream A | 1540 | 50 | 4.64 | 4.92 | 1.07 | 5.95 | 9.30 | 5.50 | 15 | 9 | <5 |
| "Stock Pond" | 1615 | 70 | 61.50 | 65.50 | 1.75 | 34.50 | 38.20 | 33.60 | 88 | 63 | 10 |
| WASTE ROCK/SOILS: | | | | | | | | | | | |
| BJ #1 | 1118 | 2400 - 2700 | 890.00 | 910.00 | | 1150.00 | 1060.00 | 860.00 | 830 | 74 | 22 |
| BJ #3B | 1313 | 150 - 200 | 140.00 | 142.00 | | 175.00 | 72.00 | 93.00 | 66 | 5 | 6 |
| BJ #3C | 1325 | 4500 | 5840.00 | 5730.00 | | 5990.00 | 5600.00 | 4320.00 | 260 | 310 | 56 |

NOTES:
A. Analyses done by NM Scientific Laboratory Division, Albuquerque
B. ur/hr = micro-roentgen per hour
C. pCi/g = picoCuries per gram
D. Radionuclides analyzed of the uranuim decay chain
E. Other elements commonly associated with uranium include arsenic, selenium, vanadium, and copper. Awaiting arsenic & selenium results from NMSLD.
F. Most of Thorium as Th-230; very large Th-230 peak overwhelmed neighboring small Th-232 peak so that Th-232 peak not visible.

ENVIRONMENTAL PROTECTION AGENCY
O… of Enforcement

REGION 6
First International … 1201 Elm St.
Dallas, Texas 75270

# CHAIN OF C… ODY RECORD

SITE ~~PROJ.~~ NO.: 408

PROJECT NAME: Poison Canyon Mining District

SAMPLERS: (Signature) Corazon Halasan / Mike Sanders

| STA. NO. | DATE | TIME | COMP. | GRAB | STATION LOCATION | NO. OF CONTAINERS | ICAP SCAN (SOIL) | RADIONUCLIDES (SOIL) | AA (SOIL) | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BJ#1 | 890713 | 1118 | ✓ | | Barbara J #1 Mine | 2 | ✓ | ✓ | ✓ | | | | |
| BJ#3A | " | 1300 | ✓ | | " " #3 Mine | 2 | ✓ | ✓ | ✓ | | | | |
| BJ#3B | " | 1313 | ✓ | | " " #3 Mine dump | 2 | ✓ | ✓ | ✓ | | | | |
| BJ#3C | " | 1325 | ✓ | | " " #3 Mine | 2 | ✓ | ✓ | ✓ | | | | |
| BG A | " | 1505 | ✓ | | Background A | 2 | ✓ | ✓ | ✓ | | | | |
| BJ STREAM A | | | | | | | | | | | | | |
| | 890713 | 1555 | | | BJ Stream A | 2 | ✓ | ✓ | ✓ | | | | |
| STOCK POND | " | 1615 | | | Stock Pond Bed | 2 | ✓ | ✓ | ✓ | | | | |
| BG B | 890714 | 0840 | | | Background B, Sect. 24 | 2 | ✓ | ✓ | ✓ | | | | |

| Relinquished by: (Signature) | Date / Time | Received by: (Signature) | Relinquished by: (Signature) | Date / Time | Received by: (Signature) |
|---|---|---|---|---|---|
| Corazon Halasan / Michael R Sanders | July 14, 1989 / 3:40 pm | Dianne Casa Radiochemistry / Russell S. Kessinger AEHM | | | |
| Relinquished by: (Signature) | Date / Time | Received by: (Signature) | Relinquished by: (Signature) | Date / Time | Received by: (Signature) |
| | | | | | |

| Relinquished by: (Signature) | Date / Time | Received for Laboratory by: (Signature) | Date / Time | Remarks |
|---|---|---|---|---|
| | | | | |

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

2

TABLE 1: POISON CANYON MINING DISTRICT
CHEMICAL DATA -- SOLIDS/INORGANICS
JULY 1989 SAMPLING

| SAMPLE LOCATION | BETA/GAMMA EMISSIONS (ur/hr) | U-238 | U-234 | Th-232 | Th-230 | Ra-226 | Pb-210 | Vanadium | Lead | Copper |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | RADIONUCLIDES (pCi/g) | | | | | HEAVY METALS (ug/g) | | |
| BACKGROUND: | | | | | | | | | | |
| Background A | 24 | 5.53 | 6.80 | 0.50 | 6.86 | 6.30 | 6.60 | 6 | <5 | 5 |
| Background B | 14 | 4.24 | 4.43 | 0.81 | 4.88 | 4.50 | 2.20 | 6 | 7 | 8 |
| BJ #3A | 15 - 20 | 1.29 | 1.22 | 0.40 | 3.23 | 3.92 | 2.00 | 12 | 6 | 9 |
| STREAM/POND SEDIMENTS: | | | | | | | | | | |
| BJ Stream A | 50 | 4.64 | 4.92 | 1.07 | 5.95 | 9.30 | 5.50 | 15 | 9 | 9 |
| "Stock Pond" | 70 | 61.50 | 65.50 | 1.75 | 34.50 | 38.20 | 33.60 | 88 | 63 | 11 |
| WASTE ROCK/SOILS: | | | | | | | | | | |
| BJ #1 | 2400 - 2700 | 890.00 | 910.00 | | 1150.00 | 1060.00 | 860.00 | 830 | 74 | 9 |
| BJ #3B | 150 - 200 | 140.00 | 142.00 | | 175.00 | 72.00 | 93.00 | 66 | 5 | <5 |
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NOTES:
A. Analyses done by NM Scientific Laboratory Division, Albuquerque
B. ur/hr = micro-roentgen per hour
C. pCi/g = picoCuries per gram
D. Radionuclides analyzed of the uranuim decay chain
E. Other elements commonly associated with uranium include arsenic, selenium, vanadium, and copper.

Superfund Site Strategy Recommendation Region 6

Site Name: Navajo - Brown Vandever Uranium Mine Site Number: NMD986669117

Alias Site Name(s):

Address: Four Miles ENE of Bluewate, NM

City/County or Parish/State/Zip: Bluewater/McKinley/NM/87045

Recommendation:

[ ] 1. No further remedial action planned under Superfund.

[XX] 2. Further pre-remedial investigative action needed under Superfund:
PA ______ Priority: High XX
SSI XX ______ Medium ______
To be performed by Navajo

[ ] 3. Action may be appropriate under other authority:
NPDES ______ SPCC ______ 404 ______ TSCA ______
UIC ______ SMCRA ______ STATE ______ RCRA ______
OTHER ERB

Discussion: PA

The Brown Vandever Mine contains about 1880 tons of uranium mine tailings abandoned on-site. Small quantities of ore grade material are found scattered over the site. The material is easily accessible by site residents and visitors. There are several uncovered ventilation shafts, timbered shfts and inclined adits on the site. There are no warning signs or fences preventing access to the site. The population within 1/4 mile of the site is around 75 persons. Over 30 children are known to play on the tailings in the immediate vicinity of the mine. The road to the site is paved with tailings. There is potential for exposure of individuals via the air pathway as some of the material is fine, and Radon is also emitted from the slag material. The primary substances of concern are Uranium, and its progeny Th 232, Bi 214, Po 214, isotopes of Pb and Radon gas. The heavy metals potentially present in the mining waste are arsenic, barium, magnesium, manganese, strontium, titanium, and zinc. Many of these materials have been demonstrated to be mobile in waters associated with Uranium mines. Three wells and a spring are located within a 4 mile radius, and serve approximately 430 persons. Ground water from 2 of the wells is at 400 feet. The adits from the mine reach to within 100 feet of the groundwater and might convey contaminants. There is no surface source of water used by the people for drinking water. Because of the air pathway and soil exposure routes as well as the potential for ground water contamination, this site is recommended for a Screening Site Inspection.

Copies to (please list) NAVAJO SF, 6T-AS, 6E-E, 6W-S, ATSDR

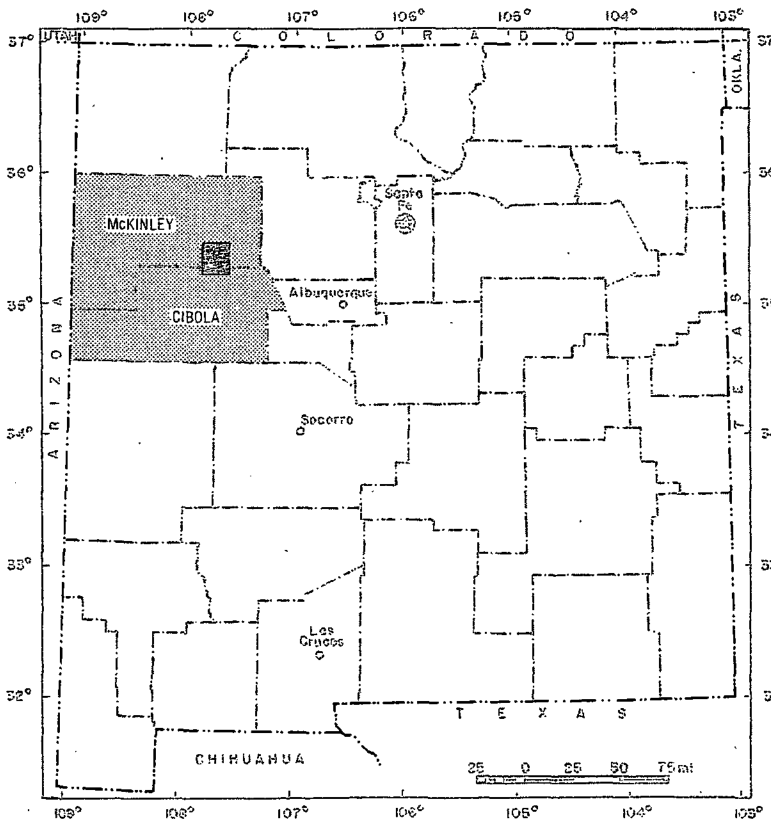
Recommended By: Barbara Driscoll Date: 7/17/90

Approved By: Bill Taylor for Betty Williamson Date: 7/17/90

# Hydrogeology of Ambrosia Lake–San Mateo area, McKinley and Cibola Counties, New Mexico

by ROBERT C. BROD and WILLIAM J. STONE






Location of Ambrosia Lake–San Mateo area

HYDROGEOLOGIC SHEET 2 New Mexico Bureau of Mines & Mineral Resources 1981

A DIVISION OF

NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY

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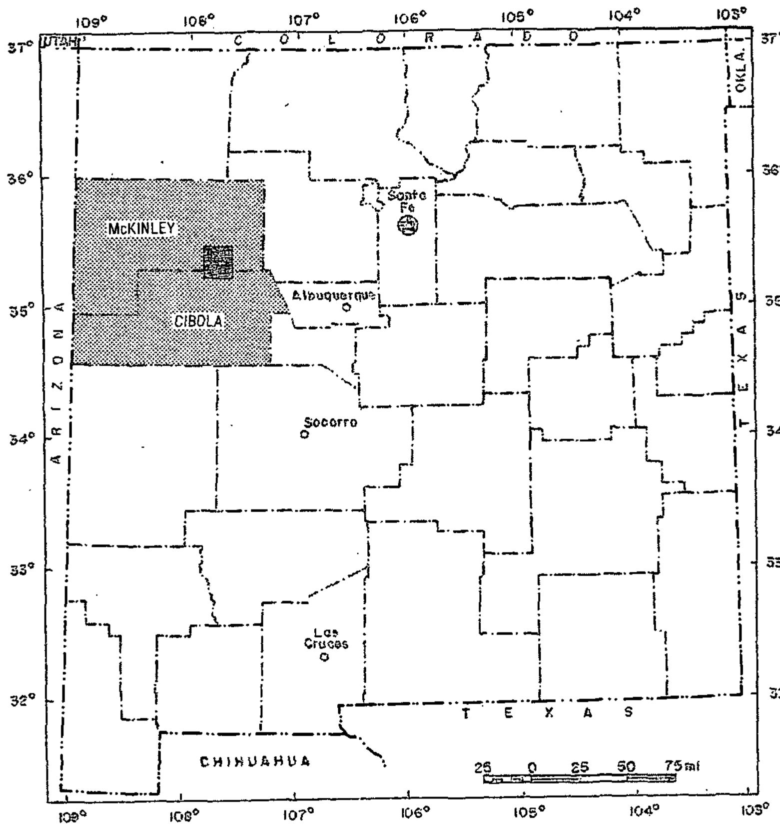


Location of Ambrosia Lake-San Mateo area

HYDROGEOLOGIC SHEET 2 New Mexico Bureau of Mines & Mineral Resources 1981

A DIVISION OF

NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY

77 In ... Ambrosia Lake area, piezometric levels have been lowered hundreds of fe... (te... of meters) after more than 20 yrs of pumping. Dewatering has not yet had an ... ficant impact on piezometric levels in the eastern part of the area where nev... elopment is underway. The tremendous amounts of ground water that are pumped by the mining industry have great potential for uses in addition to ore processing. Most of the pumped water is now released into surface drainages, where it evaporates or infiltrates to recharge local aquifers before leaving the area. The possibility of treating waste water and diverting it for agricultural and municipal use has been considered by Hiss (1977).

TABLE 5—Estimated discharge associated with uranium-mine dewatering, Ambrosia Lake–San Mateo area (compiled from New Mexico Environmental Improvement Agency, 1978).

| Company, mine | Estimated discharge million gallons per day | (million liters per day) |
|---|---|---|
| Gulf, Mt. Taylor mine | 1.70[1] | (6.40) |
| | 8.60[2] | (32.55) |
| Cobb Nuclear, sec. 14, T. 14 N., R. 10 W. | (water used and recycled) | |
| Kerr-McGee, Section 30 mine | 0.56 | (2.13) |
| Kerr-McGee, Sections 35 and 36 mines | 4.32 | (16.35) |
| Ranchers, Johnny M mine | 2.88 | (10.90) |
| Kerr-McGee, Roca Honda mine (planned; sec. 9, T. 13 N., R. 8 W. | 3.60 | (13.63) |
| United Nuclear–Homestake, recovery plant (for mines in secs. 15, 23, 25, and 32) | 2.13 | (8.07) |
| United Nuclear, Sandstone mine | 0.51 | (1.93) |
| United Nuclear, Section 27 mine | 0.14 | (0.53) |
| Ranchers, Faith mine | 1.01 | (3.82) |

[1]Approximate discharge, January 1978
[2]Approximate anticipated discharge at start of mining

### Municipalities

78 San Mateo is the only municipality in the study area operating a public water supply. Water is obtained from three wells that tap the Point Lookout Sandstone. The first municipal well (13.8.26.212) was drilled in the 1940's, but most homes continued to use private wells. The second well (13.8.26.112), drilled in 1955, provided the public supply at the time of this study. The water is not treated. The third well (13.8.26.212), constructed for the community by Gulf Mineral Resources in 1977, was not in use, reportedly because the second well provided an adequate supply.

79 Most dwellings in San Mateo now rely on the municipal supply, and only about eight private wells are still used (Nancy Brooks, representative, San Mateo Mutual Water-consumers Association, San Mateo, personal communication, 1977). Since 1970 a few new wells have been installed for trailer parks. An estimated 18,000 gpd (68 $m^3/d$) are used in the town (Everheart, 1977).

80 Since the beginning of the construction of the Mt. Taylor mine, ½ mi (0.8 km) northeast of San Mateo, no general changes in the ground-water level or quality have been observed near the town. Gulf will mine uranium ore from the Westwater Canyon Member of the Morrison, approximately 3,200 ft (975 m) below ground level. Because San Mateo obtains water from aquifers recharged by runoff from Mount Taylor, the water supply will probably continue to be hydrologically independent of the ore-bearing strata and subsurface mining activity. Gulf will have a tailings pond adjacent to the mine. Although the pond will be lined, leachate could enter the shallow aquifer if the lining, retaining


[New] Mexico Environmental Improvement Agency, 1978, Grants mineral belt: [Sant]a Fe, New Mexico Environmental Improvement Agency, unpublished ...uidebook, 56 p.
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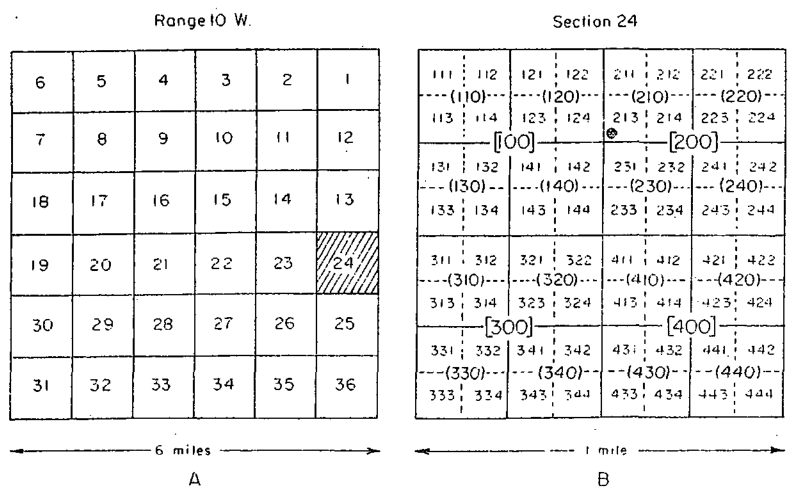


FIGURE 10—New Mexico well-numbering system; well indicated by dot would be numbered 5.10.24.213.

ds less than 10 gpm (1 L/s). A sample from well
vely large amounts of sodium and sulfate and about
Overlying aquifers generally yield water of more

### dilto Limestone (Jurassic)

: Todilto Limestone caps the cliffs of the Entrada
Montañosa and La Jara Mesa. It is approxi-
odilto occurs in thin to medium discontinuous
psum in the upper part.
are completed in the Todilto; one is used for dewa-
bandoned domestic well. In outcrop, the Todilto is
ugh the fractures may locally be filled with calcite,
it water. Cooper and John (1968) reported that the
ie, which is constructed in the Todilto Limestone,
at the time of their report. The dewatering rate now
1 (38-57 L/s; Mark Malkoski, geologist, Ranchers
ent, Grants, personal communication, 1977). The
be expected to be high in sulfate and TDS, reflecting
e unit.

### inle Formation (Triassic)

1 crops out on the flanks of the Zuni Mountains and
(30 m) of alluvium in the southwest corner of the
dicate that it is approximately 1,350 ft (412 m) thick
consists of clayey siltstone interbedded with sand-

ibed three units in the Chinle Formation near the
s approximately 900 ft (274 m) thick and consists of
rbedded with sandstone; it contains lenses of fine-
r third. The middle unit, 100–200 ft (30–61 m) thick,
ndstone and conglomerate interbedded with siltstone
e trace on geophysical logs. The lower Chinle unit is
ck and consists of silty sandstone interbedded with
d sandstone at its base.
dy area are completed in the Chinle; these wells sup-
anch house. Gordon (1961) indicated that yields are
(1 L/s) and are variable because of the interbedded
', water quality is variable. A well completed in
8.431, table 3) produces water with a specific
'cm (micromhos per centimeter). One completed at
below the surface (12.10.1.222) produced water with
,000 µmhos. The water is generally enriched with
ide, and sulfate. Cooper and John (1968) indicated
of the Chinle is used as an aquifer west of the study

### mestone–Glorieta Sandstone (Permian)

estone and Glorieta Sandstone crop out on the flanks
th of the study area. Together they compose an im-
n of Bluewater in Cibola County. Although they are
eep in the study area, they have been used locally as a

ted that the San Andres is 80–150 ft (24–46 m) thick
ists of two units of limestone divided by a unit of me-
andstone, 15–30 ft (5–9 m) thick. Extensive solution
d channels and caverns that, though commonly filled
arge amounts of water.
one, lying directly under the San Andres, is 125–300
egion and consists of well-sorted, medium-grained,
ess permeable than the San Andres, and wells rarely
with the San Andres, however, it forms a large single

iations in permeability, the yields and quality of water
ieta aquifer also vary from place to place. Gordon
0-2,200 gpm (32-139 L/s) from wells near Bluewater
dy area. Cooper and John (1968) reported yields of
d indicated that two wells in the Ambrosia Lake area
14 table 2) were completed in this aquifer but aban-
f better water at shallower depths. Water from
TDS concentration of 2,370 ppm (table 3). Ac-
es reported by Cooper and John (1968, table 3), this
water elsewhere in the region with a TDS concentra-
ifmann and others (1975) indicated that wells drawing
orieta aquifer now contribute feed water to the

**58** In ... ally conform... water in such settings ... in the alluvium indicate the ... parallel to the course of Arroyo del ... toward the southwest part of the study area ... the Menefee Formation near San Mateo indicate that ... the upper part of that unit generally parallels the path ... than the direction of the dip of the strata (fig. 5).

**59** Ground water in the consolidated units, however, is part of ... deeper flow system that is controlled largely by the geologic structure. Fig. ... map of the potentiometric surface for the Westwater Canyon Member of the Morrison, based on water-level measurements obtained in the late 1950's by Cooper and John (1968). Their data reflect conditions before the large-scale dewatering of the uranium mines. Many of the wells near Ambrosia Lake are now reportedly dry; mining has dewatered virtually all of the ground water in the Westwater Canyon Member there and has dramatically altered the flow system in it. However, fig. 7 shows that prior to mine dewatering, ground water in the Westwater ~~Canyon Sandstone Member generally flowed in the direction of the dip of the strata to the northeast and east~~. Virtually horizontal structure at the crest of San Mateo dome (cross section, fig. 1) and the relatively high concentration of TDS in the units there (fig. 6) suggest that relatively little ground-water movement occurs in the deeper flow system in that area. The dome and associated San Mateo fault seem to define a regional ground-water divide that corresponds to the boundary between the Chaco slope and the Acoma sag as described by Kelley (1963).

**60** The rate and direction of ground-water flow in the consolidated aquifers is controlled by both the intergranular and fracture permeability of the strata as well as by the potentiometric gradient. Jobin (1962) performed laboratory analyses to determine the intrinsic permeability of samples from the geologic units near Grants. The Westwater Canyon Sandstone has the greatest intrinsic permeability, equivalent to a hydraulic conductivity of about 0.10 gpd/ft$^2$ (4.07 L/m$^2$d). The other sandstone units have intrinsic permeabilities equivalent to hydraulic conductivities between 0.01 and 0.10 gpd/ft$^2$ (0.41 and 4.07 L/m$^2$d). Despite its relatively coarse and well-sorted texture, the Bluff has the lowest intrinsic permeability of the sandstones in the area; the values would convert to a hydraulic conductivity of 0.01 gpd/ft$^2$ (0.41 L/m$^2$d). This unit is very calcareous in its outcrop, and the abundant calcite cement may be responsible for the low permeability. Calcite cement in the Bluff Sandstone may have been derived from the Todilto or from the limestone beds in the Recapture Member of the Morrison Formation.

**61** Aquifer tests provide a means of assessing the overall permeability (intergranular and fracture) of the aquifer (table 4). Values determined for the Westwater Canyon Member of the Morrison indicate that its hydraulic conductivity is quite variable, presumably depending upon the degree of fracturing. The highest measurement of hydraulic conductivity for the Westwater Canyon in the study area was made near San Mateo in the proximity of the San Rafael fault zone on the western flank of the McCartys syncline. Table 4 shows that field measurements of hydraulic conductivity in the area, which include the effects of fracture permeability, tend to be approximately 100 times greater than those determined in the laboratory (which do not include effects of fractures).

**62** The effects of fracturing on ground-water flow vary according to the type of rock, the amount and type of displacement, and the orientation of the fractures. Gorham and others (1977) indicated that joints created by tensional forces tend to be parallel and open and therefore provide relatively more permeability. This type of jointing also tends to be oriented parallel to the axes of the associated folds. In some parts of the area, gouge and cement in the fracture zones inhibit ground-water flow. Flow is also inhibited where relatively permeable beds are displaced against relatively impermeable ones.

TABLE 4—RESULTS OF PUMPING TESTS IN AMBROSIA LAKE–SAN MATEO AREA.

| Formation | Locality/Source | T gpd/ft | T (L/md) | K gpd/ft$^2$ | K (L/m$^2$d) |
|---|---|---|---|---|---|
| Point Lookout Sandstone | San Mateo/1 | 1,500 | (18,600) | 11 | (448) |
| Mancos Shale (sandstone) | San Mateo/1 | 1,000 | (12,400) | 20 | (815) |
| Dakota Sandstone | San Mateo/1 | 1,000 | (12,400) | 12 | (489) |
| Westwater Canyon Member, | San Mateo/1 | 3,700 | (45,900) | 24 | (978) |
| Morrison Formation | Ambrosia Lake/2 | 1,300 | (16,100) | 8.1 | (330) |
| | Ambrosia Lake/3 | 1,500 | (18,600) | 10 | (407) |
| Glorieta Sandstone | Fort Wingate/4 | 400 | (4,900) | 1.6 | (65) |
| | Fort Wingate/5 | 130 | (1,600, average) | 0.5 | (20) |

Sources:
1—H. Jukenwold, hydrologist, Gulf Minerals, Denver, personal communication
2—Cooper and John (1967)
3—Kelley (1977)
4—Mercer and Lappala (1974)

# REFERENCES

# 49-52

# Drinking Water Bureau

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Lead And Copper Sample Summary Results

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## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3595017 | **Federal Type :** | NTNC |
| **Water System Name :** | TRI-STATE GENERATING STATION | **State Type :** | NTNC |
| **Principal County Served :** | MCKINLEY | **Primary Source :** | SW |
| **Status :** | A | **Activity Date :** | 04-01-1981 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| ARMENTA, JOHNNY | null | OP | 505-876-5232 | PO BOX 577, PREWITT, NM-87045 | Not Available |
| WALZ, BARBARA A. | | AC | 303-254-3184 | PO Box 33695, Tri-State Generation & Transmission Asso, DENVER, CO-80233-0695 | Not Available |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | NT | 125 |

### Service Connections

| Type | Count |
|---|---|
| CB | 5 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL #11 | WL | I |
| WELL #6 | WL | I |
| WELL #7 | WL | A |
| WELL #8 | WL | A |

### Service Areas

| Code | Name |
|---|---|
| NT | INDUSTRIAL/AGRICULTURAL |

| | | |
|---|---|---|
| WELL #9 | WL | A |
| WELL #10 | WL | A |
| RESERVOIR #1 | RS | A |
| WELL #1 | WL | A |
| WELL #2 | WL | A |
| WELL #4 | WL | A |
| WELL #5 | WL | A |

## Water Purchases

| Seller Water System No. | Water System Name | Seller Water Type | Purchase Date | Seller Facility Type | Seller State Asgn ID No. | Buyer Facility Type | Buyer State Asgn ID No. |
|---|---|---|---|---|---|---|---|

# Drinking Water Bureau

## Non-Coliform Sample Results

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3595017 | **Federal Type :** | NT |
| **Water System Name :** | TRI-STATE GENERATING STATION | **State Type :** | NT |
| **Principal County Served :** | MCKINLEY | **Primary Source :** | SW |
| **Status :** | A | **Activity Date :** | 04- |
| **Lab Sample No. :** | 180631001 | **Collection Date :** | 02- |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | M P |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | 900 | Y | MRL | 1.96 PCI/L | | 01-01-2004 | 1 |
| 4000 | GROSS ALPHA, EXCL. RADON & U | 900 | Y | MRL | 1.96 PCI/L | | 01-01-2004 | 1 |
| 4010 | COMBINED RADIUM (-226 & -228) | null | Y | MRL | 0.725 PCI/L | 0 | | |
| 4010 | COMBINED RADIUM (-226 & -228) | null | Y | MRL | 0.725 PCI/L | 0 | | |
| 4020 | RADIUM-226 | 903.1 | Y | MRL | 0.725 PCI/L | | 01-01-2004 | 1 |
| 4020 | RADIUM-226 | 903.1 | Y | MRL | 0.725 PCI/L | | 01-01-2004 | 1 |
| 4030 | RADIUM-228 | 904.0 | Y | MRL | 0.702 PCI/L | | 01-01-2004 | 1 |
| 4030 | RADIUM-228 | 904.0 | Y | MRL | 0.702 PCI/L | | 01-01-2004 | 1 |
| 4100 | GROSS BETA PARTICLE ACTIVITY | 900 | N | MRL | 2.59 PCI/L | 123 PCI/L | 01-01-2004 | 1 |
| 4100 | GROSS BETA PARTICLE ACTIVITY | 900 | N | MRL | 2.59 PCI/L | 123 PCI/L | 01-01-2004 | 1 |

**Total Number of Records Fetched = 10**

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## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3591033 | **Federal Type :** | C |
| **Water System Name :** | ARCO (ANACONDA) COAL CO - BLUEWATER MILL | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | I | **Activity Date :** | 08-01-1996 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | R | 60 |

### Service Connections

| Type | Count |
|---|---|
| CB | 5 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL # 1 | WL | I |
| WELL # 2 | WL | I |
| WELL # 3 | WL | I |
| WELL # 4 | WL | I |

### Service Areas

| Code | Name |
|---|---|
| R | OTHER RESIDENTIAL AREA |

### Water Purchases

| Seller Water System No. | Water System Name | Seller Water Type | Purchase Date | Seller Facility Type | Seller State Asgn ID No. | Buyer Facility Type | Buyer State Asgn ID No. |
|---|---|---|---|---|---|---|---|

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## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3598133 | **Federal Type :** | NC |
| **Water System Name :** | HOMESTAKE MILL | **State Type :** | NC |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | I | **Activity Date :** | 06-12-1990 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| KENNEDY, ED | null | OP | 505-287-4456 | PO BOX 8, GRANTS, NM-87020 | Not Available |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | T | 24 |

### Service Connections

| Type | Count |
|---|---|
| CB | 17 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL # 1 | WL | I |

### Service Areas

| Code | Name |
|---|---|
| T | OTHER TRANSIENT AREA |

### Water Purchases

| Seller Water System No. | Water System Name | Seller Water Type | Purchase Date | Seller Facility Type | Seller State Asgn ID No. | Buyer Facility Type | Buyer State Asgn ID No. |
|---|---|---|---|---|---|---|---|

EPA/540/G-91/013
Publication 9345.0-01A
September 1991

# Guidance for Performing Preliminary Assessments Under CERCLA

Hazardous Site Evaluation Division
Office of Emergency and Remedial Response
Office of Solid Waste and Emergency Response
U.S. Environmental Protection Agency
Washington, DC 20460

### 3.3.2. Targets

Ground water pathway targets are drinking water supply wells within 4 miles of the site. For every PA site, you must develop a good understanding of the drinking water supply situation within the 4-mile target distance limit, and perform a comprehensive survey of drinking water supply systems and the number of people they serve. Very often, drinking water is supplied by some combination of domestic wells serving individual residences, community wells serving multiple residences, municipal wells serving entire towns or cities, and surface water supplies. For the ground water pathway, you are specifically concerned with private and public drinking water supply wells but, in the course of developing information about water supplies, you must also find out about surface water sources of drinking water (Section 3.4.2).

Your survey must be comprehensive enough to allow you to identify, on a topographic map, the location of each municipal drinking water well and surface water intake supplying drinking water within the target distance limit. Delineate on the map the specific geographic areas where drinking water is supplied by: municipal wells, municipal intakes, private and community wells, and private and community intakes. Note that, in some areas, private water companies supply drinking water to large numbers of people. These systems also fall within the meaning of a "municipal" system.

**Multiple-Aquifer Systems**

In researching the local water supply situation, you may find that drinking water is drawn from more than one aquifer. In many areas, multiple-aquifer systems provide drinking water from different aquifers at different depths. In such situations, the deeper aquifer(s) may or may not be at risk from a release from the site, depending on whether it is hydrogeologically isolated from overlying aquifers. Often, the extent to which one aquifer may be either isolated from or in hydraulic communication with another aquifer is not easily determined and even hydrogeologic experts may disagree. For these reasons, the PA evaluation of populations drinking ground water includes all persons served by all aquifers. Nonetheless, when researching drinking water populations, it is a good practice to develop as much information as possible concerning the populations associated with specific aquifers; such information may be useful to the SI if the site advances to that stage.

**Municipal Drinking Water Supplies**

The best place to begin a water supply survey is the local municipal and county water authorities. Bring your topographic map and ask the appropriate officials to locate municipal drinking water wells and intakes, including those that might be designated as "standby" or "backup," and to delineate the municipal distribution system. Very often, the entire system is interconnected -- by way of valves or connecting lines -- so that water drawn from any individual well or intake has the potential to reach any user of the system. This is referred to as a "blended system." In other cases, separate distribution systems function independently and do not have the capability for interconnection with other systems. Identify the specific systems that are blended, and the specific systems that are independent. You also need to know either the number of people served or the number of service connections in each blended and independent system, which wells and intakes supply each system, and the average annual production from each well and intake.

**Drinking Water Supplies in Areas Not Served by a Municipal System**

After identifying municipal wells, intakes, and distribution systems, investigate water supplies in areas outside of the municipal systems. People in these areas probably obtain water from private

# REFERENCES

# 53-56

COMPOSITION
B O O K

Grants U Belt

COLLEGE RULED/MARGIN

80 Sheets • 10" x 7 7/8"

7/24/07

#26-252

0 74319 26252 7

AMPAD

(27)

BW L(SG) pics 20+21

BW OBS-3 pics 22+23

Alex Griego, Jr. SGriego7@hotmail.com
Mining engr for Lee Ranch
analyses are posted on MMD website
Mark Hiles

7/16/2008 @0903 Mike Griffin, Escalante Powerstation (Tri-State) 876-5233
lft msg.

7/21/2008 Dave Howard SLD
SLD Radiochemistry — Nidal Jadalla 841-7574

7/21/2008 1020 Mark Elkins 722-3878 Running Bear Trading Post
1 deep well and shallower
east side of highway

Drilled deep well 2 years ago. } will need to start wells
Shallower well up by Lobo Cny.
Old well near former ranch house. - ~~no electricity~~ no pump

7/21/2008 @ 1033 Jerry Elkins 870-1502
Has property in Ambrosia Lake area. May be in Farmington tho.

1035 Robert Sandoval 285-5152 no answer or vm.

1140 no answer

Roberta + Melvin Marquez 287-7251 Need to meet @ 0900.

1140 Tan hse w/ wraparound porch left side ?
2 livestock wells + 2 ranch ?ing ?

(28)

David C. Morgan
7/29/2008

7/21/2008 1200 Charlie + Marcella Sandoval - left msg 287-7187

1200 Robert Sandoval 285-5152 Hard of hearing
Has caller ID

1 section 14 residence well

22 junction of highways

Has mine shaft? Expects us ~ 1130-1200.

1206 Mike (Jay's Bar) 287-4972 no answer/vm.

1210 Marcella Sandoval 285-6694 (U. of Milan) left msg

1340 Marcella Sandoval ~~290-7998~~ @ 1600

1410 Mike ~ 3 wells 287-4972

7/23/2008 @ 1140 Marti Smith (left msg. called back 7/22/2008) 287-5603

Horses sick, losing tail hair. Concerned about water quality.

Vetenarian xcross Hwy 66 wants well tested.

Frank Anderson 290-0730

7/23/2008 @ 1221 Jerry Elkins 870-1502 left msg

@ 1224 Mark Elkins left msg 722-3878

@ 1226 Robert Sandoval 285-5152 no answer.

@ " Marcella Sandoval 290-7998 - will meet @ Jay's Bar

Wed @ 1630

1445 Mike (Sandoval?) 287-9786. Will meet Wed @ 1300.

29 David L Mayer
7/30/2008

7/29/08 @0812 Jerry Elkins 870-1502
- Leases irrigation well from ARCO - will check if we can sample?
= Not sure will be available Tmrw.

@ 0815 Mark Elkins 290-0449
Meet tmrw @ 0930-1000

@ 0819 Marquez 287-7251 no answ/no VM

@0821 Robert Sandoval (return call last night) no answ. 285-5152
@ 0824 will meet @ bar tmrw @ 1200

@ 0825 DOE 970-248-6000 (re calibration site)
Dave Traub (Stoller) - cal site has no wells. Will have Dick Johnson call about Arco well
@843 Not in GJ; maybe in NM now?

Sandra Kinsman
90517 San Mateo
4871 Hwy. 605
San Mateo 87020
876-1896
contacted Don Williams

@ 1317 Melvin Marquez → 1030 Tmrw.

1405 Logistics meeting
- DOE BW site tour on 8/27
- Schedule wells by type to ensure irrigation wells running, etc.
- UPS drop in Milan

(30)

→ C. Lundstrom for equipment storage + DOT office
– mobilize Sunday 8/24

7/30/2008 @0850 Justin Barris (Wilson property) - 2 wells
Permission given to access when not present

0845 Melvin Manuey
verbal permission to sample wells
Melvin P. Maloy

Jlan + Jane
Tim + Diane
Schmitt - North ~3 miles
corrals, doublewides

Philip Sandoval
Alvin Sandoval
Sandoval Ranch - Charlie + Alvin

7/30/2008 @1224 Mark Elkins
Verbal permission to sample wells.

Can access property through Kitt Scott.
Jerry Elkins owns Wilcoxson Ranch + northwards
HMC had sampled all wells previously; may have key to locks Cu
→ Carl Elkins (cousin): will contact re sampling

David C. Mayer
8/1/2008

David C Mayer

(31)

8/1/2008

Mike Garcia (Jay's Bar)
well #4 B-659
#3 bar D-1636

old bar well. 1960s Has pump but no power.

Rudy Marquez
ALB
domestic ~120
~300'

field w/ offer well #5 1950s ~ 1960s no pump
formerly domestic well
pump set ~ 185'

Floyd Lee (Lee Ranch mine)

Marcella Sandoval - same POB as Mike Garcia
residential well 1970s
uses bottled water.
spigot tee @ pump.
hand water
former trailer park

1950s ranch well - good water. Discharge to stock pond.
adjacent old well?

Gauging station in wash S of ranch. ~~Broken gauge~~ old station on bank.

Robert Sandoval
Sec. 14 Has shaft @ property entrance ~360'. Visited by Golder Associates. Reclamation as federal project. Claims owned by Neutron Energy. Concrete slab visible @ road and land disturbance up hill.

(32) David C [illegible] 8/1/2008

- Philip Sandoval's wife Dora works @ Sr. Center - Grants

7/31/2008 @ 0910 Robert Sandoval (call-in)
Wanted to know what would happen if well is contaminated. I explained about lengthy Superfund timeline, background, etc. Said Neutron Energy has drilled 96 holes on property. Wants to sell out.
- Doesn't get along with Alvin Sandoval - asked if I would be sampling his well. Said James Smith in SF was overseeing mine reclamation

James Smith MMD
Hogan Mine: tape measured 106'; mined originally 340'. Operated not known.
Golder hired to do maintenance and engineering.
Program funded through Office of Surface Mining.

Robert Schmitt - Told him that someone from State had sampled wells.

7/31/2008 1120 Kitt Smith 870-4472
Past shop on right w/ tire. Next gate on left. Through corrals. Wellhouse is round tank. White storage tank. 7 mile out there.

Wants Mark Ellins to call him with permission to access/enter

1130 Mark Ellins: Kitt Smith's key won't work to lock into Roundy Ranch

(33) David K. Mayer
8/4/08

7/31/2008 Al Cox
- Objects to reopening by discussion.
- Object to conduct of facilitators @ public mtg - "egging" crowd on
- Adrian will assist us w/ keys and access to Marke Elkins' property twice.

Dawn Bailey 815-931-1231 (Contacted M. Leavitt 7/30)
Buying ~~property~~ @ 21 E Malpais in Milan
Wants to know if soil has/would be sampled after 1970s flooding

Dr. Frank Anderson 290-0730
Clinic @ Airport Road ext in Milan. Meet him @ 1330

Robert Schmitt 287-2266
4062 San Mateo Rd.
Grants, NM 87020

8/1/2008 Adrian Venable
1010 @ HMC 914 (Marke Elkins old shallow well) 6" csg.
wl = 42.5' TD = 92.2'
pic. 1

1029 Roundy Ranch well - eastern wl = 78.15' Unable to start
in old freezer. Power disconnected. Fill stock tank
30' downhill. ~~Old windmill.~~ 1/2 hp. starter - adrian contacting
pics 2+3

Roundy Ranch well - western. Old windmill tower.
2" plugged pipe. pic. 4

34

1103 Elkins deep well - frost proof hydrant nearby
power switch on pole. pics. 5+6

Kitt South / HMC 920 pics. 7

→ ~~Elkins well on W side of hwy~~ (HMC 950)

1131 Kitt South's KH2 well ~2 mile W. of corrals.
windmill driven. Water coming from tube overflow
pics. 8+9.

1150 HMC-922 W.L. = 58.95' (below TOC)
TD = 100.6'
Windmill not connected. 6" csg. pic. 10

1241 Elkin / HMC 953 (well by stocktank)
Adrian says that well in locked wellhouse was
953, now controls well by stocktank pics 11+12. controller Tank

1343 Frank Anderson - need key to access property.
Permission given to sample if not present.

1429 Marquez warehouse
WL = 90.95 TD ~ 240'

1516 Milan municipal well B-50
Milan irrigation well B-49

(35)

Lenore Baros, NMDOT. 285-3206
Can use auditorium

1604 City of Milan residence well
130' deep. Pump @ 112'. ID unknown

8/4/2008 Mark Elkins
Can sample old hand dug well @ cattle drinkers off road heading south/east toward corrals.

@ 0955 Carl Elkins 237-7377 left msg.

Jerry Elkins 870-1502 (c) Agenda
Access to Anaconda irrigation well
Location + access to "new" irrigation well
Location of residential well (Bowlin's property?)
Other wells in basin

re Anaconda Chris Sanchez 970-967-3606

irrigation well - need generator + control box

- Has 20+ wells in highlands north of Ambrosia Lake, including Williamson Ranch.

- 2 ~~down~~ upgradient irrigation wells - might visit on 8/12

@1620 Cyndee Biggers - access agreement was signed 2 weeks ago

(36)

Ray Flores re screening

8/11/08 Team mtg

- return equipment to Dick Johnson on Wednesday.

→ YSI service facility. — work w/ Cathy on sol. source

acids — call Bert re tracking WTUs

GIS

GPS

Mtg w/ MMD

- Worked in area of Poison Canyon on BLM land in early 1990s.
- AML under federal land, in operation and abandoned <1977.
- Initial focus on sites where reclamation occurred previous
- Cleanup to Background.

8/11/08 Bachman 287-5404

1545 Sample front hose bib; back is on timer.

@ 1545 Arthur Gebeau 287-3613 no answer/no VM

Martinez 285-3915 left msg

@1555 Vasquez 287-3539 left msg

8/12/08 Vasquez 287-3539 call next week

37

David Colvart
8/13/2008

8/12/2008 Jerry Elkins' residence
@1645 2 wells
1950s-1960
pics 1+2 — older well in well house NE of residence.
hose bib after filter will need to remove
filter media using wrench laying on pipe
pic 3,4,5 newer well in round adobe wellhouse SW of residence
Sample at hydrant in front.

old well 35° 15.394N
107° 57.985W
elev. 6642'
new well 35° 15.357N
107° 58.066W
elev. 6603'

1705 Martinez - well disconnected. Sampling not possible
Elkins' old well
pic. 6 1 1/4" male fitting w/ hose bib

pic 7+8 Elkins' W irrigation 475' lap. @ entrance CR 29
9 Sample @ DOT pond W of well
35° 16.565N
107° 59.102W

1800 Elkins' E irrigation well ~~475~~ 444' deep 1950s
35° 14.277N elev. 6624'
107° 57.492W
Sample from irrigation pipes if running

pic. 10 Elkins' cattle well nearly 275' 2003-2004

David C Mayer
10/1/2008

(44)

9/30/2008 Mtg w/ R6 + R9
Jeff Ingless Dana, Earle
LaDonna Turner

R9 is performing screening on 500+ sites on Navajo la
starting w/ 80 in eastern region. Includes sites w/
1 mile of Navajo boundary. To determine whether sites
are point of exposure to Navajo

Al Cox 287-4456

10/1/2008 Schmitt
House well
~200' pump depth
sulfurous
clothes washing. Doesn't drink water.
has softener
Hawthorne drilling
Terry Fletcher, Rio Algom

Schmitt 1 Schmitt house well pics. 1+2+3 Sample pt @ frost
free hydrant in back of hse.
Locked gate

Schmitt 2 Schmitt Stock W pics. 4+5 231'
power box on pole. Piped into pond
2 ? x 34 4238 B A. written on fuse box
Former supply to mining camp.
Locked gate
Near Poison Canyon

(45)

David K. Mayer
10/1/2008

Schmitt 3 Schmitt Stock E 130' pics. 6, 7, 8
fuse box on power pole
water outlet 3 concrete vault 1 1/4" slip outlet

Schmitt 4 Schmitt HQ - S pic. 9
WL = 54 TD = 101.5
no pump

(R. Schmitt's brother, lives w/ parents @ Schmitt HQ)

DLM
~~Schmitt 5~~ Schmitt HQ mid old collapsed @ 42.4'
old wind mill. No pump.

Robert
Dayne Schmitt Schmitt HQ middle W pic 10, 11, 12
287-2496 - hooked to Schmitt HQ-W; need to close valve
1 1/4" slip outlet

Schmitt ~~6~~ 5

Schmitt ~~7~~ 6 Schmitt HQ-W pics 13+14
main hose bib - well 1
filter on well to hose; other line may run to hydrant.
- Installed by Coyote Drlg 5-6 gpm gpm

Schmitt ~~8~~ 7 Schmitt Stock NW pic. 15 2.3 miles W of road
WL = 177.8'
TD = 7650'
Non functioning solar pump
Top plate has 2 holes + 2 1/2" nuts.
1 to 1 1/2 gpm

David C Nagy
6/1/2008

(46)

8
Schmitt 9

Schmitt stock well thru ranch. pics 16 + 17
WL = 65.5 TD 7400'
old pump jack; sucker rod broke off @ check valve.

Schmitt mesa-top stock well pic. 18.
~500' beyond mine
no pump. 6" csg.
in shale (open hole) old mine well?
WL = 82.75'
TD ~ 96'
Brings pump in for water 2-3 gpm.

Mine (pic 19) recently investigated by State.
Decline 30° into ~~Morrison~~ Dakota - collapsed @ depth.
Abundant closely-spaced drillholes trend towards N.

Adrian
P2 not operation?
P1 collapsed
P-OK
P3 + P4 - need pump
922 - low producer
950 - has electric pump
921 - low producer
914 - low producer
CW2-1 has pump, electrical problem
CW50 + 52 - no pumps
CW35 needs pump

(47)

David C Mayer
10/14/2008

927 - has pump

Austin Glover
POB 3748
Milan 87021

10/8/08 Team mtg
Bedrock wells completed in Morrison or Dakota
→ No reason to sample in SMC before having Strathmore alluvial data now being collected.
— Alluvial wells downgradient of BW investigation area.

Angelo Pursue packaging software procurement as training
— Health monitoring plan for radiation hazards. Check w/ Radiation Monitoring Bureau.
— HSP for RI investigation.

10/14/2008 @ 0900 R. Schmitt 287-2266 left message re sampling postponement

@ 0903 John Parker, Rad Control Bureau - left msg re medical monitoring

@ 0907 Butch Tsogale 476-8787

0918 Eddie Dominguez 6-8625
Wear respiratory - particulate filter
Have rad tech from rad control to read area to determine PPE
Dosimeter badge good idea.
Concentra for help with dosimetry monitoring program

# Drinking Water Bureau

**Links**

- Water System Facilities
- Sample Schedules
- Coliform Sample Results
- Coliform Sample Summary Results
- Lead And Copper Sample Summary Results
- Non-Coliform Samples/Results
- Non-Coliform Samples/Results by Analyte
- Violations/Enforcement Actions
- Site Visits
- Milestones

**Return Links**

- Water Systems
- Water System Search
- County Map

**Glossary**

## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| HAYES, ROBERT | null | OP | 505-287-2908 | 121 Wayne Av, GRANTS, NM-87020 | Not Available |
| HORACEK, BOB | CITY MANAGER | EC | 505-287-7927 | PO Box 879, GRANTS, NM-87020 | Not Available |
| MARTINEZ, ANTHONY | | AC | 505-287-2908 | PO Box 702, GRANTS, NM-87020 | anthony.martinez@ch2m.com |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | R | 8892 |

### Service Connections

| Type | Count |
|---|---|
| CB | 3211 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL # 1 | WL | A |
| WELL # 2 | WL | I |
| WELL # 3 | WL | A |

### Service Areas

| Code | Name |
|---|---|
| R | RESIDENTIAL AREA |

### Water Purchases

# Drinking Water Bureau

## Non-Coliform Sample Results

:turn Links

Non-Coliform
mples

Analyte List

Water System
:tail

Water Systems

Water System
:arch

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC200000584 | **Collection Date :** | 06-15-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.4 PCI/L | 6.8 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.4 PCI/L | 6.8 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .2 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .2 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.5 PCI/L | 8.1 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.5 PCI/L | 8.1 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

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Water System Detail

Water Systems

Water System Search

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC200000587 | **Collection Date :** | 06-15-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.3 PCI/L | 6.8 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.3 PCI/L | 6.8 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .32 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .32 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.4 PCI/L | 8.1 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.4 PCI/L | 8.1 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results


**:turn Links**

Non-Coliform mples

Analyte List

Water System :tail

Water Systems

Water System arch

County Map

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC960294 | **Collection Date :** | 06-18-1996 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.4 PCI/L | 5.1 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.4 PCI/L | 5.1 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .25 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .25 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.7 PCI/L | 4.9 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.7 PCI/L | 4.9 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC960295 | **Collection Date :** | 06-18-1996 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.1 PCI/L | 5.8 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.1 PCI/L | 5.8 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .2 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .2 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.3 PCI/L | 5.5 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.3 PCI/L | 5.5 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM-200200263 | **Collection Date :** | 03-06-2002 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monito Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | N | MRL | 0.001 MG/L | 0.004 MG/L | 01-01-2002 | 12-31-2 |
| 1010 | BARIUM | 200.8 | Y | MRL | 0.1 MG/L | null | 01-01-2002 | 12-31-2 |
| 1015 | CADMIUM | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2 |
| 1020 | CHROMIUM | 200.8 | N | MRL | 0.001 MG/L | 0.001 MG/L | 01-01-2002 | 12-31-2 |
| 1035 | MERCURY | 200.8 | Y | MRL | 0.0002 MG/L | null | 01-01-2002 | 12-31-2 |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | 01-01-2002 | 12-31-2 |
| 1045 | SELENIUM | 200.8 | N | MRL | 0.005 MG/L | 0.007 MG/L | 01-01-2002 | 12-31-2 |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2 |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2 |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | MG/L | 01-01-2002 | 12-31-2 |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

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Water System Search

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200200264 | **Collection Date :** | 03-06-2002 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | N | | 0.001 MG/L | .004 MG/L | 01-01-2002 | 12-31-: |
| 1010 | BARIUM | 200.8 | Y | MRL | 0.1 MG/L | null | 01-01-2002 | 12-31-: |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-: |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-: |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null | 01-01-2002 | 12-31-: |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | 01-01-2002 | 12-31-: |
| 1045 | SELENIUM | 200.9 | N | | 0.005 MG/L | .007 MG/L | 01-01-2002 | 12-31-: |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-: |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-: |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | 01-01-2002 | 12-31-: |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

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Non-Coliform mples

Analyte List

Water System etail

Water Systems

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Glossary

| Water System No. : | NM3526133 | Federal Type : | C |
|---|---|---|---|
| Water System Name : | GRANTS DOMESTIC WATER SYSTEM | State Type : | C |
| Principal County Served : | CIBOLA | Primary Source : | GW |
| Status : | A | Activity Date : | 06-01-1977 |
| Lab Sample No. : | HM200200263 | Collection Date : | 03-06-2001 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | N | | 0.001 MG/L | .004 MG/L | | |
| 1010 | BARIUM | 200.8 | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | 200.8 | N | | 0.001 MG/L | .001 MG/L | | |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | 200.9 | N | | 0.005 MG/L | .007 MG/L | | |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200001349 | **Collection Date :** | 07-17-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | N | | 0.001 MG/L | .002 MG/L | | |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1035 | MERCURY | null | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | null | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | null | N | | 0.005 MG/L | .006 MG/L | | |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

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Nater System :tail

Water Systems

Water System :arch

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200001350 | **Collection Date :** | 07-17-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | N | | 0.001 MG/L | .002 MG/L | | |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1035 | MERCURY | null | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | null | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | null | Y | MRL | 0.005 MG/L | null | | |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200000567 | **Collection Date :** | 05-03-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | N | | 0.001 MG/L | .002 MG/L | | |
| 1010 | BARIUM | 200.8 | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | 200.9 | N | | 0.005 MG/L | .006 MG/L | | |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

:turn Links

Non-Coliform mples

Analyte List

Water System :tail

Water Systems

Water System :arch

County Map

lossary

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM200000568 | **Collection Date :** | 05-03-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1010 | BARIUM | 200.8 | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | 200.8 | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | 200.9 | N | | 0.005 MG/L | .006 MG/L | | |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

- Non-Coliform Samples
- Analyte List
- Water System Detail
- Water Systems
- Water System Search
- County Map

**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM9701205 | **Collection Date :** | 08-20-1997 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | Y | MRL | 0.001 MG/L | null | | |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | null | N | | 0.001 MG/L | .001 MG/L | | |
| 1035 | MERCURY | null | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | null | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | null | N | | 0.005 MG/L | .007 MG/L | | |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**·turn Links**

Non-Coliform nples

Analyte List

Water System tail

Water Systems

Water System arch

County Map

**lossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM9701206 | **Collection Date :** | 08-20-1997 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | N | | 0.001 MG/L | .001 MG/L | | |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1035 | MERCURY | null | Y | MRL | 0.0002 MG/L | null | | |
| 1036 | NICKEL | null | Y | MRL | 0.01 MG/L | null | | |
| 1045 | SELENIUM | null | N | | 0.005 MG/L | .006 MG/L | | |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

Non-Coliform Samples

Analyte List

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM940509 | **Collection Date :** | 01-25-1994 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monit Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | N | | 0 null | .002 MG/L | | |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | null | N | | 0 null | .002 MG/L | | |
| 1035 | MERCURY | null | Y | MRL | 0.0005 MG/L | null | | |
| 1036 | NICKEL | null | Y | MRL | 0.005 MG/L | null | | |
| 1045 | SELENIUM | null | Y | MRL | 0.005 MG/L | null | | |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.0005 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results


:turn Links

Non-Coliform
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Water System
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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | C |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | HM940510 | **Collection Date :** | 01-25-1994 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monito Period Dat |
|---|---|---|---|---|---|---|---|---|
| 1005 | ARSENIC | null | N | | 0 null | .004 MG/L | | |
| 1010 | BARIUM | null | Y | MRL | 0.1 MG/L | null | | |
| 1015 | CADMIUM | null | Y | MRL | 0.001 MG/L | null | | |
| 1020 | CHROMIUM | null | Y | MRL | 0.005 MG/L | null | | |
| 1035 | MERCURY | null | Y | MRL | 0.0005 MG/L | null | | |
| 1036 | NICKEL | null | Y | MRL | 0.005 MG/L | null | | |
| 1045 | SELENIUM | null | Y | MRL | 0.005 MG/L | null | | |
| 1074 | ANTIMONY, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |
| 1075 | BERYLLIUM, TOTAL | null | Y | MRL | 0.0005 MG/L | null | | |
| 1085 | THALLIUM, TOTAL | null | Y | MRL | 0.001 MG/L | null | | |

**Total Number of Records Fetched = 10**

# Drinking Water Bureau

## Non-Coliform Sample Results

**Return Links**

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Water System Search

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**Glossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | |
| **Principal County Served :** | CIBOLA | **Primary Source :** | |
| **Status :** | A | **Activity Date :** | |
| **Lab Sample No. :** | 17857 | **Collection Date :** | 2-22-05 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level |
|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | N | MRL | 0.001 MG/L | 0.00800 MG/L |
| 1010 | BARIUM | 200.8 | N | MRL | 0.002 MG/L | 0.0320 MG/L |
| 1015 | CADMIUM | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1020 | CHROMIUM | 200.8 | N | MRL | 0.001 MG/L | 0.0230 MG/L |
| 1024 | CYANIDE | 4500CN-E | Y | MRL | 0.005 MG/L | null |
| 1025 | FLUORIDE | 300.0 | N | MRL | 0.2 MG/L | 0.426 MG/L |
| 1030 | LEAD | 200.8 | N | MRL | 0.001 MG/L | 0.00900 MG/L |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null |
| 1036 | NICKEL | 200.8 | N | MRL | 0.001 MG/L | 0.0100 MG/L |
| 1038 | NITRATE-NITRITE | 300.0 | N | MRL | 0.05 MG/L | 1.77 MG/L |
| 1041 | NITRITE | 300.0 | Y | MRL | 0.05 MG/L | null |
| 1045 | SELENIUM | 200.8 | N | MRL | 0.002 MG/L | 0.0110 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null |
| 2005 | ENDRIN | 505 | Y | MRL | 0.01 UG/L | null |
| 2005 | ENDRIN | 505 | Y | MRL | 0.01 UG/L | null |
| 2010 | BHC-GAMMA | 505 | Y | MRL | 0.01 UG/L | null |
| 2010 | BHC-GAMMA | 505 | Y | MRL | 0.01 UG/L | null |
| 2015 | METHOXYCHLOR | 505 | Y | MRL | 0.05 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2015 | METHOXYCHLOR | 505 | Y | MRL | 0.05 UG/L | null |
| 2020 | TOXAPHENE | 505 | Y | MRL | 0.5 UG/L | null |
| 2020 | TOXAPHENE | 505 | Y | MRL | 0.5 UG/L | null |
| 2031 | DALAPON | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2031 | DALAPON | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2032 | DIQUAT | null | Y | MRL | 0.4 UG/L | null |
| 2032 | DIQUAT | null | Y | MRL | 0.4 UG/L | null |
| 2033 | ENDOTHALL | 548.1 | Y | MRL | 9 UG/L | null |
| 2033 | ENDOTHALL | 548.1 | Y | MRL | 9 UG/L | null |
| 2034 | GLYPHOSATE | 547 | Y | MRL | 6 UG/L | null |
| 2034 | GLYPHOSATE | 547 | Y | MRL | 6 UG/L | null |
| 2035 | DI(2-ETHYLHEXYL) ADIPATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2035 | DI(2-ETHYLHEXYL) ADIPATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2036 | OXAMYL | 531.1 | Y | MRL | 2 UG/L | null |
| 2036 | OXAMYL | 531.1 | Y | MRL | 2 UG/L | null |
| 2037 | SIMAZINE | 507 | Y | MRL | 0.07 UG/L | null |
| 2037 | SIMAZINE | 507 | Y | MRL | 0.07 UG/L | null |
| 2039 | DI(2-ETHYLHEXYL) PHTHALATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2039 | DI(2-ETHYLHEXYL) PHTHALATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2040 | PICLORAM | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2040 | PICLORAM | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2041 | DINOSEB | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2041 | DINOSEB | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2042 | HEXACHLOROCYCLOPENTADIENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2042 | HEXACHLOROCYCLOPENTADIENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2043 | ALDICARB SULFOXIDE | 531.1 | Y | MRL | 20 UG/L | null |
| 2043 | ALDICARB SULFOXIDE | 531.1 | Y | MRL | 20 UG/L | null |
| 2044 | ALDICARB SULFONE | 531.1 | Y | MRL | 20 UG/L | null |
| 2044 | ALDICARB SULFONE | 531.1 | Y | MRL | 20 UG/L | null |
| 2046 | CARBOFURAN | 531.1 | Y | MRL | 0.9 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2046 | CARBOFURAN | 531.1 | Y | MRL | 0.9 UG/L | null |
| 2047 | ALDICARB | 531.1 | Y | MRL | 20 UG/L | null |
| 2047 | ALDICARB | 531.1 | Y | MRL | 20 UG/L | null |
| 2050 | ATRAZINE | 507 | Y | MRL | 0.1 UG/L | null |
| 2050 | ATRAZINE | 507 | Y | MRL | 0.1 UG/L | null |
| 2051 | LASSO | 507 | Y | MRL | 0.2 UG/L | null |
| 2051 | LASSO | 507 | Y | MRL | 0.2 UG/L | null |
| 2065 | HEPTACHLOR | 505 | Y | MRL | 0.01 UG/L | null |
| 2065 | HEPTACHLOR | 505 | Y | MRL | 0.01 UG/L | null |
| 2067 | HEPTACHLOR EPOXIDE | 505 | Y | MRL | 0.01 UG/L | null |
| 2067 | HEPTACHLOR EPOXIDE | 505 | Y | MRL | 0.01 UG/L | null |
| 2105 | 2,4-D | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2105 | 2,4-D | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2110 | 2,4,5-TP | 515.1 | Y | MRL | 0.2 UG/L | null |
| 2110 | 2,4,5-TP | 515.1 | Y | MRL | 0.2 UG/L | null |
| 2274 | HEXACHLOROBENZENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2274 | HEXACHLOROBENZENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2306 | BENZO(A)PYRENE | 550 | Y | MRL | 0.02 UG/L | null |
| 2306 | BENZO(A)PYRENE | 550 | Y | MRL | 0.02 UG/L | null |
| 2326 | PENTACHLOROPHENOL | 515.1 | Y | MRL | 0.04 UG/L | null |
| 2326 | PENTACHLOROPHENOL | 515.1 | Y | MRL | 0.04 UG/L | null |
| 2378 | 1,2,4-TRICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2378 | 1,2,4-TRICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2380 | CIS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2380 | CIS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2383 | TOTAL POLYCHLORINATED BIPHENYLS (PCB) | 505 | Y | MRL | 0.1 UG/L | null |
| 2383 | TOTAL POLYCHLORINATED BIPHENYLS (PCB) | 505 | Y | MRL | 0.1 UG/L | null |
| 2931 | 1,2-DIBROMO-3-CHLOROPROPANE | 504.1 | Y | MRL | 0.02 UG/L | null |
| 2931 | 1,2-DIBROMO-3-CHLOROPROPANE | 504.1 | Y | MRL | 0.02 UG/L | null |
| 2946 | ETHYLENE DIBROMIDE | 504.1 | Y | MRL | 0.01 UG/L | null |
| 2946 | ETHYLENE DIBROMIDE | 504.1 | Y | MRL | 0.01 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2955 | XYLENES, TOTAL | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2955 | XYLENES, TOTAL | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2959 | CHLORDANE | 505 | Y | MRL | 0.01 UG/L | null |
| 2959 | CHLORDANE | 505 | Y | MRL | 0.01 UG/L | null |
| 2964 | DICHLOROMETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2964 | DICHLOROMETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2968 | O-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2968 | O-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2969 | P-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2969 | P-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2976 | VINYL CHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2976 | VINYL CHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2977 | 1,1-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2977 | 1,1-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2979 | TRANS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2979 | TRANS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2980 | 1,2-DICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2980 | 1,2-DICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2981 | 1,1,1-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2981 | 1,1,1-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2982 | CARBON TETRACHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2982 | CARBON TETRACHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2983 | 1,2-DICHLOROPROPANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2983 | 1,2-DICHLOROPROPANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2984 | TRICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2984 | TRICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2985 | 1,1,2-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2985 | 1,1,2-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2987 | TETRACHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2987 | TETRACHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2989 | CHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2989 | CHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2990 | BENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2990 | BENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2991 | TOLUENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2991 | TOLUENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2992 | ETHYLBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2992 | ETHYLBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2996 | STYRENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2996 | STYRENE | 524.2 | Y | MRL | 0.5 UG/L | null |

**Total Number of Records Fetched = 121**

# Drinking Water Bureau

## Non-Coliform Sample Results

**:turn Links**

Non-Coliform
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Analyte List

Water System
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Water Systems

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arch

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**lossary**

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3526133 | **Federal Type :** | |
| **Water System Name :** | GRANTS DOMESTIC WATER SYSTEM | **State Type :** | |
| **Principal County Served :** | CIBOLA | **Primary Source :** | |
| **Status :** | A | **Activity Date :** | |
| **Lab Sample No. :** | 17856 | **Collection Date :** | 2-22-05 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentratic level |
|---|---|---|---|---|---|---|
| 1005 | ARSENIC | 200.8 | N | MRL | 0.001 MG/L | 0.00500 MG/I |
| 1010 | BARIUM | 200.8 | N | MRL | 0.002 MG/L | 0.0320 MG/L |
| 1015 | CADMIUM | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1020 | CHROMIUM | 200.8 | N | MRL | 0.001 MG/L | 0.0200 MG/L |
| 1024 | CYANIDE | 4500CN-E | Y | MRL | 0.005 MG/L | null |
| 1025 | FLUORIDE | 300.0 | N | MRL | 0.2 MG/L | 0.497 MG/L |
| 1030 | LEAD | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1035 | MERCURY | 245.1 | Y | MRL | 0.0002 MG/L | null |
| 1036 | NICKEL | 200.8 | N | MRL | 0.001 MG/L | 0.00300 MG/I |
| 1038 | NITRATE-NITRITE | 300.0 | N | MRL | 0.05 MG/L | 1.79 MG/L |
| 1041 | NITRITE | 300.0 | Y | MRL | 0.05 MG/L | null |
| 1045 | SELENIUM | 200.8 | N | MRL | 0.002 MG/L | 0.0120 MG/L |
| 1074 | ANTIMONY, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1075 | BERYLLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null |
| 1085 | THALLIUM, TOTAL | 200.8 | Y | MRL | 0.001 MG/L | null |
| 2005 | ENDRIN | 505 | Y | MRL | 0.01 UG/L | null |
| 2005 | ENDRIN | 505 | Y | MRL | 0.01 UG/L | null |
| 2010 | BHC-GAMMA | 505 | Y | MRL | 0.01 UG/L | null |
| 2010 | BHC-GAMMA | 505 | Y | MRL | 0.01 UG/L | null |
| 2015 | METHOXYCHLOR | 505 | Y | MRL | 0.05 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2015 | METHOXYCHLOR | 505 | Y | MRL | 0.05 UG/L | null |
| 2020 | TOXAPHENE | 505 | Y | MRL | 0.5 UG/L | null |
| 2020 | TOXAPHENE | 505 | Y | MRL | 0.5 UG/L | null |
| 2031 | DALAPON | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2031 | DALAPON | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2032 | DIQUAT | null | Y | MRL | 0.4 UG/L | null |
| 2032 | DIQUAT | null | Y | MRL | 0.4 UG/L | null |
| 2033 | ENDOTHALL | 548.1 | Y | MRL | 9 UG/L | null |
| 2033 | ENDOTHALL | 548.1 | Y | MRL | 9 UG/L | null |
| 2034 | GLYPHOSATE | 547 | Y | MRL | 6 UG/L | null |
| 2034 | GLYPHOSATE | 547 | Y | MRL | 6 UG/L | null |
| 2035 | DI(2-ETHYLHEXYL) ADIPATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2035 | DI(2-ETHYLHEXYL) ADIPATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2036 | OXAMYL | 531.1 | Y | MRL | 2 UG/L | null |
| 2036 | OXAMYL | 531.1 | Y | MRL | 2 UG/L | null |
| 2037 | SIMAZINE | 507 | Y | MRL | 0.07 UG/L | null |
| 2037 | SIMAZINE | 507 | Y | MRL | 0.07 UG/L | null |
| 2039 | DI(2-ETHYLHEXYL) PHTHALATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2039 | DI(2-ETHYLHEXYL) PHTHALATE | 525.2 | Y | MRL | 0.6 UG/L | null |
| 2040 | PICLORAM | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2040 | PICLORAM | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2041 | DINOSEB | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2041 | DINOSEB | 515.1 | Y | MRL | 0.25 UG/L | null |
| 2042 | HEXACHLOROCYCLOPENTADIENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2042 | HEXACHLOROCYCLOPENTADIENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2043 | ALDICARB SULFOXIDE | 531.1 | Y | MRL | 20 UG/L | null |
| 2043 | ALDICARB SULFOXIDE | 531.1 | Y | MRL | 20 UG/L | null |
| 2044 | ALDICARB SULFONE | 531.1 | Y | MRL | 20 UG/L | null |
| 2044 | ALDICARB SULFONE | 531.1 | Y | MRL | 20 UG/L | null |
| 2046 | CARBOFURAN | 531.1 | Y | MRL | 0.9 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2046 | CARBOFURAN | 531.1 | Y | MRL | 0.9 UG/L | null |
| 2047 | ALDICARB | 531.1 | Y | MRL | 20 UG/L | null |
| 2047 | ALDICARB | 531.1 | Y | MRL | 20 UG/L | null |
| 2050 | ATRAZINE | 507 | Y | MRL | 0.1 UG/L | null |
| 2050 | ATRAZINE | 507 | Y | MRL | 0.1 UG/L | null |
| 2051 | LASSO | 507 | Y | MRL | 0.2 UG/L | null |
| 2051 | LASSO | 507 | Y | MRL | 0.2 UG/L | null |
| 2065 | HEPTACHLOR | 505 | Y | MRL | 0.01 UG/L | null |
| 2065 | HEPTACHLOR | 505 | Y | MRL | 0.01 UG/L | null |
| 2067 | HEPTACHLOR EPOXIDE | 505 | Y | MRL | 0.01 UG/L | null |
| 2067 | HEPTACHLOR EPOXIDE | 505 | Y | MRL | 0.01 UG/L | null |
| 2105 | 2,4-D | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2105 | 2,4-D | 515.1 | Y | MRL | 0.1 UG/L | null |
| 2110 | 2,4,5-TP | 515.1 | Y | MRL | 0.2 UG/L | null |
| 2110 | 2,4,5-TP | 515.1 | Y | MRL | 0.2 UG/L | null |
| 2274 | HEXACHLOROBENZENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2274 | HEXACHLOROBENZENE | 505 | Y | MRL | 0.1 UG/L | null |
| 2306 | BENZO(A)PYRENE | 550 | Y | MRL | 0.02 UG/L | null |
| 2306 | BENZO(A)PYRENE | 550 | Y | MRL | 0.02 UG/L | null |
| 2326 | PENTACHLOROPHENOL | 515.1 | Y | MRL | 0.04 UG/L | null |
| 2326 | PENTACHLOROPHENOL | 515.1 | Y | MRL | 0.04 UG/L | null |
| 2378 | 1,2,4-TRICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2378 | 1,2,4-TRICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2380 | CIS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2380 | CIS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2383 | TOTAL POLYCHLORINATED BIPHENYLS (PCB) | 505 | Y | MRL | 0.1 UG/L | null |
| 2383 | TOTAL POLYCHLORINATED BIPHENYLS (PCB) | 505 | Y | MRL | 0.1 UG/L | null |
| 2931 | 1,2-DIBROMO-3-CHLOROPROPANE | 504.1 | Y | MRL | 0.02 UG/L | null |
| 2931 | 1,2-DIBROMO-3-CHLOROPROPANE | 504.1 | Y | MRL | 0.02 UG/L | null |
| 2946 | ETHYLENE DIBROMIDE | 504.1 | Y | MRL | 0.01 UG/L | null |
| 2946 | ETHYLENE DIBROMIDE | 504.1 | Y | MRL | 0.01 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2955 | XYLENES, TOTAL | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2955 | XYLENES, TOTAL | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2959 | CHLORDANE | 505 | Y | MRL | 0.01 UG/L | null |
| 2959 | CHLORDANE | 505 | Y | MRL | 0.01 UG/L | null |
| 2964 | DICHLOROMETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2964 | DICHLOROMETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2968 | O-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2968 | O-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2969 | P-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2969 | P-DICHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2976 | VINYL CHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2976 | VINYL CHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2977 | 1,1-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2977 | 1,1-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2979 | TRANS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2979 | TRANS-1,2-DICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2980 | 1,2-DICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2980 | 1,2-DICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2981 | 1,1,1-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2981 | 1,1,1-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2982 | CARBON TETRACHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2982 | CARBON TETRACHLORIDE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2983 | 1,2-DICHLOROPROPANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2983 | 1,2-DICHLOROPROPANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2984 | TRICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2984 | TRICHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2985 | 1,1,2-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2985 | 1,1,2-TRICHLOROETHANE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2987 | TETRACHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2987 | TETRACHLOROETHYLENE | 524.2 | Y | MRL | 0.5 UG/L | null |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2989 | CHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2989 | CHLOROBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2990 | BENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2990 | BENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2991 | TOLUENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2991 | TOLUENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2992 | ETHYLBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2992 | ETHYLBENZENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2996 | STYRENE | 524.2 | Y | MRL | 0.5 UG/L | null |
| 2996 | STYRENE | 524.2 | Y | MRL | 0.5 UG/L | null |

**Total Number of Records Fetched = 121**

# Drinking Water Bureau

**Links**

Water System Facilities

Sample Schedules

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Coliform Sample Summary Results

Lead And Copper Sample Summary Results

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Non-Coliform Samples/Results by Analyte

Violations/Enforcement Actions

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Milestones

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## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| CHAVEZ, BEN | null | OP | 505-287-7124 | PO BOX 2727, MILAN, NM-87021 | Not Available |
| CHAVEZ, BEN | null | AC | 505-287-7124 | PO BOX 2727, MILAN, NM-87021 | Not Available |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | R | 1911 |

### Service Connections

| Type | Count |
|---|---|
| CB | 1043 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL #1 (B-23) | WL | A |
| WELL #2 (B-24) | WL | I |
| WELL #3 (B-35) | WL | A |
| WELL # 4 (GOLDEN ACRES B-50) | WL | A |

### Service Areas

| Code | Name |
|---|---|
| R | RESIDENTIAL AREA |

### Water Purchases

# Drinking Water Bureau

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC200200323 | **Collection Date :** | 07-10-2002 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.1 PCI/L | 7.2 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.1 PCI/L | 7.2 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .05 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .05 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1 PCI/L | 4.7 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1 PCI/L | 4.7 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC20020285 | **Collection Date :** | 06-18-2002 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 0.9 PCI/L | 4 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 0.9 PCI/L | 4 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .04 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .04 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.1 PCI/L | 3.1 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.1 PCI/L | 3.1 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC200000583 | **Collection Date :** | 06-15-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.8 PCI/L | 9.3 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.8 PCI/L | 9.3 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .03 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .03 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.6 PCI/L | 6.4 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.6 PCI/L | 6.4 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC200000585 | **Collection Date :** | 06-15-2000 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.5 PCI/L | 4.6 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.5 PCI/L | 4.6 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .05 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .05 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.5 PCI/L | 5.5 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.5 PCI/L | 5.5 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC980131 | **Collection Date :** | 03-23-1998 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4006 | COMBINED URANIUM | null | N | | 0.7 PCI/L | 7 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |

**Total Number of Records Fetched = 7**

# Drinking Water Bureau

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC980131 | **Collection Date :** | 12-23-1997 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4006 | COMBINED URANIUM | null | N | | 0.7 PCI/L | 7 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |

**Total Number of Records Fetched = 7**

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC980131 | **Collection Date :** | 09-23-1997 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4006 | COMBINED URANIUM | null | N | | 0.7 PCI/L | 7 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |

**Total Number of Records Fetched = 7**

# Drinking Water Bureau

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC980131 | **Collection Date :** | 06-23-1997 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4006 | COMBINED URANIUM | null | N | | 0.7 PCI/L | 7 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |

**Total Number of Records Fetched = 7**

# Drinking Water Bureau

## Non-Coliform Sample Results

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| Water System No. : | NM3525533 | Federal Type : | C |
|---|---|---|---|
| Water System Name : | MILAN COMMUNITY WATER SYSTEM | State Type : | C |
| Principal County Served : | CIBOLA | Primary Source : | GW |
| Status : | A | Activity Date : | 06-01-1977 |
| Lab Sample No. : | RC199600297 | Collection Date : | 06-19-1996 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 0.9 PCI/L | 5.5 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 0.9 PCI/L | 5.5 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .06 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .06 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.3 PCI/L | 2.8 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.3 PCI/L | 2.8 PCI/L | | |

**Total Number of Records Fetched = 6**

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|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC960292 | **Collection Date :** | 06-19-1996 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.3 PCI/L | 10.8 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.3 PCI/L | 10.8 PCI/L | | |
| 4006 | COMBINED URANIUM | null | N | | 0.7 PCI/L | 8.4 PCI/L | | |
| 4007 | URANIUM-234 | null | N | | 0.08 PCI/L | 6.26 PCI/L | | |
| 4009 | URANIUM-238 | null | N | | 0.08 PCI/L | 3.69 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .05 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .05 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.6 PCI/L | 4.7 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 2.6 PCI/L | 4.7 PCI/L | | |

**Total Number of Records Fetched = 9**

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525533 | **Federal Type :** | C |
| **Water System Name :** | MILAN COMMUNITY WATER SYSTEM | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 06-01-1977 |
| **Lab Sample No. :** | RC980131 | **Collection Date :** | null |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.1 PCI/L | 9.9 PCI/L | | |
| 4006 | COMBINED URANIUM | null | N | | 0.7 PCI/L | 7 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .14 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.9 PCI/L | 10.6 PCI/L | | |

**Total Number of Records Fetched = 7**

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## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3525133 | **Federal Type :** | C |
| **Water System Name :** | GOLDEN ACRES TRAILER PARK | **State Type :** | C |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | I | **Activity Date :** | 06-15-1995 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| MOORE, BOB | null | OP | 505-287-8789 | 2501 W. HWY 66, GRANTS, NM-87020 | Not Available |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | R | 81 |

### Service Connections

| Type | Count |
|---|---|
| CB | 23 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL # 1 | WL | I |

### Service Areas

| Code | Name |
|---|---|
| R | MOBILE HOME PARK |

### Water Purchases

| Seller Water System No. | Water System Name | Seller Water Type | Purchase Date | Seller Facility Type | Seller State Asgn ID No. | Buyer Facility Type | Buyer State Asgn ID No. |
|---|---|---|---|---|---|---|---|

# REFERENCES

# 57-60

# Drinking Water Bureau

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## Water System Details

| | | | |
|---|---|---|---|
| **Water System No. :** | NM3597233 | **Federal Type :** | NTNC |
| **Water System Name :** | MOUNT TAYLOR MILLWORKS | **State Type :** | NTNC |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 01-01-1976 |

### Points of Contact

| Name | Job Title | Type | Phone | Address | Email |
|---|---|---|---|---|---|
| ALLEN, HARDY | null | AC | 505-287-9469 | PO Box 2307, MILAN, NM-87021 | Not Available |
| ALLEN, PAT | null | OW | 505-287-9469 | PO Box 2307, MILAN, NM-87021 | Not Available |

### Annual Operating Periods & Population Served

| Start Month | Start Day | End Month | End Day | Population Type | Population Served |
|---|---|---|---|---|---|
| 1 | 1 | 12 | 31 | NT | 65 |

### Service Connections

| Type | Count |
|---|---|
| CB | 1 |

### Sources of Water

| Name | Type Code | Status |
|---|---|---|
| WELL # 1 | WL | A |

### Service Areas

| Code | Name |
|---|---|
| NT | INDUSTRIAL/AGRICULTURAL |

### Water Purchases

| Seller Water System No. | Water System Name | Seller Water Type | Purchase Date | Seller Facility Type | Seller State Asgn ID No. | Buyer Facility Type | Buyer State Asgn ID No. |
|---|---|---|---|---|---|---|---|

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# Drinking Water Bureau

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| | | | |
|---|---|---|---|
| **Water System No. :** | NM3597233 | **Federal Type :** | NTNC |
| **Water System Name :** | MOUNT TAYLOR MILLWORKS | **State Type :** | NTNC |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 01-01-1976 |
| **Lab Sample No. :** | RC200700154 | **Collection Date :** | 04-19-2007 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitori Period E Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | 900 | N | | 2.5 PCI/L | 6.6 PCI/L | 01-01-2004 | 12-31-20( |
| 4000 | GROSS ALPHA, EXCL. RADON & U | 900 | N | | 2.5 PCI/L | 6.6 PCI/L | 01-01-2004 | 12-31-20( |
| 4006 | COMBINED URANIUM | 200.8 | N | | 1 UG/L | 11. UG/L | 01-01-2004 | 12-31-20( |
| 4010 | COMBINED RADIUM (-226 & -228) | null | null | | null null | 0.23 PCI/L | | |
| 4010 | COMBINED RADIUM (-226 & -228) | null | null | | null null | 0.23 PCI/L | | |
| 4020 | RADIUM-226 | 903.1 | N | | 0.01 PCI/L | 0.09 PCI/L | 01-01-2004 | 12-31-20( |
| 4020 | RADIUM-226 | 903.1 | N | | 0.01 PCI/L | 0.09 PCI/L | 01-01-2004 | 12-31-20( |
| 4030 | RADIUM-228 | 904.0 | N | | 0.19 PCI/L | 0.14 PCI/L | 01-01-2004 | 12-31-20( |
| 4030 | RADIUM-228 | 904.0 | N | | 0.19 PCI/L | 0.14 PCI/L | 01-01-2004 | 12-31-20( |
| 4100 | GROSS BETA PARTICLE ACTIVITY | 900 | N | | 1.9 PCI/L | 10.7 PCI/L | 01-01-2004 | 12-31-20( |
| 4100 | GROSS BETA PARTICLE ACTIVITY | 900 | N | | 1.9 PCI/L | 10.7 PCI/L | 01-01-2004 | 12-31-20( |

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|---|---|---|---|
| **Water System No. :** | NM3597233 | **Federal Type :** | NTNC |
| **Water System Name :** | MOUNT TAYLOR MILLWORKS | **State Type :** | NTNC |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 01-01-1976 |
| **Lab Sample No. :** | RC200100657 | **Collection Date :** | 09-18-2001 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.6 PCI/L | 2.8 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 2.6 PCI/L | 2.8 PCI/L | | |
| 4020 | RADIUM-226 | null | Y | MRL | 0.02 PCI/L | null | | |
| 4020 | RADIUM-226 | null | Y | MRL | 0.02 PCI/L | null | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.7 PCI/L | 7.1 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.7 PCI/L | 7.1 PCI/L | | |

**Total Number of Records Fetched = 6**

# Drinking Water Bureau

## Non-Coliform Sample Results

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|---|---|---|---|
| **Water System No. :** | NM3597233 | **Federal Type :** | NTNC |
| **Water System Name :** | MOUNT TAYLOR MILLWORKS | **State Type :** | NTNC |
| **Principal County Served :** | CIBOLA | **Primary Source :** | GW |
| **Status :** | A | **Activity Date :** | 01-01-1976 |
| **Lab Sample No. :** | RC200200319 | **Collection Date :** | 07-09-2002 |

| Analyte Code | Analyte Name | Method Code | Less than Indicator | Level Type | Reporting Level | Concentration level | Monitoring Period Begin Date | Monitorin Period En Date |
|---|---|---|---|---|---|---|---|---|
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.7 PCI/L | 10.5 PCI/L | | |
| 4000 | GROSS ALPHA, EXCL. RADON & U | null | N | | 1.7 PCI/L | 10.5 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .08 PCI/L | | |
| 4020 | RADIUM-226 | null | N | | 0.02 PCI/L | .08 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.4 PCI/L | 5.8 PCI/L | | |
| 4100 | GROSS BETA PARTICLE ACTIVITY | null | N | | 1.4 PCI/L | 5.8 PCI/L | | |

**Total Number of Records Fetched = 6**

Team 1

Master Sample Log

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | SLD Bar Code | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-00 | 403600 | 250ml | pH | Field Blank | N | Ice | 3/31/09 | 1039 | 2424855 | |
| SMC-00 | 403601 | 1 Liter | Diss Anions/TDS | Field Blank | Y | Ice | | | | |
| SMC-00 | 403602 | 1 Liter | Nitrate/Nitrite | Field Blank | N | Ice/H2SO4 | | | | |
| SMC-00 | 403603 | 1 Liter | Total Metals | Field Blank | N | Ice/HNO3 | | | | |
| SMC-00 | 403604 | 1 Liter | Diss Metals | Field Blank | Y | Ice/HNO3 | | | | |
| SMC-01 | 403605 | 250 ml | pH | Field Sample | N | Ice | 3/31/09 | 1335 | 2424856 | |
| SMC-01 | 403606 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-01 | 403607 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-01 | 403608 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-01 | 403609 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-02 | 403610 | 250ml | pH | Field Sample | N | Ice | | | | |
| SMC-02 | 403611 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-02 | 403612 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-02 | 403613 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-02 | 403614 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-03 | 403615 | 250 ml | pH | Field Sample | N | Ice | 3/31/09 | 1050 | 2424857 | |
| SMC-03 | 403616 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-03 | 403617 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-03 | 403618 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-03 | 403619 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-04 | 403620 | 250ml | pH | Field Sample | N | Ice | 3/31/09 | 1224 | 2424858 | |
| SMC-04 | 403621 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-04 | 403622 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-04 | 403623 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-04 | 403624 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-05 | 403625 | 250 ml | pH | Field Sample | N | Ice | 3/31/09 | 1404 | 2424859 | |
| SMC-05 | 403626 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-05 | 403627 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-05 | 403628 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-05 | 403629 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-06 | 403630 | 250ml | pH | Field Blank | N | Ice | 4/1/09 | 1223 | 2424874 SMC-06 | |
| SMC-06 | 403631 | 1 Liter | Diss Anions/TDS | Field Blank | Y | Ice | | | | |
| SMC-06 | 403632 | 1 Liter | Nitrate/Nitrite | Field Blank | N | Ice/H2SO4 | | | | |
| SMC-06 | 403638 | 1 Liter | Total Metals | Field Blank | N | Ice/HNO3 | | | | |
| SMC-06 | 403634 | 1 Liter | Diss Metals | Field Blank | Y | Ice/HNO3 | | | | |

**Team 1**

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | SLD Bar Code | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-07 | 403635 | 250 ml | pH | Field Sample | N | Ice | 4/1/09 | 0955 | 2424875 SMC 07 | |
| SMC-07 | 403636 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-07 | 403637 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-07 | 403638 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-07 | 403639 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-08 | 403640 | 250ml | pH | Field Sample | N | Ice | 3/30/09 | 1250 | 2424860 | |
| SMC-08 | 403641 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-08 | 403642 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-08 | 403643 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-08 | 403644 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-09 | 403645 | 250 ml | pH | Field Sample | N | Ice | 3/30/09 | 1505 | 2424861 | |
| SMC-09 | 403646 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-09 | 403647 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-09 | 403648 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-09 | 403649 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-10 | 403650 | 250ml | pH | Field Sample | N | Ice | 3/30/09 | 1432 | 2424862 | |
| SMC-10 | 403651 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-10 | 403652 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-10 | 403653 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-10 | 403654 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-11 | 403655 | 250 ml | pH | Field Sample | N | Ice | 3/31/09 | 1000 | 2424863 | |
| SMC-11 | 403656 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-11 | 403657 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-11 | 403658 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-11 | 403659 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-12 | 403660 | 250 ml | pH | MS/MSD | N | Ice | 3/31/09 | 1050 | 2424864 | |
| SMC-12 | 403661 | 250 ml | pH | MS/MSD | N | Ice | | | | |
| SMC-12 | 403662 | 1 Liter | Diss Anions/TDS | MS/MSD | Y | Ice | | | | |
| SMC-12 | 403663 | 1 Liter | Diss Anions/TDS | MS/MSD | Y | Ice | | | | |
| SMC-12 | 403664 | 1 Liter | Nitrate/Nitrite | MS/MSD | N | Ice/H2SO4 | | | | |
| SMC-12 | 403665 | 1 Liter | Nitrate/Nitrite | MS/MSD | N | Ice/H2SO4 | | | | |
| SMC-12 | 403666 | 1 Liter | Total Metals | MS/MSD | N | Ice/HNO3 | | | | |
| SMC-12 | 403667 | 1 Liter | Total Metals | MS/MSD | N | Ice/HNO3 | | | | |
| SMC-12 | 403668 | 1 Liter | Diss Metals | MS/MSD | Y | Ice/HNO3 | | | | |
| SMC-12 | 403669 | 1 Liter | Diss Metals | MS/MSD | Y | Ice/HNO3 | | | | |

**Team 1**

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | SLD Bar Code | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-37 | 403795 | 250ml | pH | 8/4/07 | N | Ice | | | | |
| SMC-37 | 403796 | 1 Liter | Diss Anions/TDS | | Y | Ice | | | | |
| SMC-37 | 403797 | 1 Liter | Nitrate/Nitrite | | N | Ice/H2SO4 | | | | |
| SMC-37 | 403798 | 1 Liter | Total Metals | | N | Ice/HNO3 | | | | |
| SMC-37 | 403799 | 1 Liter | Diss Metals | JW | 8/4/09 | Ice/HNO3 | | | | |
| SMC-38 | 403800 | 250ml | pH | | N | Ice | | | | |
| SMC-38 | 403801 | 1 Liter | Diss Anions/TDS | | Y | Ice | | | | |
| SMC-38 | 403802 | 1 Liter | Nitrate/Nitrite | | N | Ice/H2SO4 | | | | |
| SMC-38 | 403803 | 1 Liter | Total Metals | | N | Ice/HNO3 | | | | |
| SMC-38 | 403804 | 1 Liter | Diss Metals | | Y | Ice/HNO3 | | | | |
| SMC-39 | 403805 | 250ml | pH | JW | N | Ice | | | | |
| SMC-39 | 403806 | 1 Liter | Diss Anions/TDS | | Y | Ice | | | | Isotopes only |
| SMC-39 | 403807 | 1 Liter | Nitrate/Nitrite | 8/4/07 | N | Ice/H2SO4 | | | | |
| SMC-39 | 403808 | 1 Liter | Total Metals | | N | Ice/HNO3 | | | | |
| SMC-39 | 403809 | 1 Liter | Diss Metals | | Y | Ice/HNO3 | | | | |
| SMC-40 | 403810 | 250ml | pH | | N | Ice | | | | |
| SMC-40 | 403811 | 1 Liter | Diss Anions/TDS | 8/4/07 | Y | Ice | | | | |
| SMC-40 | 403812 | 1 Liter | Nitrate/Nitrite | | N | Ice/H2SO4 | | | | |
| SMC-40 | 403813 | 1 Liter | Total Metals | | N | Ice/HNO3 | | | | |
| SMC-40 | 403814 | 1 Liter | Diss Metals | | Y | Ice/HNO3 | | | | |

**Team 1**

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | SLD Bar Code | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-30 | 403760 | 250 ml | pH | Field Sample | N | Ice | 4/2/09 | 0945 | 2424884 | |
| SMC-30 | 403761 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-30 | 403762 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-30 | 403763 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-30 | 403764 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-31 | 403765 | 250 ml | pH | Field Sample | N | Ice | 4/2/09 | 1129 | 2424883 | |
| SMC-31 | 403766 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-31 | 403767 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-31 | 403768 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-31 | 403769 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-32 | 403770 | 250ml | pH | Field Sample | N | Ice | 4/1/09 | 1322 | 2424881 smc 32 | |
| SMC-32 | 403771 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-32 | 403772 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-32 | 403773 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-32 | 403774 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-33 | 403775 | 250 ml | pH | Field Sample | N | Ice | 4/1/09 | 1213 | 2424879 smc 33 | |
| SMC-33 | 403776 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-33 | 403777 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-33 | 403778 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-33 | 403779 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-34 | 403780 | 250ml | pH | Field Duplicate | N | Ice | 4/1/09 | 1105 | 2424880 smc 34 | |
| SMC-34 | 403781 | 1 Liter | Diss Anions/TDS | Field Duplicate | Y | Ice | | | | |
| SMC-34 | 403782 | 1 Liter | Nitrate/Nitrite | Field Duplicate | N | Ice/H2SO4 | | | | |
| SMC-34 | 403783 | 1 Liter | Total Metals | Field Duplicate | N | Ice/HNO3 | | | | |
| SMC-34 | 403784 | 1 Liter | Diss Metals | Field Duplicate | Y | Ice/HNO3 | | | | |
| SMC-35 | 403785 | 250ml | pH | Field Duplicate | N | Ice | 3/31/09 | 1000 | 2424872 | |
| SMC-35 | 403786 | 1 Liter | Diss Anions/TDS | Field Duplicate | Y | Ice | | | | |
| SMC-35 | 403787 | 1 Liter | Nitrate/Nitrite | Field Duplicate | N | Ice/H2SO4 | | | | |
| SMC-35 | 403788 | 1 Liter | Total Metals | Field Duplicate | N | Ice/HNO3 | | | | |
| SMC-35 | 403789 | 1 Liter | Diss Metals | Field Duplicate | Y | Ice/HNO3 | | | | |
| SMC-36 | 403790 | 250ml | pH | Field Duplicate | N | Ice | 3/31/09 | 1615 | 2424873 | |
| SMC-36 | 403791 | 1 Liter | Diss Anions/TDS | Field Duplicate | Y | Ice | | | | |
| SMC-36 | 403792 | 1 Liter | Nitrate/Nitrite | Field Duplicate | N | Ice/H2SO4 | | | | |
| SMC-36 | 403793 | 1 Liter | Total Metals | Field Duplicate | N | Ice/HNO3 | | | | |
| SMC-36 | 403794 | 1 Liter | Diss Metals | Field Duplicate | Y | Ice/HNO3 | | | | |

Team 1

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | S | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-23 | 403725 | 250 ml | pH | Field Sample | N | Ice | 3/30/09 | 1421 | 2424868 | |
| SMC-23 | 403726 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-23 | 403727 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-23 | 403728 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-23 | 403729 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-24 | 403730 | 250ml | pH | Field Sample | N | Ice | 3/30/09 | 1246 | 2424869 | |
| SMC-24 | 403731 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-24 | 403732 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-24 | 403733 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-24 | 403734 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-25 | 403735 | 250 ml | pH | Field Sample | N | Ice | 3/30 | 1617 | 2424870 | |
| SMC-25 | 403736 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-25 | 403737 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-25 | 403738 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-25 | 403739 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-26 | 403740 | 250ml | pH | Field Sample | N | Ice | 3/31/2009 | 1515 | 2424871 | |
| SMC-26 | 403741 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-26 | 403742 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-26 | 403743 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-26 | 403744 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-27 | 403745 | 250 ml | pH | Field Sample | N | Ice | | — | | |
| SMC-27 | 403746 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-27 | 403747 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-27 | 403748 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-27 | 403749 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-28 | 403750 | 250ml | pH | Field Sample | N | Ice | 4/2/09 | 1100 | 2424885 | |
| SMC-28 | 403751 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-28 | 403752 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-28 | 403753 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-28 | 403754 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-29 | 403755 | 250 ml | pH | Field Sample | N | Ice | | | | |
| SMC-29 | 403756 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-29 | 403757 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-29 | 403758 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-29 | 403759 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |

Team 1

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | SLD Bar Code | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-20 | 403705 | 250ml | pH | Field Sample | N | Ice | 3/31/09 | 0950 | 2424865 | |
| SMC-20 | 403706 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-20 | 403707 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-20 | 403708 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-20 | 403709 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-21 | 403710 | 250 ml | pH | Field Sample | N | Ice | 3/31/09 | 1115 | 2424866 | |
| SMC-21 | 403711 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-21 | 403712 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-21 | 403713 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-21 | 403714 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-22 | 403715 | 250ml | pH | MS/MSD | N | Ice | 3/31/08 | 1305 | 2424867 | |
| SMC-22 | 403716 | 250ml | pH | MS/MSD | N | Ice | | | | |
| SMC-22 | 403717 | 1 Liter | Diss Anions/TDS | MS/MSD | Y | Ice | | | | |
| SMC-22 | 403718 | 1 Liter | Diss Anions/TDS | MS/MSD | Y | Ice | | | | |
| SMC-22 | 403719 | 1 Liter | Nitrate/Nitrite | MS/MSD | N | Ice/H2SO4 | | | | |
| SMC-22 | 403720 | 1 Liter | Nitrate/Nitrite | MS/MSD | N | Ice/H2SO4 | | | | |
| SMC-22 | 403721 | 1 Liter | Total Metals | MS/MSD | N | Ice/HNO3 | | | | |
| SMC-22 | 403722 | 1 Liter | Total Metals | MS/MSD | N | Ice/HNO3 | | | | |
| SMC-22 | 403723 | 1 Liter | Diss Metals | MS/MSD | Y | Ice/HNO3 | | | | |
| SMC-22 | 403724 | 1 Liter | Diss Metals | MS/MSD | Y | Ice/HNO3 | | | | |

Team 1

| Station ID | Tag No. | Bottle | Analysis | Sample Type | Filtered | Preservation | Date | Time | SLD Bar Code | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| SMC-13 | 403670 | 250 ml | pH | Field Sample | N | Ice | 4/2/09 | 1305 | 2424901 | |
| SMC-13 | 403671 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-13 | 403672 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-13 | 403673 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-13 | 403674 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-14 | 403675 | 250ml | pH | Field Sample | N | Ice | 4/2/09 | 1030 | 2424882 | |
| SMC-14 | 403676 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-14 | 403677 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-14 | 403678 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-14 | 403679 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-15 | 403680 | 250 ml | pH | Equip Blank | N | Ice | 4/2/09 | 1500 ~~1448~~ | | |
| SMC-15 | 403681 | 1 Liter | Diss Anions/TDS | Equip Blank | Y | Ice | | | | |
| SMC-15 | 403682 | 1 Liter | Nitrate/Nitrite | Equip Blank | N | Ice/H2SO4 | | | | |
| SMC-15 | 403683 | 1 Liter | Total Metals | Equip Blank | N | Ice/HNO3 | | | | |
| SMC-15 | 403684 | 1 Liter | Diss Metals | Equip Blank | Y | Ice/HNO3 | | | | |
| SMC-16 | 403685 | 250ml | pH | Field Sample | N | Ice | 4/1/09 | 1125 | 2424876 SMC 16 | |
| SMC-16 | 403686 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-16 | 403687 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-16 | 403688 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-16 | 403689 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-17 | 403690 | 250 ml | pH | Field Sample | N | Ice | 4/1/09 | 1012 | 2424877 SMC 17 | |
| SMC-17 | 403691 | 1 Liter | Diss Anions/TDS | Field Sample | Y | Ice | | | | |
| SMC-17 | 403692 | 1 Liter | Nitrate/Nitrite | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-17 | 403693 | 1 Liter | Total Metals | Field Sample | N | Ice/HNO3 | | | | |
| SMC-17 | 403694 | 1 Liter | Diss Metals | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-18 | 403695 | 250ml | pH | Field Sample | N | Ice | 4/1/09 | 1155 | 2424878 SMC 18 | |
| SMC-18 | 403696 | 1 Liter | pH ~~Diss Anions/TDS~~ | Field Sample | Y | Ice | | | | |
| SMC-18 | 403697 | 1 Liter | ~~Nitrate/Nitrite~~ DA | Field Sample | N | Ice/H2SO4 | | | | |
| SMC-18 | 403698 | 1 Liter | ~~Total Metals~~ DA | Field Sample | N | Ice/HNO3 | | | | |
| SMC-18 | 403699 | 1 Liter | ~~Diss Metals~~ NO3 | Field Sample | Y | Ice/HNO3 | | | | |
| SMC-~~19~~ 18 | 403700 | 250 ml | ~~pH~~ NO3 | Equip Blank | N | Ice | | | | |
| SMC-~~18~~ 18 | 403701 | 1 Liter | ~~Diss Anions/TDS~~ TM | Equip Blank | Y | Ice | | | | |
| SMC-~~19~~ 18 | 403702 | 1 Liter | ~~Nitrate/Nitrite~~ TM | Equip Blank | N | Ice/H2SO4 | | | | |
| SMC-~~19~~ 18 | 403703 | 1 Liter | Diss ~~Total~~ Metals | Equip Blank | N | Ice/HNO3 | | | | |
| SMC-~~19~~ 18 | 403704 | 1 Liter | Diss Metals | Equip Blank | Y | Ice/HNO3 | | | | |

| Sample ID | QA/QC sample | Well ID | LAT (NAD83) | LON (NAD83) | Owner's Name | Contact Name | Additional contact | Water Level (ft-BGS) | Well Depth (ft) | Pump & Discharge Type | Notes | Isotope samples Collected ? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMC-00 | FB | | | | | | | | | | **Field Blank** to be collected at SMC-01 well location | NA |
| SMC-01 | | HMC-951 | 35.24748000 | -107.92398100 | Homestake Mining Co. | Al Cox | Adrian Venable | | | Irrigation well near BWDS entrance (south) | Corresponds to BWSI-34 sample location; | Yes |
| SMC-03 | | Milan-DOM | 35.20425100 | -107.89779700 | City of Milan | Ben Chavez | | | | Residence well; 3/4" MHT spigot | | No |
| SMC-04 | | D Letgate | 35.20644906 | -107.87140245 | Deborah Letgrate | Owner | | | 340 | Residence well; 3/4" MHT spigot | MOA well contact | No |
| SMC-05 | | G Zeller | 35.20420379 | -107.87292451 | Gae Zeller | Owner | | | 180 | Residence well; 3/4" MHT spigot | MOA well contact | No |
| SMC-06 | FB | | | | | | | | | | **Field Blank** to be collected at SMC-07 well location | NA |
| SMC-07 | | M Reichle | 35.44245970 | -107.82332929 | Mervin Reichle | Owner | | | 1250 | Residence well; 3/4" MHT spigot | Water fair contact | No |
| SMC-08 | | | 35.26671357 | -107.83545097 | Justin Barris | Owner | | | | Residence well; 3/4" MHT spigot | Well closest to residence | Yes |
| SMC-09 | | RM Elkins-2 | 35.23852000 | -107.78490200 | Roy-Mark Elkins | Owner | | | | Livestock well; 1 1/4" steel bibb w/poly tubing | | No |
| SMC-10 | | HMC-914 | 35.27773900 | -107.83082400 | Roy-Mark Elkins | Owner | | 42 | 93 | No pump; open well head | Collected sample w/SOS mega-monsoon pump | Yes |
| SMC-11 | | HMC-920 | 35.27693900 | -107.84418000 | Homestake Mining Co. | Al Cox | Adrian Venable | 33 | | Discharge fitting/type unknown | Check w/Adrian Venable about discharge specs; U-total: 200 ug/L | No |
| SMC-12 | | Kit South-1 | 35.28944300 | -107.83951500 | Kit South | Owner | | 26 | 81 | Windmill; electric pump; collect at discharge on top of tank | HMC-950; U-total:140 ug/L | No |
| SMC-12 | MS/MSD | | | | | | | | | | **MS/MSD associated w/SMC-12**; use same sample ID & time | NA |
| SMC-13 | | HMC-921 | 35.27548193 | -107.85065211 | Homestake Mining Co. | Al Cox | Adrian Venable | 39 | 73 | No pump; open well head | Collected sample w/SOS mega-monsoon pump; U-total: 220 ug/L | Yes |
| SMC-14 | | HMC-922 | 35.27519400 | -107.85929400 | Homestake Mining Co. | Al Cox | Adrian Venable | 51 | 96 | No pump; open well head | Collected sample w/SOS mega-monsoon pump | No |
| SMC-15 | EB | | | | | | | | | | **Equipment blank;** Decon & collect equipment rinsate after sampling w/SOS mega-monsoon pump at SMC-13 | NA |
| SMC-16 | | Schmitt-6 | 35.34800600 | -107.73715000 | Robert Schmitt | Owner | | | | Residence well; 3/4" MHT spigot | | No |
| SMC-17 | | Schmitt-8 | 35.35755700 | -107.80773300 | Robert Schmitt | Owner | | 65.5 | >400 | Discharge fitting/type unknown | | No |
| SMC-18 | | Schmitt-9 | 35.34829000 | -107.80319700 | Robert Schmitt | Owner | | 82.75 | ~96 | No pump; open well head | Close to U-mine adit;Collected sample w/SOS mega-monsoon pump | Yes |
| SMC-18 | MS/MSD | | | | | | | | | | **MS/MSD associated w/SMC-18;** use same sample ID & time | NA |
| SMC-20 | | Marquez-1 | 35.34902900 | -107.77978100 | Melvin Marquez | Owner | | 200 | 478 | 3/4" MHT spigot | Strathmore-111; Sample RH08-0055; U-total: 62.5 ug/L | Yes |
| SMC-21 | | Marquez-2 | 35.36355100 | -107.76920200 | Melvin Marquez | Owner | | | | Livestock well; 1 1/4" steel bibb w/poly tubing | | Yes |
| SMC-22 | | Marquez-3 | 35.32518500 | -107.82638400 | Melvin Marquez | Owner | | | | Livestock well; 1 1/4" PVC | Located near big rock outcrop in Poison Canyon | No |
| SMC-22 | MS/MSD | | | | | | | | | | **MS/MSD associated w/SMC-22;** use same sample ID & time | NA |
| SMC-23 | | B-1636 | 35.34515200 | -107.78605642 | Mike Garcia | Owner | | 190 | 220 | Residence well; 3/4" MHT spigot | Well serves Jay's Bar | No |
| SMC-24 | | Garcia-2 | 35.34458600 | -107.78513600 | Mike Garcia | Owner | | 86 | 170 | Residence well; 3/4" MHT spigot | Strathmore-138; Sample RH08-0074; U-total: 35 ug/L | Yes |
| SMC-25 | | M Sandoval-1 | 35.34713100 | -107.78334000 | Marcella Sandoval | Mike Garcia | | | | Residence well; 3/4" MHT spigot | | No |
| SMC-26 | | M Sandoval-2 | 35.34658400 | -107.77466600 | Marcella Sandoval | Mike Garcia | | 88 | 130 | Discharge fitting/type unknown; covered w/debris | Strathmore-115; Sample RH08-0069; U-total: 170 ug/L | Yes |
| SMC-28 | | PR Sandoval | 35.34878676 | -107.76743364 | Phillip R Sandoval | Owner | | 520 | 590 | Residence well; 3/4" MHT spigot | Water fair contact | Yes |
| SMC-30 | | CT Marquez | 35.33670592 | -107.65423117 | Cathy Tammy Marquez | Owner | | | | Residence well; 3/4" MHT spigot | Water fair contact; CT Marquez & S Kinsman share same well | No |
| SMC-31 | | E Chavez | 35.33506441 | -107.63822618 | Amilia Chavez | Owner | | | | Residence well; 3/4" MHT spigot | Water fair contact | No |
| SMC-32 | | Schmitt-1 | 35.35452000 | -107.79461300 | Robert Schmitt | Owner | | | | Residence well; 3/4" MHT spigot | Pump set at ~200' | Yes |
| SMC-33 | | Schmitt-2 | 35.32145500 | -107.81758600 | Robert Schmitt | Owner | | | 231 | Livestock well; 1 1/4" steel pipe - open end | | Yes |
| SMC-34 | | Schmitt-3 | 35.33265400 | -107.80274300 | Robert Schmitt | Owner | | | 130 | Livestock well; 1 1/4" steel bibb w/poly tubing | | No |
| SMC-35 | FD | | | | | | | | | | **Field Duplicate assoc.w/SMC-11;** indicate sample time as 1 hour later | No |
| SMC-36 | FD | | | | | | | | | | **Field Duplicate assoc.w/SMC-26;** indicate sample time as 1 hour later | [illegible] |
| SMC-39 | | NMEID-1 | 35.34677074 | -107.77579651 | Marcella Sandoval | Owner | | | | No pump; open well head | Easternmost well; Low yield - Isotopes only. | [illegible] |

Well Sampling Field Data Sheet

| Well Number: SMC-01 (HMC-951) | Date: 3/31/09 |
|---|---|
| Field Crew: Sabino Rivera Phyllis Bustamante | Site: SMC |

Well Depth (ft.): ______
DTW (ft.) ______
Depth of screen (ft.): ______
Well Diameter (in.) ______
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1315 | | | | 6.94 | 14.03 | 1.56 | 202.8 | 4.48 |
| 1320 | | | | 6.84 | 14.03 | 1.559 | 205.2 | 4.34 |
| 1325 | | | | 6.79 | 14.03 | 1.559 | 201.5 | 4.36 |
| 1330 | | | | 6.82 | 14.02 | 1.56 | 199.3 | 4.39 |
| 1335 | | | | 6.81 | 14.06 | 1.56 | 196.2 | 4.4 |
| | | | | | | | | |
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| | | | | | | | | |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: T metals, D metals, $NO_2+NO_3$, TDS, pH, ~~isotopes~~, rad
Notes:

Sample Date/Time: 3/31/09 / 1335
Signed/Sampler: Phyllis Bustamante

Well Sampling Field Data Sheet

| Well Number: SMC-03 | Date: 03/31/2009 |
|---|---|
| Field Crew: Mayerson + Pasteris | Site: SMC Basin SI |

| | | |
|---|---|---|
| Well Depth (ft.): | 140-150' | (andy - com) |
| DTW (ft.) | | |
| Depth of screen (ft.): | | |
| Well Diameter (in.) | | |
| Placement of Pump (ft.) | | |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 0948 | | | | 7.30 | 11.45 | 1.489 | 170.6 | 9.16 |
| 0948 | | | | 7.27 | 13.12 | 1.500 | 162.6 | 7.53 |
| 0952 | | | | 7.30 | 12.85 | 1.500 | 158.2 | 4.45 |
| 0957 | | | | 7.32 | 12.96 | 1.495 | 153.6 | 6.76 |
| 1004 | | | | 7.33 | 12.46 | 1.491 | 152.7 | 4.64 |
| ~~1004~~ | | | | | | | | |
| 1010 | | | | 7.27 | 12.89 | 1.486 | 152.2 | 5.55 |
| 1020 | | | | 7.54 | 12.30 | ~~1.37~~ 1.413 | 137.1 | 7.34 |
| 1029 | | | | 7.37 | 12.97 | 1.464 | 132.6 | 4.76 |
| 1032 | | | | 7.28 | 1263 | 1.482 | 137.0 | 5.09 |
| 1039 | | | | 7.29 | 13.28 | 1.481 | 130.2 | 4.55 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters:

Notes: Change sampling point from split hydrant on backside of residence to hydrant on adjacent garage @ 1010

* SMC-00: field blank collected @ 1039 on location

Sample Date/Time: 03/31/09 @ 1050

Signed/Sampler: [signature]

3

Well Sampling Field Data Sheet

| Well Number: SMC-04 | Date: 03/31/2009 |
|---|---|
| Field Crew: Mayerson + Pasteris | Site: SMC Basin LUS |

| | |
|---|---|
| Well Depth (ft.): | 340' |
| DTW (ft.) | |
| Depth of screen (ft.): | |
| Well Diameter (in.) | |
| Placement of Pump (ft.) | |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1123 | start purge | | | 1.3 gpm | | | | |
| 1129 | | 1.3 | 7.8 | 8.71 | 10.72 | 1.286 | 90.8 | 1.09 |
| 1134 | | | 14.3 | 8.70 | 10.08 | 1.307 | 80.5 | 1.01 |
| 1144 | | | 27.3 | 8.58 | 10.79 | 1.303 | 56.5 | 0.96 |
| 1154 | | | 40.3 | 8.61 | 11.37 | 1.303 | 40.5 | 0.97 |
| 1204 | | | 53.3 | 8.61 | 12.63 | 1.284 | 26.2 | 1.21 |
| 1214 | | | 66.3 | 8.57 | 12.79 | 1.291 | 25.2 | 1.29 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: CLP, SLD

Notes: Sample taken at hydrant @ NW corner of residence

Sample Date/Time: 03/31/2009 @ 1224

Signed/Sampler: David C Mayerson

(4)

Well Sampling Field Data Sheet

| Well Number: SMC-05 | Date: 03/31/2009 |
|---|---|
| Field Crew: Posteris + Mayerson | Site: SMC Basin LUS |

Well Depth (ft.): 180
DTW (ft.)
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1323 | | ~1 | Start purge | | | | | |
| 1328 | | 1.5 | | 8.85 | 14.82 | 1.134 | 105.6 | 3.35 |
| 1336 | | | 17 | 8.83 | 15.09 | 1.125 | 99.9 | 3.27 |
| 1346 | | | 22 | 8.82 | 14.94 | 1.130 | | 3.27 |
| 1356 | | | | 8.81 | 15.09 | 1.126 | 93.3 | 3.24 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: CLP, SLD
Notes:

Sample Date/Time: 03/31/2009 @ 1404
Signed/Sampler: [signature]

NMED Well Sampling Form

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Well Sampling Field Data Sheet

| Well Number: SMC-07 | Date: 4/1/09 |
|---|---|
| Field Crew: Rivera + Mayerson | Site: SMC |

| | |
|---|---|
| Well Depth (ft.): | ~1250 |
| DTW (ft.) | |
| Depth of screen (ft.): | |
| Well Diameter (in.) | |
| Placement of Pump (ft.) | |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | No purge - sampled from hydrant | | | | | | |
| | | fed from tanks on hillside | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters:

Notes:

Sample Date/Time: 04/01/09 @ 0955

Signed/Sampler: [signature]

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Well Sampling Field Data Sheet

| Well Number: SMC-08 (Burris well) | Date: 3/30/09 |
|---|---|
| Field Crew: Jetter / Dixon | Site: |

Well Depth (ft.): ______
DTW (ft.) ______
Depth of screen (ft.): ______
Well Diameter (in.) ______
Placement of Pump (ft.)

**Field Parameters**

Rental YSI 556 Ser# 04J16163

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. mS/cm ~~(umhos/cm)~~ | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1205 | Begin | pumping | | | | | | |
| 12:10 | Shut off to reconnect hose | | | | | | | |
| 12:13 | Start | pumping | | | | | | |
| 12:20 | | 2.0 | ~25 | 8.44 | 11.60 | 0.729 | 113.8 | 3.81 |
| 12:25 | | ~~2.0~~ | ~~35~~ | 8.39 | 11.44 | 0.728 | 109.7 | 3.74 |
| | | Flow decrease to ~ 0.25 gpm | | | | | increased | |
| | | back to 2.25 gpm | | | | | | |
| 12:30 | | 2.25 | ~45 | 8.38 | 12.58 | 0.728 | 112.8 | 4.63 |
| 12:35 | | 2.25 | 56 | 8.38 | 12.27 | 0.728 | 112.4 | 4.32 |
| 12:40 | | | ~67 | 8.36 | 12.74 | 0.727 | 116.5 | 5.01 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: pH Dissolved metals, $NO_2/NO_3$ for CLP
Notes: 2 gals Ur α β method 803 for SLD
Ur isotopes $O_2$ $H^2$ for UNM

Sample Date/Time: 3/30/09 @ 12:50
Signed/Sampler: [signature]

2

Well Sampling Field Data Sheet

| Well Number: SMC-09 | Date: 3/30/09 |
|---|---|
| Field Crew: Ortelli / Rivera | Site: QMB / SMC-S1 |
| Well Depth (ft.): ______<br>DTW (ft.) ______<br>Depth of screen (ft.): ______<br>Well Diameter (in.) ______<br>Placement of Pump (ft.) | Livestock well<br>1½" hose bibb discharge |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (mmhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1450 | | 15.0 | 50 | 7.31 | 12.93 | 0.895 | 74.7 | 25.8 |
| 1453 | | ↓ | 95 | 7.36 | 12.81 | 0.890 | 81.9 | 61.3 |
| 1458 | | | 170 | 7.53 | 12.70 | 0.895 | 84.4 | 64.1 |
| 1501 | | | 230 | 7.47 | 12.89 | 0.897 | 91.0 | 66.1 |
| 1504 | | | 275 | 7.47 | 12.77 | 0.898 | 92.8 | 70.7 |
| 1505 | – Collected GW samples for EPA-R6 & SLD | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | AKO | | | | |
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**Observations**

Color: Clear    Other (describe):

Odor: None    Low    Medium    High    Very Strong    H2S    Fuel-Like

Turbidity: None    Low    Medium    High

Sample Parameters:

Notes: High-flow rate

Sample Date/Time: 3/30/09, 1505

Signed/Sampler: John Ortelli

8

Well Sampling Field Data Sheet

| Well Number: SMC-10 (HMC-914) | Date: 3/30/09 |
|---|---|
| Field Crew: Jetter / Dixon | Site: |

| | | |
|---|---|---|
| Well Depth (ft.): | 92.1 | pump - 505 mega monsoon |
| DTW (ft.) | 42.80 | |
| Depth of screen (ft.): | | |
| Well Diameter (in.) | 8" | |
| Placement of Pump (ft.) | 80' | |

**Field Parameters**

Rental YSI 556 Ser# 045 16163

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1325 | begin | purging | | | | | | |
| | | 1.0 | | | | | | |
| 1336 | 46' | " | | 7.99 | 13.0 °C | 2346 | -83.9 | 1.06 mg/L |
| 1342 | | " | 10gal | 8.16 | 13.05 | 2346 | -204.9 | 0.55 |
| 1352 | ± 52' | | 20gal | 8.07 | 13.17 | 2346 | -201.2 | 0.48 |
| 1402 | 54' | | ~~30~~25gal | 8.09 | 13.03 | 2345 | -232.9 | 0.32 |
| 1410 | 57' | | 35gal | 8.07 | 13.05 | 2343 | -219.9 | 0.27 |
| 1420 | 60' | | 45gal | 7.94 | 12.98 | 2341 | -195.3 | 0.16 |

**Observations**

Color: Clear Other (describe): start w/sediment FeO particles light green color

Odor: None Low Medium High Very Strong H2S Fuel-Like Some H2S odor

Turbidity: None Low Medium High

Sample Parameters: - take 1420 hrs parameters. 45-50 gallons purged.

Notes: water dark w/FeO particles when started (no screen)

SAMPLES FOR CLP, SLD, AND UNM ISOTOPES

Sample Date/Time: 03/30/2009 @ 1432 hrs

Signed/Sampler: Earle C. Dixon

-9

Well Sampling Field Data Sheet

| | |
|---|---|
| **Well Number:** SMC-~~#~~11 HMC-920 | **Date:** 3/31/09 |
| **Field Crew:** Sabino Rivera + Phyllis Bustamante | **Site:** HMC |

Well Depth (ft.): ______

DTW (ft.) ______

Depth of screen (ft.): ______

Well Diameter (in.) ______

Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 9:30 | | | | 6.78 | 12.61 | 3.54 | 213.1 | 0.33 |
| 9:35 | | | | 6.81 | 12.6 | 3.53 | 212.8 | 0.26 |
| 9:40 | | | | 6.82 | 12.58 | 3.53 | 212.7 | 0.28 |
| 9:45 | | | | 6.87 | 12.71 | 3.53 | 207 | 0.21 |
| 9:50 | | | | 6.90 | 12.58 | 3.53 | 210.6 | 0.20 |
| 9:55 | | | | 6.92 | 13.05 | 3.59 | 207.4 | 0.20 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: CLP, SCD, UNM

Notes:

Sample Date/Time: 3/31/09 ~~9:25~~ 10:00

Signed/Sampler:

SMC-35 duplicate to this sample

10

Well Sampling Field Data Sheet

| Well Number: HMC 950 - SMC 12 | Date: 3/31/09 |
|---|---|
| Field Crew: Sabino Rivera Phyllis Bustamante | Site: SMC |

Well Depth (ft.): __________

DTW (ft.) __________

Depth of screen (ft.): __________

Well Diameter (in.) __________

Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 10:50 | | | | 7.70 | 12.43 | 3.206 | 201 | 4.1 |
| | | | | | | | | |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: T metals, D metals, TDS, NO2 + NO3, pH, rad, isotopes

Notes: was not able to take ~~multip~~ multiple purge readings - well ran on windmill had to sit on top of 20 ft high tank to take sample from 3 inch pipe and drop down to surface. ~~#~~ Took sample prior to holding tank - straight from well

Sample Date/Time: 3/31/09 10:50

Signed/Sampler: Phyllis Bustamante

Well Sampling Field Data Sheet

11

| Well Number: HMC-921 | Date: 4-2-09 |
|---|---|
| Field Crew: Dixon / Rivera | Site: |

Well Depth (ft.):

DTW (ft.) 39.10

Depth of screen (ft.):

Well Diameter (in.) 6"

Placement of Pump (ft.) 65'

SMC-13

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1150 | | 0.5 | | | | | | |
| 1155 | | | | 7.03 | 12.79 | 2.874 | 113 | 0.88 |
| 1205 | 39.45 | " | 10gal | 6.74 | 13.19 | 2927 | 6.1 | 0.36 |
| 1218 | 39 | ~~.9~~ | | | 1310 | 2.911 | -3.6 | 0.64 |
| 1230 | 39.50 | 0.5gal | 23gal | 6.81 | 13.39 | 2925 | 4.6 | 0.15 |
| increase flow | to 1.0 GPM | SWL @ 39.62 | | | | | | |
| 1240 | 39.62 | 1.0 | 33gal | 6.75 | 13.51 | 2930 | 5.1 | 0.15 |
| 1250 | 39.65 | 1.0 | 43 " | 6.73 | 13.43 | 2919 | 23.8 | 0.15 |
| 1300 | 39.65 | | 53 | 6.83 | 13.52 | 2922 | 13.7 | 1.57 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters:

Notes:

Sample Date/Time: 4/2/09 1305

Signed/Sampler: S. Rivera

(12)

Well Sampling Field Data Sheet

| Well Number: ~~HMC-922~~ SMC-14 | Date: 4/02/09 |
|---|---|
| Field Crew: Rivera / Dixon | Site: Homestake SMC-14 |

Well Depth (ft.): 96'
DTW (ft.): (51') 50.72' on 4/2/09
Depth of screen (ft.):
Well Diameter (in.): 8-inch
Placement of Pump (ft.): None - Monsoon Set Pump @ 85'

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 0909 | | | | | | | | |
| 0912 | | .5 GPM | | 9.33 | 11.44 | 1.477 | 71.3 | 1.68 |
| 0922 | 56.02 | | | 9.35 | 11.61 | 1.496 | -8.4 | 0.49 |
| 0932 | 58.27 | " | 12.5 | 9.25 | 11.75 | 1.536 | -44.2 | 0.32 |
| 0945 | 60.68 | 1 GPM | 25.5 | 9.12 | 11.72 | 1.581 | -101.5 | 0.35 |
| 0956 | ~~63.21~~ | .5 GPM | 30.5 | 9.13 | 12.30 | 1.593 | -169.2 | 0.20 |
| 1004 | 63.21 | 0.5 GPM | | 8.97 | 11.96 | 1.615 | -191.7 | 0.17 |
| 1014 | 63.5 | 0.5 GPM | | 8.86 | 11.76 | 1.626 | -202.9 | 0.51 |
| 1024 | 63.95 | | 47 | 8.80 | 11.98 | 1.644 | -213.3 | 0.32 |
| 1030 | 64.10 | | | 8.76 | 11.80 | 1.643 | -222.5 | 0.17 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Observations: Pump Surging @ 1 GPM, lowered rate .5 GPM

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters:
Notes:

Sample Date/Time: 4-2-09 10:30
Signed/Sampler: S. Rivera

34 × 5 = 170

25 × .5 = 12.5

13

Well Sampling Field Data Sheet

| Well Number: SMC-16 (Schmitt-6) | Date: 4/1/09 |
|---|---|
| Field Crew: Garman / Peters / Ortelli | Site: SMC-8 |

Well Depth (ft.): ______
DTW (ft.) ______
Depth of screen (ft.): ______
Well Diameter (in.) ______
Placement of Pump (ft.) ______

Residential / Domestic well located in underground vault

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. uS/cm ~~(umhos/cm)~~ | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1100 | Start pumping through flow cell via pressure tank (~50 gal) | | | | | | | |
| 1108 | | 0.75 | 6.0 | 8.38 | 10.44 | 1224 | -228 | 0.45 |
| 1113 | | 1.5 | 13.5 | 8.30 | 10.43 | 1207 | -229.1 | 0.35 |
| 1118 | | | 21.0 | 8.10 | 10.53 | 1196 | -221.9 | 0.30 |
| 1123 | | | 28.5 | 8.10 | 10.50 | 1184 | -225.0 | 0.25 |
| 1125 | Collected GW samples: EPA-R6 + SLD | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | ABN 4/1/09 | | | | | |
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| | | | | | | | | |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters:
Notes: Pressure tank refilled @ 1115 (i.e. pump engaged)

Sample Date/Time: 4/1/09 1125
Signed/Sampler: J. Ortelli

(14)

Well Sampling Field Data Sheet

| Well Number: SMC-17 Schmidt 8 | Date: 4/1/09 |
|---|---|
| Field Crew: Steve Jetter Phyllis Bustamante | Site: SMC |

| | | |
|---|---|---|
| Well Depth (ft.): | | Rental YSI |
| DTW (ft.) | | |
| Depth of screen (ft.): | | |
| Well Diameter (in.) | | |
| Placement of Pump (ft.) | 600 ft. | |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 9:40 | | 8 gpm | | | | | | |
| 9:45 | | | | 7.9 | 12.70 | 1.97 | 152. | 4.06 |
| 9:50 | | | | 7.71 | 12.12 | 1.49 | 198.8 | 2.73 |
| 9:55 | | | | 7.74 | 13.93 | 1.972 | 210.24 | 2.76 |
| 10:00 | | | | 7.58 | 13.00 | 1.995 | 202 | 3.15 |
| 10:05 | | | | 7.57 | 13.00 | 1.98 | 196.02 | 3.24 |
| 10:10 | | | | 7.57 | 14.14 | 1.98 | 195 | 3.18 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None ~~Low~~ Medium High

Sample Parameters:

Notes: temp moving a lot may have been cold air temps

Sample Date/Time: 4/1/09 10:12

Signed/Sampler: Phyllis Bustamante

15

Well Sampling Field Data Sheet

| Well Number: SMC-18 Schmidt #9 | Date: 4/1/09 |
|---|---|
| Field Crew: Steve Jetter Phyllis Bustamante | Site: SMC |

| | | |
|---|---|---|
| Well Depth (ft.): | 162 | Pump on @ 11:10 |
| DTW (ft.) | 82.3 | |
| Depth of screen (ft.): | — | |
| Well Diameter (in.) | 6 inch | |
| Placement of Pump (ft.) | 95 | |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 11:15 | | .75 | | | | | | |
| 11:20 | | .5 | | 7.35 | 12.97 | 1.279 | 115.9 | 1.18 |
| 11:25 | | | 6 | 7.1 | 13.25 | 1.28 | 51.6 | 0.58 |
| 11:30 | | | 8.5 | 7.29 | 13.34 | 1.28 | 22.1 | 0.35 |
| 11:35 | | | 11 | 7.29 | 13.42 | 1.28 | -0.1 | 0.28 |
| 11:40 | | | 13.5 | 7.28 | 13.48 | 1.28 | -19.7 | 0.20 |
| 11:45 | | | 16.2 | 7.28 | 13.37 | 1.283 | -34.7 | 0.21 |
| 11:50 | | | 17.7 | 7.27 | 13.13 | 1.285 | -46.3 | 0.18 |
| 11:55 | | | 21 | 7.28 | 13.18 | 1.289 | -55.9 | 0.18 |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |

**Observations**

Color: Clear Other (describe): blackish

Odor: None Low Medium High Very Strong H2S Fuel-Like Sulfur smell

Turbidity: None Low Medium High

Sample Parameters: TM, DM, Anions, TDS, pH, isotope, RAD

Notes:

Sample Date/Time: 4/1/09 11:55

Signed/Sampler: Phyllis Bustamante

16

Well Sampling Field Data Sheet

| Well Number: SMC-20 (Marquez-1) | Date: 3/31/09 |
|---|---|
| Field Crew: Jetter / Ortelli | Site: San Mateo Creek ~~The Anaconda Bluewater uranium mill~~ SI |

Well Depth (ft.): 478 } According to owner
WL: 200
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.)

Field Parameters YSI-556 - 07E100009

| Time | | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | µS/cm Cond. ~~(umhos/cm)~~ | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 0920 | | 1.25 | 6.25 | 6.92 | 8.60 | 516 | 54.1 | 7.7 |
| 0925 | | | 12.5 | 6.99 | 11.55 | 560 | 13.4 | 5.4 |
| 0930 | | | 18.75 | 7.03 | 12.63 | 574 | -4.2 | 4.0 |
| 0935 | | | 25.0 | 7.04 | 13.12 | 581 | -9.3 | 3.3 |
| 0940 | | | 31.25 | 7.05 | 13.40 | 585 | -11.7 | 2.8 |
| 9:40 | Shut off flow at horse trough | | | | | | | |
| ~~9:45~~ 0945 | AEO 3/31/09 | 1.25 | 37.5 | 7.05 | 13.74 | 589 | -13.9 | 2.5 |
| 0950 | Collected GW samples: EPA-R6, SLD, & UNM. | | | | | | | |
| | | | | AEO 3/31/09 | | | | |

Observations

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: EPA-R6 series, SLD, & UNM Isotopes

Notes: Mr Marquez has a second tap turned on
Total flow likely 2x the recorded flow & Volume
Actual measured flow - 6 gpm

Sample Date/Time: 3/31/09 0950

Signed/Sampler: Jayla Ortelli

NMED Well Sampling Form

l Sampling Field Data Sheet

(17)

| l Number: Suc-21 (Marquez-2) | Date: 3/31/09 |
|---|---|
| d Crew: Jetter / Ortelli | Site: Suc-81 |

l Depth (ft.): ______
V (ft.) ______
th of screen (ft.): ______
l Diameter (in.) ______
ement of Pump (ft.)

**Field Parameters**

| ne | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (~~umhos~~/cm) µS/cm | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 3 | Start pumping livestock well ; total flow ~8 GPM | | | | | | | |
| 0 | | 8.0 | 40 | 6.93 | 12.49 | 2836 | 63.7 | 7.3 |
| 5 | | | 80 | 6.80 | 12.33 | 2829 | 73.9 | 5.6 |
| 02 | | | 136 | 6.90 | 12.36 | 2832 | 56.6 | 4.5 |
| 7 | | | 176 | 6.86 | 12.91 | 2867 | 57.2 | 2.8 |
| 2 | | ↓ | 216 | 6.84 | 12.96 | 2870 | 57.1 | 2.3 |
| 5 | Collected GW samples | | | | | | | |

AEO 3/31/09

**Observations**

or: Clear Other (describe):
r: None Low Medium High Very Strong H2S Fuel-Like
bidity: None Low Medium High
ple Parameters: EPA-R6 series, SLD, + UNM Isotopes
s: By-passing flow rate ~0.5 GPM through flow cell

Date/Time: 3/31/09, 1115
mpler: [signature] 3/31

Well Sampling Field Data Sheet

| Well Number: SMC-22 (Marquez #3) | Date: 3/31/09 |
|---|---|
| Field Crew: Jetter / Ortello | Site: |

Well Depth (ft.): ______
DTW (ft.) ______
Depth of screen (ft.): ______
Well Diameter (in.) ______
Placement of Pump (ft.)

stock well near "big rock" in Poison Canyon

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | uS/cm Cond. ~~(umhos/cm)~~ | ORP | D. (mg |
|---|---|---|---|---|---|---|---|---|
| 12:29 | begin | pumping | | | | | | |
| 1237 | | ~3.0 | | 9.32 | 16.56 | 716 | 52.7 | 49. |
| 12:45 | | | | 9.28 | 16.56 | 709 | 46.1 | 5. |
| 12:50 | | | | 9.28 | 16.57 | 709 | 43.7 | 5.4 |
| 12:55 | | | | 9.29 | 16.49 | 707 | 40.9 | 5.4 |
| 1300 | | | 90 | 9.29 | 16.56 | 707 | 40.2 | 5.5 |
| | | | | | | | | |
| 1305 | Begin | collecting | samples | | | | | |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S
Turbidity: None Low Medium High
Sample Parameters: EPA Region 6 lab Lab
Notes: By-pass ~0.6 GPM through flow cell
pump shutdown during sample c
back on @ 13:30 to finish
Sample Date/Time: 3/31/09 @ 1305
Signed/Sampler: [signature]

Sa
Notes
Sample D
Signed/Sa
NMED Well Sampl

Well Sampling Field Data Sheet

19

| Well Number: SMC-23 | Date: 3/30/09 |
|---|---|
| Field Crew: Pasteris/Carman | Site: Jangs Bar |

Well Depth (ft.): 220
DTW (ft.) 190
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.) NA - SP 160T

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1341 | | | | | | | | |
| 1346 | | ~1.0 | 5.0 | 7.02 | 10.67 | 3.083 | 106.0 | 0.46 |
| 1351 | | ~1.0 | 10.0 | 6.96 | 12.87 | 3.259 | 97.7 | 0.50 |
| 1356 | | ~1.0 | 15.0 | 6.97 | 12.80 | 3.249 | 95.3 | 0.45 |
| 1401 | | ~1.0 | 20.0 | 6.98 | 12.65 | 3.237 | 90.7 | ~~0.48~~ 0.42 |
| 1406 | | ~1.0 | 25.0 | 6.96 | 12.68 | 3.238 | 87.0 | 0.40 |
| 1411 | | ~1.0 | 30.0 | 6.97 | 12.64 | 3.236 | 82.0 | 0.37 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: CLP (pH, metals, TDS, nitrates), SLD (RAD), UNM (isotopes)
Notes: Faucet on pressure tank (Sampling Pt)

Sample Date/Time: 3/30/09 @ 1421
Signed/Sampler: [signature]

Cond. mS/cm

NMED Well Sampling Form

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Well Sampling Field Data Sheet

| Well Number: SMC-24 | Date: 3/30/09 |
|---|---|
| Field Crew: PASTERIS / GARMAN | Site: GRANTS URANIUM BELT |

| | |
|---|---|
| Well Depth (ft.): | 170 |
| DTW (ft.) | 86 |
| Depth of screen (ft.): | |
| Well Diameter (in.) | |
| Placement of Pump (ft.) | NA / SPIGOT |

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1146 | | ~1.3 | | | | | | |
| 1153 | | ~1.5 | 9 | 7.13 | 11.43 | 3.151 | 96.6 | 0.91 |
| 1158 | | ~1.5 | 16.5 | 7.11 | 12.68 | 3.240 | 79.1 | 0.89 |
| 1203 | | ~1.5 | 24.0 | 7.12 | 12.22 | 3.201 | 62.2 | 0.80 |
| 1208 | | ~1.5 | 31.5 | 7.11 | 11.79 | 3.169 | 55.0 | 0.81 |
| 1213 | | ~1.5 | 38.0 | 7.11 | 12.58 | 3.233 | 48.7 | 0.80 |
| 1218 | | ~1.5 | 45.5 | 7.10 | 12.17 | 3.204 | 44.5 | 0.80 |
| 1223 | | ~1.5 | 53.0 | 7.10 | 12.80 | 3.269 | 41.6 | 0.82 |
| 1228 | | ~1.5 | 60.0 | 7.11 | 12.53 | 3.242 | 40.8 | 0.78 |
| 1232 | | ~1.5 | 67.5 | 7.11 | 12.26 | 3.221 | 40.0 | 0.78 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: CLP (pH, METALS, TDS, NITRATES), SLD (RAD), UNM (ISOTOPES)

Notes:

Sample Date/Time: 3/30/09 @ 1246

Signed/Sampler: [signature]

21

Well Sampling Field Data Sheet

| Well Number: SMC-25 | Date: 3/30/09 |
|---|---|
| Field Crew: PASTORIS / GARMAN | Site: |

Well Depth (ft.):
DTW (ft.)
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.) NA - SPIGOT

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1534 | | | | | | | | |
| 1539 | | 5 | 25 | 7.08 | 13.08 | 3.307 | 96.0 | 0.65 |
| 1543 | | 5 | 45 | 7.08 | 13.05 | 3.305 | 94.3 | 0.63 |
| 1546 ~~1546~~ | | 5 | 60 | | | | | |
| 1555 | | 1 | 62 | 7.04 | 13.18 | 3.149 | 88.5 | 1.44 |
| 1558 | | 1 | 65 | 7.03 | 11.12 | 3.144 | 84.6 | 0.99 |
| 1601 | | 1 | 68 | 7.04 | 11.05 | 3.138 | 81.4 | 0.74 |
| 1604 | | 1 | 71 | 7.08 | 10.80 | 3.119 | 88.4 | 0.64 |
| 1607 | | 1 | 74 | 7.05 | 10.80 | 3.119 | 80.4 | 0.83 |
| 1610 | | 1 | 77 | 7.05 | 10.68 | 3.110 | 78.7 | 0.83 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: CLP (pH, METALS, TDS, NITRATES), SLD (RAD)
Notes: SEE FIELD BOOK FOR PURGING DETAILS

Sample Date/Time: 3/30/09 @ 1617
Signed/Sampler: [signature]

22

Well Sampling Field Data Sheet

| Well Number: SMC-26 (M. Sandoval stock well #2) | Date: 3/31/09 |
|---|---|
| Field Crew: Jetter/Ortelli | Site: |

Well Depth (ft.): 100 – According to Charlie Sandoval
DTW (ft.)
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | mS/cm Cond. ~~(umhos/cm)~~ | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1458 | Begin pumping | | | | | | | |
| 1500 | | 10 | 20 | 7.86 | 13.95 | 727 | 74.2 | 7.28 |
| 1505 | | ↓ | 70 | 7.68 | 13.72 | 720 | 70.5 | 7.29 |
| 1508 | | ↓ | 100 | 7.64 | 13.92 | 722 | 69.0 | 7.28 |
| 1510 | | ↓ | 120 | 7.64 | 13.69 | 721 | 68.1 | 7.29 |
| 1515 | Collected | Orig | Samples | | | | | |
| 1615 | Collected | Field | Duplicate | samples | | | | |

AE 3/31/09

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: EPA-R6, SLD
Notes: Historical U-total: 170 ug/L

* SMC-36 Field Duplicate: 1615

Sample Date/Time: 3/31/09, 1515
Signed/Sampler: Jayda Ortelli

23

Well Sampling Field Data Sheet

| Well Number: SMC-26 (M. Sandoval-2) | Date: 4/1/09 |
|---|---|
| Field Crew: Garman/Pastorn/Ortelli | Site: SMC-81 |

Well Depth (ft.): ~100

DTW (ft.)

Depth of screen (ft.):

Well Diameter (in.)

Placement of Pump (ft.)

Isotope sampling

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | mS/cm Cond. (~~umhos/cm~~) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 0942 | Start pumping | | ~10 GPM | | | | | |
| 0944 | | | 20 | 7.57 | 12.23 | 775 | 132.8 | 8.10 |
| 0947 | | | 50 | 7.52 | 13.02 | 786 | 135.5 | 7.24 |
| 0949 | | | 70 | 7.56 | 13.29 | 794 | 127.0 | 7.39 |
| 0953 | | | 110 | 7.54 | 13.38 | 795 | 121.0 | 7.25 |
| 0956 | | | 140 | 7.54 | 13.31 | 795 | 118.5 | 7.41 |
| 1000 | Collected UNM samples | | | | | | | |
| 1100 | Collected field duplicate | | | | SMC-36 | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | AEO 4/1/09 | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: UNM - Isotopes

Notes: Filtered using Geopump

Field duplicate SMC-36 @ 1100

Sample Date/Time: 4/1/09 @ 1000 4/1/09 1100 : FD

Signed/Sampler: Jayda Ortelli

NMED Well Sampling Form

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Well Sampling Field Data Sheet

| Well Number: SMC 28 | Date: 4/2/09 |
|---|---|
| Field Crew: David Mayerson Phyllis Bustamante | Site: SMC |

Well Depth (ft.):
DTW (ft.)
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.)

10:08 purge began
Rental YSI

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 10:08 | | | | | | | | |
| 10:10 | | | | 7.43 | 15.92 | 0.71 | 98.1 | 1.87 |
| 10:15 | | | | 7.50 | 12.21 | 0.75 | 102 | 1.37 |
| 10:20 | | | | 7.50 | 16.68 | 0.714 | 104.3 | 1.56 |
| 10:25 | | | | 7.51 | 16.67 | 0.704 | 103.6 | 1.65 |
| 10:30 | | | | 7.51 | 16.69 | 0.711 | 103.4 | 1.66 |
| 10:35 | | | | 7.49 | 17.10 | 0.715 | 104.0 | 1.52 |
| 10:40 | | | | 7.47 | 17.20 | 0.717 | 103.5 | 1.55 |
| 10:45 | | | | 7.52 | 17.04 | 0.718 | 102.2 | 1.54 |
| 10:50 | | | | 7.47 | 17.28 | 0.711 | 101.9 | 1.73 |
| 10:55 | | | | 7.50 | 16.98 | 0.714 | 101.7 | 1.61 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: CLP 1L HDPE
Notes:

Sample Date/Time: 4/1/09 11:00
Signed/Sampler: Phyllis Bustamante

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Well Sampling Field Data Sheet

| Well Number: SMC-30 | Date: 4/2/09 |
|---|---|
| Field Crew: Garman/Pasteris | Site: SMC |

Well Depth (ft.): ______
DTW (ft.) ______
Depth of screen (ft.): ______
Well Diameter (in.) ______
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 0914 | | 8gpm | | | | | | |
| 0917 | | 8gpm | 24 | 7.01 | 10.71 | 0.454 | 125.1 | 4.03 |
| 0922 | | 1gpm | 29 | 6.94 | 10.73 | 0.456 | 129.1 | 4.42 |
| 0926 | | 1gpm | 33 | 6.90 | 10.83 | 0.454 | 129.1 | 4.61 |
| 0930 | | 1gpm | 37 | 6.86 | 10.65 | 0.454 | 132.2 | 4.55 |
| 0936 | | 1gpm | 43 | 6.83 | 10.90 | 0.451 | 130.3 | 4.51 |
| 0940 | | 1 | 47 | 6.84 | 10.88 | 0.453 | 129.8 | 4.40 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters:

Notes:
I want this place to live

Sample Date/Time: 4/2/09 0948

Signed/Sampler: [signature]

26

Well Sampling Field Data Sheet

| Well Number: SMC-31 | Date: 4/2/09 |
|---|---|
| Field Crew: PASTORIS / GARMAN | Site: GRANTS URANIUM BELT |

Well Depth (ft.):
DTW (ft.) 350 FT
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1044 | | ~2 | | | | | | |
| 1049 | | ~~~10~~ ~2 | 10 | 7.54 | 7.91 | 971 | 42.3 | 0.82 |
| 1054 | | ~2 | 20 | 7.54 | 8.88 | 969 | 20.9 | 0.23 |
| 1059 | | ~2 | 30 | 7.52 | 9.17 | 969 | 12.9 | 0.08 |
| 1104 | | ~2 | 40 | 7.45 | 9.43 | 969 | 6.7 | 0.03 |
| 1109 | | ~2 | 50 | 7.41 | 9.74 | 969 | 1.5 | 0.00 |
| 1114 | | ~2 | 60 | 7.38 | 9.95 | 969 | -5.0 | 0.01 |
| 1119 | | ~ | 70 | 7.37 | 10.10 | 969 | -11.6 | 0.12 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):

Odor: None Low Medium High Very Strong H2S Fuel-Like

Turbidity: None Low Medium High

Sample Parameters: CLP, SLD, UNM

Notes:

Sample Date/Time: 4/2/09 @ 1129

Signed/Sampler: [signature]

27

Well Sampling Field Data Sheet

| Well Number: SMC-32 Schmidt 1 | Date: 4/1/09 |
|---|---|
| Field Crew: Steve Fetter Phyllis Bustamante | Site: SMC |

Well Depth (ft.): ______ Rental YSI
DTW (ft.) ______ 2.25 gpm
Depth of screen (ft.): ______ 50 gallon tank
Well Diameter (in.) ______
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 12:50 | | 2.25 | | | | | | |
| 12:55 | | | | 7.09 | 12.50 | 2.611 | -35.4 | 1.01 |
| 13:00 | | | | 7.04 | 13.42 | 2.607 | -46.4 | 0.16 |
| 1305 | | | | 7.11 | 13.07 | 2.607 | -52.9 | 0.09 |
| 1310 | | | | 7.02 | 13.43 | 2.606 | -60.1 | 0.10 |
| 1315 | | | | 7.0 | 13.90 | 2.60 | -61.9 | 0.10 |
| 1320 | | | | 7.0 | 13.38 | 2.591 | -61.9 | 0.10 |
| | | | | | | | | |
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**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: CLP TM, DM, TDS, $NO_2 + NO_3$, pH ; SLD- RAD
Notes:

Sample Date/Time: 4/1/09 1322
Signed/Sampler: Phyllis Bustamante

Well Sampling Field Data Sheet

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| Well Number: SMC-33 | Date: 4/1/2009 |
|---|---|
| Field Crew: Rivera + Mayerson | Site: SMC Basin |

Well Depth (ft.):
DTW (ft.)
Depth of screen (ft.):
Well Diameter (in.)
Placement of Pump (ft.)

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | Cond. (umhos/cm) | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1137 | Start purge | | | | | | | |
| 1138 | | | | 7.25 | 14.68 | 2.473 | 54.9 | 2.59 |
| 1143 | | | | 7.22 | 15.17 | 2.483 | 49.3 | 2.24 |
| 1148 | | | | 7.13 | 15.35 | 2.478 | 49.8 | 2.04 |
| 1153 | | | | 7.12 | 15.44 | 2.482 | 52.2 | 2.05 |
| 1158 | | | | 7.13 | 15.41 | 2.483 | 56.3 | 2.22 |
| 1204 | | | | 7.12 | 15.42 | 2.478 | 59.5 | 2.25 |

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters:
Notes:

Sample Date/Time: 4/1/09 @ 1213
Signed/Sampler:

NMED Well Sampling Form

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Well Sampling Field Data Sheet

| Well Number: Luc-39 (NMEID #1 - east) | Date: 4/1/09 |
|---|---|
| Field Crew: Garmon / Pastorini / Ortelli | Site: |

Well Depth (ft.): 88.0 (TOSC) - steel casing, 6" dia
DTW (ft.) 86.6
Depth of screen (ft.):
Well Diameter (in.) 4" ID PVC
Placement of Pump (ft.) Bailed — Isotopes only

**Field Parameters**

| Time | Depth to Water (ft.) | Flow Rate (gpm) | Total Volume (gal) | pH | Temp (C) | uS/cm Cond. ~~(umhos/cm)~~ | ORP | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 1252 | 86.60 | Initial | 0.25 | 7.64 | 12.25 | 802 | 39.2 | 3.59 |
| 1300 | | ↓ | 0.5 | 7.61 | 11.79 | 788 | 48.9 | 4.93 |
| 1307 | 86.68 | ↓ | 0.75 | 7.48 | 11.63 | 792 | 49.1 | 5.24 |
| 1313 | Collected 1-gal. cube container for UNM isotopes | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
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AM 4/1/09

**Observations**

Color: Clear Other (describe):
Odor: None Low Medium High Very Strong H2S Fuel-Like
Turbidity: None Low Medium High
Sample Parameters: UNM - Isotopes only
Notes: Lock was removed by Glen Sandoval.
Property owner: Charlie & Marcella Sandoval

Sample Date/Time: 4/1/09 1313
Signed/Sampler: [illegible] Ortelli

# Site Investigation Sample and Analysis Plan
# San Mateo Creek Legacy Uranium Sites
# CERCLIS ID NMN00060684
# Cibola and McKinley Counties, New Mexico

Superfund Oversight Section
Ground Water Quality Bureau
New Mexico Environment Department

September 9, 2008

## Introduction

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 United States Code (U.S.C.) §§ 9601 to 9675 ("CERCLA"), the New Mexico Environment Department (NMED) Superfund Oversight Section will conduct a Site Investigation ("SI") of the San Mateo Creek legacy uranium sites ("Site"), Cibola and McKinley Counties, New Mexico (CERCLIS ID NMN00060684). The investigation will gather information and acquire sampling data to evaluate the site using the Hazard Ranking System (HRS) and the Superfund Chemical Data Matrix ("SCDM") to determine if threats to human health and the environment exist such that further action under CERCLA is warranted.

## Site Description

The San Mateo Creek basin (Hydrologic Unit Code ["HUC"] 1302020703), by which the boundary of the Site is defined, comprises approximately 321 square miles within the Rio San Jose drainage basin in McKinley and Cibola counties, New Mexico. This basin is located within the Grants Mineral Belt ("GMB"), which is an area of uranium mineralization occurrence approximately 100 miles long and 25 miles wide encompassing portions of McKinley, Cibola, Sandoval and Bernalillo counties, and includes the Ambrosia Lake mining district. Main access into the Site is provided by New Mexico State Roads 605 and 509.

The San Mateo Creek basin contains 85 legacy uranium mines with recorded production and 4 legacy uranium millsites. One of these millsites, the Homestake Mining Company Superfund Site ("HMC;" CERCLIS ID NMD007860935), currently is undergoing ground water remediation activities in 4 aquifers under the primary jurisdiction of the U.S. Nuclear Regulatory Agency ("NRC"). Background concentrations of constituents of concern (a.k.a., clean-up levels) for these 4 aquifers generally exceed federal and state drinking water standards. The origin of these elevated background contaminant concentrations is thought to be due, in part, to contamination from upgradient legacy uranium mine and mill sites within the basin. Far upgradient geochemical data from HMC suggest that overall alluvial ground water quality relative to drinking water standards, is worse than in the immediate upgradient vicinity of HMC, possibly due to the continuing migration of ground water that is impacted from the high concentration of legacy uranium sites in this area of the basin.

## Sampling activities

For this phase of the Site Investigation, NMED proposes to sample ground water from existing wells between the north side of HMC and approximately the junction of New Mexico state highways 509 and 605. The purpose of this sampling is to determine if contaminant concentration and other hydrochemical changes can be discerned, especially within the alluvial aquifer, which would indicate continuing downgradient contaminant migration from legacy uranium sites within the Ambrosia Lake mining district of the San Mateo Creek basin. NMED has already identified over 20 wells in this area for sampling; these wells would be sampled during October 2008. Due to the remote location of many other existing wells and logistics of access, NMED proposes to collect samples from wells as they are located in the field, and to submit all samples for total and dissolved metals analyses monthly to the EPA Contract Laboratory Program for analyses. Ground water samples for TDS, nitrite/nitrate, carbonate, and bicarbonate analyses would be submitted to the New Mexico State Laboratory Division ("SLD") since these have shorter holding times (see Table 1). NMED also requests EPA assistance in performing analyses for radionuclide analyses (*e.g.*, $radium_{226+228}$, gross alpha and gross beta), and radionuclide isotopes, as these are essential both to characterize ground water contamination and to establish possible anthropogenic source attribution.

Water samples at each domestic well location will be collected from an access point closest to the well head if there is a dedicated pump already installed and operational. Well locations without a dedicated pump will require the utilization of a portable submersible pump or similar apparatus. Domestic wells will be purged for 15 minutes or until field parameters (*e.g.*, pH, conductivity, temperature) stabilize. Samples will be collected in the appropriate containers and preservatives, placed in insulated coolers with ice, and shipped to the laboratories specified by the CLP. Samples that will be analyzed by SLD also will be collected within appropriate containers supplied by SLD, and transported to the laboratory for submittal within analysis-specific holding time periods. All samples that are collected in this program will utilize chain-of-custody handling procedures.

Worker safety and the safe sampling of wells in the field will follow the requirements described in Site Safety Plan (Attachment 1). All field personnel will work in teams of at least 2 individuals, and shall have communication availability with project leaders. The collection of a representative ground water sample will follow the guidance described in the SOP, Section 7 – Ground Water Sampling, (Attachment 2). Level D is the appropriate Personal Protection Equipment ("PPE") level for the sampling of the proposed well locations.

The appropriate level of documentation for the field sampling event, sample chain-of-custody forms, laboratory results, and the site safety plan are the responsibility of the Project Management Team Leaders, David L. Mayerson and Al Pasteris.

**Table 1. Proposed ground water analytes for proposed Site Investigation ground water sampling for the San Mateo Creek legacy uranium sites, Cibola and McKinley counties, New Mexico.**

A. Field parameters

| Parameter |
|---|
| Electrical conductivity (EC) |
| pH |
| Temperature |
| Dissolved oxygen (DO) |
| Oxidation-reduction potential (ORP or Eh) |

B. Laboratory analyses through CLP

| Analyte (Total & Dissolved) | MAXIMUM^ Required Detection Limit (µg/L) |
|---|---|
| pH | - |
| Carbonate (CO3) | - |
| Chloride (Cl) | 250,000 |
| Fluoride (F) | 1,600 |
| Sulfate (SO4) | 250,000 |
| Calcium (Ca) | 5000 |
| Magnesium (Mg) | 5000 |
| Sodium (Na) | 5000 |
| Potassium (K) | 5000 |
| Aluminum (Al) | 50 |
| Antimony (Sb) | 6 |
| Arsenic (As) | 10 |
| Barium (Ba) | 200 |
| Beryllium (Be) | 4 |
| Cadmium (Cd) | 5 |
| Chromium (Cr) | 50 |
| Cobalt (Co) | 50 |
| Copper (Cu) | 1000 |
| Iron (Fe) | 1000 |
| Mercury (Hg) | 2 |
| Manganese (Mn) | 50 |
| Nickel (Ni) | 200 |
| Lead (Pb) | 15 |
| Molybdenum (Mo) | 1000 |
| Silver (Ag) | 50 |
| Selenium (Se) | 35 |
| Thallium (Tl) | 2 |
| Uranium (U) | 30 |

| | |
|---|---|
| Vanadium (V) | 50 |
| Zinc (Zn) | 5000 |

C. Non-standard additional analyses requested through EPA CLP

| **Analyte** | **Required analytical detection limit** |
|---|---|
| Gross Alpha | 15 pCi/L |
| Radium-226 + 228 ($^{226}Ra + {}^{228}Ra$) | 5 pCi/L |
| Gross Beta | NS |

| |
|---|
| Radium-226 ($^{226}Ra$) |
| Radium-228 ($^{228}Ra$) |
| Uranium-238 ($^{238}U$) |
| Uranium-235 ($^{235}U$) |
| Uranium-234 ($^{234}U$) |
| Thorium-232 ($^{232}Th$) |
| Thorium-230 ($^{230}Th$) |
| **Isotopes** |
| Delta Carbon-13 ($\partial^{13}C$ ‰) |
| Delta Deuterium ($\partial D$ ‰) |
| Delta Oxygen-18 ($\partial^{18}O$ ‰) |
| Delta Sulfur-34 ($\partial^{34}S$ ‰) |
| Delta Nitrogen-15 ($\partial^{15}N$ ‰) |

D. Laboratory analyses through SLD

| **Analyte** | **Required analytical detection limit** |
|---|---|
| Total dissolved solids (TDS) | 500,000 µg/l |
| Nitrate + nitrite ($NO_3 + NO_2$) | 10,000 µg/l |
| Bicarbonate ($HCO_3$) | NS |
| Carbonate | NS |

NS=not specified

## Attachment 1: Site Safety Plan

**Personal Protection**
Level of Protection (anticipated): D
**Protective Clothing:** Steel-toe boots and disposable nitrile gloves.
**Surveillance Equipment:** NA
**Decontamination Procedures**

**Personnel:** Wash any exposed skin with soap and water.
**Equipment:** Wash with liquinox, rinse with de-ionized water.

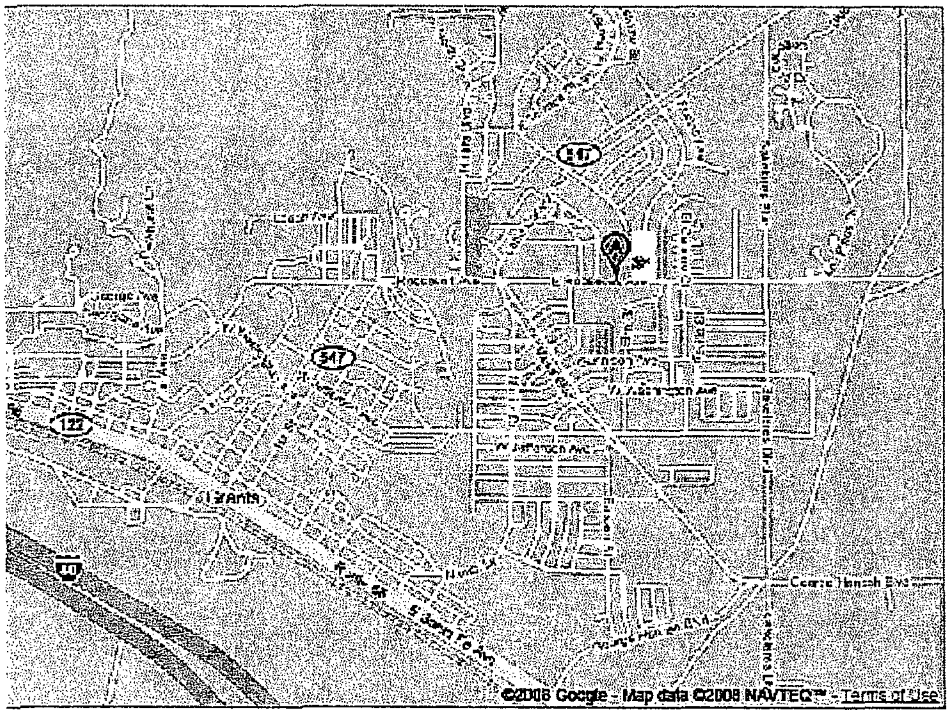
**Contaminants of Concern:**
Uranium, molybdenum, selenium, $radium_{226+228}$, nitrates (a NIOSH book is on site for reference.)
**Other potential workplace hazards:**

1. Slips, trips, and falls
2. Poisonous snakes
3. Heat dehydration/exhaustion/stroke
4. One large diameter open wellbore without barricade
5. Potential for vehicle miring in mud when raining on mill site
6. Low overhead pipes in supply wellhouses

### Emergency Information

**Hospital:** Cibola General Hospital
1016 Roosevelt Avenue
Grants, NM 87020
(505) 287-4446

A. **Cibola General Hospital**
1016 E Roosevelt Ave, Grants, NM - (505) 287-4446




**Facilities for Toxic Waste Related Emergency:**
Milan Fire Department: (505) 287-3776
Hazardous Waste Bureau 24-hour Emergency number: (505) 827-1557

**Telephone Numbers:**
Ambulance: 911
Police: 911 or (505) 894-6617
NMED: (800) 219-6157
New Mexico Emergency Response: (505) 827-1557
Poison Control Center: (800) 432-6866
Fire Department: (505) 287-3776

**Other:**
Be careful to avoid slip, trip, and fall hazards. Stray dogs, insects, sunburn, and windburn are potential problems in this area. Avoid inciting dogs, wear gloves, and sunscreen. Drink plenty of water.

I have been briefed on the San Mateo Creek legacy uranium sites

| | | |
|---|---|---|
| ____________________ | ____________________ | __________ |
| Signature | Printed Name | Date |
| ____________________ | ____________________ | __________ |
| Signature | Printed Name | Date |

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

GROUND WATER

AUG 1 3 2009

BUREAU

August 7, 2009

Ms. Dana Bahar
Program Manager, Superfund Oversight Section
New Mexico Environment Department
Ground Water Quality Bureau
1190 St. Francis Drive
Santa Fe, New Mexico 87502

Dear Dana:

Enclosed you will find hard copies of Final Analytical Reports for the following sites:

* San Mateo Creek Basin;
LaLinda Texaco Gallup;
San Vicente Creek Mill;
Alarid & Cerrillos; and
North Main and 9th Street.

If you should have any questions, please contact me at 214-665-6666.

Sincerely,

LaDonna Turner

LaDonna Turner
Superfund
Risk and Site Assessment Section

Enclosures

Environmental Protection Agency
# Region 6 Laboratory
10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## ANALYTICAL REPORT FOR SAMPLES

| Station ID | Laboratory ID | Sample Type | Date Collected | Date Received |
|---|---|---|---|---|
| SMC-23 | 0903074-01 | Liquid | 3/30/09 14:21 | 03/31/09 11:45 |
| SMC-25 | 0903074-02 | Liquid | 3/30/09 16:17 | 03/31/09 11:45 |
| SMC-08 | 0903074-03 | Liquid | 3/30/09 12:50 | 03/31/09 11:45 |
| SMC-24 | 0903074-04 | Liquid | 3/30/09 12:46 | 03/31/09 11:45 |
| SMC-09 | 0903074-05 | Liquid | 3/30/09 15:05 | 03/31/09 11:45 |
| SMC-10 | 0903074-06 | Liquid | 3/30/09 14:32 | 03/31/09 11:45 |
| SMC-00 | 0904002-01 | Liquid | 3/31/09 10:39 | 04/01/09 09:40 |
| SMC-01 | 0904002-02 | Liquid | 3/31/09 13:35 | 04/01/09 09:40 |
| SMC-03 | 0904002-03 | Liquid | 3/31/09 10:50 | 04/01/09 09:40 |
| SMC-04 | 0904002-04 | Liquid | 3/31/09 12:24 | 04/01/09 09:40 |
| SMC-05 | 0904002-05 | Liquid | 3/31/09 14:04 | 04/01/09 09:40 |
| SMC-11 | 0904002-06 | Liquid | 3/31/09 10:00 | 04/01/09 09:40 |
| SMC-12 | 0904002-07 | Liquid | 3/31/09 10:50 | 04/01/09 09:40 |
| SMC-20 | 0904002-08 | Liquid | 3/31/09 9:50 | 04/01/09 09:40 |
| SMC-21 | 0904002-09 | Liquid | 3/31/09 11:15 | 04/01/09 09:40 |
| SMC-22 | 0904002-10 | Liquid | 3/31/09 13:05 | 04/01/09 09:40 |
| SMC-26 | 0904002-11 | Liquid | 3/31/09 15:15 | 04/01/09 09:40 |
| SMC-35 | 0904002-12 | Liquid | 3/31/09 10:00 | 04/01/09 09:40 |
| SMC-36 | 0904002-13 | Liquid | 3/31/09 16:15 | 04/01/09 09:40 |
| SMC-06 | 0904006-01 | Liquid | 4/1/09 8:25 | 04/03/09 10:00 |
| SMC-07 | 0904006-02 | Liquid | 4/1/09 9:55 | 04/03/09 10:00 |
| SMC-16 | 0904006-03 | Liquid | 4/1/09 11:25 | 04/03/09 10:00 |
| SMC-17 | 0904006-04 | Liquid | 4/1/09 10:12 | 04/03/09 10:00 |
| SMC-18 | 0904006-05 | Liquid | 4/1/09 11:55 | 04/03/09 10:00 |
| SMC-33 | 0904006-06 | Liquid | 4/1/09 12:13 | 04/03/09 10:00 |
| SMC-34 | 0904006-07 | Liquid | 4/1/09 11:05 | 04/03/09 10:00 |
| SMC-13 | 0904011-01 | Liquid | 4/2/09 13:05 | 04/03/09 10:00 |
| SMC-14 | 0904011-02 | Liquid | 4/2/09 10:30 | 04/03/09 10:00 |
| SMC-15 | 0904011-03 | Liquid | 4/2/09 15:00 | 04/03/09 10:00 |
| SMC-28 | 0904011-04 | Liquid | 4/2/09 11:00 | 04/03/09 10:00 |
| SMC-30 | 0904011-05 | Liquid | 4/2/09 9:48 | 04/03/09 10:00 |
| SMC-31 | 0904011-06 | Liquid | 4/2/09 11:29 | 04/03/09 10:00 |
| SMC-32 | 0904011-07 | Liquid | 4/1/09 13:22 | 04/03/09 10:00 |

Environmental Protection Agency

# Region 6 Laboratory

10625 Fallstone Road, Houston; TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **55.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **7,510** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| **Copper (7440-50-8)** | **27.1** | **B** | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **152** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **1,480** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **148,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **32.7** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| **Arsenic (7440-38-2)** | **2.3** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **27.1** | | 2.0 | " | " | " |
| **Thallium (7440-28-0)** | **2.4** | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **10.3** | | 2.0 | " | " | " |

Environmental Protection Agency
# Region 6 Laboratory
10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| **Barium (7440-39-3)** | **54.3** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **7,070** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **45.2** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **1,440** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **143,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

Environmental Protection Agency
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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D0301 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **3.1** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **27.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **10.1** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D1701 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0903074-01** **Station ID: SMC-23**

Batch: B9D2109 Date Collected: 03/30/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.4** | | | 1 | 04/20/09 | 04/20/09 |

Environmental Protection Agency
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10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0304 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **63.4** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **69,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,760** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,170** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **107,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **28.2** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0303 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| **Arsenic (7440-38-2)** | **11.2** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **13.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **21.5** | | 2.0 | " | " | " |

Environmental Protection Agency
# Region 6 Laboratory
10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| **Barium (7440-39-3)** | **59.3** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **64,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,260** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,010** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **102,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **26.5** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

**Environmental Protection Agency**

# Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0304
Sample Type: Liquid

Date Collected: 03/30/09
Sample Volume: 50ml

Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **63.4** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **69,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,760** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,170** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **107,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **28.2** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0303
Sample Type: Liquid

Date Collected: 03/30/09
Sample Volume: 50ml

Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| **Arsenic (7440-38-2)** | **11.2** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **13.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **21.5** | | 2.0 | " | " | " |

Environmental Protection Agency
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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D1706 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0302 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| **Barium (7440-39-3)** | **59.3** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **64,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,260** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,010** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **102,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **26.5** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D0301 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **11.8** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **13.2** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **20.6** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D1701 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0903074-02** **Station ID: SMC-25**

Batch: B9D2109 Date Collected: 03/30/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.8** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **17.0** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **112,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **3,090** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **25,000** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **110** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,640** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **357,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **3.4** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D1706 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D0302 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| **Barium (7440-39-3)** | **15.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **106,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **2,740** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **23,400** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **101** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,290** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **341,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **3.8** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0903074-03** **Station ID: SMC-08**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 03/30/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.1** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **10.6** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **555,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **151,000** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **7,060** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **273,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| **Arsenic (7440-38-2)** | **5.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **66.8** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **14.0** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D1706 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D0302 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| **Barium (7440-39-3)** | **11.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **509,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **138,000** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **6,350** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **254,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **5.3** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **66.2** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **13.8** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0903074-04** **Station ID: SMC-24**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 03/30/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.3** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **11.2** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **612,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| **Copper (7440-50-8)** | **39.9** | **B** | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **1,300** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **169,000** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **33.6** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **10,800** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **278,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **251** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| **Arsenic (7440-38-2)** | **3.3** | | 2.0 | " | " | " |
| **Lead (7439-92-1)** | **11.1** | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **36.2** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **42.0** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D1706 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D0302 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **541,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **148,000** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **9,360** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **251,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **209** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D0301 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **3.4** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **36.5** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **40.7** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D1701 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0903074-05** **Station ID: SMC-09**

Batch: B9D2109 Date Collected: 03/30/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.4** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D0304 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **595,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **159,000** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **7,640** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **271,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **65.2** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D0303 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **31.4** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **30.5** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/30/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/01/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **567,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **149,000** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **6,950** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **261,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **81.9** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D0301 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **3.2** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **32.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **30.9** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D1701 Date Collected: 03/30/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0903074-06** **Station ID: SMC-10**

Batch: B9D2109 Date Collected: 03/30/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.4** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| Calcium (7440-70-2) | U | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| Magnesium (7439-95-4) | U | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **825** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| Calcium (7440-70-2) | U | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| Magnesium (7439-95-4) | U | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| Sodium (7440-23-5) | U | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-01** **Station ID: SMC-00**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.7** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D0304
Sample Type: Liquid

Date Collected: 03/31/09
Sample Volume: 50ml

Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **17.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **161,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **46,600** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **5,520** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **89,900** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **39.6** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D0303
Sample Type: Liquid

Date Collected: 03/31/09
Sample Volume: 50ml

Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/28/09 |
| **Arsenic (7440-38-2)** | **2.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **5.8** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **37.6** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **18.7** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **162,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **42,300** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **4,590** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **71,200** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **25.2** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **3.3** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **6.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **36.7** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-02** **Station ID: SMC-01**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 03/31/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.3** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **37.5** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **169,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **33.1** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **43,900** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **4,830** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **68,600** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **2.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **22.4** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **11.4** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **39.4** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **172,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **40,100** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **4,100** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **54,300** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **28.9** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **2.9** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **22.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **11.0** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-03** **Station ID: SMC-03**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.4** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **10,400** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **40.0** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **3,440** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,340** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **239,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **20.3** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **4.3** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **5.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **21.2** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **11,200** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **3,240** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,420** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **208,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **5.1** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **5.8** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **20.6** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-04** **Station ID: SMC-04**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.4** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **29.1** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **2,610** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **614** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,640** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **228,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **22.9** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **2.6** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **4.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **27.1** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **31.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **2,830** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **580** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **199,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **22.3** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **3.2** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **4.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **26.2** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-05** **Station ID: SMC-05**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.6** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **10.6** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **447,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **84,500** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **10,300** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **274,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **21.2** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **352** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **231** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **11.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **479,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **88,500** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **10,100** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **269,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **21.5** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **367** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **228** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-06** **Station ID: SMC-11**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.5** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **56,100** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **909** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **9,690** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,380** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **586,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **58.4** | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **2,520** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **24.3** | | 2.0 | " | " | " |
| **Lead (7439-92-1)** | **32.9** | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **363** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **184** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **11.3** | L | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **59,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **10,300** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | K | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **628,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **38.3** | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **481** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **22.8** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **382** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **163** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-07** **Station ID: SMC-12**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.0** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **66.3** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **91,100** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **15,000** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **53.6** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **5,780** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **64,100** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **24.8** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **5.1** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **74.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **66.6** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **67.0** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **92,300** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **15,800** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **56.8** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **5,900** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **67,900** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **54.8** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **4.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **73.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **63.9** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-08** **Station ID: SMC-20**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 03/31/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.6** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **13.1** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **524,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **179,000** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **130** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **5,450** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **256,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **7.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **11.9** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **12.5** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **536,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **183,000** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **128** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **4,760** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **257,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **8.0** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **11.9** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-09** **Station ID: SMC-21**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.4** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | K | 100 | 1 | 04/06/09 | 04/28/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **1,300** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **160** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **212,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **152** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **21.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **29.9** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **48.2** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| Barium (7440-39-3) | U | L | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **1,090** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| Magnesium (7439-95-4) | U | K | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | K | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **191,000** | | 500 | " | " | " |
| **Vanadium (7440-62-2)** | **135** | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **21.5** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **26.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **42.9** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-10** **Station ID: SMC-22**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 03/31/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **9.2** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **28.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **49,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **64.5** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,430** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,820** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **157,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **29.5** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **23.9** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **188** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **29.2** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **48,700** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,350** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,250** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **156,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **20.8** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **2.5** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **26.2** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **188** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-11** **Station ID: SMC-26**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 03/31/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.9** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **449,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **85,300** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **10,300** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **273,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **23.6** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **350** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **224** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 03/31/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **432,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **84,100** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **9,260** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **269,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **23.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **375** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **231** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-12** **Station ID: SMC-35**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | 7.5 | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D0304 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/28/09 |
| **Barium (7440-39-3)** | **30.5** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **52,600** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **65.0** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **9,030** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,990** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **164,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **29.8** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D0303 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **25.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **190** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D1706 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D0302 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 04/30/09 |
| **Barium (7440-39-3)** | **27.5** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **46,700** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **8,050** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,120** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **148,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D0301 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **2.3** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **26.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **187** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D1701 Date Collected: 03/31/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904002-13** **Station ID: SMC-36**

Batch: B9D2109 Date Collected: 03/31/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.9** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| Calcium (7440-70-2) | U | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| **Copper (7440-50-8)** | **22.5** | **B** | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| Magnesium (7439-95-4) | U | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| Sodium (7440-23-5) | U | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| Calcium (7440-70-2) | U | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| Magnesium (7439-95-4) | U | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| Sodium (7440-23-5) | U | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-01** **Station ID: SMC-06**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 04/01/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.0** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **20.5** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **21,100** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **124** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **7,710** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **5,430** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **163,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **94.3** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **3.6** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.5** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D1706 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D0302 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| **Barium (7440-39-3)** | **21.3** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **21,700** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **7,940** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **5,280** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **168,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **70.9** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D0301 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **4.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.5** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D1701 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-02** **Station ID: SMC-07**

Batch: B9D2109 Date Collected: 04/01/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.2** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **33.7** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **46,500** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **173** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **17,100** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **56.7** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,970** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **266,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.6** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D1706 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D0302 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| **Barium (7440-39-3)** | **36.0** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **47,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **168** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **17,200** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **57.0** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **2,700** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **266,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D0301 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.5** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D1701 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-03** **Station ID: SMC-16**

Batch: B9D2109 Date Collected: 04/01/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.1** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **10.8** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **80,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| **Copper (7440-50-8)** | **23.9** | **B** | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **521** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **5,050** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **46.6** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,840** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **277,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **1,110** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **12.3** | | 2.0 | " | " | " |
| **Lead (7439-92-1)** | **6.9** | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **45.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **98.4** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| **Barium (7440-39-3)** | **11.1** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **87,700** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **112** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **5,530** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **53.6** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,830** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **301,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **959** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D0301 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **10.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **49.0** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **99.5** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D1701 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-04** **Station ID: SMC-17**

Batch: B9D2109 Date Collected: 04/01/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.8** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **10.9** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **89,600** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **89.1** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **15,200** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **75.4** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **8,490** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **136,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **3.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.0** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D1706 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D0302 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| **Barium (7440-39-3)** | **13.2** | **L** | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **89,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **86.9** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **14,800** | **K** | 150 | " | " | " |
| **Manganese (7439-96-5)** | **75.7** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **8,120** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **136,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D0301 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **3.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D1701 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-05** **Station ID: SMC-18**

Batch: B9D2109 Date Collected: 04/01/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | 7.7 | | | 1 | 04/20/09 | 04/20/09 |

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# Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 50ml
Sample Qualifiers:

## Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **12.1** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **226,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **27.4** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **25,300** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **7.4** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **4,020** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **267,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

# Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 50ml
Sample Qualifiers:

## Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **21.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **257** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **164** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D1706
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D0302
Sample Type: Liquid
Date Collected: 04/01/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| **Barium (7440-39-3)** | **13.6** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **225,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **24,800** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **6.8** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,550** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **262,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D0301
Date Collected: 04/01/09
Sample Type: Liquid
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **21.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **268** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **166** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D1701
Date Collected: 04/01/09
Sample Type: Liquid
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-06** **Station ID: SMC-33**

Batch: B9D2109
Date Collected: 04/01/09
Sample Type: Liquid
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.5** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **249,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **201** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **40,600** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **8,630** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **325,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **29.3** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **427** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **119** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D1706 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D0302 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/04/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **247,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **39,200** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **7,830** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **317,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D0301 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **29.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **434** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **117** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D1701 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904006-07** **Station ID: SMC-34**

Batch: B9D2109 Date Collected: 04/01/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.5** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D0304 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **372,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **71,700** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **10.5** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **8,770** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **340,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D0303 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **37.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **604** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **240** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D1706 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D0302 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **389,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **73,700** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **11.5** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **8,440** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **355,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D0301 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **37.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **618** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **240** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D1701 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-01** **Station ID: SMC-13**

Batch: B9D2109 Date Collected: 04/02/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.4** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D0304
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **14.2** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **4,830** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **411** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **849** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **29.2** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,830** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **437,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D0303
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **4.2** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **51.1** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **23.0** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D1706 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D0302 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| **Barium (7440-39-3)** | **15.4** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **4,940** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **28.4** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **838** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **23.8** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,140** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **434,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **4.7** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **52.9** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **23.2** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-02** **Station ID: SMC-14**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 04/02/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **8.7** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-03** **Station ID: SMC-15**

Batch: B9D0304 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **29,600** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **9,090** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **15,800** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **20.3** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-03** **Station ID: SMC-15**

Batch: B9D0303 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **3.2** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.2** | | 2.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-03** **Station ID: SMC-15**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **3.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.1** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-03** **Station ID: SMC-15**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-03** **Station ID: SMC-15**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 04/02/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | 7.7 | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-03** **Station ID: SMC-15**

*Batch: B9D1706* *Date Collected: 04/02/09*
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-03** **Station ID: SMC-15**

Batch: B9D0302 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| Barium (7440-39-3) | U | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **29,700** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **9,140** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| Potassium (7440-09-7) | U | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **16,100** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **20.7** | | 20.0 | " | " | " |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D0304 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **29.7** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **55,600** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **6,790** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,650** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **74,300** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **554** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D0303 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **5.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **42.3** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **46.7** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D1706 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D0302 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| **Barium (7440-39-3)** | **28.1** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **52,400** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **6,470** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,260** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **70,100** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **527** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| **Arsenic (7440-38-2)** | **5.0** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| **Selenium (7782-49-2)** | **42.6** | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **46.4** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-04** **Station ID: SMC-28**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 04/02/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.8** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D0304 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **300** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **53,900** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **7,530** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,840** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **25,600** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D0303 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.7** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D1706 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D0302 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| **Barium (7440-39-3)** | **288** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **51,500** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| Iron (7439-89-6) | U | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **7,260** | | 150 | " | " | " |
| Manganese (7439-96-5) | U | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **3,590** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **24,300** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D0301 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **2.7** | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D1701 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-05** **Station ID: SMC-30**

Batch: B9D2109 Date Collected: 04/02/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.3** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D0304 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **45.3** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **35,500** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **75.6** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **7,620** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **88.8** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,720** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **149,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **269** | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D0303 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D1706 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D0302 Date Collected: 04/02/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| **Barium (7440-39-3)** | **46.6** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **36,200** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **27.4** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **7,820** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **88.4** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **1,630** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **151,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **268** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D0301
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 50ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D1701
Sample Type: Liquid
Date Collected: 04/02/09
Sample Volume: 25ml
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-06** **Station ID: SMC-31**

Batch: B9D2109
Sample Type: Liquid
Date Collected: 04/02/09
Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | **7.9** | | | 1 | 04/20/09 | 04/20/09 |

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## Metals by CLP ILMO5.3 - ICP

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D0304 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/06/09 | 04/23/09 |
| **Barium (7440-39-3)** | **21.1** | | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **299,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| Copper (7440-50-8) | U | B | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **1,690** | K | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **68,900** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **1,100** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **7,410** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **111,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| Zinc (7440-66-6) | U | | 20.0 | " | " | " |

## Metals by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D0303 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/06/09 | 04/29/09 |
| **Arsenic (7440-38-2)** | **3.4** | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| **Uranium (7440-61-1)** | **113** | | 2.0 | " | " | " |

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## Metals by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D1706 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## Metals (Dissolved) by CLP ILMO5.3 - ICP

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D0302 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Aluminum (7429-90-5) | U | | 100 | 1 | 04/07/09 | 05/06/09 |
| **Barium (7440-39-3)** | **22.9** | **L** | 10.0 | " | " | " |
| Beryllium (7440-41-7) | U | | 5.0 | " | " | " |
| Cadmium (7440-43-9) | U | | 5.0 | " | " | " |
| **Calcium (7440-70-2)** | **316,000** | | 150 | " | " | " |
| Chromium (7440-47-3) | U | | 10.0 | " | " | " |
| Cobalt (7440-48-4) | U | | 20.0 | " | " | " |
| **Copper (7440-50-8)** | **25.8** | | 20.0 | " | " | " |
| **Iron (7439-89-6)** | **1,650** | | 25.0 | " | " | " |
| **Magnesium (7439-95-4)** | **72,300** | | 150 | " | " | " |
| **Manganese (7439-96-5)** | **1,150** | | 5.0 | " | " | " |
| Nickel (7440-02-2) | U | | 20.0 | " | " | " |
| **Potassium (7440-09-7)** | **7,870** | | 1,000 | " | " | " |
| Silver (7440-22-4) | U | | 10.0 | " | " | " |
| **Sodium (7440-23-5)** | **118,000** | | 500 | " | " | " |
| Vanadium (7440-62-2) | U | | 20.0 | " | " | " |
| **Zinc (7440-66-6)** | **23.3** | | 20.0 | " | " | " |

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## Metals (Dissolved) by CLP ILMO5.3 - ICP/MS

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D0301 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 50ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Antimony (7440-36-0) | U | | 2.0 | 4 | 04/07/09 | 04/27/09 |
| Arsenic (7440-38-2) | U | | 2.0 | " | " | " |
| Lead (7439-92-1) | U | | 2.0 | " | " | " |
| Selenium (7782-49-2) | U | | 2.0 | " | " | " |
| Thallium (7440-28-0) | U | | 2.0 | " | " | " |
| Uranium (7440-61-1) | U | K | 2.0 | " | " | " |

## Metals (Dissolved) by CLP ILMO5.3 - CVAAS

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D1701 Date Collected: 04/01/09
Sample Type: Liquid Sample Volume: 25ml Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result µg/l | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| Mercury (7439-97-6) | U | | 0.200 | 1 | 04/15/09 | 04/16/09 |

## pH by EPA Method 150.1

**Lab ID: 0904011-07** **Station ID: SMC-32**

Batch: B9D2109 Date Collected: 04/01/09
Sample Type: Liquid Sample Qualifiers:

### Targets

| Analyte (CAS Number) | Result pH Units | Analyte Qualifiers | Reporting Limit | Dilution | Prepared | Analyzed |
|---|---|---|---|---|---|---|
| **pH (C-006)** | 7.4 | | | 1 | 04/20/09 | 04/20/09 |

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## Notes and Definitions

| | |
|---|---|
| L | The identification of the analyte is acceptable; the reported value may be biased low. The actual value is expected to be greater than the reported value. |
| K | The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value. |
| B | Blank Related - The concentration found in the sample was less than 10X the concentration found in the associated extraction, digestion and/or analysis blank. Presence in the sample is therefore suspect. |
| A | This sample was extracted at a single acid pH. |
| HTS | Sample was prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values. |
| AES | Atomic Emission Spectrometer |
| CVAA | Cold Vapor Atomic Absorption |
| ECD | Electron Capture Detector |
| GC | Gas Chromatograph |
| GFAA | Graphite Furnace Atomic Absorption |
| ICP | Inductively Coupled Plasma |
| MS | Mass Spectrometer |
| NA | Not Applicable |
| NPD | Nitrogen Phosphorous Detector |
| NR | Not Reported |
| TCLP | Toxicity Characteristic Leaching Procedure |
| U | Undetected |
| # | Out of QC limits |

Initial pressure in air analyses is the pressure at which the canister was received in psia (pounds *per* square inch absolute pressure).

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The pH reported for Volatile liquid samples was tested using a 0-14 pH indicator strip for the purpose of verifying chemical preservation.

The statistical software used for the reporting of toxicity data is ToxCalc 5.0.32, Environmental Toxicity Data Analysis System 1994-2007 Tidepool Scientific Software.

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# Results

# from

# TCEQ Laboratory
# 5144 E. Sam Houston Prkwy N.
# Houston, TX 77015

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Environmental Protection Agency

# Region 6 Laboratory

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ

Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Bicarbonate as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 192 | | 310.1 | 04/08/09 |
| 0903074-02 | SMC-25 | 181 | | 310.1 | 04/08/09 |
| 0903074-03 | SMC-08 | 10 | | 310.1 | 04/08/09 |
| 0903074-04 | SMC-24 | 172 | | 310.1 | 04/08/09 |
| 0903074-05 | SMC-09 | 168 | | 310.1 | 04/08/09 |
| 0903074-06 | SMC-10 | 170 | | 310.1 | 04/08/09 |
| 0904002-01 | SMC-00 | <10 | | 310.1 | 04/08/09 |
| 0904002-02 | SMC-01 | 274 | | 310.1 | 04/08/09 |
| 0904002-03 | SMC-03 | 272 | | 310.1 | 04/08/09 |
| 0904002-04 | SMC-04 | 284 | | 310.1 | 04/08/09 |
| 0904002-05 | SMC-05 | 308 | | 310.1 | 04/08/09 |
| 0904002-06 | SMC-11 | 188 | | 310.1 | 10/08/09 |
| 0904002-07 | SMC-12 | 210 | | 310.1 | 04/08/09 |
| 0904002-08 | SMC-20 | 260 | | 310.1 | 04/08/09 |
| 0904002-09 | SMC-21 | 153 | | 310.1 | 04/08/09 |
| 0904002-10 | SMC-22 | 206 | | 310.1 | 04/08/09 |
| 0904002-11 | SMC-26 | 280 | | 310.1 | 04/08/09 |
| 0904002-12 | SMC-35 | 192 | | 310.1 | 04/08/09 |
| 0904002-13 | SMC-36 | 282 | | 310.1 | 04/08/09 |
| 0904006-01 | SMC-06 | <10 | | 310.1 | 04/14/09 |
| 0904006-02 | SMC-07 | 243 | | 310.1 | 04/14/09 |
| 0904006-03 | SMC-16 | 359 | | 310.1 | 04/14/09 |
| 0904006-04 | SMC-17 | 139 | | 310.1 | 04/14/09 |
| 0904006-05 | SMC-18 | 167 | | 310.1 | 04/14/09 |
| 0904006-06 | SMC-33 | 153 | | 310.1 | 04/14/09 |
| 0904006-07 | SMC-34 | 163 | | 310.1 | 04/14/09 |
| 0904011-01 | SMC-13 | 180 | | 310.1 | 04/16/09 |

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Bicarbonate as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904011-02 | SMC-14 | 246 | | 310.1 | 04/16/09 |
| 0904011-03 | SMC-15 | 60 | | 310.1 | 04/16/09 |
| 0904011-04 | SMC-28 | 136 | | 310.1 | 04/16/09 |
| 0904011-05 | SMC-30 | 184 | | 310.1 | 04/16/09 |
| 0904011-06 | SMC-31 | 286 | | 310.1 | 04/16/09 |
| 0904011-07 | SMC-32 | 184 | | 310.1 | 04/14/09 |

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Carbonate as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | <10 | | 310.1 | 04/08/09 |
| 0903074-02 | SMC-25 | <10 | | 310.1 | 04/08/09 |
| 0903074-03 | SMC-08 | <10 | | 310.1 | 04/08/09 |
| 0903074-04 | SMC-24 | <10 | | 310.1 | 04/08/09 |
| 0903074-05 | SMC-09 | <10 | | 310.1 | 04/08/09 |
| 0903074-06 | SMC-10 | <10 | | 310.1 | 04/08/09 |
| 0904002-01 | SMC-00 | <10 | | 310.1 | 04/08/09 |
| 0904002-02 | SMC-01 | <10 | | 310.1 | 04/08/09 |
| 0904002-03 | SMC-03 | <10 | | 310.1 | 04/08/09 |
| 0904002-04 | SMC-04 | <10 | | 310.1 | 04/08/09 |
| 0904002-05 | SMC-05 | 20 | | 310.1 | 04/08/09 |
| 0904002-06 | SMC-11 | <10 | | 310.1 | 10/08/09 |
| 0904002-07 | SMC-12 | <10 | | 310.1 | 04/08/09 |
| 0904002-08 | SMC-20 | <10 | | 310.1 | 04/08/09 |
| 0904002-09 | SMC-21 | <10 | | 310.1 | 04/08/09 |
| 0904002-10 | SMC-22 | 44 | | 310.1 | 04/08/09 |
| 0904002-11 | SMC-26 | <10 | | 310.1 | 04/08/09 |

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Carbonate as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904002-12 | SMC-35 | <10 | | 310.1 | 04/08/09 |
| 0904002-13 | SMC-36 | <10 | | 310.1 | 04/08/09 |
| 0904006-01 | SMC-06 | <10 | | 310.1 | 04/14/09 |
| 0904006-02 | SMC-07 | <10 | | 310.1 | 04/14/09 |
| 0904006-03 | SMC-16 | <10 | | 310.1 | 04/14/09 |
| 0904006-04 | SMC-17 | <10 | | 310.1 | 04/14/09 |
| 0904006-05 | SMC-18 | <10 | | 310.1 | 04/14/09 |
| 0904006-06 | SMC-33 | <10 | | 310.1 | 04/14/09 |
| 0904006-07 | SMC-34 | <10 | | 310.1 | 04/14/09 |
| 0904011-01 | SMC-13 | <10 | | 310.1 | 04/16/09 |
| 0904011-02 | SMC-14 | 36 | | 310.1 | 04/16/09 |
| 0904011-03 | SMC-15 | <10 | | 310.1 | 04/16/09 |
| 0904011-04 | SMC-28 | <10 | | 310.1 | 04/16/09 |
| 0904011-05 | SMC-30 | <10 | | 310.1 | 04/16/09 |
| 0904011-06 | SMC-31 | <10 | | 310.1 | 04/16/09 |
| 0904011-07 | SMC-32 | <10 | | 310.1 | 04/14/09 |

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Phenolphthalein as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | <10 | | 310.1 | 04/08/09 |
| 0903074-02 | SMC-25 | <10 | | 310.1 | 04/08/09 |
| 0903074-03 | SMC-08 | <10 | | 310.1 | 04/08/09 |
| 0903074-04 | SMC-24 | <10 | | 310.1 | 04/08/09 |
| 0903074-05 | SMC-09 | <10 | | 310.1 | 04/08/09 |
| 0903074-06 | SMC-10 | <10 | | 310.1 | 04/08/09 |
| 0904002-01 | SMC-00 | <10 | | 310.1 | 04/08/09 |

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ

Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Phenolphthalein as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904002-02 | SMC-01 | <10 | | 310.1 | 04/08/09 |
| 0904002-03 | SMC-03 | <10 | | 310.1 | 04/08/09 |
| 0904002-04 | SMC-04 | <10 | | 310.1 | 04/08/09 |
| 0904002-05 | SMC-05 | 10 | | 310.1 | 04/08/09 |
| 0904002-06 | SMC-11 | <10 | | 310.1 | 10/08/09 |
| 0904002-07 | SMC-12 | <10 | | 310.1 | 04/08/09 |
| 0904002-08 | SMC-20 | <10 | | 310.1 | 04/08/09 |
| 0904002-09 | SMC-21 | <10 | | 310.1 | 04/08/09 |
| 0904002-10 | SMC-22 | 22 | | 310.1 | 04/08/09 |
| 0904002-11 | SMC-26 | <10 | | 310.1 | 04/08/09 |
| 0904002-12 | SMC-35 | <10 | | 310.1 | 04/08/09 |
| 0904002-13 | SMC-36 | <10 | | 310.1 | 04/08/09 |
| 0904006-01 | SMC-06 | <10 | | 310.1 | 04/14/09 |
| 0904006-02 | SMC-07 | <10 | | 310.1 | 04/14/09 |
| 0904006-03 | SMC-16 | <10 | | 310.1 | 04/14/09 |
| 0904006-04 | SMC-17 | <10 | | 310.1 | 04/14/09 |
| 0904006-05 | SMC-18 | <10 | | 310.1 | 04/14/09 |
| 0904006-06 | SMC-33 | <10 | | 310.1 | 04/14/09 |
| 0904006-07 | SMC-34 | <10 | | 310.1 | 04/14/09 |
| 0904011-01 | SMC-13 | <10 | | 310.1 | 04/16/09 |
| 0904011-02 | SMC-14 | 18 | | 310.1 | 04/16/09 |
| 0904011-03 | SMC-15 | <10 | | 310.1 | 04/16/09 |
| 0904011-04 | SMC-28 | <10 | | 310.1 | 04/16/09 |
| 0904011-05 | SMC-30 | <10 | | 310.1 | 04/16/09 |
| 0904011-06 | SMC-31 | <10 | | 310.1 | 04/16/09 |
| 0904011-07 | SMC-32 | <10 | | 310.1 | 04/14/09 |

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Total as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 200 | | 310.1 | 04/08/09 |
| 0903074-02 | SMC-25 | 181 | | 310.1 | 04/08/09 |
| 0903074-03 | SMC-08 | 10 | | 310.1 | 04/08/09 |
| 0903074-04 | SMC-24 | 172 | | 310.1 | 04/08/09 |
| 0903074-05 | SMC-09 | 168 | | 310.1 | 04/08/09 |
| 0903074-06 | SMC-10 | 170 | | 310.1 | 04/08/09 |
| 0904002-01 | SMC-00 | <10 | TQ05 | 310.1 | 04/08/09 |
| 0904002-02 | SMC-01 | 274 | | 310.1 | 04/08/09 |
| 0904002-03 | SMC-03 | 272 | | 310.1 | 04/08/09 |
| 0904002-04 | SMC-04 | 292 | | 310.1 | 04/08/09 |
| 0904002-05 | SMC-05 | 328 | | 310.1 | 04/08/09 |
| 0904002-06 | SMC-11 | 188 | | 310.1 | 04/08/09 |
| 0904002-07 | SMC-12 | 210 | | 310.1 | 04/08/09 |
| 0904002-08 | SMC-20 | 260 | | 310.1 | 04/08/09 |
| 0904002-09 | SMC-21 | 153 | | 310.1 | 04/08/09 |
| 0904002-10 | SMC-22 | 250 | | 310.1 | 04/08/09 |
| 0904002-11 | SMC-26 | 280 | | 310.1 | 04/08/09 |
| 0904002-12 | SMC-35 | 192 | | 310.1 | 04/08/09 |
| 0904002-13 | SMC-36 | 282 | | 310.1 | 04/08/09 |
| 0904006-01 | SMC-06 | <10 | | 310.1 | 04/14/09 |
| 0904006-02 | SMC-07 | 243 | | 310.1 | 04/14/09 |
| 0904006-03 | SMC-16 | 359 | | 310.1 | 04/14/09 |
| 0904006-04 | SMC-17 | 139 | | 310.1 | 04/14/09 |
| 0904006-05 | SMC-18 | 167 | | 310.1 | 04/14/09 |
| 0904006-06 | SMC-33 | 153 | | 310.1 | 04/14/09 |
| 0904006-07 | SMC-34 | 163 | | 310.1 | 04/14/09 |
| 0904011-01 | SMC-13 | 180 | | 310.1 | 04/16/09 |

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Alkalinity, Total as CaCO3 mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904011-02 | SMC-14 | 282 | | 310.1 | 04/16/09 |
| 0904011-03 | SMC-15 | 60 | | 310.1 | 04/16/09 |
| 0904011-04 | SMC-28 | 136 | | 310.1 | 04/16/09 |
| 0904011-05 | SMC-30 | 184 | | 310.1 | 04/16/09 |
| 0904011-06 | SMC-31 | 286 | | 310.1 | 04/16/09 |
| 0904011-07 | SMC-32 | 184 | | 310.1 | 04/14/09 |

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Chloride mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 33 | | 300.0 | 04/02/09 |
| 0903074-02 | SMC-25 | 26 | | 300.0 | 04/03/09 |
| 0903074-03 | SMC-08 | 78 | | 300.0 | 04/03/09 |
| 0903074-04 | SMC-24 | 50 | | 300.0 | 04/03/09 |
| 0903074-05 | SMC-09 | 48 | | 300.0 | 04/03/09 |
| 0903074-06 | SMC-10 | 47 | | 300.0 | 04/03/09 |
| 0904002-01 | SMC-00 | <5 | | 300.0 | 04/03/09 |
| 0904002-02 | SMC-01 | 57 | | 300.0 | 04/03/09 |
| 0904002-03 | SMC-03 | 32 | | 300.0 | 04/03/09 |
| 0904002-04 | SMC-04 | 33 | | 300.0 | 04/03/09 |
| 0904002-05 | SMC-05 | 27 | | 300.0 | 04/03/09 |
| 0904002-06 | SMC-11 | 55 | | 300.0 | 04/03/09 |
| 0904002-07 | SMC-12 | 125 | | 300.0 | 04/03/09 |
| 0904002-08 | SMC-20 | 15 | | 300.0 | 04/03/09 |
| 0904002-09 | SMC-21 | 42 | | 300.0 | 04/03/09 |
| 0904002-10 | SMC-22 | 27 | | 300.0 | 04/03/09 |
| 0904002-11 | SMC-26 | 13 | | 300.0 | 04/03/09 |

Environmental Protection Agency
# Region 6 Laboratory
10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Chloride mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904002-12 | SMC-35 | 55 | | 300.0 | 04/03/09 |
| 0904002-13 | SMC-36 | 13 | | 300.0 | 04/03/09 |
| 0904006-01 | SMC-06 | <5 | | 300.0 | 04/07/09 |
| 0904006-02 | SMC-07 | <5 | | 300.0 | 04/07/09 |
| 0904006-03 | SMC-16 | 25 | | 300.0 | 04/08/09 |
| 0904006-04 | SMC-17 | 11 | | 300.0 | 04/08/09 |
| 0904006-05 | SMC-18 | 10 | | 300.0 | 04/08/09 |
| 0904006-06 | SMC-33 | 46 | | 300.0 | 04/08/09 |
| 0904006-07 | SMC-34 | 53 | | 300.0 | 04/08/09 |
| 0904011-01 | SMC-13 | 59 | | 300.0 | 04/07/09 |
| 0904011-02 | SMC-14 | 58 | | 300.0 | 04/07/09 |
| 0904011-03 | SMC-15 | 10 | | 300.0 | 04/07/09 |
| 0904011-04 | SMC-28 | <5 | | 300.0 | 04/08/09 |
| 0904011-05 | SMC-30 | <5 | | 300.0 | 04/07/09 |
| 0904011-06 | SMC-31 | 7 | | 300.0 | 04/07/09 |
| 0904011-07 | SMC-32 | 33 | | 300.0 | 04/08/09 |

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Fluoride mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 0.43 | | 300.0 | 04/02/09 |
| 0903074-02 | SMC-25 | 1.43 | | 300.0 | 04/03/09 |
| 0903074-03 | SMC-08 | <0.25 | | 300.0 | 04/03/09 |
| 0903074-04 | SMC-24 | 0.63 | | 300.0 | 04/03/09 |
| 0903074-05 | SMC-09 | 0.36 | | 300.0 | 04/03/09 |
| 0903074-06 | SMC-10 | 0.56 | | 300.0 | 04/03/09 |
| 0904002-01 | SMC-00 | <0.25 | | 300.0 | 04/03/09 |

Environmental Protection Agency

# Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ

Matrix: Liquid

| Laboratory ID | Station ID | Fluoride mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904002-02 | SMC-01 | 0.44 | | 300.0 | 04/03/09 |
| 0904002-03 | SMC-03 | 0.39 | | 300.0 | 04/03/09 |
| 0904002-04 | SMC-04 | 1.18 | | 300.0 | 04/03/09 |
| 0904002-05 | SMC-05 | 1.28 | | 300.0 | 04/03/09 |
| 0904002-06 | SMC-11 | 0.31 | | 300.0 | 04/03/09 |
| 0904002-07 | SMC-12 | 0.91 | | 300.0 | 04/03/09 |
| 0904002-08 | SMC-20 | <0.25 | | 300.0 | 04/03/09 |
| 0904002-09 | SMC-21 | 0.46 | | 300.0 | 04/03/09 |
| 0904002-10 | SMC-22 | 1.27 | | 300.0 | 04/03/09 |
| 0904002-11 | SMC-26 | 1.04 | | 300.0 | 04/03/09 |
| 0904002-12 | SMC-35 | 0.32 | | 300.0 | 04/03/09 |
| 0904002-13 | SMC-36 | 1.05 | | 300.0 | 04/03/09 |
| 0904006-01 | SMC-06 | <0.25 | | 300.0 | 04/07/09 |
| 0904006-02 | SMC-07 | 0.76 | | 300.0 | 04/07/09 |
| 0904006-03 | SMC-16 | 1.68 | | 300.0 | 04/08/09 |
| 0904006-04 | SMC-17 | 1.25 | | 300.0 | 04/08/09 |
| 0904006-05 | SMC-18 | 0.29 | | 300.0 | 04/08/09 |
| 0904006-06 | SMC-33 | 0.73 | | 300.0 | 04/08/09 |
| 0904006-07 | SMC-34 | 0.52 | | 300.0 | 04/08/09 |
| 0904011-01 | SMC-13 | 0.50 | | 300.0 | 04/07/09 |
| 0904011-02 | SMC-14 | 1.08 | | 300.0 | 04/07/09 |
| 0904011-03 | SMC-15 | <0.25 | | 300.0 | 04/07/09 |
| 0904011-04 | SMC-28 | 0.69 | | 300.0 | 04/08/09 |
| 0904011-05 | SMC-30 | 0.41 | | 300.0 | 04/07/09 |
| 0904011-06 | SMC-31 | 0.98 | | 300.0 | 04/07/09 |
| 0904011-07 | SMC-32 | <0.25 | | 300.0 | 04/08/09 |

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Environmental Protection Agency

# Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Nitrate+Nitrite as N mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 4.43 | | 353.2 | 04/07/09 |
| 0903074-02 | SMC-25 | 5.67 | | 353.2 | 04/07/09 |
| 0903074-03 | SMC-08 | 0.05 | | 353.2 | 04/07/09 |
| 0903074-04 | SMC-24 | 20.2 | | 353.2 | 04/07/09 |
| 0903074-05 | SMC-09 | 22.8 | | 353.2 | 04/07/09 |
| 0903074-06 | SMC-10 | 21.2 | | 353.2 | 04/07/09 |
| 0904002-01 | SMC-00 | <0.04 | | 353.2 | 04/07/09 |
| 0904002-02 | SMC-01 | 4.70 | | 353.2 | 04/07/09 |
| 0904002-03 | SMC-03 | 4.12 | | 353.2 | 04/07/09 |
| 0904002-04 | SMC-04 | 0.82 | | 353.2 | 04/07/09 |
| 0904002-05 | SMC-05 | 0.86 | | 353.2 | 04/07/09 |
| 0904002-06 | SMC-11 | <0.04 | | 353.2 | 04/07/09 |
| 0904002-07 | SMC-12 | 11.5 | | 353.2 | 04/07/09 |
| 0904002-08 | SMC-20 | 1.08 | | 353.2 | 04/07/09 |
| 0904002-09 | SMC-21 | 9.38 | | 353.2 | 04/07/09 |
| 0904002-10 | SMC-22 | 1.86 | | 353.2 | 04/07/09 |
| 0904002-11 | SMC-26 | 6.28 | | 353.2 | 04/07/09 |
| 0904002-12 | SMC-35 | 12.7 | | 353.2 | 04/07/09 |
| 0904002-13 | SMC-36 | 5.96 | | 353.2 | 04/07/09 |
| 0904006-01 | SMC-06 | <0.04 | | 353.2 | 04/09/09 |
| 0904006-02 | SMC-07 | <0.04 | | 353.2 | 04/09/09 |
| 0904006-03 | SMC-16 | <0.04 | | 353.2 | 04/09/09 |
| 0904006-04 | SMC-17 | 1.45 | | 353.2 | 04/09/09 |
| 0904006-05 | SMC-18 | <0.04 | | 353.2 | 04/09/09 |
| 0904006-06 | SMC-33 | 9.62 | | 353.2 | 04/09/09 |
| 0904006-07 | SMC-34 | 6.15 | | 353.2 | 04/09/09 |
| 0904011-01 | SMC-13 | 18.6 | | 353.2 | 04/09/09 |

Environmental Protection Agency

# Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

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## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Nitrate+Nitrite as N mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904011-02 | SMC-14 | 2.36 | | 353.2 | 04/09/09 |
| 0904011-03 | SMC-15 | 1.02 | | 353.2 | 04/09/09 |
| 0904011-04 | SMC-28 | 1.11 | | 353.2 | 04/09/09 |
| 0904011-05 | SMC-30 | 0.11 | | 353.2 | 04/09/09 |
| 0904011-06 | SMC-31 | <0.04 | | 353.2 | 04/09/09 |
| 0904011-07 | SMC-32 | <0.04 | | 353.2 | 04/09/09 |

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Sulfate mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 49 | | 300.0 | 04/02/09 |
| 0903074-02 | SMC-25 | 144 | | 300.0 | 04/03/09 |
| 0903074-03 | SMC-08 | 911 | | 300.0 | 04/03/09 |
| 0903074-04 | SMC-24 | 2070 | | 300.0 | 04/03/09 |
| 0903074-05 | SMC-09 | 2070 | | 300.0 | 04/03/09 |
| 0903074-06 | SMC-10 | 2110 | | 300.0 | 04/03/09 |
| 0904002-01 | SMC-00 | <5 | | 300.0 | 04/03/09 |
| 0904002-02 | ~~SMC-01~~ | ~~353~~ | | 300.0 | 04/03/09 |
| 0904002-03 | ~~SMC-03~~ | ~~369~~ | | 300.0 | 04/03/09 |
| 0904002-04 | SMC-04 | 200 | | 300.0 | 04/03/09 |
| 0904002-05 | SMC-05 | 105 | | 300.0 | 04/03/09 |
| 0904002-06 | SMC-11 | 1580 | | 300.0 | 04/03/09 |
| 0904002-07 | SMC-12 | 955 | | 300.0 | 04/03/09 |
| 0904002-08 | SMC-20 | 96 | | 300.0 | 04/03/09 |
| 0904002-09 | SMC-21 | 546 | | 300.0 | 04/03/09 |
| 0904002-10 | SMC-22 | 100 | | 300.0 | 04/03/09 |
| 0904002-11 | SMC-26 | 135 | | 300.0 | 04/03/09 |

Environmental Protection Agency
# Region 6 Laboratory
10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Miscellaneous Results
## (TCEQ)

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Sulfate mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904002-12 | SMC-35 | 396 | | 300.0 | 04/03/09 |
| 0904002-13 | SMC-36 | 134 | | 300.0 | 04/03/09 |
| 0904006-01 | SMC-06 | <5 | | 300.0 | 04/07/09 |
| 0904006-02 | SMC-07 | 168 | | 300.0 | 04/07/09 |
| 0904006-03 | SMC-16 | 323 | | 300.0 | 04/08/09 |
| 0904006-04 | SMC-17 | 656 | | 300.0 | 04/08/09 |
| 0904006-05 | SMC-18 | 370 | | 300.0 | 04/08/09 |
| 0904006-06 | SMC-33 | 899 | | 300.0 | 04/08/09 |
| 0904006-07 | SMC-34 | 1080 | | 300.0 | 04/08/09 |
| 0904011-01 | SMC-13 | 1610 | | 300.0 | 04/07/09 |
| 0904011-02 | SMC-14 | 535 | | 300.0 | 04/07/09 |
| 0904011-03 | SMC-15 | 73 | | 300.0 | 04/07/09 |
| 0904011-04 | SMC-28 | 144 | | 300.0 | 04/08/09 |
| 0904011-05 | SMC-30 | 12 | | 300.0 | 04/07/09 |
| 0904011-06 | SMC-31 | 120 | | 300.0 | 04/07/09 |
| 0904011-07 | SMC-32 | 1100 | | 300.0 | 04/08/09 |

Batch: TCEQ Matrix: Liquid

| Laboratory ID | Station ID | Total Dissolved Solids mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0903074-01 | SMC-23 | 440 | | 160.1 | 04/06/09 |
| 0903074-02 | SMC-25 | 504 | | 160.1 | 04/06/09 |
| 0903074-03 | SMC-08 | 1400 | | 160.1 | 04/06/09 |
| 0903074-04 | SMC-24 | 3310 | | 160.1 | 04/06/09 |
| 0903074-05 | SMC-09 | 3400 | | 160.1 | 04/06/09 |
| 0903074-06 | SMC-10 | 3380 | | 160.1 | 04/06/09 |
| 0904002-01 | SMC-00 | <10 | | 160.1 | 04/07/09 |

Environmental Protection Agency
# Region 6 Laboratory
10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

## Miscellaneous Results
## (TCEQ)

Batch: TCEQ

Matrix: Liquid

| Laboratory ID | Station ID | Total Dissolved Solids mg/L | Analyte Qualifier | Specific Method | Date Analyzed |
|---|---|---|---|---|---|
| 0904002-02 | SMC-01 | 884 | | 160.1 | 04/07/09 |
| 0904002-03 | SMC-03 | 884 | | 160.1 | 04/07/09 |
| 0904002-04 | SMC-04 | 698 | | 160.1 | 04/07/09 |
| 0904002-05 | SMC-05 | 592 | | 160.1 | 04/07/09 |
| 0904002-06 | SMC-11 | 2440 | | 160.1 | 04/07/09 |
| 0904002-07 | SMC-12 | 1870 | | 160.1 | 04/07/09 |
| 0904002-08 | SMC-20 | 504 | | 160.1 | 04/07/09 |
| 0904002-09 | SMC-21 | 3320 | | 160.1 | 04/07/09 |
| 0904002-10 | SMC-22 | 506 | | 160.1 | 04/07/09 |
| 0904002-11 | SMC-26 | 572 | | 160.1 | 04/07/09 |
| 0904002-12 | SMC-35 | 2530 | | 160.1 | 04/07/09 |
| 0904002-13 | SMC-36 | 598 | | 160.1 | 04/07/09 |
| 0904006-01 | SMC-06 | <10 | | 160.1 | 04/07/09 |
| 0904006-02 | SMC-07 | 534 | | 160.1 | 04/07/09 |
| 0904006-03 | SMC-16 | 864 | | 160.1 | 04/07/09 |
| 0904006-04 | SMC-17 | 1100 | | 160.1 | 04/07/09 |
| 0904006-05 | SMC-18 | 732 | | 160.1 | 04/07/09 |
| 0904006-06 | SMC-33 | 1490 | | 160.1 | 04/07/09 |
| 0904006-07 | SMC-34 | 1780 | | 160.1 | 04/07/09 |
| 0904011-01 | SMC-13 | 2710 | TQ04 | 160.1 | 04/07/09 |
| 0904011-02 | SMC-14 | 1180 | | 160.1 | 04/07/09 |
| 0904011-03 | SMC-15 | 210 | | 160.1 | 04/07/09 |
| 0904011-04 | SMC-28 | 378 | | 160.1 | 04/07/09 |
| 0904011-05 | SMC-30 | 254 | | 160.1 | 04/07/09 |
| 0904011-06 | SMC-31 | 500 | | 160.1 | 04/07/09 |
| 0904011-07 | SMC-32 | 1630 | | 160.1 | 04/07/09 |

**EPA USEPA Contract Laboratory Program**
**Generic Chain of Custody**

Reference Case
Client No:
SDG No:
L

| | | | | |
|---|---|---|---|---|
| Date Shipped: 3/30/2009 | **Chain of Custody Record** | | Sampler Signature: | **For Lab Use Only** |
| Carrier Name: UPS | Relinquished By (Date / Time) | | Received By (Date / Time) | Lab Contract No: |
| Airbill: 1Z703AY90198467615 | 1 | | Sarah Harris 3/31/09 11:45 | Unit Price: |
| Shipped to: US EPA Region 6 Lab 10625 Fallstone Road Houston TX 77099 (281) 983-2137 | 2 | | | Transfer To: |
| | 3 | | | Lab Contract No: |
| | 4 | | | Unit Price: |

| SAMPLE No. | MATRIX/ SAMPLER | CONC/ TYPE | ANALYSIS/ TURNAROUND | TAG No/ PRESERVATIVE/ Bottles | STATION LOCATION | SAMPLE COLLECT DATE/TIME | FOR LAB USE ONLY Sample Condition On Receipt |
|---|---|---|---|---|---|---|---|
| SMC-08 | Ground Water | /G | DA + TDS (14), DM/U/Mo (14), NO3/NO2 (14), pH (14), TM/U/Mo (14) | 6-403640 (Ice Only), 6-403641 (Ice Only), 6-403642 (H2SO4), 6-403643 (HNO3), 6-403644 (HNO3) (5) | SMC-08 | S: 3/30/2009 12:50 | |
| SMC-24 | Ground Water | /G | DA + TDS (14), DM/U/Mo (14), NO3/NO2 (14), pH (14), TM/U/Mo (14) | 6-403730 (Ice Only), 6-403731 (Ice Only), 6-403732 (H2SO4), 6-403733 (HNO3), 6-403734 (HNO3) (5) | SMC-24 | S: 3/30/2009 12:40 | |

| | | | | |
|---|---|---|---|---|
| Shipment for Case Complete?N | Sample(s) to be used for laboratory QC: | Additional Sampler Signature(s): | Cooler Temperature Upon Receipt: 5°C | Chain of Custody Seal Number: |
| Analysis Key: | Concentration: L = Low, M = Low/Medium, H = High | √ Type/Designate: Composite = C, Grab = G | | Custody Seal Intact? __ Shipment Iced? __ |

DA + TDS = Dissolved Anions + TDS, DM/U/Mo = CLP TAL Dissolved Metals + U, Mo, NO3/NO2 = Nitrate/Nitrite, pH = pH, TM/U/Mo = CLP TAL Total Metals + U, Mo

**TR Number: 6-043013577-033009-0001**

**LABORATORY COPY**

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

F2V5.1.0U Page 1 of 1

# REFERENCES

# 61-64

State of New Mexico | Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

1

April 27, 2009

Request
ID No. 2424855

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0036

Distribution
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: NMED GWQ Bureau Abatement and Asse
P.O. Box 26110
Santa Fe, NM 87502

Submitter: NMED - Ground Water Pollution Prevention S
P.O. Box 26110
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

COLLECTION

On: 3/31/2009 By: MARK GARMAN
At: 10:39 In/Near:

LOCATION

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-00

### Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | -0.2 | 0.2 | 0.5 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | -0.2 | 0.2 | 0.5 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 0.4 | 0.5 | 0.9 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 0.4 | 0.5 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 15262-20-1 | Radium-228, SDWA Method | 0.08 | 0.10 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

Reviewed By: [signature]
Nidal Jadalla 4/27/2009
*Supervisor, Radiochemistry Section*

RECEIVED
MAY 2009

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

2

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

*Distribution*
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

*May 29, 2009*

**Request**
**ID No. 2424856**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0037

To: **NMED - Ground Water Pollution Preventio**
**P.O. Box 26110**
**Santa Fe, NM 87502**

User: **DAVID L MAYERSON**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 13:35 | In/Near: | | SMC-01 |

### Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 16.4 | 1.5 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 18.8 | 1.7 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 9.9 | 1.5 | 2.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 9.7 | 1.5 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 33. | 3.3 | 1.0 | uG/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.04 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.14 | 0.06 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

RECEIVED
JUN 2009

Reviewed By: 
Nidal Jadalla 5/29/2009
*Supervisor, Radiochemistry Section*

State of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

3

RADIOCHEMISTRY SECTION [505]-841-2574

*May 29, 2009*

**Request ID No. 2424857**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0038

*Distribution*
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: **NMED - Ground Water Pollution Preventio**
**P.O. Box 26110**
**Santa Fe, NM 87502**

User: **DAVID L MAYERSON**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

**COLLECTION**

On: 3/31/2009 By: MARK GARMAN
At: 10:50 In/Near:

**LOCATION**

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-03

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 5.6 | 0.9 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 6.5 | 1.0 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 5.1 | 1.2 | 2.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 5.0 | 1.2 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 13982-63-3 | Radium-226, SDWA Method | 0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | -0.08 | 0.04 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

RECEIVED
JUN 2009

**Reviewed By:** Nidal Jadalla
Nidal Jadalla 5/29/2009
*Supervisor, Radiochemistry Section*

~~State~~ of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

(4)

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

*June 19, 2009*

**Request**
**ID No. 2424858**

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0039

*Distribution*
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: **David Mayerson**
**NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 12:24 | In/Near: | | SMC-04 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 17.4 | 1.7 | 0.9 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 21.1 | 2.1 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 5.4 | 1.3 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 5.2 | 1.3 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 19. | 1.9 | 1.0 | uG/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 11.1 | 0.34 | 0.10 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 5.61 | 0.19 | 0.05 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 0.08 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.15 | 0.05 | 0.13 | pCi/L | Ewing | 904.0 |

### *Notations & Comments:*

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

### *Laboratory Comments:*

Sample contained a small amount of sediment.

**Reviewed By:** [signature]
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700, Albuquerque, NM 87196 — 700 Camino de Salud, NE, [505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

5

June 19, 2009

Request ID No. 2424859

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0040

*Distribution*
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: David Mayerson
NMED GWQ Bureau Abatement and Asse
P.O. Box 5469
Santa Fe, NM 87502

Submitter: David Mayerson
NMED - Ground Water Pollution Prevention S
P.O. Box 26110
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

**COLLECTION**

On: 3/31/2009 By: MARK GARMAN
At: 14:04 In/Near:

**LOCATION**

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-05

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 20.8 | 1.9 | 0.9 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 24.8 | 2.3 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 10.7 | 1.5 | 1.5 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 10.3 | 1.5 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 26. | 2.6 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.05 | 0.02 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | -0.17 | 0.05 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** [signature]
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

**State of New Mexico** **Department of Health**

# SCIENTIFIC LABORATORY DIVISION

6

P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196 [505]-841-2500
RADIOCHEMISTRY SECTION [505]-841-2574

*May 15, 2009*

**Request**
**ID No. 2424874**

# ANALYTICAL REPORT
## SLD Accession No. RC-2009-0064

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

*Re:* **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 8:25 | In/Near: Milan | | SMC-06 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 0.1 | 0.2 | 0.5 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 0.1 | 0.2 | 0.5 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | -0.1 | 0.5 | 0.9 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | -0.1 | 0.5 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 15262-20-1 | Radium-228, SDWA Method | 0.21 | 0.11 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:**
Nidal Jadalla 5/15/2009
*Supervisor, Radiochemistry Section*

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MAY 2009
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

(7)

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

July 13, 2009

Request
ID No. 2424875

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0065

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

GROUND WATEI
JUL 1 6 2009
BUREAU

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 9:55 | In/Near: Milan | | SMC-07 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 8.2 | 0.9 | 0.8 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 9.5 | 1.1 | 0.9 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 7.0 | 1.1 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 6.8 | 1.1 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 2. | 0.5 | 1.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 4.03 | 0.12 | 0.03 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 0.70 | 0.03 | 0.02 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 1.61 | 0.07 | 0.02 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.87 | 0.15 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

**State of New Mexico** **Department of Health**

# SCIENTIFIC LABORATORY DIVISION

**P.O. Box 4700** **700 Camino de Salud, NE**
**Albuquerque, NM 87196** **[505]-841-2500**

RADIOCHEMISTRY SECTION [505]-841-2574

8

*May 29, 2009*

**Request ID No. 2424860**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0041

*Distribution*
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: **NMED - Ground Water Pollution Preventio**
**P.O. Box 26110**
**Santa Fe, NM 87502**

User: **DAVID L MAYERSON**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION |
|---|---|---|
| On: 3/30/2009 | By: DL MAYERSON | Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 12:50 | In/Near: | SMC-08 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 6.7 | 1.0 | 0.7 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 8.3 | 1.3 | 0.8 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 1.6 | 0.8 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 1.5 | 0.8 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 9. | 0.9 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.02 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.89 | 0.12 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

RECEIVED
JUN 2009

**Reviewed By:**

Nidal Jadalla 5/29/2009
*Supervisor, Radiochemistry Section*

~~State~~ of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

9

RADIOCHEMISTRY SECTION [505]-841-2574

*June 19, 2009*

Request
ID No. 2424861

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0042

*Distribution*

(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: David Mayerson
NMED GWQ Bureau Abatement and Asse
P.O. Box 5469
Santa Fe, NM 87502

Submitter: David Mayerson
NMED - Ground Water Pollution Prevention S
P.O. Box 26110
Santa Fe, NM 87502

*Re:* **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

COLLECTION

On: 3/30/2009 By: DAVID MAYERSON
At: 15:05 In/Near:

LOCATION

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-09

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 7.9 | 1.2 | 0.8 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 9.7 | 1.5 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 7.0 | 1.2 | 1.3 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 6.7 | 1.1 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 21. | 2.1 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.31 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.28 | 0.07 | 0.11 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

Reviewed By: Nidal Jadalla

Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

~~State~~ of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

10

RADIOCHEMISTRY SECTION [505]-841-2574

*June 26, 2009*

**Request ID No. 2424862**

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0043

*Distribution*
(x) User 55321
(x) Submitter 541
. Client -
(x) SLD Files

To: **David Mayerson**
**NMED - Ground Water Pollution Preventio**
**P.O. Box 5469**
**Santa Fe, NM 87502**

User: **David Mayerson**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

JUL 07 2009
BY:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION |
|---|---|---|
| On: 3/30/2009 | By: DAVID MAYERSON | Facility: SAN MATEO CREEK SITE INVESTIGATION |
| At: 14:32 | In/Near: | SMC-10 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 1.3 | 0.6 | 1.3 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 1.6 | 0.7 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 4.1 | 1.1 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 3.9 | 1.0 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 13982-63-3 | Radium-226, Total | 0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, Total | 0.36 | 0.21 | 0.30 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** Nidal Jadalla
Nidal Jadalla
*Supervisor, Radiochemistry Section*

State of New Mexico | Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

11

*June 19, 2009*

Request
ID No. 2424863

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0044

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED GWQ Bureau Abatement and Asse
P.O. Box 5469
Santa Fe, NM 87502

Submitter: David Mayerson
NMED - Ground Water Pollution Prevention S
P.O. Box 26110
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

COLLECTION
On: 3/31/2009 By: MARK GARMAN
At: 10:00 In/Near:

LOCATION
Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-11

### Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 91.3 | 7.7 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 129.5 | 10.9 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 90.1 | 7.8 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 82.7 | 7.1 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 200. | 20. | 10. | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.16 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.76 | 0.12 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** [signature]
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico | Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

12

RADIOCHEMISTRY SECTION [505]-841-2574

*June 19, 2009*

**Request ID No. 2424864**

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0045

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **David Mayerson**
**NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 10:50 | In/Near: | | SMC-12 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 66.8 | 4.8 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 82.7 | 5.9 | 1.8 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 30.6 | 3.3 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 29.5 | 3.2 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 150. | 15. | 5.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 54.6 | 1.65 | 0.50 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 44.8 | 1.38 | 0.25 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.52 | 0.07 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

13

July 20, 2009

Request
ID No. 2424901

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0059

Distribution
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009

Client: JUL 24 2009

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/2/2009 | By: DAVID L MAYERSON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 13:05 | In/Near: | | SMC-13 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 121.0 | 7.7 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 154.1 | 9.8 | 2.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 87.5 | 6.4 | 3.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 83.0 | 6.1 | 2.8 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 220. | 22. | 10. | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.07 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.28 | 0.13 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** N. Jadalla

Nidal Jadalla 7/20/2009
*Supervisor, Radiochemistry Section*

~~State~~ of New Mexico | Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

(14)

RADIOCHEMISTRY SECTION [505]-841-2574

June 19, 2009

Request
ID No. 2424882

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0055

Distribution
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

*Re:* **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

COLLECTION

On: 4/2/2009 By: DAVID L MAYERSON
At: 10:30 In/Near:

LOCATION

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-14

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 14.0 | 1.4 | 1.3 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 17.2 | 1.7 | 1.7 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 10.1 | 1.4 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 9.7 | 1.3 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 21. | 2.1 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | -0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.45 | 0.11 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

RECEIVED
JUN 2009

**Reviewed By:**
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

15

RECEIVED JUL 10 2009 BY:

RADIOCHEMISTRY SECTION [505]-841-2574

July 6, 2009

Request ID No. 2424876

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0067

Distribution
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION |
|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 11:25 | In/Near: Milan | SMC-16 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 0.9 | 0.6 | 1.3 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 1.1 | 0.8 | 1.7 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 4.8 | 0.9 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 4.6 | 0.9 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 13982-63-3 | Radium-226, SDWA Method | 0.28 | 0.02 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.44 | 0.11 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

Reviewed By: N. Jadalla

Nidal Jadalla 7/6/2009
*Supervisor, Radiochemistry Section*

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

16

P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196 [505]-841-2500
RADIOCHEMISTRY SECTION [505]-841-2574

*July 13, 2009*

**Request**
**ID No. 2424877**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0060

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **David Mayerson**
**NMED - Ground Water Pollution Preventio**
**P.O. Box 5469**
**Santa Fe, NM 87502**

User: **David Mayerson**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

GROUND WATER
JUL 16 2009
BUREAU

*Re:* **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 10:12 | In/Near: Milan | | SMC-17 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 58.8 | 4.0 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 69.4 | 4.7 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 34.2 | 3.4 | 2.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 33.3 | 3.4 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 85 | 8.5 | 4.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 44.9 | 1.24 | 0.14 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 27.1 | 0.79 | 0.09 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 0.14 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.46 | 0.15 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

State of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

17

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

*August 12, 2009*

Request
ID No. 2424878

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0062

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **Earl Dixon**
**NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 5469**
**Santa Fe, NM 87502**

GROUND WATER

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

AUG 17 2009

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

BUREAU

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 11:55 | In/Near: Milan | | SMC-18 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 10.9 | 1.2 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 13.2 | 1.5 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 15.2 | 1.6 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 14.6 | 1.6 | 1.6 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 2. | 0.5 | 1.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 3.73 | 0.11 | 0.04 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 0.52 | 0.03 | 0.03 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, Total | 1.35 | 0.05 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, Total | 0.83 | 0.14 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

State of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

18

RADIOCHEMISTRY SECTION [505]-841-2574

*May 29, 2009*

**Request**
**ID No. 2424865**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0046

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **NMED - Ground Water Pollution Preventio**
**P.O. Box 26110**
**Santa Fe, NM 87502**

User: **DAVID L MAYERSON**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

**COLLECTION**
On: 3/31/2009 By: MARK GARMAN
At: 9:50 In/Near:

**LOCATION**
Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-20

### Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 46.6 | 3.6 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 53.4 | 4.2 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 20.9 | 2.8 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 20.6 | 2.8 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 58. | 5.8 | 2.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.96 | 0.04 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 1.87 | 0.23 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

RECEIVED
JUN 2009

Reviewed By:

Nidal Jadalla 5/29/2009
*Supervisor, Radiochemistry Section*

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

19

RADIOCHEMISTRY SECTION [505]-841-2574

June 19, 2009

Request
ID No. 2424866

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0047

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED GWQ Bureau Abatement and Asse
P.O. Box 5469
Santa Fe, NM 87502

Submitter: David Mayerson
NMED - Ground Water Pollution Prevention S
P.O. Box 26110
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 11:15 | In/Near: | | SMC-21 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 6.5 | 1.0 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 9.1 | 1.5 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 8.1 | 1.3 | 2.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 7.5 | 1.3 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 10. | 1.0 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.27 | 0.02 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 2.40 | 0.33 | 0.50 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

Reviewed By: [signature]
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700, Albuquerque, NM 87196 — 700 Camino de Salud, NE [505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

20

*June 19, 2009*

**Request ID No. 2424867**

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0048

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **David Mayerson**
**NMED - Ground Water Pollution Preventio**
**P.O. Box 26110**
**Santa Fe, NM 87502**

User: **David Mayerson**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 13:05 | In/Near: | | SMC-22 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 33.5 | 2.7 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 38.3 | 3.2 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 11.9 | 2.0 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 11.7 | 1.9 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 42. | 4.2 | 1.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 22.9 | 0.67 | 0.19 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 12.8 | 0.40 | 0.10 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | -0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.11 | 0.05 | 0.12 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** [signature]
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700, Albuquerque, NM 87196 — 700 Camino de Salud, NE [505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

21

*June 19, 2009*

**Request ID No. 2424868**

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0049

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **David Mayerson**
**NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/30/2009 | By: DAVID MAYERSON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 14:21 | In/Near: | | SMC-23 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 6.2 | 1.1 | 1.8 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 8.2 | 1.5 | 2.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 11.6 | 1.7 | 2.8 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 10.9 | 1.6 | 2.6 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 12. | 1.2 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.42 | 0.02 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.97 | 0.15 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** 
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

22

*June 19, 2009*

**Request ID No. 2424869**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0050

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **David Mayerson**
**NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/30/2009 | By: DAVID MAYERSON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 12:46 | In/Near: | | SMC-24 |

### Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 20.7 | 2.0 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 27.7 | 2.7 | 2.6 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 21.5 | 2.1 | 2.8 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 20.1 | 2.0 | 2.6 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 36. | 3.6 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | -0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.33 | 0.18 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** Nidal Jadalla
Nidal Jadalla 6/19/2009
*Supervisor, Radiochemistry Section*

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

23

RADIOCHEMISTRY SECTION [505]-841-2574

June 26, 2009

Request
ID No. 2424870

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0051

Distribution
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

*Re:* **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

RE
JUL 07 2009
BY

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

COLLECTION

On: 3/30/2009 By: DAVID MAYERSON
At: 16:17 In/Near:

LOCATION

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-25

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 16.0 | 1.5 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 19.3 | 1.9 | 2.3 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 10.8 | 1.9 | 3.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 10.4 | 1.9 | 3.4 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 26. | 2.6 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | -0.01 | 0.02 | 0.02 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.51 | 0.12 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

Reviewed By: Nidal Jadalla
Nidal Jadalla 6/26/2009
*Supervisor, Radiochemistry Section*

State of New Mexico | Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700, Albuquerque, NM 87196 | 700 Camino de Salud, NE [505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

24

July 20, 2009

Request ID No. 2424871

# ANALYTICAL REPORT

## SLD Accession No. RC-2009-0052

Distribution
(x) User 55321
(x) Submitter 541
Client 0-0
(x) SLD Files

To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

JUL 24 2009

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 15:15 | In/Near: | | SMC-26 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 128.3 | 9.5 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 149.2 | 11.0 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 46.2 | 6.8 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 45.3 | 6.7 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 170. | 17. | 5.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 82.4 | 2.32 | 0.28 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 52.9 | 1.56 | 0.18 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 0.13 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.24 | 0.11 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

25

RADIOCHEMISTRY SECTION [505]-841-2574

*July 13, 2009*

Request
ID No. 2424885

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0066

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

GROUND WATER

JUL 16 2009

BUREAU

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/2/2009 | By: DAVID L MAYERSON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 11:00 | In/Near: | | SMC-28 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 19.4 | 2.2 | 0.6 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 22.6 | 2.6 | 0.7 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 19.1 | 2.5 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 18.6 | 2.4 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 43 | 4.3 | 1.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.15 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.34 | 0.11 | 0.17 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

Reviewed By: Nidal Jadalla 7/13/2009
*Supervisor, Radiochemistry Section*

State of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

26

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

*June 1, 2009*

Request
ID No. 2424884

## ANALYTICAL REPORT

## SLD Accession No. RC-2009-0058

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **NMED - Ground Water Pollution Preventio**
**P.O. Box 26110**
**Santa Fe, NM 87502**

User: **David Mayerson**
**NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/2/2009 | By: DAVID L MAYERSON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 9:45 | In/Near: | | SMC-30 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 2.0 | 0.5 | 0.6 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 2.4 | 0.6 | 0.8 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 3.2 | 0.7 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 3.1 | 0.7 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 15262-20-1 | Radium-228, SDWA Method | 0.80 | 0.13 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

RECEIVED
JUN 2009

**Reviewed By:** [signature]
Nidal Jadalla 6/1/2009
*Supervisor, Radiochemistry Section*

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

27

RADIOCHEMISTRY SECTION [505]-841-2574

*May 15, 2009*

Request
ID No. 2424883

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0057

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

*Re:* **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/2/2009 | By: DAVID L MAYERSON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 11:29 | In/Near: | | SMC-31 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | -0.1 | 0.4 | 0.9 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | -0.1 | 0.5 | 1.1 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 2.0 | 0.8 | 1.5 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 2.0 | 0.7 | 1.4 | pCi/L | Crowell | SM 7110 B |
| 15262-20-1 | Radium-228, SDWA Method | 0.38 | 0.12 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:**
Nidal Jadalla 5/15/2009
*Supervisor, Radiochemistry Section*

RECEIVED
MAY 2009

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700 — 700 Camino de Salud, NE
Albuquerque, NM 87196 — [505]-841-2500
RADIOCHEMISTRY SECTION [505]-841-2574

28

*July 20, 2009*

**Request ID No. 2424881**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0061

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: **NMED - Ground Water Pollution Preventio**
**P.O. Box 5469**
**Santa Fe, NM 87502**

User: **NMED GWQ Bureau Abatement and Assessm**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

JUL 24 2009

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 13:22 | In/Near: Milan | | SMC-32 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 56.0 | 4.4 | 1.5 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 72.6 | 5.7 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 53.2 | 4.4 | 2.3 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 50.3 | 4.1 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 100. | 10. | 5.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 2.90 | 0.09 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 3.91 | 0.40 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** [signature]
Nidal Jadalla — 7/20/2009
*Supervisor, Radiochemistry Section*

State of New Mexico
Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

27

RADIOCHEMISTRY SECTION [505]-841-2574

*August 12, 2009*

Request
ID No. 2424879

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0063

*Distribution*
(x) User 55321
(x) Submitter 541
. Client 0-0
(x) SLD Files

To: Earl Dixon
NMED GWQ Bureau Abatement and Asse
P.O. Box 5469
Santa Fe, NM 87502

Submitter: David Mayerson
NMED - Ground Water Pollution Prevention S
P.O. Box 5469
Santa Fe, NM 87502

GROUND WATER
AUG 17 2009
BUREAU

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 12:13 | In/Near: Milan | | SMC-33 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 72.1 | 5.1 | 1.2 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 89.4 | 6.3 | 1.5 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 65.1 | 5.3 | 2.2 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 62.5 | 5.1 | 2.1 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 150. | 15. | 5.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 53.5 | 1.52 | 0.37 | piCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 42.7 | 1.25 | 0.31 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 0.13 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.50 | 0.13 | 0.16 | pCi/L | Ewing | 904.0 |

### *Notations & Comments:*

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

For SDWA Reports: The MCL for gross alpha excludes the contribution from uranium, but this must be calculated from the results. When the "Gross Alpha w/U-nat Reference" value is greater than 7.5 pCi/L, the report should include a value for "Uranium, Mass Concentration" in uG/L. To convert units and exclude the uranium contribution to the gross alpha: 1) Multiply the "Uranium, Mass Concentration" value by 0.67 to convert to pCi/L; 2) Subtract this converted uranium value from the "Gross Alpha w/U-nat Reference" ; 3) This calculated amount is what is compared to the gross alpha MCL of 15 pCi/L.

State of New Mexico Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196 [505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

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July 7, 2009

Request
ID No. 2424880

# ANALYTICAL REPORT
## SLD Accession No. RC-2009-0056

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To: **David Mayerson**
**NMED GWQ Bureau Abatement and Asse**
**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 5469**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 03, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION |
|---|---|---|
| On: 4/1/2009 | By: EARLE DIXON | Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 11:05 | In/Near: Milan | SMC-34 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 56.2 | 4.5 | 1.8 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 74.1 | 5.9 | 2.4 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 49.0 | 4.2 | 2.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 46.4 | 4.0 | 1.9 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 100. | 10. | 5.0 | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.27 | 0.02 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.46 | 0.13 | 0.15 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

**Reviewed By:** [signature]
Nidal Jadalla 7/6/2009
*Supervisor, Radiochemistry Section*

State of New Mexico

Department of Health

# SCIENTIFIC LABORATORY DIVISION

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
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RADIOCHEMISTRY SECTION [505]-841-2574

July 6, 2009

Request
ID No. 2424872

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0053

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To: David Mayerson
NMED - Ground Water Pollution Preventio
P.O. Box 5469
Santa Fe, NM 87502

User: David Mayerson
NMED GWQ Bureau Abatement and Assessm
P.O. Box 5469
Santa Fe, NM 87502

*Re:* A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009

Client:

SLD: Radiochemistry Section
Scientific Laboratory Division
700 Camino de Salud, NE
P.O. Box 4700
Albuquerque, NM 87196-4700

## DEMOGRAPHIC DATA

COLLECTION

On: 3/31/2009 By: MARK GARMAN
At: 10:00 In/Near:

LOCATION

Facility: SAN MATEO CREEK BASIN SITE INVESTIGATION
SMC-35

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 111.5 | 6.9 | 2.3 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 139.8 | 8.7 | 2.8 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 89.9 | 6.4 | 2.6 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 86.4 | 6.2 | 2.5 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 200. | 20. | 10. | ug/L | Patel | 200.8 |
| 13982-63-3 | Radium-226, SDWA Method | 0.06 | 0.03 | 0.02 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.20 | 0.11 | 0.16 | pCi/L | Ewing | 904.0 |

***Notations & Comments:***

Uncertainties, sigmas, are expressed as +- one standard deviation, i.e. one standard error. Small negative or positive values which are less than two(2) standard deviations should be interpreted as: "not detected": as "less than the detection limit (<d.Lmt.)" when reported; or "less than twice the standard deviation".

Reviewed By: N. Jadalla

Nidal Jadalla 7/6/2009
*Supervisor, Radiochemistry Section*

State of New Mexico — Department of Health

# SCIENTIFIC LABORATORY DIVISION

32

P.O. Box 4700
Albuquerque, NM 87196

700 Camino de Salud, NE
[505]-841-2500

RADIOCHEMISTRY SECTION [505]-841-2574

*June 19, 2009*

**Request ID No. 2424873**

## ANALYTICAL REPORT
## SLD Accession No. RC-2009-0054

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To: **David Mayerson**
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**P.O. Box 5469**
**Santa Fe, NM 87502**

Submitter: **David Mayerson**
**NMED - Ground Water Pollution Prevention S**
**P.O. Box 26110**
**Santa Fe, NM 87502**

***Re:*** **A(n) 'Water, Non-Filtered' sample submitted to this laboratory on April 01, 2009**

Client:

SLD: **Radiochemistry Section**
**Scientific Laboratory Division**
**700 Camino de Salud, NE**
**P.O. Box 4700**
**Albuquerque, NM 87196-4700**

## DEMOGRAPHIC DATA

| COLLECTION | | LOCATION | |
|---|---|---|---|
| On: 3/31/2009 | By: MARK GARMAN | Facility: | SAN MATEO CREEK BASIN SITE INVESTIGATION |
| At: 16:15 | In/Near: | | SMC-36 |

## Analytical Results

| CAS No. | Analyte | Value | Sigma | D. Lmt. | Units | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 12587-46-1 | Gross Alpha w/ Am-241 Reference | 110.1 | 8.2 | 0.8 | pCi/L | Crowell | SM 7110 B |
| 12587-46-1 | Gross Alpha w/ U-nat Reference | 129.3 | 9.7 | 1.0 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Cs-137 Reference | 58.4 | 7.0 | 1.5 | pCi/L | Crowell | SM 7110 B |
| 12587-47-2 | Gross Beta w/ Sr/Y-90 Reference | 57.0 | 6.8 | 1.5 | pCi/L | Crowell | SM 7110 B |
| 07440-61-1 | Uranium, Mass Concentration | 170. | 17. | 5.0 | ug/L | Patel | 200.8 |
| 13966-29-5 | Uranium-234, by Alpha Spec. | 78.3 | 2.26 | 0.50 | pCi/L | Ewing | 7500-UC |
| 07440-61-1 | Uranium-238, by Alpha Spec. | 53.4 | 1.60 | 0.25 | pCi/L | Ewing | 7500-UC |
| 13982-63-3 | Radium-226, SDWA Method | 0.01 | 0.01 | 0.01 | pCi/L | Valdez | 903.1 |
| 15262-20-1 | Radium-228, SDWA Method | 0.25 | 0.12 | 0.15 | pCi/L | Ewing | 904.0 |

### *Notations & Comments:*

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DRAFT DOCUMENT

# Geochemical Analysis and Interpretation of Ground Water Data Collected as part of the Anaconda Company Bluewater Uranium Mill Site Investigation (CERCLIS ID NMD007106891) and San Mateo Creek Site Legacy Uranium Sites Investigation (CERCLIS ID NMN00060684)

McKinley and Cibola County, New Mexico

Draft Released
May 2010

New Mexico Environment Department
Ground Water Quality Bureau
Superfund Oversight Section

**Table of Contents**

Table ES-1: Summary of Geochemical Distinctions between the Alluvial and Bedrock Aquifers in the San Mateo Creek Basin.

| Criteria | Alluvial Aquifer | Bedrock Aquifer |
|---|---|---|
| TDS | More brackish water (> 1,000 mg/l); 1,000 – 3,000 + mg/l range | More fresh water (< 1,000 mg/l); some Morrison Formation/West Water Canyon TDS = 1,000 – 2,000 mg/l range. |
| Stiff diagrams | Larger than bedrock Stiff w/ longer tails | Smaller Stiff w/ shorter tails |
| Major ions | Ca > Na; $SO_4$ > $HCO_3$ | Na > Ca; $HCO_3$ > $SO_4$ |
| Piper diagrams | Predominantly CaMg-Na/$HCO_3$-$SO_4$ water-type | Mixed ion water-type; Na-CaMg/$SO_4$-$HCO_3$ |
| $NO_2$+$NO_3$ | Usually >/= 5 mg/l or 10-20 mg/l | Usually ≤ 1 mg/l or ≤ 5 mg/l |
| $NO_2$+$NO_3$ | More shallow = higher concentration; increases along flow path | Decreases w/ depth of water bearing zone |
| Arsenic | > 20 ug/l | ≤ 5 ug/l |
| Selenium | > 80 ug/l; some > 250 ug/l | < 80 ug/l |
| Uranium | > 100 ug/l | < 50 ug/l |
| $^{234}U$:$^{238}U$ Activity Ratio (AR) | Low AR (1-2) & U > 150 ug/l; SMC-11, -12, -13, -26, & -33 are impacted based on this criteria (see Figure 35 in report). | AR > 2 & U < 75 ug/l |
| $\delta^2H$; $\delta^{18}O$; $\delta^{13}C$ | Slightly more enriched (contains more of heavier isotopes than bedrock) | Slightly less enriched |
| $\delta^{34}S$ | More depleted in heavier isotope than bedrock | Slightly more enriched than alluvial water |
| Distance | Within boundaries of or close to alluvial channel | Far away from or out of alluvial channel boundaries |
| Depth to Static Water Level (SWL) | Generally 30-80 feet | Greater than 80 feet |
| Well depth | Generally ≤ 100-130 feet | Generally > 150 – several 100 feet |
| Sample/well numbers that meet most criteria | SMC-08, -09, -10, -11, -12, -13, -14, -17, -26, -33, & -34 | SMC-07, -20, -23, -24, & -28. |
| Sample/well numbers that meet a few criteria | SMC-21 | SMC-03, -04, -05, -16, -18, -22, -25, -28, -30, & -32. |

Interestingly, it appears that the samples with the more elevated Ra concentrations occur in samples that are assumed to produce water from bedrock hydrostratigraphic units (SMC-07, -18, -20, and -32). This observation and assumption supports the geochemical behavior of Ra in that this radionuclide is seldom found far from the source because extreme low pH is necessary to mobilize Ra in the dissolved state. If Ra is present at elevated total concentrations it is because it has likely adsorbed to suspended particulate matter in the water.

8.8 SMC Uranium Isotope Results

Background information on the isotope geochemistry of U was described earlier in the Bluewater Mill SI uranium isotope section and is not repeated here. The approach described by Zielinski et al., 1997 is applied in the analysis of the SMC U isotope sample results.

Figure 35 is a plot of the U concentration in ug/l and AR for the 18 samples from the SMC area. Figure 36 is a plot of the reciprocal of the U concentration in ug/l and AR for the 18 samples from the SMC area. **Note that, unlike the study by Zielinski, there are no SMC SI samples of actual raffinate as in Figure 11 to provide one of the anchor points for a mixing line end member.** In Figures 35 and 36 the AR range from the samples of raffinate in the Zielinski paper are used to represent the possible AR range for the SMC raffinate sources since it is assumed to have a ratio close to 1.0. From here forward, the paper by Zielinski and the results presented in Figures 19, 35, and 36 are used to provide an interpretation of and suggestion for the source of U in some of the samples from the SMC investigation.

In Figures 35 and 36 three groups of samples are apparent. The first group, samples SMC-07, -08, -18, -31, and -32 are unique because the levels of dissolved U are low or less than the laboratory limit of detection. These five samples display a large range of AR values that range from 0.98 to 7.67. The low U concentration and large range of AR values for this first group of samples are interpreted to be representative of local background ground water U geochemistry. Based on the assumed and unknown hydrostratigraphic units, the first group of samples appears to produce water from bedrock aquifers (Jmw and Cretaceous sandstones).

The second group, samples SMC-04, -10, -20, -21, -22, -23, -24, and -28, are unique because their U concentrations range from 5.8 to 73.6 ug/l and average 35.2 ug/l. These eight samples have AR values between 1.3 and 2.5. These samples appear to indicate possible background U conditions, mixtures of more than one source of U not necessarily anthropogenic, or samples that reflect geochemical processes that shifted the original U isotopic ratios away from the value of 1.0. Based on the assumed and unknown hydrostratigraphic units, the second group of samples may produce water from bedrock aquifers, primarily the Jmw unit.

The third group, samples SMC-11, -12, -13, -26, and -33, are unique because their U concentrations are elevated, and their AR values are very low and close to the upper range of the raffinate AR defined by Zielinski et al., 1997. The U concentration in these five samples range from 188 to 613 ug/l and average 363.4 ug/l. These five samples have U concentrations one order of magnitude greater than the other two sample groups. The AR values for this third group of samples range from approximately 1.19 to 1.51. Based on the elevated U concentrations and low AR values, the third group of samples is interpreted to represent ground water that is possibly contaminated by raffinate waste water from the U milling activities in the SMC area. It is also important to note that these five sample locations are assumed to produce water only from the alluvial aquifer (Qal). Historically, the alluvial aquifer was recharged by discharges from the U mines and mills that released water into surface drainages such as the Arroyo del Puerto and SMC. Evaluation of recharge of the bedrock aquifers has occurred from legacy discharges in the surface drainages was not possible by this method and so few samples to evaluate.

An attempt was made to identify mixing lines and AR values to define background water sample groups following the technique employed by Zielinski, but using a correlation between U and Se concentrations instead of U and Mo. Unfortunately, the attempt to use the correlation between U and Se in the manner that Zielinski used U and Mo appears to be unsuccessful.

water with 610 mg/l $HCO_3$ and a pH of 8.0 to 11.0 should contain less than 100 ug/l of Zn (Hem, 1972). Zn complexes of carbonate, $SO_4$, and Cl are probably controlling the occurrence of Zn in ground water.

### 8.5 SMC Dissolved Uranium Results

The 27 samples averaged 58.3 ug/l of U and ranged from less than the limit of detection (< 2 ug/l) to a high of 240 ug/l (SMC-13). Eleven samples exceeded the NMWQCC ground water U standard of 30 ug/l. The U values are observed to be highest in the sample locations from the Alluvial aquifer. Two areas in the SMC SI with the highest U values are the southern end of the SMC area (SMC-12, 163 ug/l– and SMC-13, 240 ug/l); the junction of highways 605 and 509 (SMC-20, 63.9 ug/l); and the area south of the highway junction (SMC-33, 166 ug/l and SMC-34, 117 ug/l). Figure 33 presents the dissolved U concentrations in ug/l for the SMC SI sample locations.

Comparison to the NURE ground water sample data for U in the Bluewater, Dos Lomas, and Milan 7.5 minute quadrangle indicate qualitatively that some water samples from the Alluvial aquifer had elevated U concentrations in the late 1970s, which still prevail to the current day. As noted in the Bluewater Mill SI, the natural concentration of U in most ground water was approximately 1.1 ug/l. No attempt is made in the SMC NURE sample data to qualitatively determine a natural concentration of U because most of the water samples were collected from wells assumed to be completed in the Alluvial aquifer. It is generally observed in the NURE water sample data and the data collected for the SMC SI that sample locations located away from the main drainages and farther up in the watershed contain the lowest levels of U, which is presumed to be representative of background to the basin.

### 8.6 SMC Correlation between U and Se

Analysis of the ground water data for the SMC SI indicates a positive correlation between U and Se concentrations. Figure 34 presents a plot of U vs. Se concentration for the SMC SI sample set and displays a trend line with an $R^2$ value of 0.7196. A positive correlation between U and Se concentrations is interesting because it suggests these two trace elements may become mobilized under similar geochemical conditions.

### 8.7 SMC Radiochemical Results

Gross alpha and gross beta results are not used in this investigation to evaluate and interpret ground water geochemistry in the SMC SI area. Fifteen samples exceeded the MCL for gross alpha of 15 pCi/l, and three samples exceeded the 50 pCi/l gross beta MCL. Elevated concentrations of gross alpha are assumed to come from dissolved U and $^{226}$Ra, whereas, elevated concentrations of gross beta are assumed to come from $^{228}$Ra or other beta emitting radionuclides not measured in the sample.

Ra and U are the primary radionuclides measured in both historical and the current investigations of the SMC area. The 1975 EPA reports, and the 1980 and 1986 NMEID reports observed elevated concentrations of Ra and U in tailings water, tailings seepage, raw mine water, treated mine water, and discharge water. It is important to note that the EPA samples were filtered, whereas the NMEID samples were not. In this investigation SLD provided the laboratory results for Ra, and for some U, $^{234}$U and $^{238}$U isotope results. SLD radiochemical results are for total concentrations. Results from CLP and UNM were filtered at the time of collection and those results are reported as dissolved concentrations. Regardless, the ground water samples submitted to SLD contained very low levels of suspended sediment and the concentrations of Ra and U are assumed to be representative of dissolved levels. Some U concentration values reported by UNM and SLD for the same water sample show differences between the two laboratory results by several to a few tens of ug/l (e.g. SMC-09, -11, -12, -17, -24, -26, -32, -33, and -34).

~~$^{226}$Ra concentrations ranged from less than a detection limit of 0.01 pCi/l to a high of 2.9 pCi/l (SMC-32).~~ $^{226}$Ra concentrations averaged 0.37 pCi/l. $^{228}$Ra concentrations ranged from a low of less than a detection limit of 0.08 pCi/l to a high of 3.91 pCi/l (SMC-32). $^{228}$Ra concentrations averaged 0.75 pCi/l. Detection limits for Ra vary from sample to sample because of the influence of the amount of TDS in the sample.

In early 2009 NMED collected ground water samples for analyses of metals, general chemistry, and radioactivity from 27 unique locations, and 17 samples among these 27 for specific isotopic analyses in an effort to characterize the ground water quality and flow system in the SMC area. As presented in Table 10, the average TDS concentration for the set of samples was approximately 1,370 mg/l, and appears to be highest in Qal wells. The average pH of the water was slightly alkaline at approximately 7.6. Na and $SO_4$ were highest among major ion concentrations. Six samples had a cation-anion balance error of greater than 10%. Minor ion concentrations were generally low for F and averaged less than 1.0 mg/l. Concentrations of $NO_3$+$NO_2$ averaged approximately 5.5 mg/l and are assumed to be higher in the Qal wells (9.5 mg/l average). Concentrations of $NO_3$+$NO_2$ in wells assumed to be completed in bedrock hydrostratigraphic units averaged less than 1.0 mg/l. Elevated concentrations of $NO_3$+$NO_2$ above background levels. in Qal wells suggest an anthropogenic component.

The majority of other minor constituents and trace elements for which the ground water samples were analyzed reported concentrations that were generally less than detection limits (Ag, Al, Be, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, and Tl). Since only one water sample (SMC-26) reported a concentration of 72.8 ug/l of Mo, an analysis similar to the one employed by Zielinski is not possible for the SMC SI. Laboratory results for dissolved Fe reported less than the reporting limit of 25 ug/l in 19 samples. Apparently, dissolved Fe does not occur in an oxidized form (FeO) that would complex with dissolved U in most of the ground water in the SMC area.

TDS concentrations generally increase in the direction of the alluvial ground water flow path from the upper to the lower SMC basin. TDS concentrations are observed to be markedly higher below the State Highway 605-509 junction primarily because: 1) the sampled wells are assumed to be completed in the Qal unit; 2) historical data suggest ground water here was impacted by legacy U mining-milling discharge waters; 3) Qal ground water is in an unconfined system open to evaporation; and 4) the assumed longer ground water residence time has provided more opportunity for geochemical processes like dissolution, ion exchange, and mineral precipitation, all of which can increase TDS concentrations. The pH of ground water samples below the State Highway 605-509 junction is slightly more alkaline than above the junction. The concentration of $NO_3$+$NO_2$ in wells around the State Highway 605-509 junction, and in the cluster of Qal wells above HMC were higher than other samples in the study area. It is unclear if current $NO_3$+$NO_2$ levels are representative pre-U mining-milling levels. Use of nitrogen isotopes ($^{15}N/^{14}N$ or $\delta^{15}N$) could aid investigation of the origin of $NO_3$+$NO_2$ concentrations in these areas. Isotopic analysis of N in ground water may reveal a distinction among potential sources (U milling, agriculture, and domestic septic or leach field), and what concentrations are possibly representative of natural conditions.

Stiff diagrams of SMC samples are distinctly different for wells assumed or known to be completed in the Qal unit as compared to wells completed in bedrock aquifer units (e.g., Jmw). Stiff diagrams from Qal wells have a pendant flag shape with the nose on the left side and a flag tail on the right side. Stiff diagrams from bedrock aquifer wells have shapes similar to a thin rectangle. Stiff diagrams with skewed hour glass shapes are interpreted to be intermediate between these two shapes, suggesting that these wells may draw water from more than one hydrostratigraphic unit.

NMED initially thought that plotting ionic sample compositions in a trilinear diagram could help to discriminate hydrostratigraphic units for well completions. Unfortunately, since the major ion chemistry in many of the ground water samples is ionically similar, the resulting sample positions in the trilinear diagram show a wide, overlapping variation even though TDS concentrations are not similar. Many sample values plot in positions reflecting the dominant anions of $HCO_3$ and $SO_4$, and the dominant cations of Ca and Na. The dominant water type in the SMC SI samples is a Ca-Mg-Na/Cl-$SO_4$. Mixed ion water types of Ca-Mg-Na/$HCO_3$-Cl-$SO_4$ are also present. Samples that have a Ca-Mg-Na/$SO_4$ water-type and a TDS of 1,000-3,000 are assumed to be from wells that are completed in the Qal unit. The remainder of water samples is either a Na+K-Ca+Mg-$SO_4$-$HCO_3$ or mixed ion water type. These latter ground water types are suggestive of a bedrock hydrostratigraphic unit-- possibly the Jmw, Cretaceous Dakota Sandstone, and/or undifferentiated Jurassic and Triassic units. The earlier work by Brod (1979) indicated the average major ion composition of water in the alluvium, Dakota sandstone, and Jurassic Morrison formation is a mixed ion water type that is chemically similar even through the units are different. More insight into the hydrogeology of the SMC area might be gained by careful review of the hydrogeologic information on Hydrologic Sheet 2 (Brod and Stone, 1981) to clarify and refine the interpretation of hydrostratigraphy in the study area.

Brief summaries of historical water sampling data from the Ambrosia Lake Mining sub-District were presented to demonstrate that the Arroyo del Puerto drainage had received discharges from legacy U mining and milling operations. Concentrations for 12 trace metals in the ground water samples collected for this investigation were not reported to exceed the respective analytical reporting limits. Only seven trace elements occurred in enough samples with concentrations above the respective analytical reporting limits to be useful in evaluating ground water geochemistry in the study area (As, Ba, Mn, Se, V, Zn, and U). The number of samples exceeding EPA drinking water standards or NMWQCC ground water standards in this group of trace elements were: As=5; Mn =1; Se = 8; and U = 11. Except for Se and U, the one time sample results for trace elements are mostly unremarkable.

Se and U concentrations are observed or assumed to be highest in sample locations from the Qal unit. The average Se concentration in the sample set was approximately 95 ug/l. The average U concentration was approximately 58 ug/l. in the sample set. A positive correlation was observed between Se and U at a value of 0.7196, suggesting that these two trace elements are covariant and may mobilize in ground water under similar geochemical conditions. The area with the highest concentrations of Se and U is in the southern part of the study area in the group of assumed alluvial wells located north of HMC. Comparison of the NURE water sample results from well locations in the SMC alluvial channel to the U concentration results throughout this study area suggests that the Qal ground water quality was impacted in the late 1970s and remains impacted today. The average concentrations of Se and U determined by this investigation qualitatively suggest these metals are present above background levels.

Legacy radiochemical water sample results emphasized Ra and U as clear indicators of U mining-milling discharges; however, most Ra concentrations measured from ground water samples collected during this investigation were low. The average $^{226}Ra$ and $^{228}Ra$ concentrations were 0.37 pCi/l and 0.75 pCi/l, respectively. Interestingly, SMC-32, which is the closest sample in this investigation below the cumulative discharges of the 2 uranium mills and mines along the Arroyo del Puerto had the highest $^{226}Ra$ and $^{228}Ra$ concentrations at 2.9 pCi/l and 3.91 pCi/l, respectively. SMC-32 is reported to be completed in the Jmw unit (250 ft deep). Spatial evaluation of Ra data from this investigation suggests that bedrock hydrostratigraphic unit wells contain slightly higher concentrations of Ra than Qal unit wells.

Ra in solution exists only in the 2+ oxidation state, and its chemistry resembles that of Ba (Landa, 1980). The solubility product for $RaSO_4$, which is the presumed chemical form of Ra in sulfuric acid-leached tailings, is extremely low ($K_{sp} = 4.25 \times 10^{-11}$ at 20° C [Sedlet, 1966]). Ra does not appear to be a contaminant of concern in the ground water system of the SMC study area because it is relatively insoluble, does not tend to form soluble complexes with other ions, was easily precipitated out of acidic mill tailings by the addition of $BaSO_4$, and has a strong tendency to adsorb onto various mineral surfaces such as clays and other silicate minerals (Landa, 1980). Based on the water sample results from EPA, 1975, and the results from this investigation, Ra does not appear to be a radiochemical of concern or a reliable indicator of legacy U mining and milling impacts.

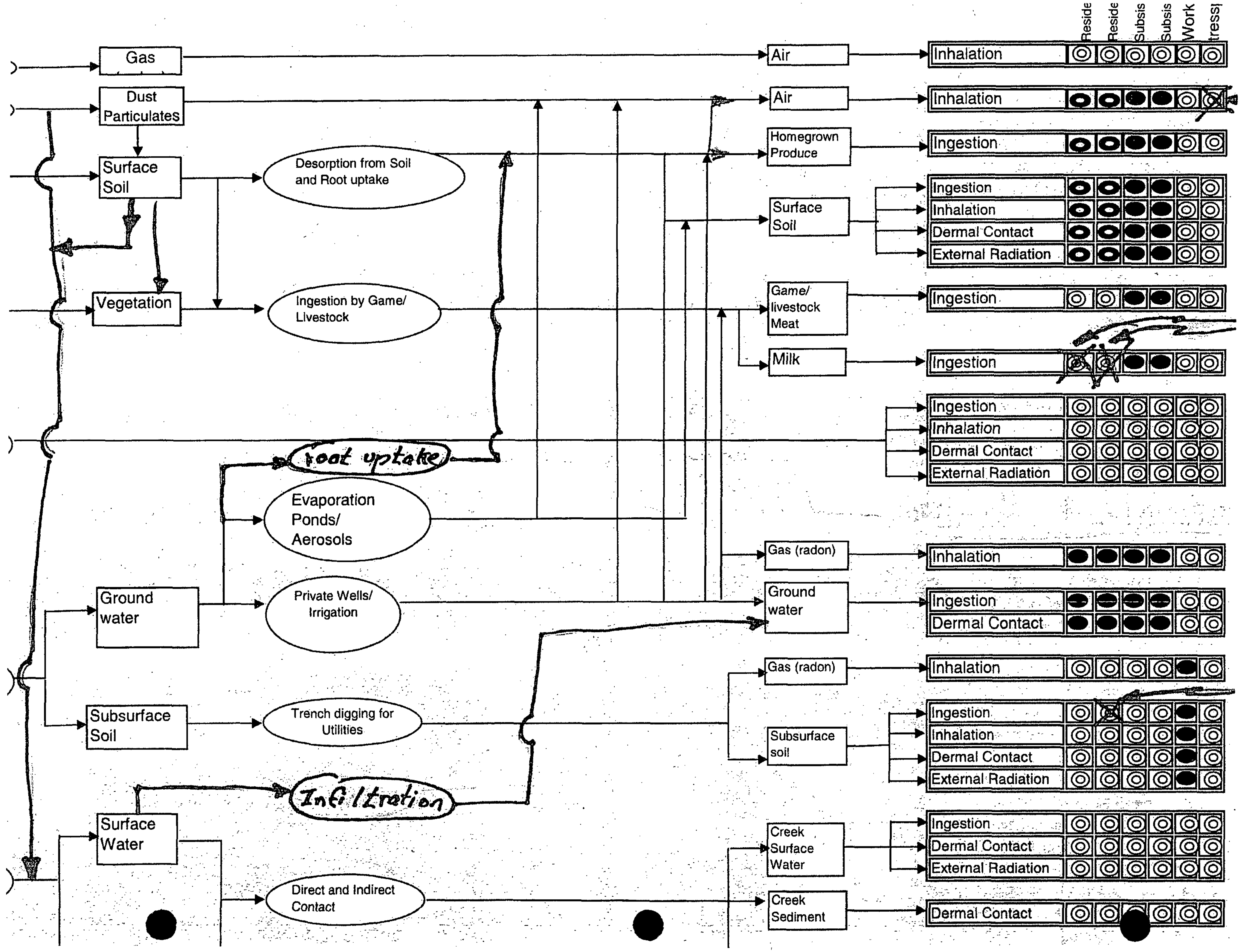
In contrast, U concentrations from this investigation indicate that this radionuclide is elevated in the ground water, and the geochemical conditions support transport of this metal in the aqueous environment. U transport generally occurs in oxidizing surface and ground waters as the uranyl ion, $UO_2^{2+}$, or as complexes of phosphate, carbonate, and sulfate (Landa, 1980 and Langmuir, 1978). U does sorb onto surfaces of silicate minerals (clays), organic matter, and oxides of Fe and Mn across a pH range of 5.0 to 8.5 (Langmuir, 1978). However, the sorption of uranyl ions may be reversible, and for U to be physically and chemically "fixed" requires reduction from $U^{6+}$ to $U^{4+}$ by the substrate material or by a mobile phase such as hydrogen sulfide, or $H_2S$ (Kochenov et al., 1965; and Langmuir, 1978).

In a previous section of this paper, background information describing the theory behind using U isotopes to "fingerprint" sources of U in ground water samples was presented, and several examples were given, which included discussion of a site in southwest Colorado that was used for comparison and source data in NMED's investigation. Eighteen samples of ground water from various locations in the SMC study area were analyzed for concentrations of $^{238}U$ and $^{234}U$. Sample AR values ($^{234}U$:$^{238}U$) were plotted against concentrations of dissolved U for each sample. The AR for U mill raffinate was used as a chemical end member to compare against the 18 samples in NMED's investigation (Zielinski, et al., 1997). Three distinct groups of water samples were identified: 1) background; 2) mixed sources of background and anthropogenic; and 3) anthropogenic. The third group of samples is interpreted to contain an anthropogenic component of raffinate waste water, possibly from legacy U milling discharges in the SMC area. The evidence for an anthropogenic component is the elevated dissolved U concentration and the low U AR values that are close to the upper range of the raffinate waste water from the study in southwest Colorado (Zielinski et al., 1997). This conclusion should be examined and reviewed by other geochemical experts, with the hypothesis subjected to a "proof-of-concept" investigation by repeat isotopic sampling and laboratory analysis at both the same and additional well locations in the study area. Laboratory resources at UNM, the EPA, and at Los Alamos National Laboratory (LANL) could provide the U isotopic analysis, as well as some additional professional geochemical expertise. Future investigations in the SMC SI area should continue to sample ground water locations for isotopic analysis of U to build a more in-depth geochemical data base, and to help fingerprint sources of ground water geochemistry.

The stable isotope results for concentrations of $\delta^{18}O$ and $\delta D$ in 17 ground water samples from the SMC SI are interesting, but not very conclusive for identification of source waters or possible components of legacy U mining and milling discharge waters. This conclusion is partly due to the small number of samples that were collected in NMED's investigation, which likely represent too few parts of the hydrologic cycle to enable an explanation of a complex ground water system. The range of $\delta^{18}O$ and $\delta D$ values in NMED's samples may represent both isotopically enriched water (possibly heavier isotopic fractionation caused by evaporation), and more isotopically depleted water (lighter isotopic fractionation caused by low temperature precipitation or snow at higher land elevations). Most of the ground water sample $\delta^{18}O$ and $\delta D$ concentrations were similar and plotted close together in an x-y graph. Utilization of the $\delta^{18}O$ and $\delta D$ isotopes in future investigations may be useful since samples are easy to collect, require no preservatives, and can be stored for more than a year if the sample containers are tightly sealed to prevent evaporation. Samples of $\delta^{18}O$ and $\delta D$ from other parts of the hydrologic system (seasonal precipitation, surface water, infiltration, impacted ground water) would be helpful to better interpretation and quantification of the hydrologic balance in the study area.

Interpretation of the stable isotope $\delta^{13}C$ concentration values in the 16 samples collected and analyzed during this investigation is inconclusive and should be evaluated by an expert with a strong knowledge of carbonate geochemistry.

Utilization of stable isotope $\delta^{34}S$ concentrations was hypothesized to help identify the source of $SO_4$ in ground water in the SMC SI area. Interpretation of the stable isotope $\delta^{34}S$ concentration values in the 15 waters samples collected and analyzed during this investigation are suggested to have an isotopic composition similar to the S isotope results from a 1963 study of U ore rock samples from the Ambrosia Lake area (Jensen, 1963). The $\delta^{34}S$ concentrations in the ground water samples are predominantly negative (depleted in the heavier sulfur isotope), which suggests the S may have come from biogenic processes and geochemical conditions similar to the reducing environment that created the original U ore deposit. Since sulfuric acid leaching was performed to extract and concentrate U at mill sites in the Ambrosia Lake area, it was hypothesized that S isotopic analysis could help determine if the source of $SO_4$ in ground water in the study area may contain a sulfuric acid component. NMED's results are interesting but inconclusive, and the data should be reviewed and evaluated by a professional geochemical expert.



Reside
Reside
Subsis
Subsis
Work
tress
Gas
Dust Particulates
Surface Soil
Vegetation
Desorption from Soil and Root uptake
Ingestion by Game/ Livestock
root uptake
Evaporation Ponds/ Aerosols
Ground water
Private Wells/ Irrigation
Subsurface Soil
Trench digging for Utilities
Infiltration
Surface Water
Direct and Indirect Contact
Air
Air
Homegrown Produce
Surface Soil
Game/ livestock Meat
Milk
Gas (radon)
Ground water
Gas (radon)
Subsurface soil
Creek Surface Water
Creek Sediment
Inhalation
Inhalation
Ingestion
Ingestion
Inhalation
Dermal Contact
External Radiation
Ingestion
Ingestion
Ingestion
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Inhalation
Dermal Contact
External Radiation
Ingestion
Dermal Contact
External Radiation
Dermal Contact

Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: As needed

Spatial_Domain:
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    North_Bounding_Coordinate: 37.00014496
    South_Bounding_Coordinate: 31.33181763

Keywords:
  Theme:
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    Theme_Keyword: New Mexico Roads, Interstates, US Highways, NM Highways, County Roads, Streets
  Place:
    Place_Keyword_Thesaurus: none
    Place_Keyword: The State of New Mexico

Access_Constraints: None

Use_Constraints:
  Resource Geographic Information System (RGIS) Program assumes no liability for misuse of the data. Data should be used at the scale for which they were intended. No warranty, expressed, or implied, is made by Earth Data Analysis Center (EDAC) regarding the utility of the data on any other system, nor shall the act of distribution constitute such warranty.

Point_of_Contact:
  Contact_Information:
    Contact_Person_Primary:
      Contact_Organization: Earth Data Analysis Center
    Contact_Position: RGIS Clearinghouse Coordinator
    Contact_Address:
      Address_Type: mailing address
      Address: University of New Mexico, Bandelier West Room 111
      City: Albuquerque
      State_or_Province: New Mexico
      Postal_Code: 87131-6031
      Country: USA
    Contact_Voice_Telephone: 505-277-3622
    Contact_Facsimile_Telephone: 505-277-3614
    Contact_Electronic_Mail_Address: edac@edac.unm.edu
    Hours_of_Service: 8:00-5:00 Mountain Time Zone
Browse_Graphic
  Browse_Graphic_File_Name: http://rgisedac.unm.edu/previews/tra0005.jpg
  Browse_Graphic_File_Description: Simple image of the data set and/or its extent.
  Browse_Graphic_File_Type: jpg
Native_Data_Set_Environment:
  OSF1, V4.0, alpha UNIX
  ARC/INFO version 7.2.1

Data_Quality_Information:
  Logical_Consistency_Report:
    Chain-node topology present.
    Tolerances were chosen to prevent errors in labels, intersections, tics, overshoots, and undershoots. Tests were performed to detect these types of errors and necessary corrections were made.

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Identification_Information:
  Citation:
    Citation_Information:
      Originator: Earth Data Analysis Center
      Publication_Date: 19951201
      Title: New Mexico GPS Roads
      Edition: First
      Geospatial_Data_Presentation_Form: map
      Publication_Information:
        Publication_Place: Albuquerque
        Publisher: Earth Data Analysis Center
      Other_Citation_Details:
      Online_Linkage: http://rgis.unm.edu/rgisftp.htm
      Online_Linkage: http://rgisedac.unm.edu/transport/gpsrdsdde00.zip
      Online_Linkage: http://rgisedac.unm.edu/transport/gpsrdsddshp.zip

  Description:
    Abstract:
      This data set contains a 1:100,000 scale vector digital representation of
      all interstate highways, all US highways, most of the state highways,
      and some county roads in New Mexico.
      The data were collected using Trimble Pathfinder Basic Plus GPS units and
      differentially corrected with Trimble Pfinder software, version 2.40-07.
      They were converted to ARC/INFO format using ARC/INFO 7.0.3.
      The file size is approximately 4.2 Mb, compressed.

    Purpose:
      These data are typically used as base data for other coverages.  The
      data are intended for use as a general reference to the extent and
      location of Highways and Interstates in New Mexico.

    Supplemental_Information:
      Procedures_Used:
      The data were collected using Trimble Pathfinder Basic Plus GPS units.
      The data were differentially corrected using Base Station Files in the
      Pfinder software program.  The files were converted to ARC/INFO format
      and then imported into ARC/INFO and turned into a coverage and attributed
      with the name information.

      Revisions:
      None to data.
      Item called TYPE added Nov. 2002 to delineate Interstate, US Highway,
      State Highway, or Local road.

      Reviews_Applied_to_Data:
      None

      Related_Spatial_and_Tabular_Data_Sets:
      none

      Other_References_Cited:
      none

      Notes:
      Contact the RGIS Clearinghouse for price information.
      http://rgis.unm.edu

  Time_Period_of_Content:
    Time_Period_Information:
      Single_Date/Time:
        Calendar_Date: 19951201
    Currentness_Reference: Publication Date
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    further makes no warranties, either expressed or implied as to any other matter
    whatsoever, including, without limitation, the condition of the product, or its
    fitness for any particular purpose. The burden for determining fitness for use
    lies entirely with the user. Although these data have been processed
successfully
    on computers of RGIS, no warranty, expressed or implied, is made by RGIS
regarding
    the use of these data on any other system, nor does the fact of distribution
    constitute or imply any such warranty. In no event shall RGIS have any liability

    whatsoever for payment of any consequential, incidental, indirect, special, or
tort
    damages of any kind, including, but not limited to, any loss of profits arising
    out of use of or reliance on the geographic data or arising out of the delivery,

    installation, operation, or support by RGIS.

  Standard_Order_Process:
    Digital_Form:
      Digital_Transfer_Information:
        Format_Name: ArcExport
        Format_Version_Number: 8.0.1
        Format_Version_Date:
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        Online_Option:
          Computer_Contact_Information:
            Network_Address:
              Network_Resource_Name: http://rgis.unm.edu/rgisftp.htm
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        Format_Name: Arc shape file
        Format_Version_Number: 8.0.1
        Format_Version_Date:
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        Online_Option:
          Computer_Contact_Information:
            Network_Address:
              Network_Resource_Name: http://rgis.unm.edu/rgisftp.htm

Metadata_Reference_Information:
  Metadata_Date: 19980127
  Metadata_Review_Date: 19980127
  Metadata_Contact:
    Contact_Information:
      Contact_Organization_Primary:
        Contact_Organization: Earth Data Analysis Center
      Contact_Position: Geographic Data Services Manager
      Contact_Address:
        Address_Type: mailing and physical address
        Address: 111 Bandelier West, University of New Mexico
        City: Albuquerque
        State_or_Province: NM
        Postal_Code: 87131-6031
        Country: USA
      Contact_Voice_Telephone: 505-277-3622
      Contact_Facsimile_Telephone: 505-277-3614
      Contact_Electronic_Mail_Address: edac@edac.unm.edu
  Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
  Metadata_Standard_Version: Version of June 8, 1994
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  Completeness_Report: Data completeness reflects the content of the source file.

  Positional_Accuracy:
    Horizontal_Positional_Accuracy:
      Horizontal_Positional_Accuracy_Report:
        The root-mean square error is generally .003 map units
        or less.

  Lineage:
    Process_Step:
      Process_Description: NOREEN DOCUMENT TRA0005
      Process_Date: 19951201

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  Direct_Spatial_Reference_Method: Vector
  Point_and_Vector_Object_Information:
    SDTS_Terms_Description:
      SDTS_Point_and_Vector_Object_Type: String
      Point_and_Vector_Object_Count: 11299

Spatial_Reference_Information:
  Horizontal_Coordinate_System_Definition:
    Geographic:
      Latitude_Resolution: 0.001
      Longitude_Resolution: 0.001
      Geographic_Coordinate_Units: Decimal Degrees
    Geodetic_Model:
      Horizontal_Datum_Name: North American Datum of 1983
      Ellipsoid_Name: Geodetic Reference System 80
      Semi-major_Axis: 6,378,137
      Denominator_of_Flattening_Ratio: 298.257

Entity_and_Attribute_Information:
  Overview_Description:
    Entity_and_Attribute_Overview:
      There are two attributes, Name and Alt_name. The names were provided
      by the New Mexico State Highway and Transportation Department (NMSHTD).
      Name is the primary road name and Alt_name contains the secondary
      road name or the NMSHTD route designation, i.e. interstate, federally
      aided local, business loop, frontage, state highway, or county road.
    Entity_and_Attribute_Detail_Citation: none

Distribution_Information:
  Distributor:
    Contact_Information:
      Contact_Person_Primary:
        Contact_Organization: Earth Data Analysis Center
      Contact_Position: Geographic Data Services Manager
      Contact_Address:
        Address_Type: mailing and physical address
        Address: 111 Bandelier West, University of New Mexico
        City: Albuquerque
        State_or_Province: New Mexico
        Postal_Code: your 87131-6031
        Country: USA
      Contact_Voice_Telephone: 505-277-3622
      Contact_Facsimile_Telephone: 505-277-3614
      Contact_Electronic_Mail_Address: edac@edac.unm.edu
      Hours_of_Service: 8AM - 5PM Mountain Time

  Distribution_Liability:
    RGIS provides these geographic data "as is" and makes no guarantee or warranty
    concerning the accuracy of information contained in the geographic data. RGIS
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# REFERENCES

# 65-68

Cities_Metadata

Identification_Information:
 Citation:
  Citation_Information:
   Originator: Earth Data Analysis Center
   Publication_Date: 19950501
   Publication_Time:
   Title: Cities and towns
   Edition:
   Geospatial_Data_Presentation_Form: map
     Series_Name:
     Issue_Identification:
   Publication_Information:
     Publication_Place: Albuquerque
     Publisher: RGIS
   Other_Citation_Details:
   Online_Linkage:

 Description:
   Abstract:
    This data set contains points for 1600 populated places, cities and towns, in New Mexico. The points were generated from latitude and longitude coordinates contained in the GNIS file, and therefore, do not have a known scale.

   Purpose:
    This data set was created to show the locations of towns in New Mexico mainly as a reference background to other geographic features.

   Supplemental_Information:

     Procedures_Used:
     A completed dBASE III file of New Mexico place names was obtained from the local GNIS contractor. Coordinates for longitude and latitude were extracted from that file. They are in the format nnnnnnNnnnnnnnW. A C program was written to remove the N and W; insert spaces between the degrees, minutes, and seconds as well as between the 2 coordinates; and reverse the order so that longitude was first. Next, points were created in ARC/INFO 7.0.3 with the generate command. Then the point file was joined back to the GNIS file attributes. From the GNIS Web Site a text file of population, elevation, and 7.5 minute topographic quad map name was obtained. Using the GNIS ID, this new data was attached to the point data set.

     Revisions:
     This data set has been revised once to correct points for which the original geographic coordinates were incorrect.

     Reviews_Applied_to_Data:
     Points were checked for accurate locations by drawing them against a background of county boundaries and comparing county names of the two files for matching.

     Related_Spatial_and_Tabular_Data_Sets:
     Fpn0003 Features and Place Names for populated and historic towns, etc.

     Other_References_Cited:

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    Notes:
    data sets.


Time_Period_of_Content:
 Time_Period_Information:
  Single_Date/Time:
    Calendar_Date: 19950501
 Currentness_Reference:


Status:
  Progress:  Complete
  Maintenance_and_Update_Frequency:


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    East_Bounding_Coordinate: -103.04165649
    North_Bounding_Coordinate: 36.99861145
    South_Bounding_Coordinate: 31.33388901
Keywords:
  Theme:
    Theme_Keyword_Thesaurus:  None
    Theme_Keyword:  cities
  Place:
    Place_Keyword_Thesaurus:  None
    Place_Keyword:  State of New Mexico
  Stratum:
    Stratum_Keyword_Thesaurus:  None
    Stratum_Keyword: None
  Temporal:
    Temporal_Keyword_Thesaurus:  None
    Temporal_Keyword: None
Access_Constraints:


Use_Constraints:
 The coordinates from which the points were derived were determined manually
 from paper 7.5 minute map sheets. The points are only as accurate as
 the original manual locating process allows.


Point_of_Contact:
 Contact_Information:
  Contact_Person_Primary:
    Contact_Person: Amy Budge
    Contact_Organization: Earth Data Analysis Center
  Contact_Position: Geographic Data Services Manager
  Contact_Address:
    Address_Type: mailing address
    Address: 118 Bandelier West, University of New Mexico
    City: Albuquerque
    State_or_Province: New Mexico
    Postal_Code: 87131
    Country: USA
  Contact_Voice_Telephone: 505-277-3622 x231
  Contact_TDD/TTY_Telephone: none
  Contact_Facsimile_Telephone: 505-277-3614
  Contact_Electronic_Mail_Address: edac@spock.unm.edu
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Hours_of_Service: 8:00 AM to 5:00 PM, Mountain Time Zone

Data_Set_Credit:

Security_Information:
  Security_Classification_System: None
  Security_Classification:  Unclassified
  Security_Handling_Description: None
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Cross_Reference:
 Citation_Information:
  Originator: Julyan, Bob and U.S.G.S. Goegraphic Names Information System
  Publication_Date: 1995
  Publication_Time:
  Title: Goegraphic Names of New Mexico
  Edition:
  Geospatial_Data_Presentation_Form: dBase file
  Series_Information:
    Series_Name:
    Issue_Identification:
  Publication_Information:
    Publication_Place: unknown
    Publisher: U.S. Geological Survey
  Other_Citation_Details:
  Online_Linkage:

Data_Quality_Information:
 Attribute_Accuracy:
  Attribute_Accuracy_Report:  See Entity_Attribute_Information
  Quantitative_Attribute_Accuracy_Assessment:
    Attribute_Accuracy_Value:  See Explanation
    Attribute_Accuracy_Explanation:
      Attribute accuracy is described, where present, with each attribute defined in the Entity and Attribute Section.
 Logical_Consistency_Report:  Point features present.
 Completeness_Report:

 Positional_Accuracy:
  Horizontal_Positional_Accuracy:
    Horizontal_Positional_Accuracy_Report:

  Vertical_Positional_Accuracy:
    Vertical_Positional_Accuracy_Report:

 Lineage: See also Supplemental_Information:
  Source_Information:
  Source_Citation:
   Citation_Information:
    Originator:
    Publication_Date:
    Title:
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  Type_Of_Source_Media:
  Source_Time_Period_of_Content:
    Time_Period_Information:
     Single_Date/Time:
      Calendar_Date:
    Source_Currentness_Reference:

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    Source_Citation_Abbreviation:
    Source_Contribution:
  Cloud_Cover:

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  Direct_Spatial_Reference_Method:  Point
  Point_and_Vector_Object_Information:
    SDTS_Terms_Description:
      SDTS_Point_and_Vector_Object_Type:  Point
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      Point_and_Vector_Object_Count:  0

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      Denominator_of_Flattening_Ratio: 294.98

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      Entity_Type_Definition_Source:  ARC/INFO
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      Attribute_Definition:  Point Attribute Table
      Attribute_Definition_Source:  ARC/INFO
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          Enumerated_Domain_Value_Definition_Source:
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          Enumerated_Domain_Value_Definition_Source:
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          Enumerated_Domain_Value_Definition_Source:
    Attribute:
      Attribute_Label:  CIT0004#
      Attribute_Definition:  Internal feature number
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      Enumerated_Domain:
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        Enumerated_Domain_Value_Definition:
        Enumerated_Domain_Value_Definition_Source:
  Attribute:
    Attribute_Label:  CIT0004-ID
    Attribute_Definition:  User-assigned feature number
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        Enumerated_Domain_Value_Definition:
        Enumerated_Domain_Value_Definition_Source:
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    Attribute_Definition:  GNIS identification number
    Attribute_Definition_Source:
    Attribute_Domain_Values:
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        Enumerated_Domain_Value:
        Enumerated_Domain_Value_Definition:
        Enumerated_Domain_Value_Definition_Source:
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    Attribute_Domain_Values:
      Enumerated_Domain:
        Enumerated_Domain_Value:
        Enumerated_Domain_Value_Definition:
        Enumerated_Domain_Value_Definition_Source:
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    Attribute_Label:  FEATURE
    Attribute_Definition:  Type of feature
    Attribute_Definition_Source:
    Attribute_Domain_Values:
      Enumerated_Domain:
        Enumerated_Domain_Value:  ppl = populated place
        Enumerated_Domain_Value_Definition:
        Enumerated_Domain_Value_Definition_Source:
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    Attribute_Label:  CNTY
    Attribute_Definition:  County wherein city is located
    Attribute_Definition_Source:
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        Enumerated_Domain_Value:
        Enumerated_Domain_Value_Definition:
        Enumerated_Domain_Value_Definition_Source:
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    Attribute_Definition:  latitude and longitude of city point location
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    Attribute_Domain_Values:
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Attribute_Definition_Source:
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value:
Enumerated_Domain_Value_Definition:
Enumerated_Domain_Value_Definition_Source:
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Attribute_Definition: Name of 7.5 minute quad map on which city is located
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Enumerated_Domain:
Enumerated_Domain_Value:
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Attribute_Label: POP
Attribute_Definition: Population of city (only availble for larger places)
Attribute_Definition_Source:
Attribute_Domain_Values:
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Enumerated_Domain_Value:
Enumerated_Domain_Value_Definition:
Enumerated_Domain_Value_Definition_Source:
Overview_Description:
Entity_and_Attribute_Overview:
The num, name, feature, cnty, and coord fields were taken from the original GNIS file for New Mexico. Elevatn, topomap, and pop were attached later from files obtained from the Board of Geographic names Web site.

Entity_and_Attribute_Detail_Citation: Not Available

Distribution_Information:
Distribution_Liability: RGIS program assumes no liability for misuse of the data
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ARCE ARC/INFO Export format
Format_Version_Number: 7.1.1
Format_Version_Date: n/a
Format_Specification: n/a
Format_Information_Content: n/a
File_Decompression_Technique: Compressed
Digital_Transfer_Option:
Offline_Option:
Offline_Media: CDROM, 3.5" disk, 4mm tape, 8mm tape, .25" tape
Recording_Format: low, medium, or high density
Fees: Most files $45.00 plus $25.00 media charge
Ordering_Instructions: RGIS Clearinghouse, Earth Data Analysis Center
Turnaround: Variable, usually within 10 working days

Custom_Order_Process: Guest account option for ftp access.
Technical_Prerequisites: Hardware and software compatible with Arc Export or ArcView.
Available_Time_Period:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: Present
Ending_Date: Unknown

Metadata_Reference_Information:
Metadata_Date: 19980223

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    Contact_Person: Amy Budge
    Contact_Organization: Earth Data Analysis Center
  Contact_Position: Geographic Data Services Manager
  Contact_Address:
    Address_Type: mailing address
    Address: 118 Bandelier West, University of New Mexico
    City: Albuquerque
    State_or_Province: New Mexico
    Postal_Code: 87131
    Country: USA
  Contact_Voice_Telephone: 505-277-3622 x231
  Contact_TDD/TTY_Telephone: none
  Contact_Facsimile_Telephone: 505-277-3614
  Contact_Electronic_Mail_Address: edac@spock.unm.edu
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## Mayerson, David, NMENV

**From:** Mayerson, David, NMENV

**Sent:** Wednesday, January 09, 2008 11:49

**To:** Arfman, Suzan, NMENV

**Subject:** Categorization of minesites for map presentation

Suzan: As we had discussed yesterday, could you see if you could symbolize the minesites by the PRODUCTION and MINING_MET fields. For the PRODUCTION field, some of the sites are categorized by a letter followed by hyphen and "f" (e.g., the Dakota Mine is classified "a-f"); just use the first letter in all cases.

For MINING_MET, just use 3 categories: surface, underground, surface + underground. For the few that have some odd entries, categorize as follows
Open stope=underground
stripping=surface
room and pillar=underground

Hopefully this will cover all the combinations and not make the map too messy.

**David L. Mayerson**
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Ground Water Quality Bureau
Superfund Oversight Section
1190 St. Francis Drive, Suite N2312
Santa Fe, NM 87505

Telephone: (505) 476-3777
Fax: (505) 827-2965
david.mayerson@state.nm.us

## Mayerson, David, NMENV

**From:** Mayerson, David, NMENV
**Sent:** Tuesday, January 15, 2008 13:02
**To:** Arfman, Suzan, NMENV
**Subject:** RE: Mines

Now this is starting to look like what I'm after. See comments to previous email regarding Bluewater mill especially.

Can you symbolize the mines so that the shape indicates one of the 3 MINING_MET categories, and the color indicates production?

**David L. Mayerson**
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david.mayerson@state.nm.us

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**From:** Arfman, Suzan, NMENV
**Sent:** Tuesday, January 15, 2008 12:50
**To:** Mayerson, David, NMENV
**Subject:** Mines

Abstract:
The Digital Geologic Map of New Mexico in ARC/INFO Format
by Gregory N. Green and Glenn E. Jones
This geologic map was prepared as part of a study of digital methods and techniques as applied to complex geologic maps. The geologic map was digitized in GSMAP version 8 (Selner and Taylor, 1992) at Socorro, New Mexico by Orin Anderson and Glen Jones and published as the Geologic Map of New Mexico 1:500,000 (Anderson and Jones, 1994) in GSMAP format. The vector line work and polygon point labels were converted to ARC/INFO format on a DOS based PC with GSMARC (Green and Selner,1988). These data were transferred to a Data General UNIX system and loaded into ARC/INFO. Each vector and polygon was given attributes derived from the original 1994 GSMAP geologic map. Both digital versions are at 1:500,000 scale using the Lambert Conformal Conic map projection parameters of the State base map. The coverage was projected into Geographic NAD27 August 2000, and reprojected into Geographic NAD83 in August 2001.

* Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Purpose:
Applications that use this data
models and assesments
Intended use of data
base geologic map

Limitations_of_Data:
Scale is 1:500,000 and should not be used outside that range

In order to use this database, ARC/INFO software and hardware and FTP transfer software to copy the database to the ARC/INFO platform are required. Published geologic maps are prepared using a USGS topographic base map that contains the hydrology, hypsography, and political features. Because this digital version of the Geologic Map of New Mexico started as a geologic map, these features were not present. Only those water bodies that were required to close polygons were added. The digital hydrology is not complete or as accurate as the original USGS 1:500,000 topographic base. A few water bodies were added for visual effect. No roads, contours, or towns were present on the GSMAP version of the geologic map and none were added to this ARC/INFO version.

Entity_and_Attribute_Overview:
CODING SCHEME FOR ARC ATTRIBUTES:

| ITEM | FEATURE |
|---|---|
| P1 | GSMAP Shorthand attribute |
| HP | Line pattern from NMLIN.LIN |
| NAME | Name |

Line Types and Attributes

| P1 | HP | Name |
|---|---|---|
| 1 | 1 | contact |
| 2 | 501 | Ti dikes |
| 5 | 102 | solid faults |
| 6 | 102 | thrust faults |
| 8 | 114 | dashed fault |
| 9 | 1 | group to specific (lump grouping) |
| 11 | 106 | dotted faults |
| 12 | 507 | Yi dikes |
| 21 | 127 | Map Border |
| 22 | 505 | TKi dikes |
| 32 | 503 | Tli dikes |

| | | |
|---|---|---|
| 42 | 508 | Tif dikes |
| 50 | 1 | Dams |
| 51 | 1 | Mine dumps |
| 52 | 502 | Tuim dikes |
| 62 | 504 | Tui dikes |
| 72 | 506 | Zi dikes |
| 75 | 1 | Precambrian shear zone |
| 400 | 4 | water (shore line) |
| 401 | 4 | water (playa) |

CODING SCHEME FOR POLYGON ATTRIBUTES:

| ITEM | FEATURE |
|---|---|
| P1 | GSMAP Shorthand attribute |
| HP | Shade pattern from NMSHD.SHD |
| NAME | Name |

Polygon Types and Attributes

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|---|---|---|
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| 2 | 2 | Ql |
| 3 | 3 | Qe |
| 4 | 4 | Qeg |
| 5 | 58 | Qd |
| 6 | 5 | Qpl |
| 7 | 8 | Qp |
| 8 | 181 | Qb |
| 9 | 243 | Qr |
| 10 | 113 | Qv |
| 11 | 18 | Qbo |
| 12 | 22 | Qvr |
| 13 | 118 | Qbt |
| 14 | 218 | Qoa |
| 15 | 83 | QTb |
| 17 | 59 | QTt |
| 18 | 9 | QTp |
| 19 | 11 | QTg |
| 20 | 10 | QTsf |
| 21 | 17 | QTs |
| 23 | 61 | Tus |
| 25 | 6 | Tfl |
| 26 | 60 | Tsf |
| 27 | 42 | To |
| 28 | 40 | Tlp |
| 29 | 15 | Tos |
| 30 | 19 | Thb |
| 31 | 72 | Tnb |
| 32 | 55 | Tpb |
| 33 | 41 | Tmb |
| 34 | 52 | Tnr |
| 35 | 51 | Tnv |
| 36 | 16 | Tc |
| 37 | 56 | Tv |
| 38 | 20 | Tif |
| 39 | 24 | Tuv |
| 40 | 25 | Tlv |
| 41 | 63 | Tuau |
| 42 | 31 | Tual |
| 43 | 18 | Turp |
| 44 | 12 | Tlrp |

| | | |
|---|---|---|
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| 46 | 68 | Turf |
| 47 | 7 | Tlrf |
| 48 | 26 | Ti |
| 49 | 54 | Tui |
| 50 | 57 | Tuim |
| 51 | 73 | Tli |
| 52 | 45 | Tps |
| 53 | 90 | Tsj |
| 54 | 91 | Tn |
| 55 | 92 | Toa |
| 56 | 102 | Tpc |
| 57 | 109 | TKr |
| 58 | 107 | TKpr |
| 59 | 93 | TKa |
| 60 | 261 | TKav |
| 61 | 267 | TKi |
| 62 | 238 | K |
| 64 | 255 | Ki |
| 65 | 221 | Ka |
| 66 | 239 | Ku |
| 67 | 236 | Kmc |
| 68 | 134 | Kvt |
| 69 | 79 | Kkf |
| 70 | 81 | Kpc |
| 71 | 82 | Kls |
| 72 | 208 | Kpn |
| 73 | 233 | Knf |
| 74 | 231 | Kmv |
| 75 | 123 | Kch |
| 76 | 129 | Klv |
| 77 | 124 | Kmf |
| 78 | 225 | Kpl |
| 79 | 170 | Kms |
| 80 | 219 | Kph |
| 81 | 242 | Kmm |
| 82 | 197 | Kcc |
| 83 | 223 | Kg |
| 84 | 226 | Kmg |
| 85 | 169 | Kmr |
| 86 | 227 | Kpg |
| 87 | 191 | Kth |
| 88 | 232 | Kma |
| 89 | 78 | Km |
| 90 | 171 | Kmu |
| 91 | 241 | Kml |
| 92 | 186 | Kdr |
| 93 | 80 | Kdm |
| 94 | 166 | Kd |
| 95 | 229 | Kc |
| 96 | 187 | Kgg |
| 97 | 237 | Kgh |
| 98 | 192 | Kgr |
| 99 | 165 | Kdg |
| 100 | 164 | Kbm |
| 101 | 163 | Kl |
| 102 | 142 | J |
| 103 | 143 | Jm |
| 104 | 148 | Jmsu |
| 105 | 151 | Jz |
| 106 | 150 | Jze |
| 107 | 149 | Je |
| 108 | 144 | Jsr |

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|---|---|---|
| 109 | 120 | @ |
| 110 | 206 | @rp |
| 111 | 121 | @c |
| 112 | 122 | @r |
| 113 | 125 | @b |
| 114 | 126 | @t |
| 115 | 127 | @g |
| 116 | 128 | @s |
| 117 | 86 | @cu |
| 118 | 162 | @m |
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| 120 | 253 | P |
| 121 | 184 | Pqr |
| 122 | 172 | Pqm |
| 123 | 173 | Pr |
| 124 | 174 | Psl |
| 125 | 183 | Pc |
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| 127 | 188 | Pty |
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| 137 | 167 | Pg |
| 138 | 234 | Psg |
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| 140 | 154 | Pvp |
| 141 | 222 | Py |
| 142 | 168 | Pa |
| 143 | 131 | Pau |
| 144 | 132 | Pal |
| 145 | 205 | Pys |
| 146 | 209 | Pay |
| 147 | 88 | Pct |
| 148 | 228 | Ph |
| 149 | 247 | Pb |
| 150 | 193 | P& |
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| 152 | 116 | & |
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| 154 | 111 | &me |
| 155 | 94 | &s |
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| 164 | 89 | SO_ |
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| 166 | 99 | O_p |
| 169 | 101 | Ys |
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| 171 | 87 | YXp |
| 172 | 85 | X |
| 173 | 117 | Xms |
| 174 | 160 | Xm |
| 175 | 97 | Xp |
| 176 | 112 | Xmo |
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| | | |
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| 184 | 2 | Ql/QTs |
| 189 | 8 | Qp/QTs |
| 190 | 8 | Qp/QTsf |
| 191 | 8 | Qp/Tsf |
| 193 | 3 | Qe/Qa |
| 194 | 3 | Qe/Qp |
| 195 | 3 | Qe/Qpl |
| 196 | 3 | Qe/QTs |
| 197 | 3 | Qe/QTsf |
| 198 | 9 | QTp |
| 199 | 224 | Kgc |
| 200 | 3 | Qe/Tnb |
| 201 | 36 | ds |
| 202 | 137 | Xmu |
| 203 | 218 | Qoa/To |
| 400 | 216 | Water |
| 401 | 216 | Playa |
| 300 | 0 | blank |

Procedures_Used:
This geologic map was prepared as part of a study of digital methods and techniques as applied to complex geologic maps. The geologic map was digitized in GSMAP version 8 (Selner and Taylor, 1992) at Socorro, New Mexico by Orin Anderson and Glen Jones and published as the Geologic Map of New Mexico 1:500,000 (Anderson and Jones, 1994) in GSMAP format. The vector line work and polygon point labels were converted to ARC/INFO format on a DOS based PC with GSMARC (Green and Selner,1988). These data were transferred to a Data General UNIX system and loaded into ARC/INFO. Each vector and polygon was given attributes derived from the original 1994 GSMAP geologic map. Both digital versions are at 1:500,000 scale using the Lambert Conformal Conic map projection parameters of the State base map. The coverage was projected into Geographic NAD27 August 2000, and reprojected into Geographic NAD83 in August 2001.

This database was developed on a Data General computer system using DG/UX Release 5.4R3.10 UNIX and ARC/INFO 7.0.3 software. The lineset and shadeset files are coded for a HP 650C plotter.

Revisions:

| | |
|---|---|
| 31 March 1997 | Creation date |
| 25 Aug 1997 | Last revision to dataset |
| 16 Aug 2000 | Projection change from Lambert NAD27 to Geographic NAD27 |
| 31 Aug 2001 | Datum Change from Geographic NAD27 to Geographic NAD83 |

Reviews_Applied_to_Data:
For the digital review, we thank Nancy Shock and Pat Stamile of the USGS.

Related_Spatial_and_Tabular_Data_Sets:

| | |
|---|---|
| 0READ.ME | Text file that contains this Open-File 97-52 document. |
| 0READ.MET | A text version of the ARC DOCUMENT metafile. |
| LOAD.AML | ARC/INFO commands to create the data bases. |
| NNMAP.AML | ARCPLOT commands that create a plot file of the geologic map from the data bases. |
| NMMAP.E00 | Contacts, dikes and faults file for the Geologic Map of New Mexico. |
| NMAP1.TXT | Text files for the Geologic Map |

through
NMMAP2.TXT

VENTS.E00 Volcanic Vents for the Geologic Map of New Mexico.

MAPBAR.AML ARCPLOT commands for the scale bar, courtesy of Bill Beeman, USGS.

LAMBERT.PRJ The Geologic Map of New Mexico projection parameters.

NMLIN.E00 ARC/INFO lineset NMLIN.LIN, the palette of line types.

NMSHD.E00 ARC/INFO shadeset NMSHD.SHD, the palette of colors.

FNT003.E00 ARC/INFO geologic symbols font file.

NMINDEX.AML ARCPLOT commands that create a plot file of the index sheet.

NMINDEX.E00 Data base of the geologic map explanation.

NMINDEX1.TXT through NMINDEX8.TXT Text files for the sheet two of the explanation.

NMINDEX1.FRM through NMINDEX8.FRM Formation text files for sheet two of the explanation.

SOURCES.AML ARCPLOT commands that create a plot file of the source of data sheet.

SOURCES.E00 Data base of the sources data sheet.

NMSCR1.TXT through NMSCR4.TXT Text files for the sources of data sheet.

References_Cited:
Anderson, O. J., and Jones, G. E., 1994, Geologic Map of New Mexico: New Mexico Bureau of Mines and Mineral Resources, Open-file Report 408-A and B, Geologic map and 15 magnetic disks, 1:500,000.

Selner, G.I. and Taylor, R.B., 1992, System 8, computer file: GSMAP, GSMEDIT, GSMUTIL, GSPOST, GSDIG and other programs version 8: U.S. Geological Survey Open-File Report 92-217-A and B, 217 p. and magnetic disk.

Green, G.N., and Selner, G.I., 1988, GSMARC: A program and procedure to convert GSMAP data bases into ARC/INFO coverages, GSDARC: A counterpart program for GSDRAW data bases and an ARC/INFO procedure to topologically structure resultant data: U.S. Geological Survey Open-File Report 88-430-A and B, 16 p. and magnetic disk.

Notes:
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The authors wish to thank Orin Anderson for providing access to the Geologic Map of New Mexico GSMAP data sets. For the digital review, we also thank Nancy Shock and Pat Stamile of the USGS.

Currentness_Reference:
none planned
Maintenance_and_Update_Frequency:
none planned

Access_Constraints:
no restrictions apply

Data_Set_Credit:
U.S. Geological Survey
New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico
Completeness_Report:
The digital hydrology is not complete or as accurate as the original
USGS 1:500,000 topographic base.
Horizontal_Positional_Accuracy_Report:

Vertical_Positional_Accuracy_Report:

Cloud_Cover:

# REFERENCES

# 69-72

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# W.A.T.E.R.S.
## Use Codes

Office of the State Engineer
Interstate Stream Commission

| Use Code | Use Description |
|---|---|
| AGR | AGRICULTURE OTHER THAN IRRIGATION |
| BPW | BRINE PRODUCTION WELL |
| COM | COMMERCIAL |
| CON | CONSTRUCTION |
| CPS | CATHODIC PROTECTION WELL |
| DAI | DAIRY OPERATION |
| DCN | DOMESTIC CONSTRUCTION |
| DEW | DEWATERING WELL |
| DOL | 72-12-1 DOMESTIC AND LIVESTOCK WATERING |
| DOM | 72-12-1 DOMESTIC ONE HOUSEHOLD |
| EXP | EXPLORATION |
| FCD | Flood Control |
| FGP | FISH AND GAME PROPOGATION |
| FPO | FEED PEN OPERATION |
| HWY | HIGHWAY CONSTRUCTION |
| IND | INDUSTRIAL |
| INJ | INJECTION |
| IRR | IRRIGATION |
| MDW | COMMUNITY TYPE USE - MDWCA, PRIVATE OR COMMERCIAL SUPPLIED |
| MFG | MANUFACTURING |
| MIL | MILITARY - MILITARY INSTALLATIONS |
| MIN | MINING OR MILLING OR OIL |
| MOB | MOBILE HOME PARKS |
| MON | MONITORING WELL |
| MPP | MEAT PACKING PLANT |
| MUL | 72-12-1 MULTIPLE DOMESTIC HOUSEHOLDS |
| MUN | MUNICIPAL - CITY OR COUNTY SUPPLIED WATER |
| NON | NON-PROFIT ORGANIZATIONAL USE |
| NOT | NO USE OF RIGHT OR POD |
| NRT | NO RIGHT |
| OBS | OBSERVATION |
| OFM | OIL FIELD MAINTENANCE |
| OIL | OIL PRODUCTION |
| PDL | NON 72-12-1 DOMESTIC & LIVESTOCK |
| PDM | NON 72-12-1 DOMESTIC |
| PLS | NON 72-12-1 LIVESTOCK WATERING |
| PMH | NON 72-12-1 MULTIPLE HOUSEHOLD USE |
| POL | POLLUTION CONTROL WELL |
| POU | POULTRY AND EGG OPERATION |
| PPP | PETROLEUM PROCESSING PLANT |
| PRO | 72-12-1 PROSPECTING OR DEVELOPMENT OF NATURAL RESOURCE |
| PUB | 72-12-1 CONSTRUCTION OF PUBLIC WORKS |
| REC | RECREATION |
| SAN | 72-12-1 SANITARY IN CONJUNCTION WITH A COMMERCIAL USE |
| SCH | SCHOOL USE - PUBLIC, PRIVATE, PAROCHIAL, & UNIVERSITIES |
| SRO | SECONDARY RECOVERY OF OIL |
| STK | 72-12-1 LIVESTOCK WATERING |
| STO | STORAGE |

# W.A.T.E.R.S.

## Use Codes

Interstate Stream Commission

| Use Code | Use Description |
|---|---|
| SUB | SUBDIVISION |
| UTL | PUBLIC UTILITY |

**From:** Mayerson, David, NMENV
**Sent:** Tuesday, January 15, 2008 13:22
**To:** Arfman, Suzan, NMENV
**Subject:** RE: Wells table

Many more wells than I thought...
Let's try this grouping by the use field:

- Consumptive--multiple domestic: MUL, MOB, MDW
- Consumptive--single domestic: DOM
- Non-consumptive: IND, IRR, SAN, STK
- Other: DEW, EXP, MIN, MON, NOT, OBS, PRO, PUB, and blanks

**David L. Mayerson**
New Mexico Environment Department
Ground Water Quality Bureau
Superfund Oversight Section
1190 St. Francis Drive, Suite N2312
Santa Fe, NM 87505

Telephone: (505) 476-3777
Fax: (505) 827-2965
david.mayerson@state.nm.us

---

**From:** Arfman, Suzan, NMENV
**Sent:** Tuesday, January 15, 2008 13:00
**To:** Mayerson, David, NMENV
**Subject:** Wells table

David

Here is the "clipped" version of the OSE wells.

As always, enjoy

7 L

# FINAL
# ENGINEERING EVALUATION/COST ANALYSIS REPORT
# SAN MATEO URANIUM MINE
## CIBOLA NATIONAL FOREST, NEW MEXICO

*Submitted to:*

**U.S. Department of Agriculture**
**U.S. Forest Service, Southwestern Region**
**333 Broadway, SE**
**Albuquerque, New Mexico 87102**

*Prepared by:*

SAIC
From Science to Solutions


**Science Applications International Corporation**
**1000 Broadway, Suite 675**
**Oakland, California 94607**


August 19, 2009

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NEW MEXICO
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Governor
DIANE DENISH
Lieutenant Governor

RON CURRY
Secretary
JON GOLDSTEIN
Deputy Secretary

## Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Poison Canyon Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Poison Canyon Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 29.51" | **Longitude** | 107° 49' 51.55" | | |

**Site physical description:** The Poison Canyon Mine currently is an area of mine pits and presumably recontoured mine wastes, which is bounded on 3 sides by bedrock escarpment. At the time that NMED staff visited the site, surface water was present within some of the pits. A surface water drainage has developed through the middle of the site, which connects to the former access road that has been eroded into a drainage. An area of bench cut roads west of the main mine site also was assessed as part of this site.
**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.
**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. Most surface materials exhibited only slightly elevated

radioactivity (highest reading=63 counts per second [cps]; background=24 cps). Bedrock outcroppings exposed within the larger excavation and along the bordering escarpment also had slightly elevated radioactivity (highest reading=121 cps). Contamination of vicinity soils and surface drainages by precipitative erosion comprises the primary contaminant pathway that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality through seepage through alluvium.
**Targets:** The closest residence to the Site is located off of Haystack Road, approximately 1.05 air-miles to the southwest, from which another residence is visible further to the west. Residences also are located near the junction of State Hwy. 605 and 509, approximately 2.8 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (1.1 air-miles; 48.2 µg/l total uranium in 2009 sampling).
**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by Schmitt; mineral rights reportedly are held by Newmont Mining Company. Teton Exploration and Drilling Company reportedly last operated the mine in 1978.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 1, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.

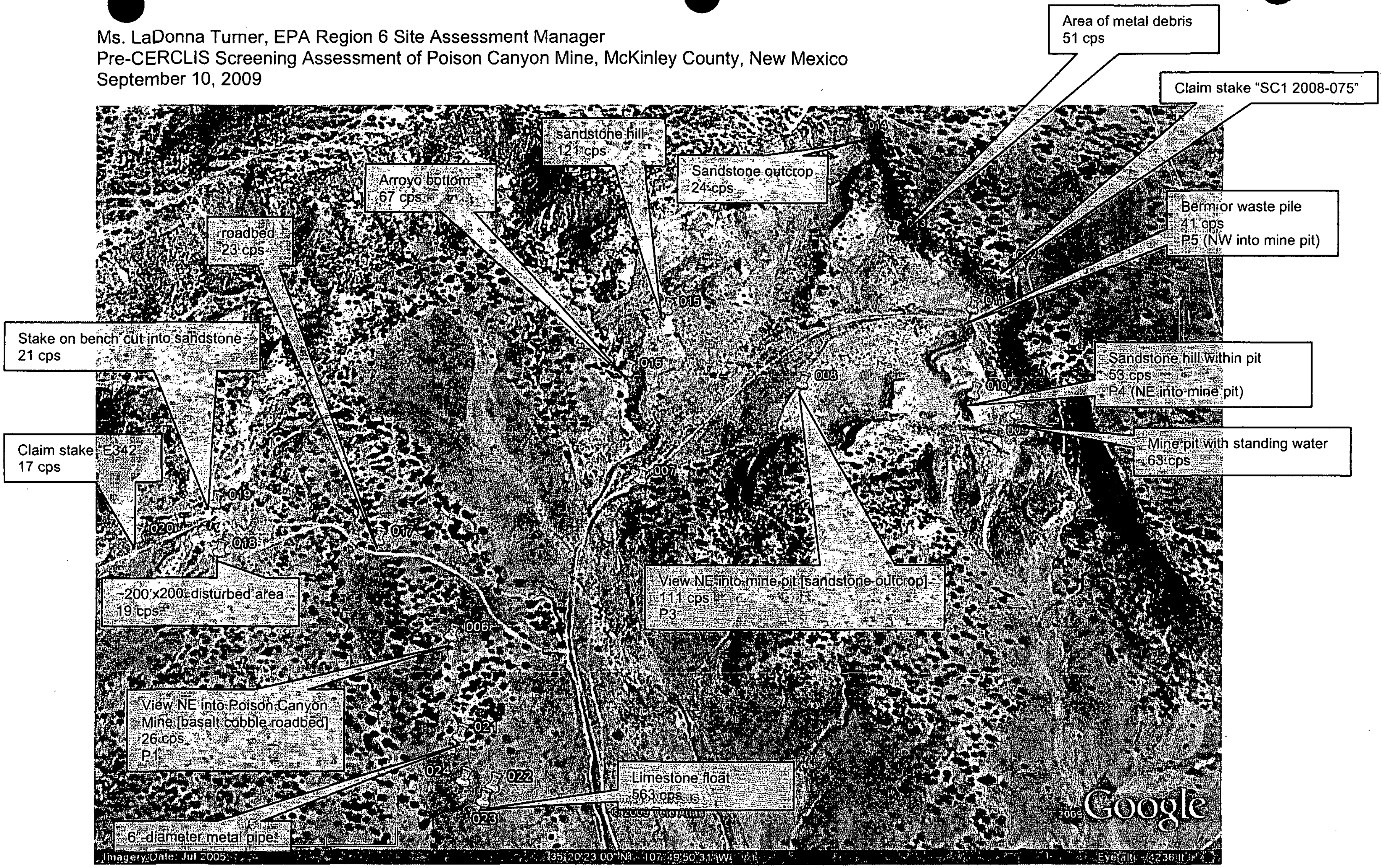


**Figure 1: Poison Canyon Mine—measurements taken on July 1, 2009**

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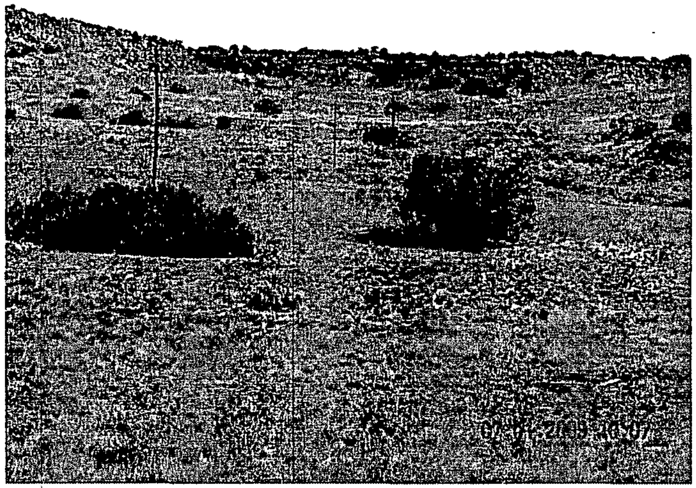
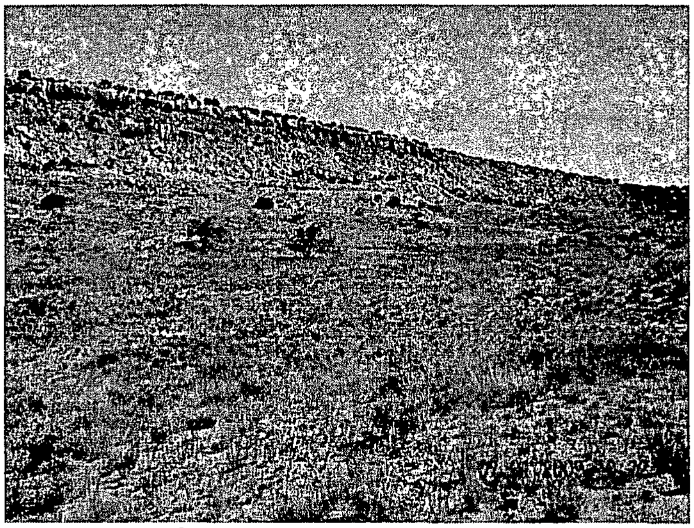


P1: Poison Canyon Mine view NE into minesite



P2: Poison Canyon Mine view NNE into minesite

P3: Poison Canyon Mine view into mine pit

P4: Poison Canyon Mine view NE into mine pit

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Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Red Bluff #1 Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Red Bluff #1 Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 18' 59.97" | **Longitude** | 107° 50' 26.61" | | |

**Site physical description:** Site observations of the Red Bluff #1 Mine by NMED personnel were made from Haystack Road from which no disturbance was evident since access to the privately-owned site could not be arranged in advance. Anderson (1980) describes the site as comprising two pit areas oriented along the north and east section lines respectively that were excavated to exploit uranium deposits within the Todilto Limestone.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. As indicated, no disturbance was visible from Haystack Road.

However, Anderson (1980) includes pictures of stripped areas and waste materials, which mostly comprise veneers on natural slopes. Anderson also states that the maximum radioactivity at this site was 1100 counts per second. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality through seepage through alluvium.
**Targets:** The closest residence to the Site is approximately 1.0 mile northwest of the site on Haystack Road; a second residence on Haystack Road is located approximately 1.3 miles northwest. Residences located near the junction of State Hwy. 605 and 509 are approximately 4 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (1 air-mile; 48.2 µg/l total uranium in 2009 sampling).
**Site ownership and Potentially Responsible Parties:** Surface and mineral rights for the site are held by the State of New Mexico. Homer Scriven reportedly last operated the mine in 1964.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize impacts to surface water accumulations and to ground water.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Reclaim unstable pit highwalls.

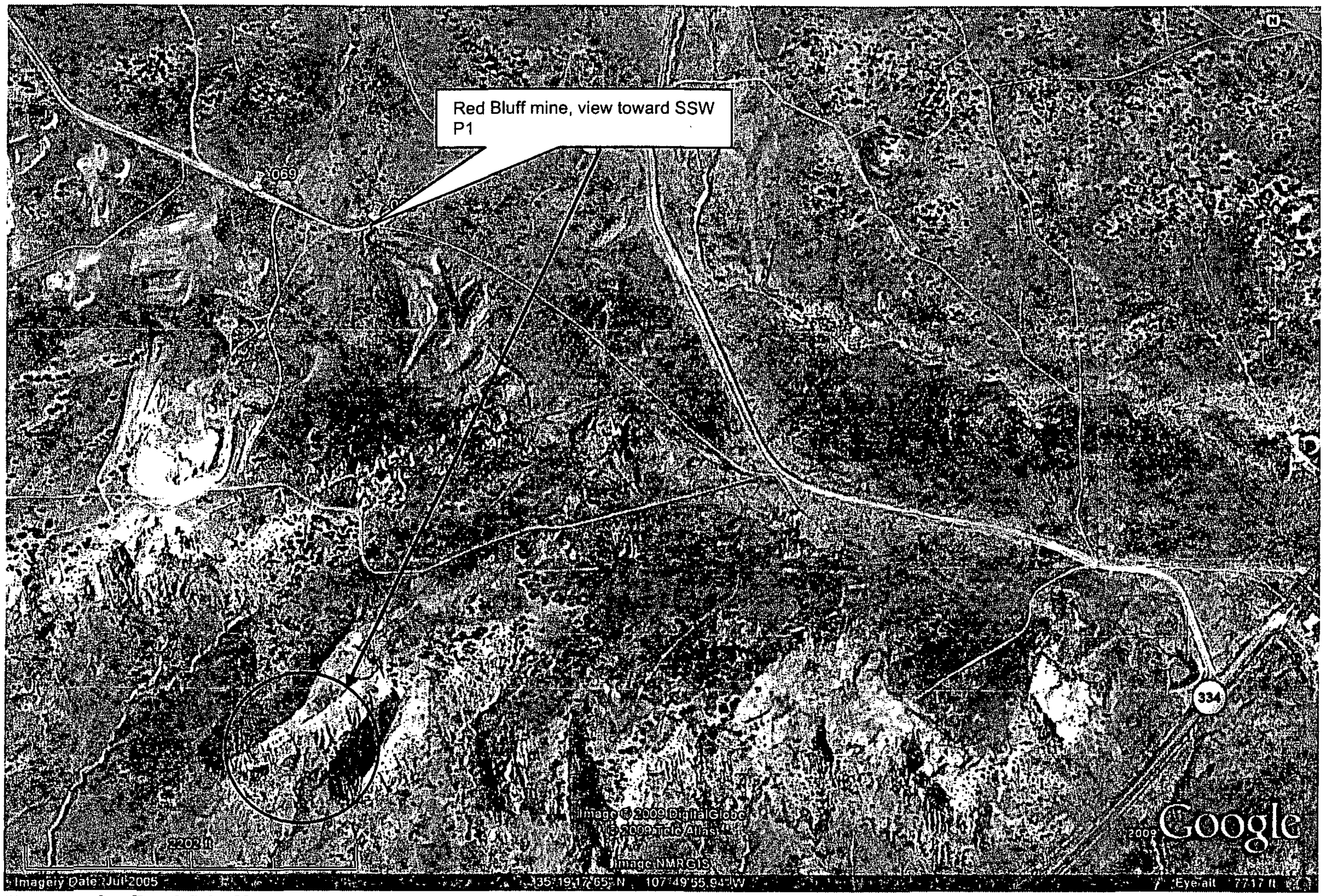
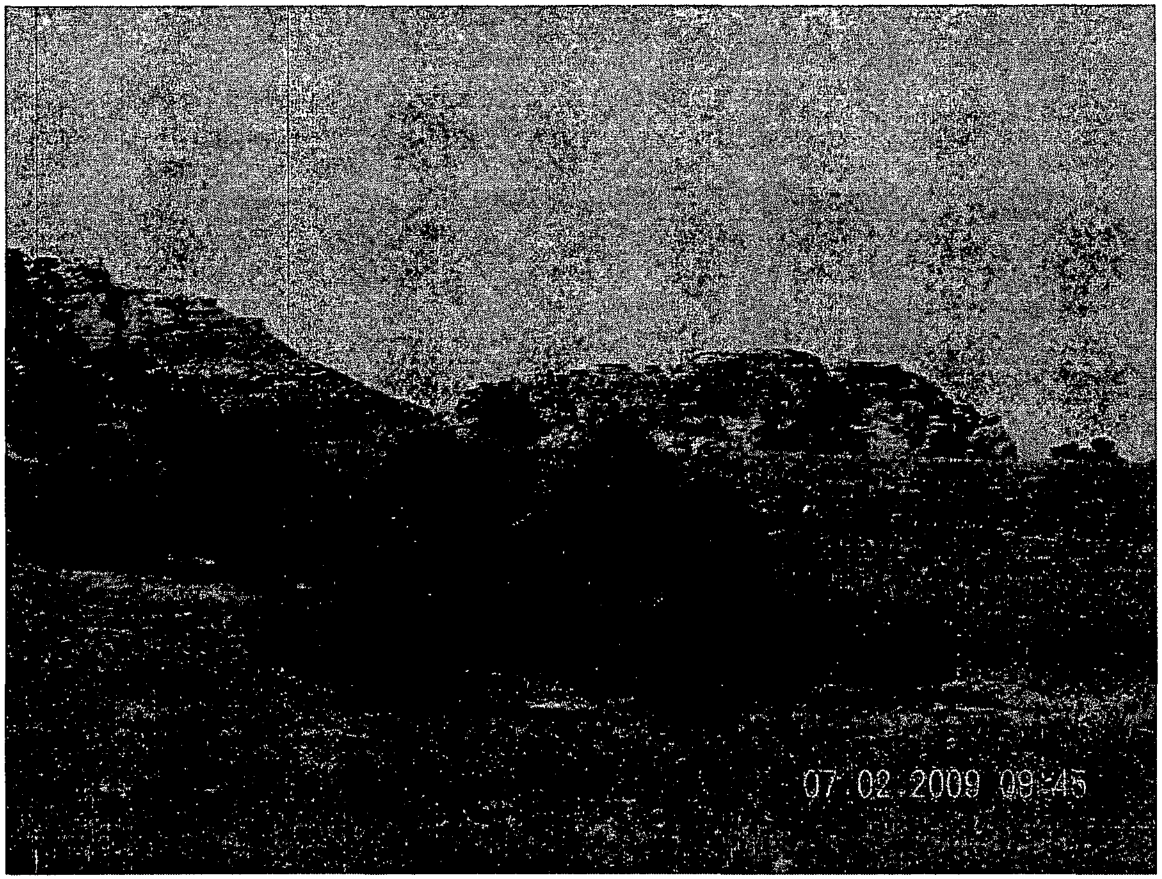



**Figure 1: Red Bluff mine**

"Px" reference the location of photographs on pages following.




P1: Red Bluff Mine; view toward SSW

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JON GOLDSTEIN
Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Piedre Trieste Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Piedre Trieste Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 34.17" | **Longitude** | 107° 50' 01.99" | | |

**Site physical description:** The Piedre Trieste Mine currently is an area of disturbance with scattered limestone waste materials bordering a former road that has been eroded into a drainage.
**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.
**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figure. Limestone material scattered about the site generally has elevated levels of radioactivity (highest radioactivity reading=725 counts per second [cps]; background=30 cps). Little vegetation is present over much of the site. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise

the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality through seepage through alluvium.

**Targets:** The closest residence to the Site is located off of Haystack Road, approximately 0.75 air-miles to the northwest. Residences also are located near the junction of State Hwy. 605 and 509, approximately 3.3 air-miles northeast of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (0.4 air-miles; 48.2 µg/l total uranium in 2009 sampling).

**Site ownership and Potentially Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Todilto Exploration and Development Company reportedly last operated the mine in 1981.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.

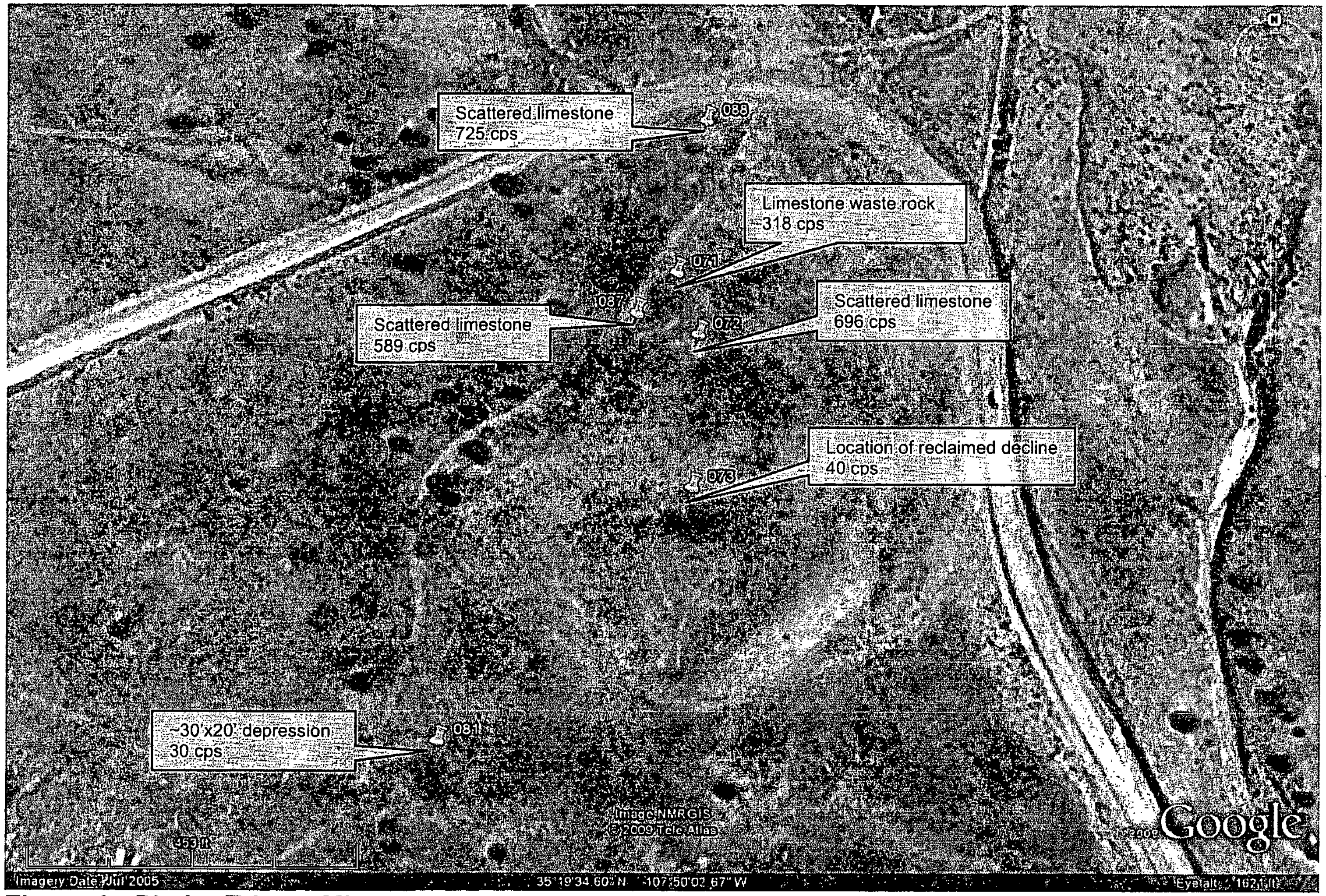


**Figure 1: Piedre Trieste Mine—measurements taken on July 2, 2009**

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Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Roundy Manol Strip Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Roundy Manol Strip Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 21.04" | **Longitude** | 107° 50' 07.80" | | |

**Site physical description:** The Roundy Manol Strip Mine currently is an area of excavated pits and mine waste piles over a broad area south of Haystack Road. Surface water was present in several of the pits visited by NMED personnel.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. One excavated pit borders Haystack Road; erosion of the Haystack Road roadway is being temporarily impeded by concrete barriers, but shows evidence of undercutting (see P1). One pit that was examined by NMED had been used to dump trash and automobiles. Waste piles examined were comprised of limestone; the highest radioactivity measurement from these materials was 683 counts per second (cps); background is presumed to be 34-41 cps from measurements on-site. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality through seepage through alluvium.

**Targets:** The closest residence to the Site is located off of Haystack Road, approximately 1.15 air-miles to the northwest, from which another residence is visible further to the west. Residences also are located near the junction of State Hwy. 605 and 509, approximately 3 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (0.5 air-miles; 48.2 µg/l total uranium in 2009 sampling).

**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are private. Rimrock Mining Company reportedly last operated the mine in 1971.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize surface water accumulations and ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Stabilize unstable pit highwalls.

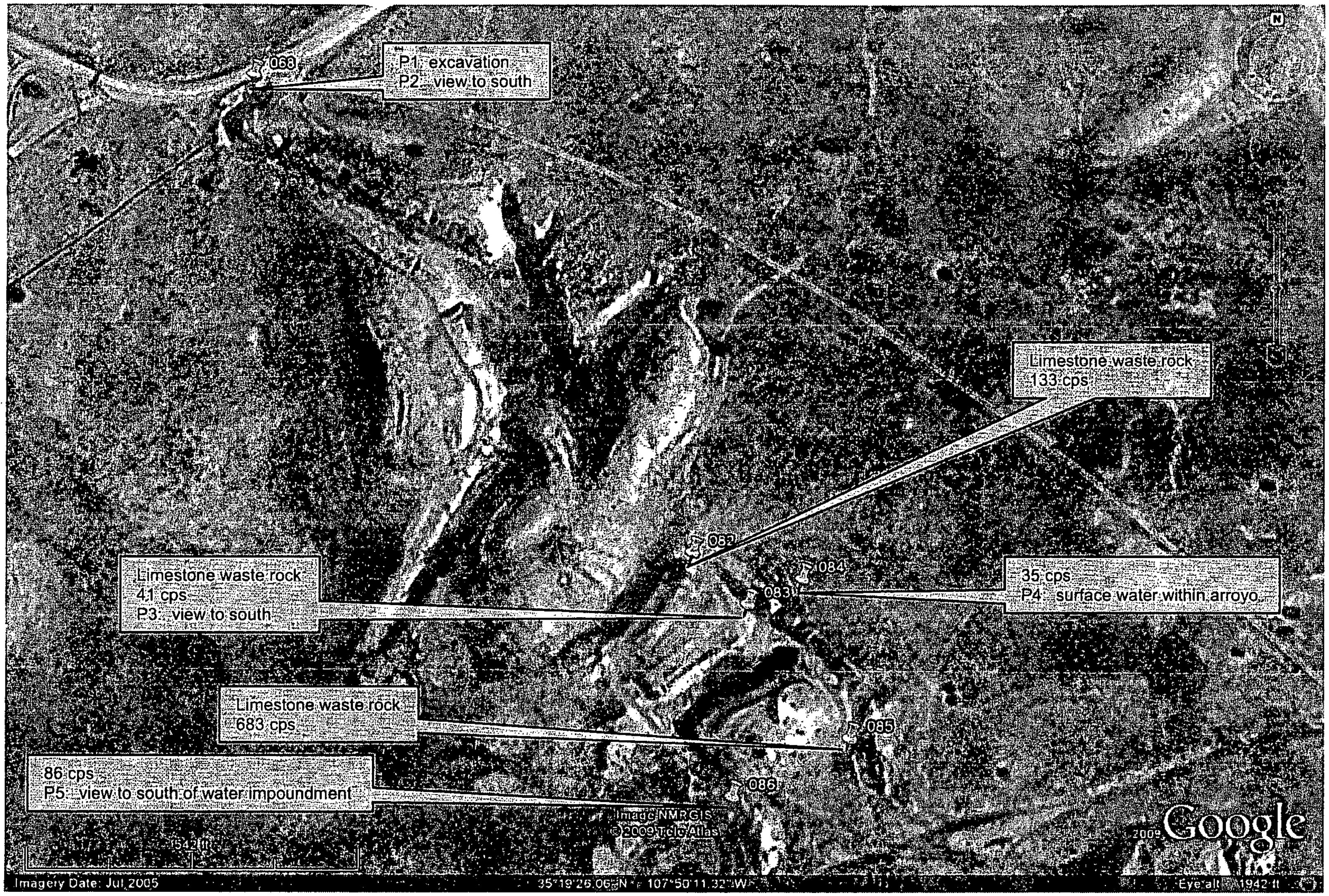
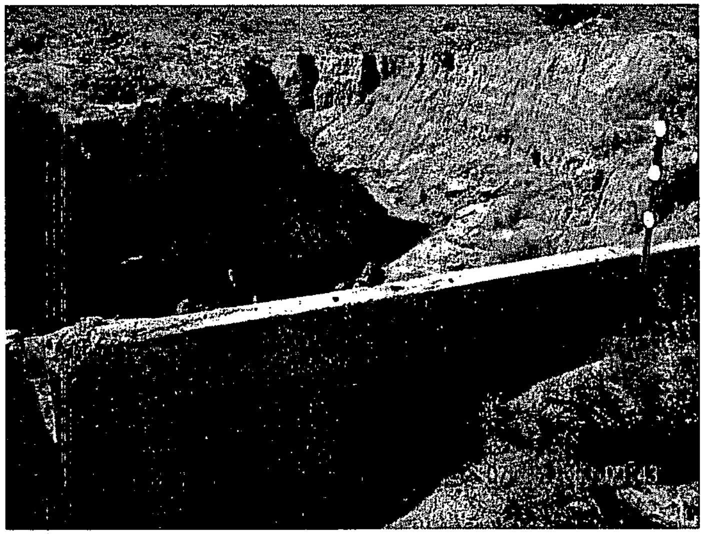


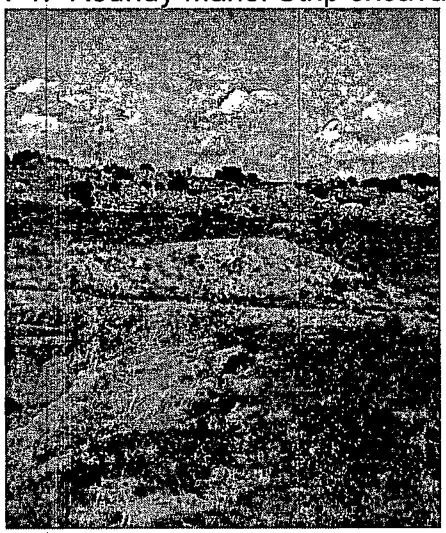

**Figure 1: Roundy Manol Strip**

“Px” reference the location of photographs on pages following.

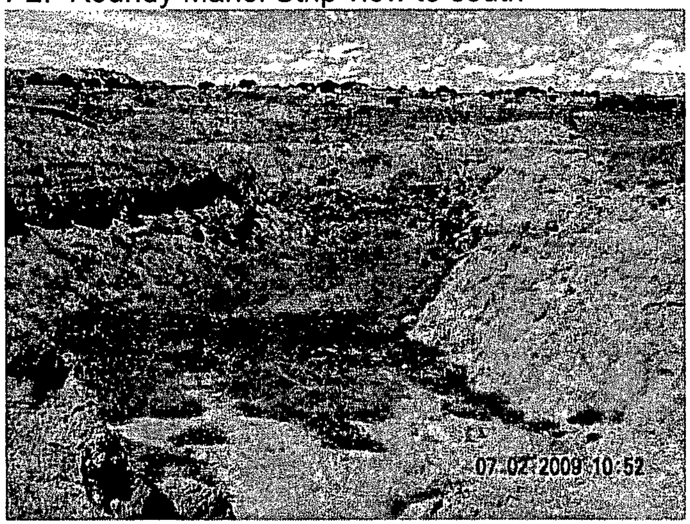


P1: Roundy Manol Strip excavation

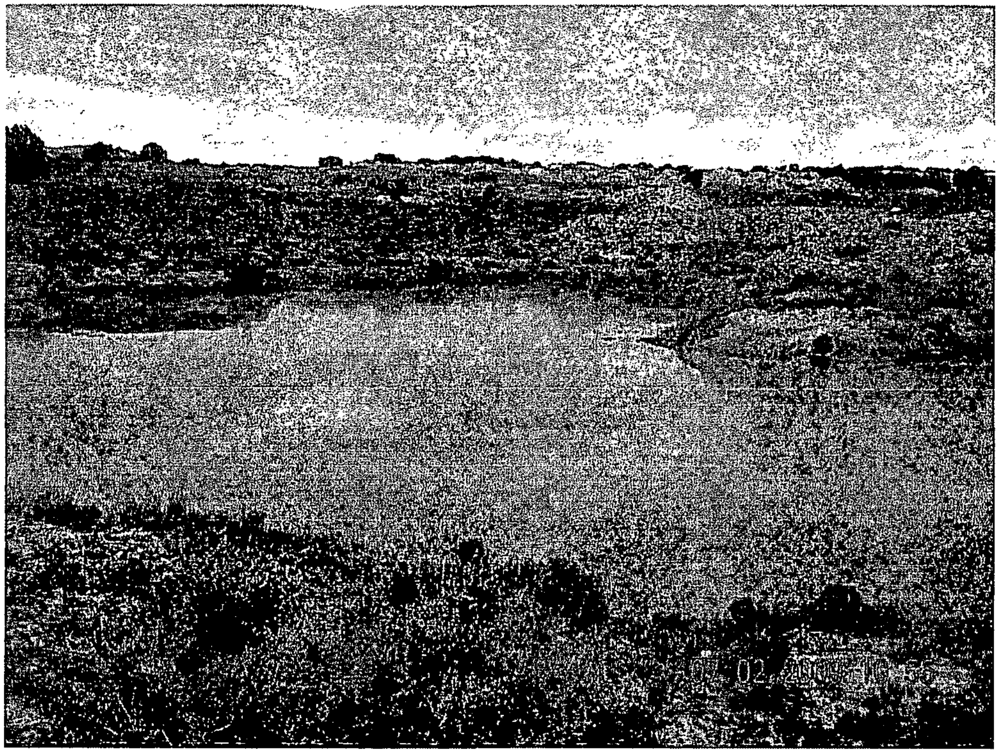
P2: Roundy Manol Strip view to south



P3: Roundy Manol Strip view to south




P4: Roundy Manol Strip surface water within arroyo



P5: Roundy Manol Strip view to south of water impoundment

# REFERENCES

# 77-80

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Deputy Secretary

## Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Response and Prevention Branch**
**U.S. Environmental Protection Agency, Region VI**

**Date:** **September 10, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Subject:** **Pre-CERCLIS Screening Assessment of Mesa Top mine, McKinley County, New Mexico: Further action under CERCLA is recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Mesa Top mine | **Street address** | not applicable | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 25.67" N | **Longitude** | 107° 49' 03.13" W | | |

**Site physical description:** The Mesa Top minesite currently has numerous waste piles, building pads, debris, and 2 open shafts remaining from uranium mining activities. Some waste piles emit elevated levels of radioactivity in comparison to background values (i.e., 34 counts per second [cps] from measurements taken on-site), and most waste piles show evidence of erosion, or border surface water drainage channels.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background ground water standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a June 3, 2009 site visit are shown on the accompanying figures. Radioactivity at one shaft, the location of which is marked by a vertical large diameter pipe, measured 900 cps outside a closed metal hatch. Several waste piles and barren areas with elevated radioactivity (highest radioactivity=553 cps; background=34 cps) were noted. Many waste piles are marked by erosional rills, suggesting that waste has been dispersed down-stream. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry via the open shafts.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.8 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 1.9 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-34 (1.0 air-miles; 119 µg/l total uranium in 2009 sampling)

**Site ownership and Potential Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Holly Minerals reportedly last operated the mine in 1958.

**File review:** NMED Superfund Oversight Section (SOS) staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico," p. 73-76.
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources, p. 122-.
- Souder, Miller, and Associates, 2008. "Abandoned uranium mine field survey project."
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 3, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shafts.

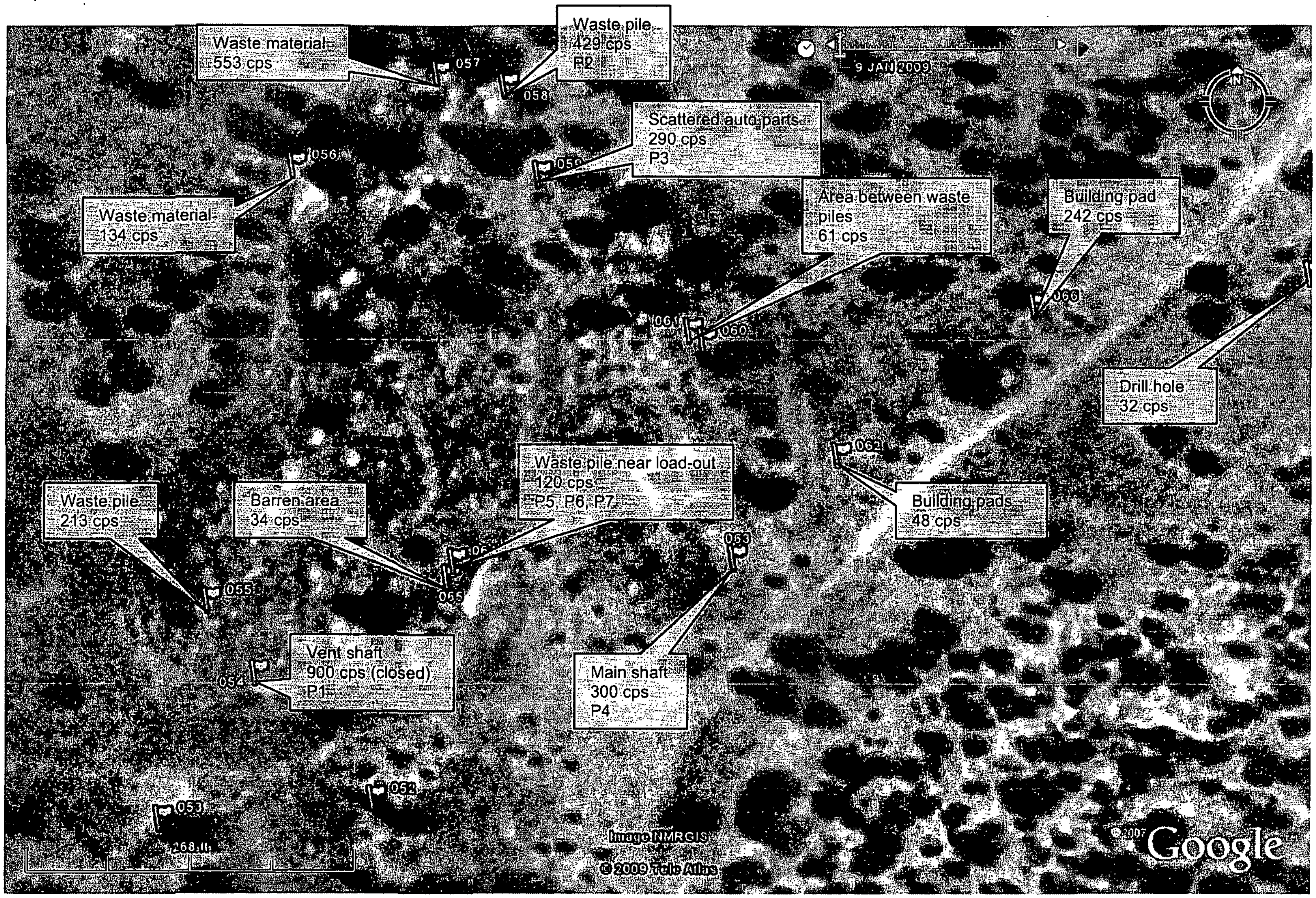
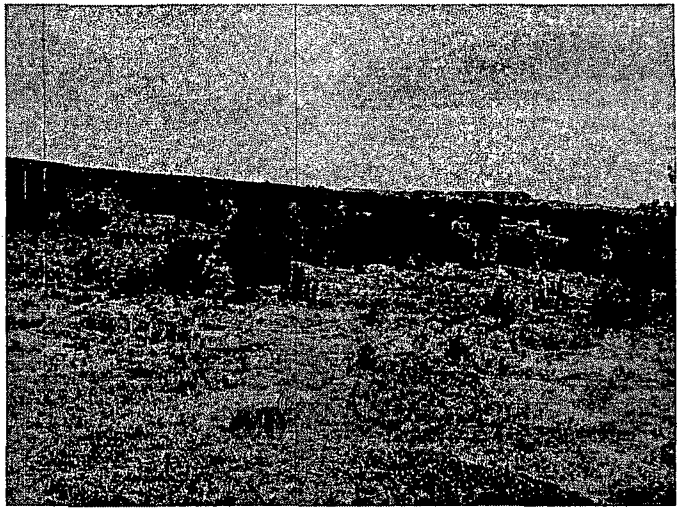


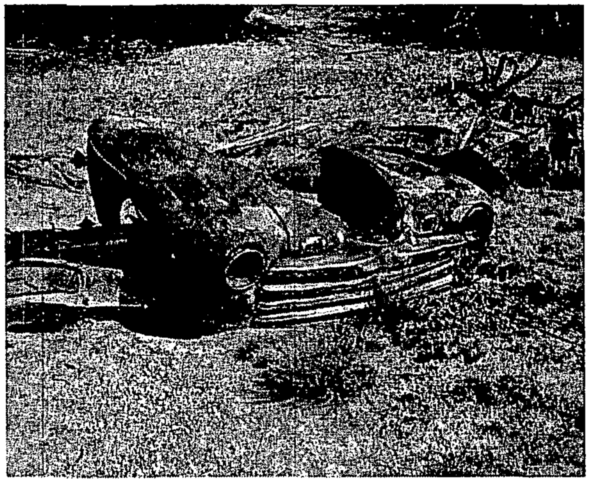

**Figure 1: Mesa Top mine—measurements taken on June 3, 2009**

"Px" reference the location of photographs on pages following.

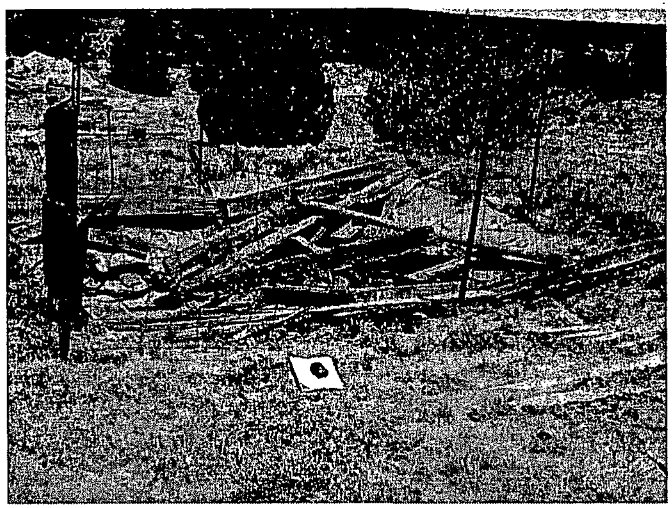


P1: Mesa Top Mine ventilation shaft

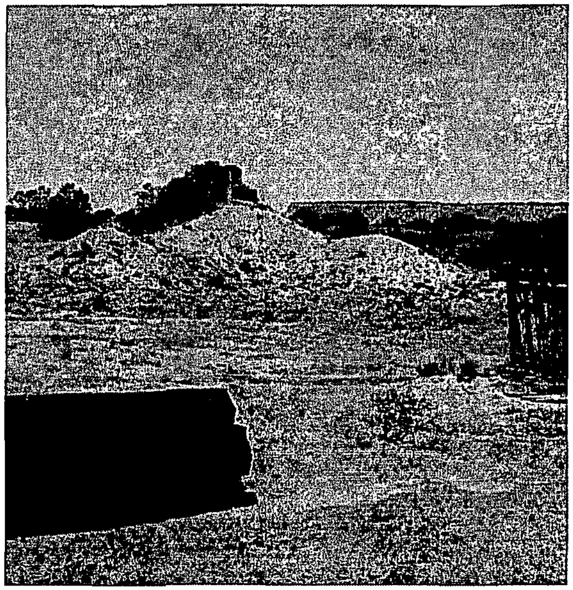
P2: Mesa Top Mine waste pile



P3: Mesa Top Mine scattered automobile parts



P4: Mesa Top Mine shaft


P5: Mesa Top Mine waste pile near load-out facility


P6: Mesa Top Mine view from waste pile near load-out toward north


P7: Mesa Top Mine view from waste pile near load-out toward south

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Malpais Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Malpais Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 42.21" | **Longitude** | 107° 48' 51.62" | | |

**Site physical description:** The Malpais Mine currently has an open and unfenced shaft and numerous waste material piles bordering or within drainages.
**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.
**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The largest pile of waste material had radioactivity readings between 140 and 400 micro Roentgens/hour (μR/h); background was measured at 15—18 μR/h. The open and unfenced shaft presents a hazard to livestock, wildlife, and humans. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this

site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open shaft.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.82 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 2.0 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-18 (0.7 air-miles; 2 μg/l total uranium in 2009 sampling).

**Site ownership and Potentially Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Four Corners Exploration Company reportedly last operated the mine in 1961.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shaft.

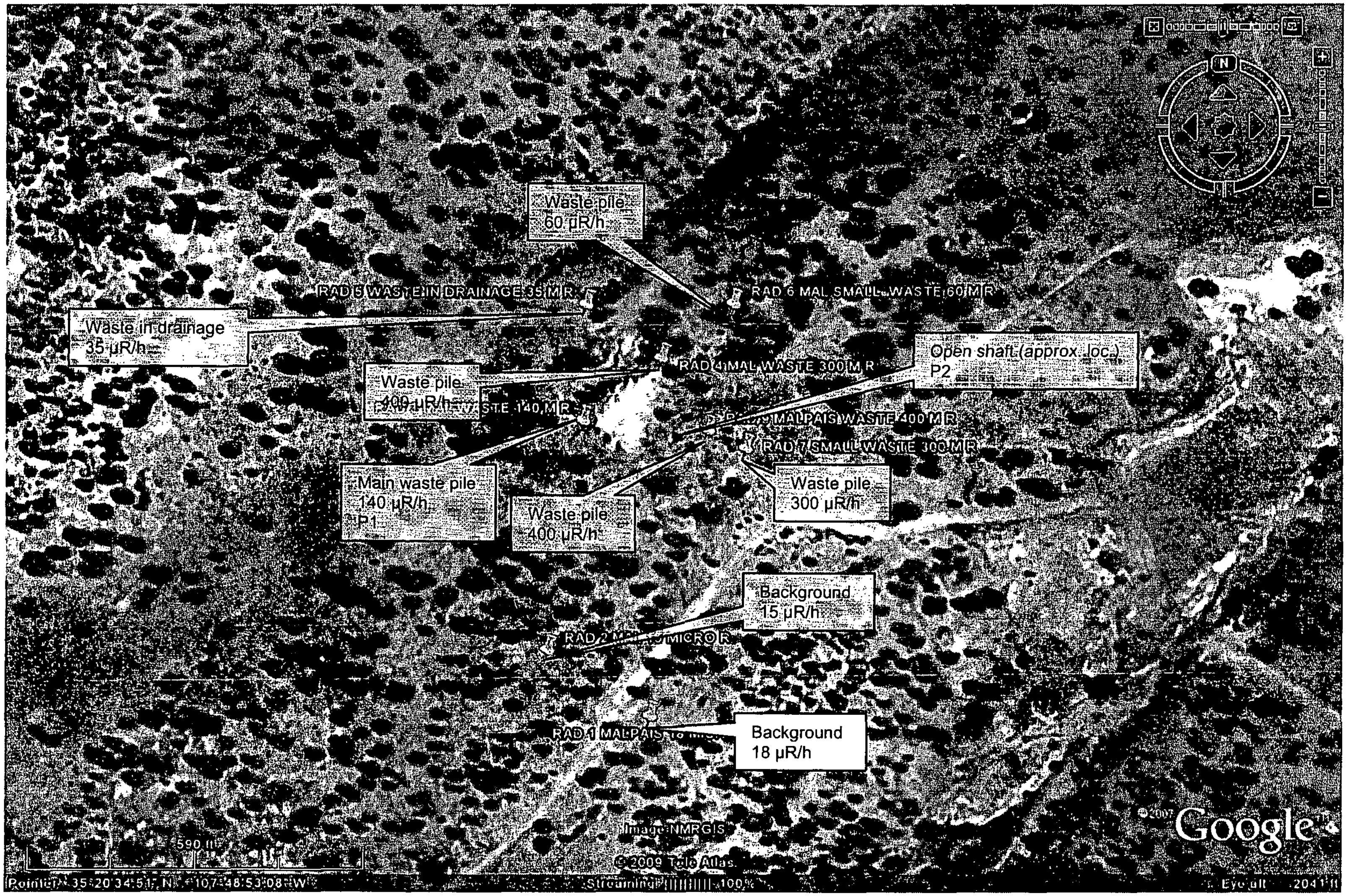


**Figure 1: Malpais Mine**

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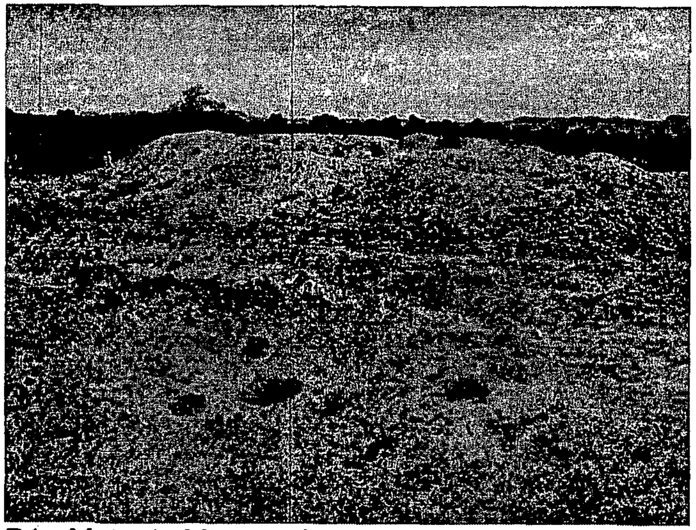
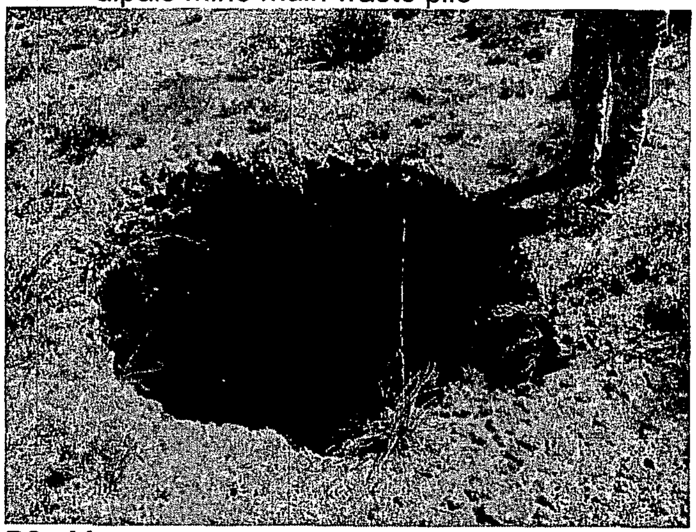


P1: Malpais Mine main waste pile



P2: Malpais Mine open shaft

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Hope Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Hope Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 10.78" | **Longitude** | 107° 49' 59.77" | | |

**Site physical description:** The Hope Mine currently is an area of disturbance with scattered limestone waste material, several concrete slabs, and a possible open shaft covered by a steel plate.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figure. A possible location of a mineshaft is indicated by a heavy steel plate. The highest radioactivity reading was measured at a waste rock pile (823 counts per second [cps]; background=32 cps). Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open shaft.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.0 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (0.8 air-miles; 48.2 µg/l total uranium in 2009 sampling).

**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by Marquez; mineral rights are held by Newmont Mining Company. Ranchers Development and Exploration Company reportedly last operated the mine in 1981.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shaft, if present.

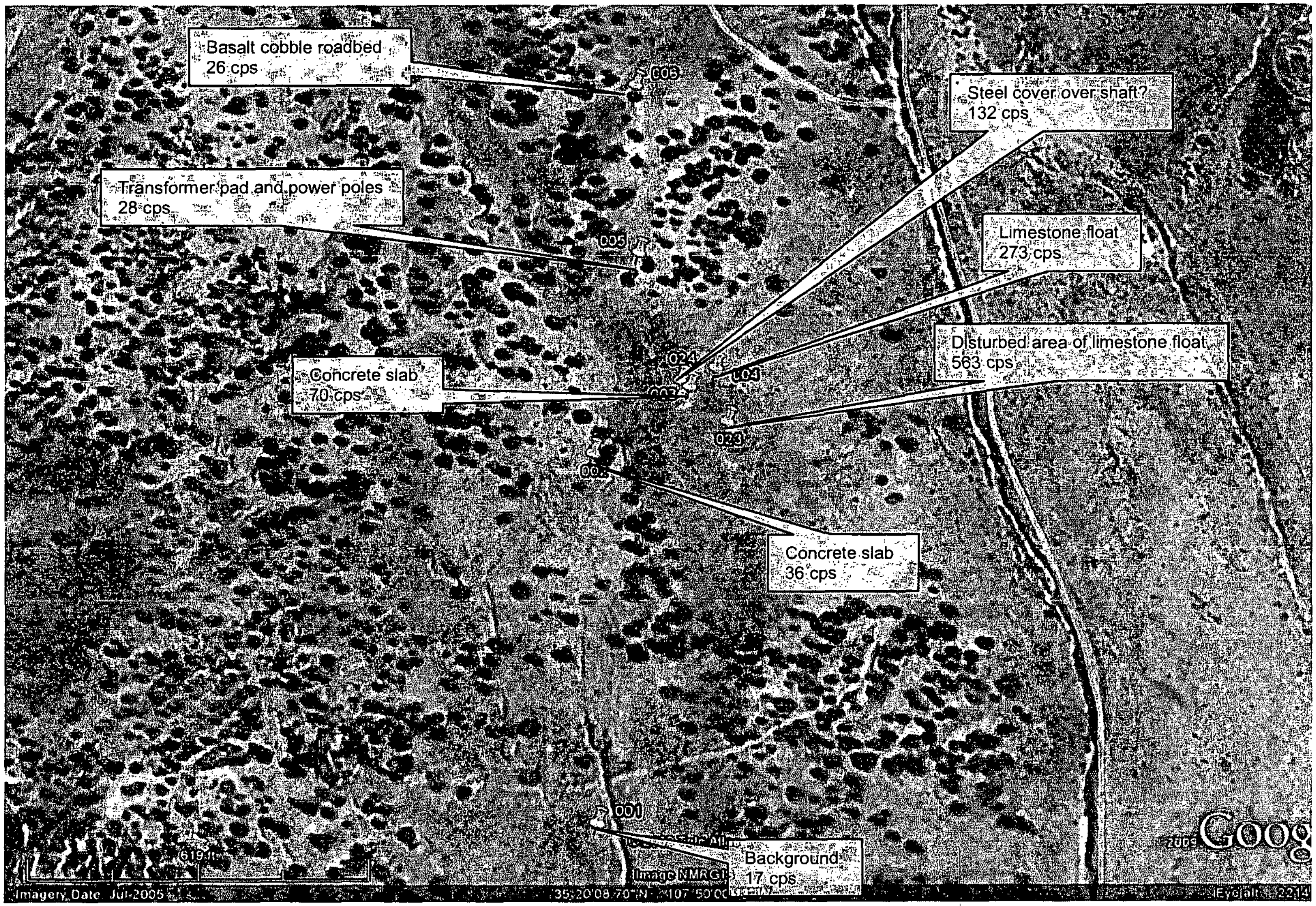


**Figure 1: Hope Mine—measurements taken on July 2, 2009**

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Isabella Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Isabella Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 22' 49.19" | **Longitude** | 107° 49' 36.19" | | |

**Site physical description:** The Isabella Mine is comprised 2 areas of waste material piles and one open shaft that are approximately 0.06 air-miles apart. The more northerly area is approximately 0.6 miles south of the Rio Algom—Ambrosia Lake mill. The southern area of the minesite is comprised of several piles of waste material and a mostly barren area with elevated radioactivity; these are located in or near an arroyo. The northern area of the minesite is comprised of larger waste material piles and barren areas with elevated radioactivity and an unfenced open shaft. This area is located at the base of an escarpment, along a roadway that has become a drainage.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The barren area in the southern portion has radioactivity of 741 counts per second (cps; background assumed to be in the range of 10 to 40 cps from data collected at nearby sites); the waste material bordering and within the arroyo have slightly elevated radioactivity (highest reading during reconnaissance=104 cps). The open mine shaft in the northerly area is a hazard to livestock, wildlife, and humans. A barren area near the shaft had radioactivity of 582

cps, while 330 cps was measured at the shaft opening. The former roadway that cuts through this area has been extensively incised by erosion. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open hole and shaft.
**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 3.0 air-miles southeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-17 (0.8 air-miles; 98.4 µg/l total uranium in 2009 sampling).
**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by the Bureau of Land Management (BLM); mineral rights are held by Newmont Mining Company. United Nuclear and Ranchers Exploration Company reportedly last operated the mine in 1980.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shafts.

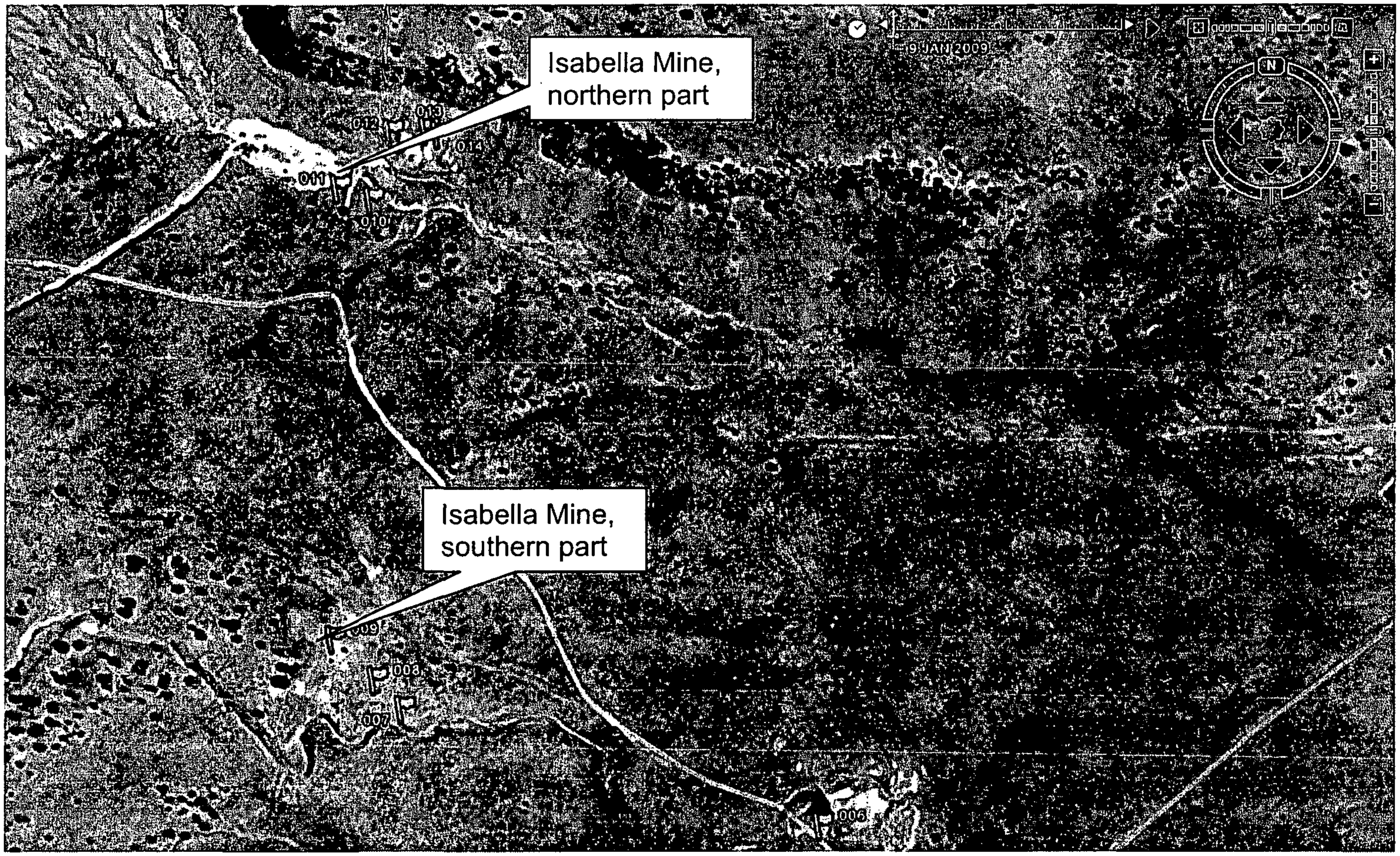



**Figure 1: Isabella Mine overview**

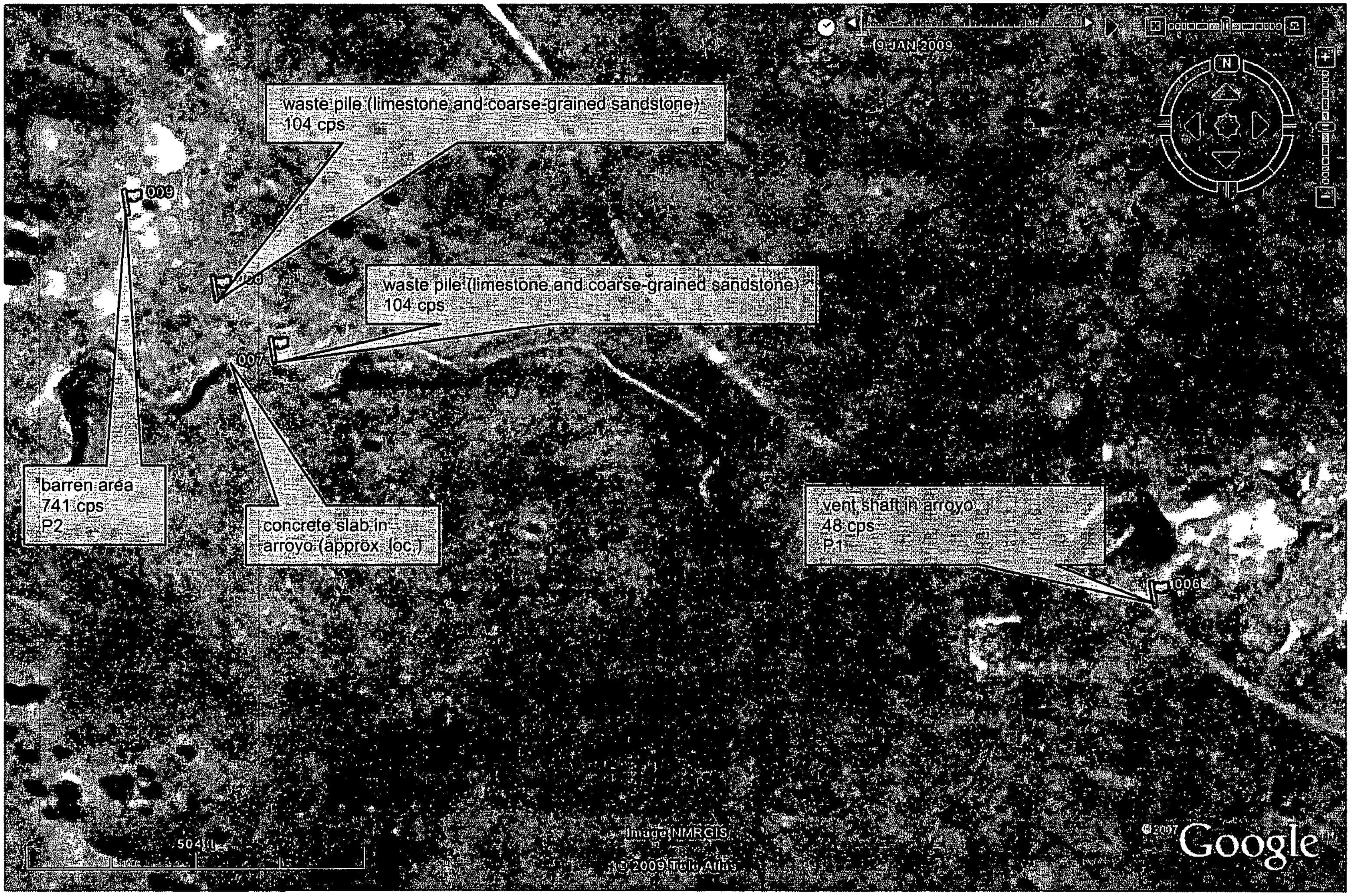



**Figure 2: Isabella Mine, southern part—measurements taken on July 2, 2009**

“Px” reference the location of photographs on pages following.

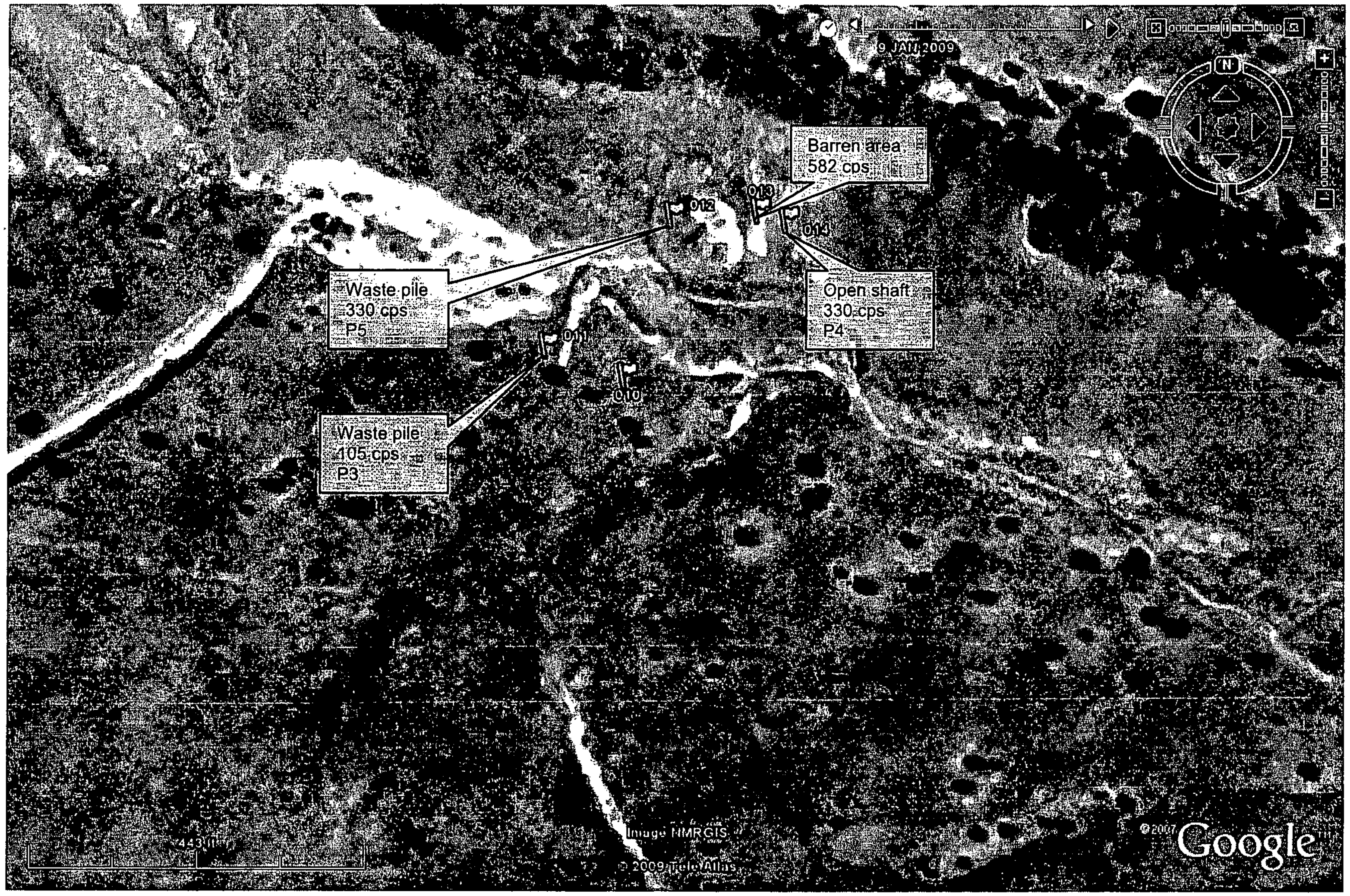
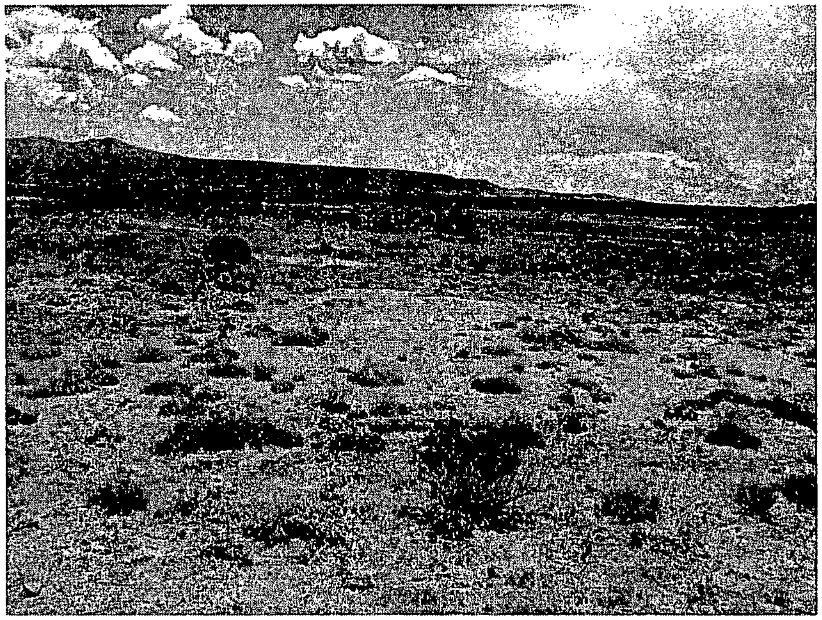


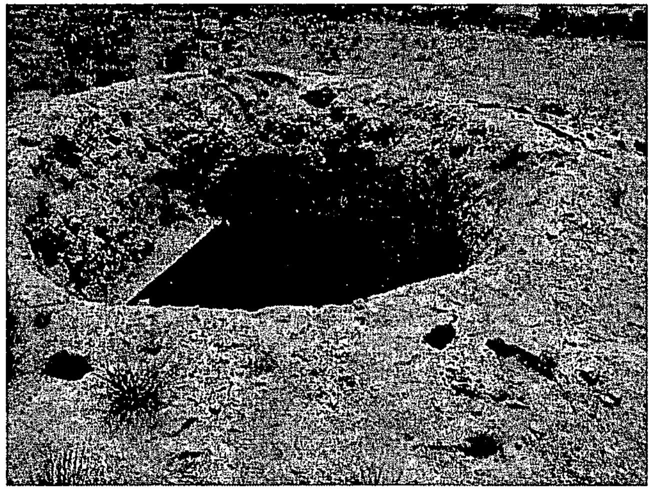

**Figure 3: Isabella Mine, northern part—measurements taken on July 2, 2009**

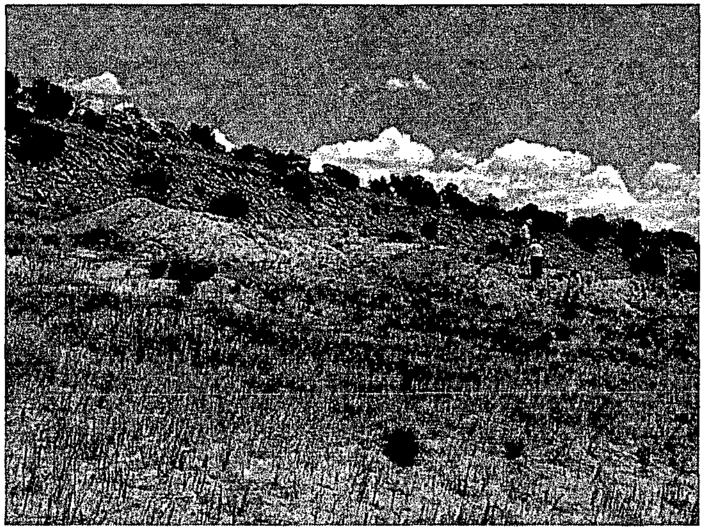
"Px" reference the location of photographs on pages following.


P1: Isabella Mine vent shaft


P2: Isabella mine barren area


P3: Isabella Mine waste pile


P4: Isabella Mine shaft



P5: Barren waste pile

# REFERENCES

# 81-84

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Haystack Section 31 Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Haystack Section 31 Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 19.07" | **Longitude** | 107° 49' 10.07" | | |

**Site physical description:** NMED personnel assessed the Haystack Section 31 Mine from Haystack Road because access to the private property could not be arranged. Several large poorly-vegetated piles of presumed waste material are visible from this viewpoint. Anderson (1980) describes the site as comprising several open pits and trenches that were excavated to exploit small uranium deposits within the Todilto Limestone.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. As indicated, only piles of presumed waste materials associated with this site could be seen from Haystack Road. Anderson (1980) includes pictures of large pits and trenches, and states that the maximum radioactivity at this site was 3000 counts per second.

**Targets:** The closest residence to the Site is approximately 1.5 miles northwest of the site on Haystack Road; a second residence on Haystack Road is located approximately 2 miles northwest, from which another residence is visible further to the west. Residences located near the junction of State Hwy. 605 and 509 are approximately 3 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-33 (0.4 air-miles; 164 µg/l total uranium in 2009 sampling).

**Site ownership and Potentially Responsible Parties:** Surface rights for the site are privately-held, possibly by the successor to the Isabella O. Marquez trust. Newmont Mining Company reportedly holds the mineral rights. United Nuclear Corporation reportedly last operated the mine in 1975.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

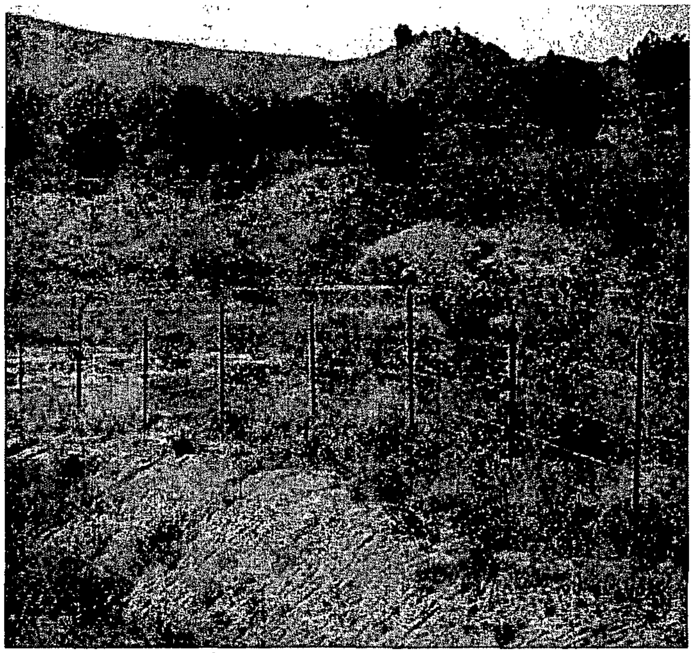
1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize surface and ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Reclaim unstable pit highwalls
3. Characterize ground water impacts through drilling


**Figure 1: Haystack Section 31 mine—photographs taken on July 2, 2009**

"Px" reference the location of photographs on pages following.



P1: Haystack Section 31 mine, view to SE

P2: Haystack Section 31 mine, view to SW

8 2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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Flat Top Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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**Site name** Flat Top Mine **Street address:** Not applicable
**City** not applicable **State** New Mexico **Zip code** not applicable
**County** McKinley
**Latitude** 35° 19' 20.11" **Longitude** 107° 49' 25.33"

**Site physical description:** The Flat Top Mine currently comprises scattered waste material piles and debris. Some of these waste piles are located near drainages, and show evidence of erosion. Some areas of apparent subsidence were noted during site reconnaissance

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The highest radioactivity was measured from mineralized limestone on the ground surface (1065 counts per second (cps). Elevated radioactivity also was noted at the reclaimed shaft location (553 cps; background=34 cps).

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.73 air-miles east-northeast of the Site. Other potential targets may include cattle and wildlife.

Closest wells sampled to date: livestock well SMC-33 (0.38 air-miles; 164 µg/l total uranium in 2009 sampling); livestock well SMC-22 (0.22 air-miles; 48.2 µg/l total uranium in 2009).

**Site ownership and Potentially Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Bailey and Fife reportedly last operated the mine in 1966.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.

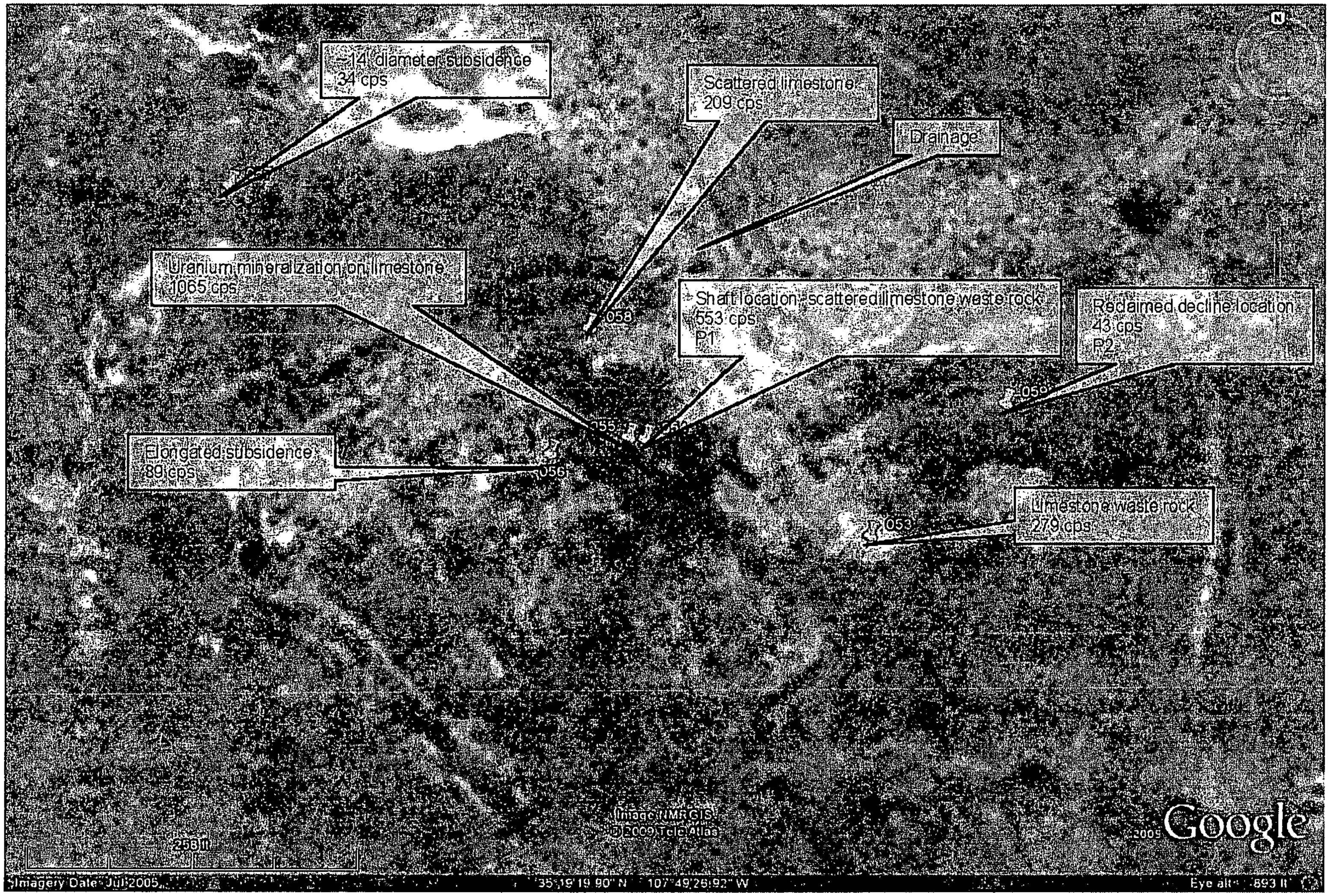
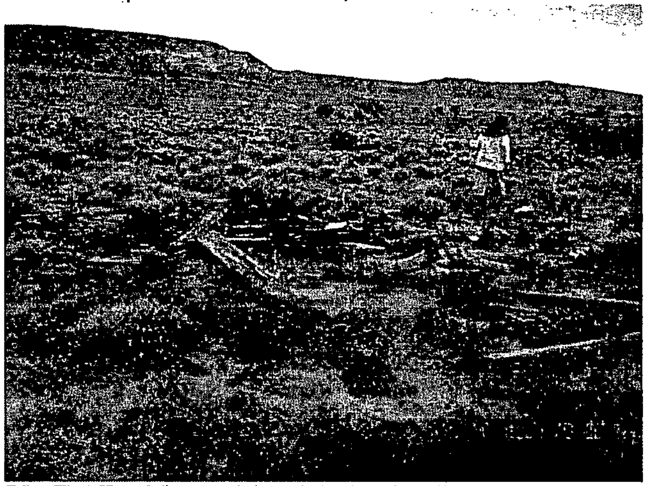



**Figure 1: Flat Top Mine—measurements taken on July 2, 2009**

"Px" reference the location of photographs on pages following.

P1: Flat Top Mine shaft location; scattered limestone waste rock



P2: Flat Top Mine reclaimed decline location

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 10, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department**

**Subject:** **Pre-CERCLIS Screening Assessment of Beacon Hill Gossett mine, McKinley County, New Mexico: Further action under CERCLA is recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Beacon Hill Gossett mine | **Street address** | not applicable | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 55.17" N | **Longitude** | 107° 49' 27.82" W | | |

**Site physical description:** The Beacon Hill Gossett minesite currently has numerous waste piles, and an open vent shaft remaining from past uranium mining activities. Some waste piles emit elevated levels of radioactivity in comparison to background values (assumed to be in the range of 10 to 40 counts per second [cps] from data collected at this and nearby sites), and most waste piles show evidence of erosion; some also border a drainage course that has developed from the access road to this site (see Figure 1).

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). The New Mexico Environment Department (NMED) conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a June 3, 2009 site visit are shown on the accompanying figures. Numerous waste piles and barren areas with elevated radioactivity (highest radioactivity=489 cps; background=34 cps) were noted. Many waste piles are marked by erosional rills, indicating that waste has been dispersed down-stream. The remaining open vent shaft may provide a conduit for surface contamination to enter ground water. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open vent shaft.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 2.5 air-miles east of the Site. Another residence is located along Haystack Road approximately 1.5 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.58 air-miles; 48.2 μg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 μg/l])

**Site ownership and Potential Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Reserve Oil and Minerals reportedly last operated the mine in 1978, using the mine shaft as a ventilation shaft for the Poison Canyon Mine.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 3, 2009

**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open vent shaft.

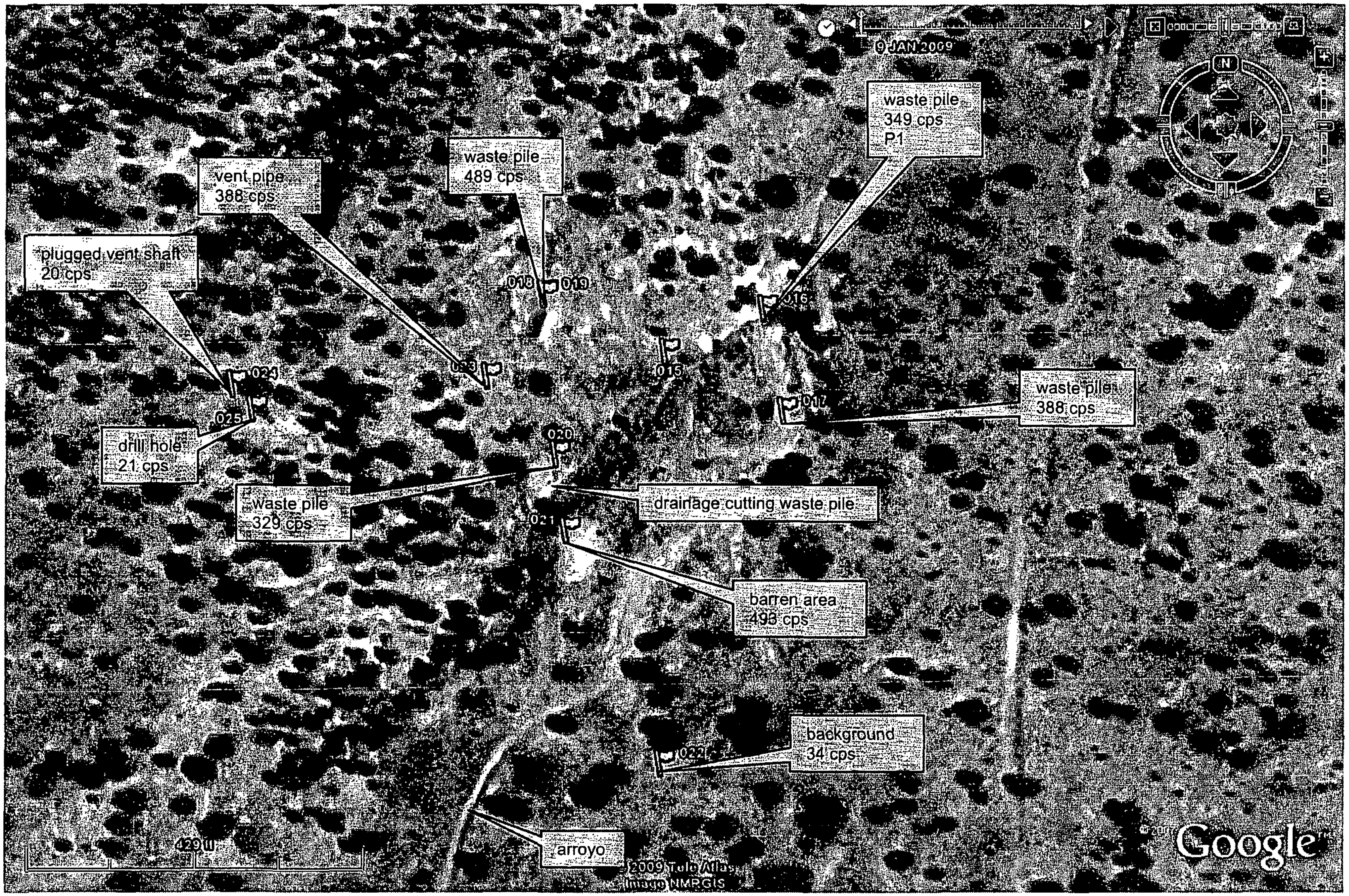
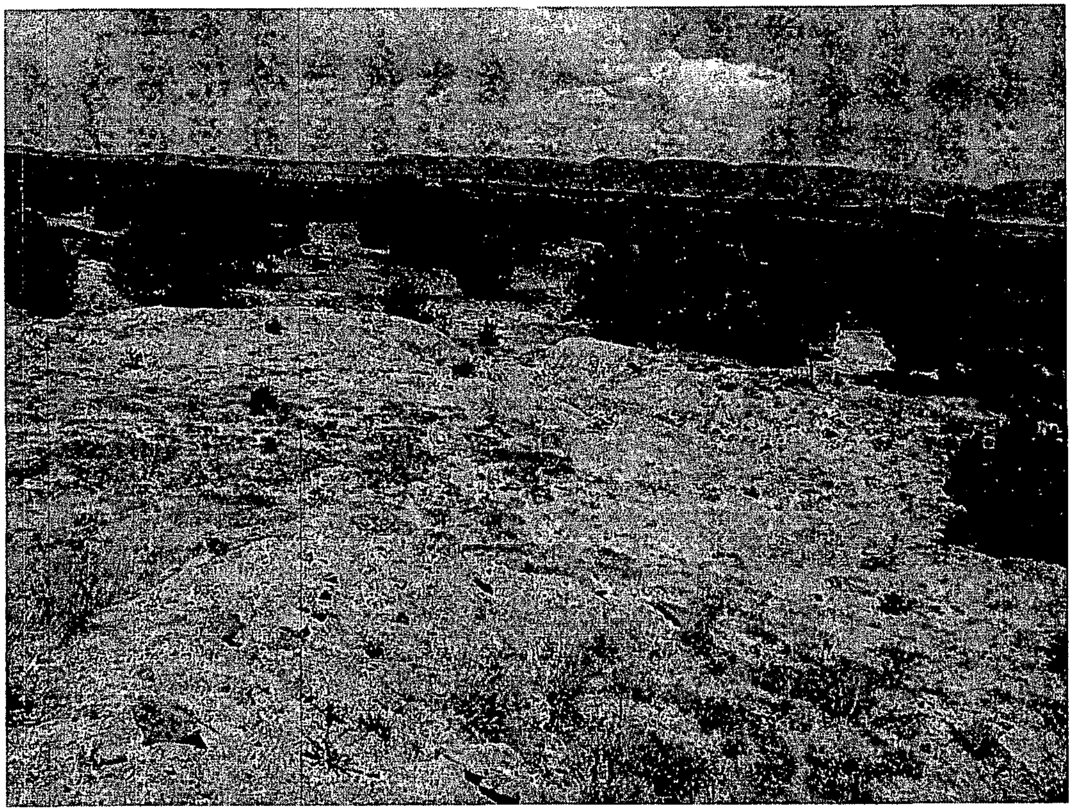



**Figure 1: Beacon Hill Gossett Mine—measurements taken June 3, 2009**

"Px" reference the location of photographs on pages following.

Ms. LaDonna Turner, EPA Region 6 Site Assessment Manager
**RE:** Pre-CERCLIS screening Assessment of Beacon Hill Gossett mine, McKinley County, New Mexico
September 10, 2009



P1: Beacon Hill Gossett Mine waste pile

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 1, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Subject:** **Pre-CERCLIS Screening Assessment of Spencer Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Spencer Mine | **Street address** | | not applicable | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 22' 25.23" | **Longitude** | | 107° 49' 16.58" | |

**Site physical description:** The Spencer Mine currently comprises a headframe that has collapsed into the mineshaft due to capture and undercutting by the formerly-adjacent surface drainage, and numerous barren waste piles that are cut by or adjacent to the surface drainage. The collapsed mineshaft is poorly fenced. Several concrete pads, possibly the remains of buildings, are evident outside of the surface drainage. A vent shaft, comprising a large diameter pipe, protrudes approximately 4 feet above the drainage channel surface approximately 300 feet north of the mineshaft and fallen headframe. The Site is located approximately 1 mile south of the Ambrosia Lake—Rio Algom millsite, and 0.3 mile southwest of the southern portion of the Isabella Mine. A gopher colony is located on the north bank of the surface drainage.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). The New Mexico Environment Department (NMED) conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a June 2, 2009 site visit are shown on accompanying figures. The enlarged mineshaft that has been captured by the surface drainage provides a conduit for surface water flows to enter the subsurface; waste materials from both the Spencer and Isabella (southern) mines have been deposited into this drainage above the mineshaft. The concrete

headframe foundations that remain on the bank of the drainage, as well as the surrounding fence, are collapsing into the mineshaft as arroyo undercutting continues. Waste piles and the mineshaft generally have elevated radioactivity (highest radioactivity=607 counts per second [cps]; background=40 cps). Waste piles associated with the site either are cut through by the surface drainage, or exhibit evidence of erosion, indicating that the materials have been distributed downstream. Principal contaminant pathways for this site include contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion of on-site wastes, and contamination of ground water via seepage through alluvium or by direct entry to the subsurface via the open shafts.
**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 3.0 air-miles southeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-17 (1.4 air-miles; 98.4 µg/l total uranium in 2009 sampling).
**Site ownership and Potential Responsible Parties:** Surface rights are held by the U.S. Bureau of Land Management. The Koppen Mining Construction Company reportedly last operated this mine in 1980
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- Souder, Miller, and Associates, 2008. "Abandoned uranium mine field survey project."
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 3, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shaft and vent hole.

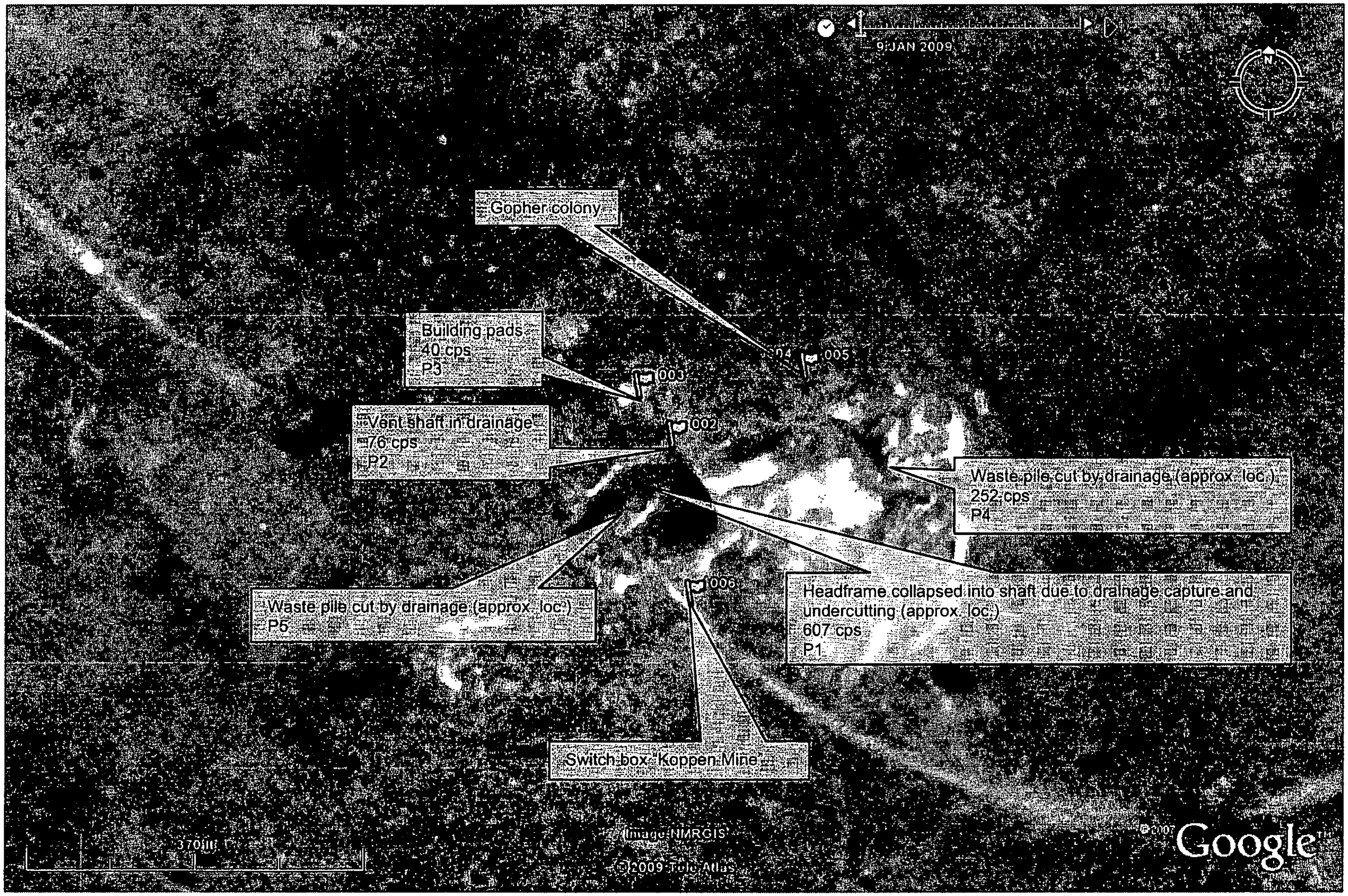
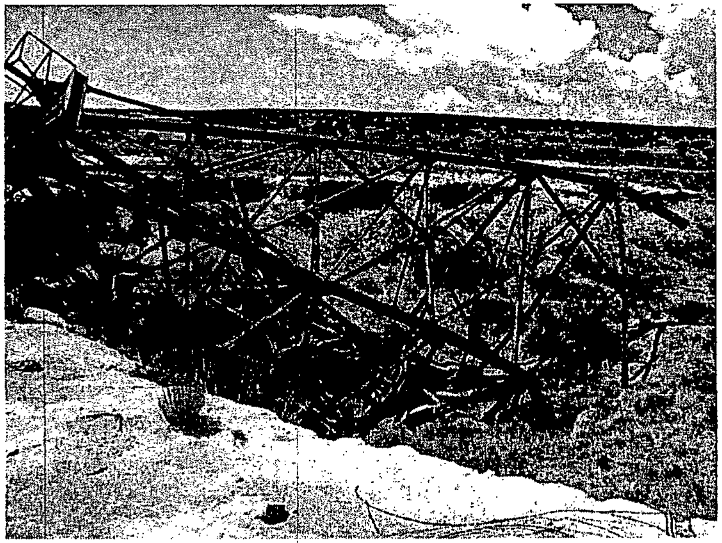
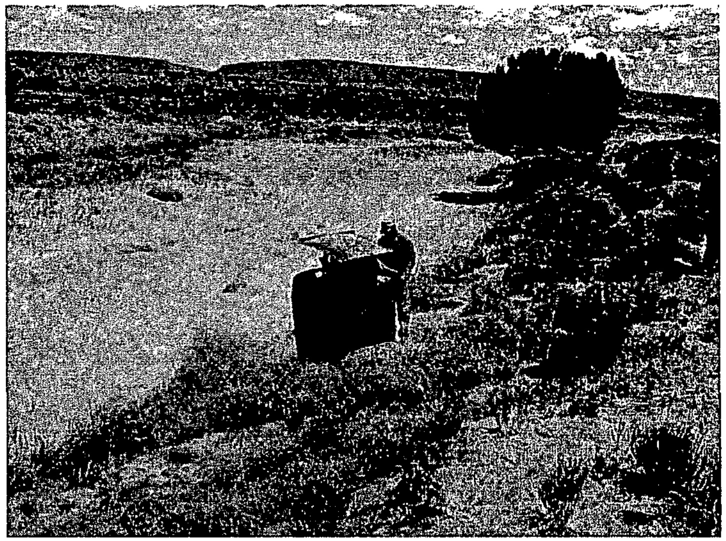



**Figure 1: Spencer Mine—measurements taken on June 3, 2009**

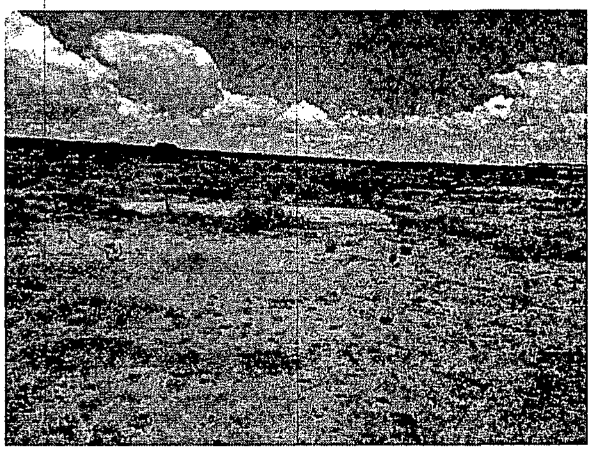
“Px” reference the location of photographs on pages following.



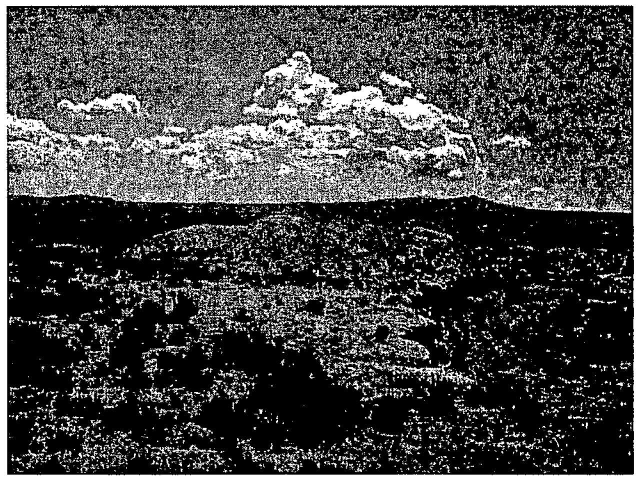
P1: Spencer Mine headframe collapsed into shaft due to arroyo capture and undercutting



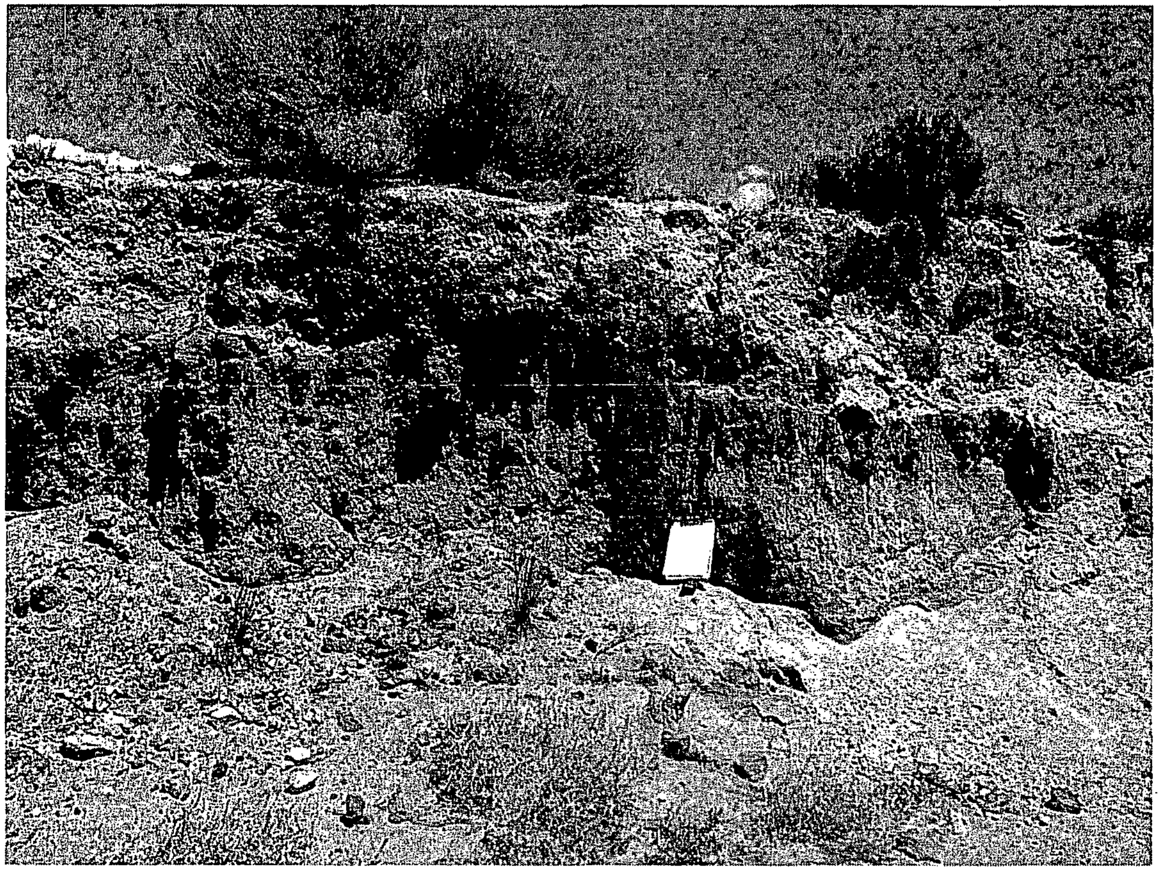
P2: Spencer Mine vent shaft



P3: Spencer Mine building pad



P4: Spencer Mine waste pile cut through by arroyo



P5: Spencer Mine waste pile cut by drainage

# REFERENCES

# 85-88

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 1, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Subject:** **Pre-CERCLIS Screening Assessment of T-20 Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | T-20 | **Street address** | not applicable | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 27.22" | **Longitude** | 107° 49' 13.43" | | |

**Site physical description:** The T-20 Mine currently comprises piles of limestone waste materials that are deposited along surface drainages, and 2 collapsed mineshafts. An area of gridded drill holes is located adjacent to one of the mineshafts.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). The New Mexico Environment Department (NMED) conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a July 2, 2009 site visit are shown on accompanying figure. Limestone waste materials associated with the site generally have elevated radioactivity compared to background (highest radioactivity=859 counts per second [cps]; background=15-50 cps from measurements taken at this and nearby sites). Contamination of vicinity soils and surface drainages by precipitative erosion and wind

dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the collapsed shafts.
**Targets:** Residences are located near junction State Hwy. 605 and 509, approximately 2.25 air-miles northeast of the Site. Another residence is located along Haystack Road approximately 1.5 air-miles southwest of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.1 air-miles; 48.2 μg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 μg/l])
**Site ownership and Potential Responsible Parties:** The U.S. Bureau of Land Management owns the surface rights of the Site. Bailey and Fife reportedly last operated the mine in 1968.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- Golder Associates, 2009. "Findings of Barbara J Sites, Abandoned uranium mine lands pilot study conducted March—May 2009." Draft Technical Memorandum.
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.
**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug and seal collapsed shafts.

Ms. LaDonna Turner, EPA Region 6 Site Assessment Manager
**RE:** Pre-CERCLIS screening assessment of the T-20 mine, McKinley County, New Mexico
September 1, 2009

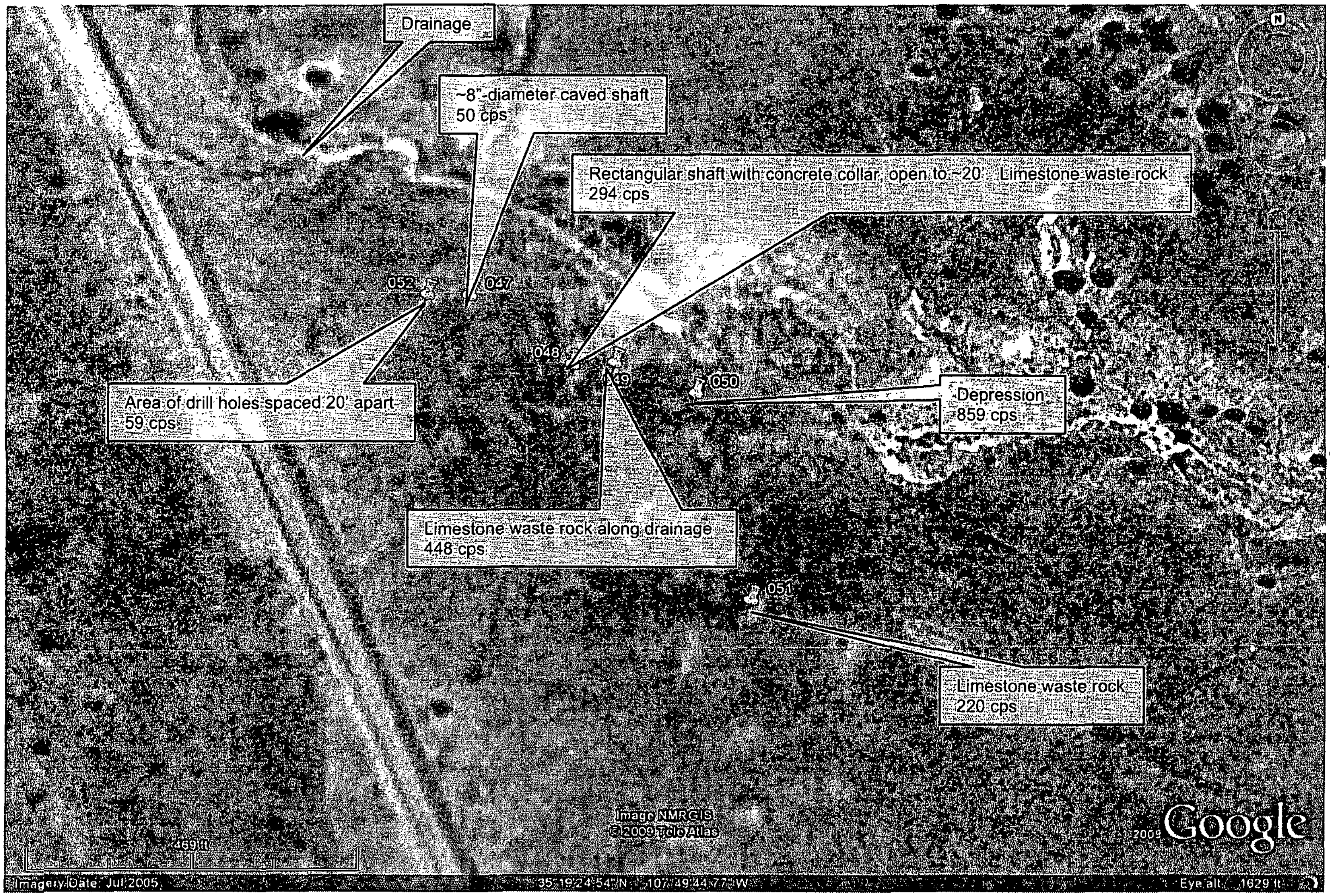


**Figure 1: T-20 Mine—measurements taken on July 2, 2009**

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Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Flea Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Flea Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 27.51" | **Longitude** | 107° 48' 20.64" | | |

**Site physical description:** The Flea Mine currently has a caved decline, an open vent shaft, several concrete pads, and numerous waste piles within or bordering an arroyo over a distance of 0.25 mile. The disturbance is located approximately 0.1 mile from an arroyo, although the landscape generally shows evidence of erosional scarring.
**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.
**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The highest radioactivity reading came from an area of limestone rock scattered on the ground surface near to the supposed shaft location (563 counts per second [cps]; background=17 cps). The location of a shaft is presumed by the

presence of a heavy steel plate that is mostly covered by soil. While few piles of waste materials can be attributed to this site, the landscape is largely denuded of vegetation, and shows evidence of erosion. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open shaft.

**Targets:** The closest residence to this site is located on Haystack Road, approximately 0.7 air-miles to the southwest, from which another residence is visible further to the west. Residences also are located near the junction of State Hwy. 605 and 509, approximately 3 air-miles east-northeast of the Site. Other potential targets may include cattle and wildlife.

Closest wells sampled to date: livestock well SMC-34 (0.60 air-miles; 119 µg/l total uranium in 2009 sampling); livestock well SMC-18 (0.60 air-miles; 2.0 µg/l total uranium in 2009).

**Site ownership and Potentially Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM) and Schmitt. M&M Mining Company reportedly last operated the mine in 1981.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 3, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shaft.

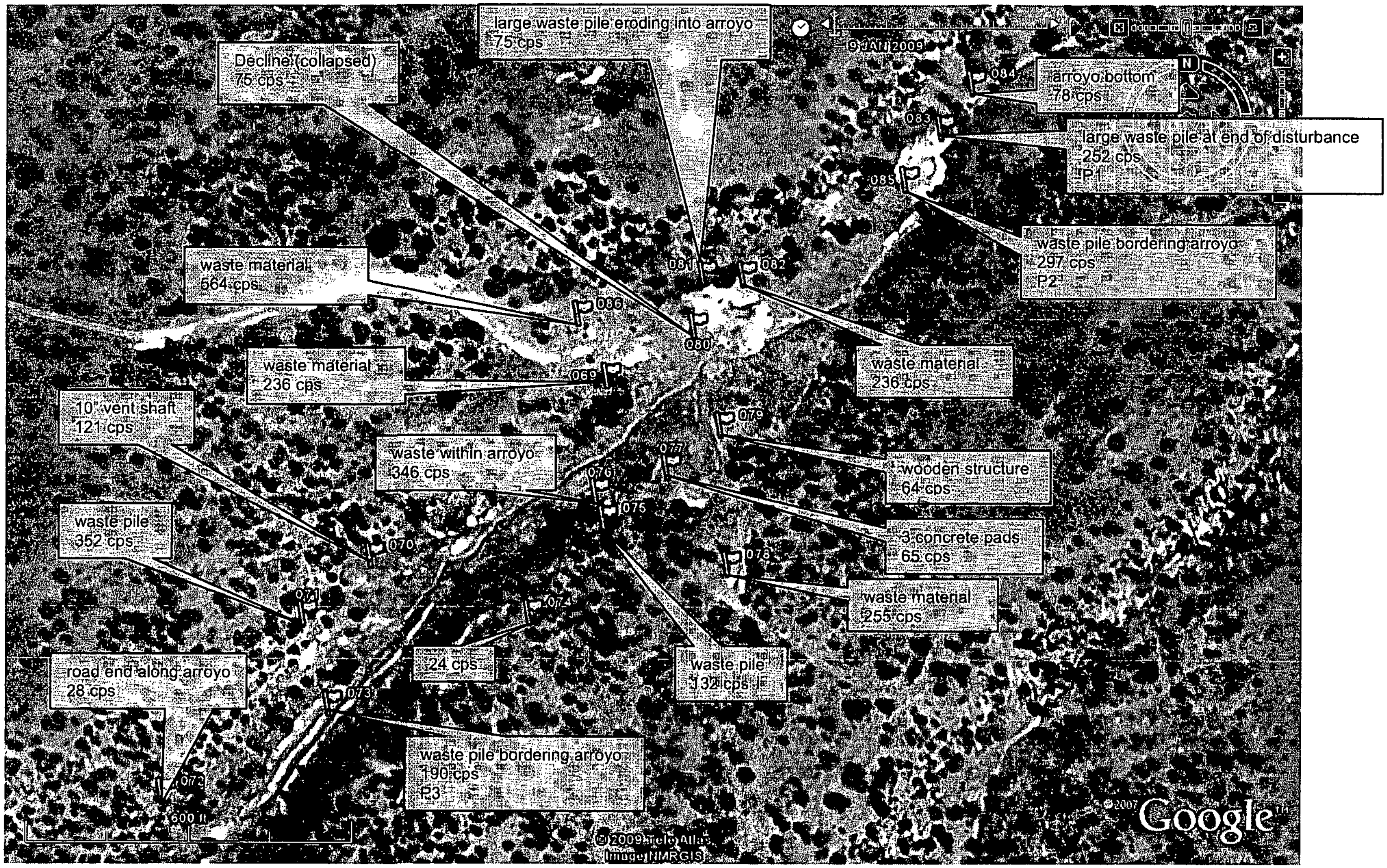
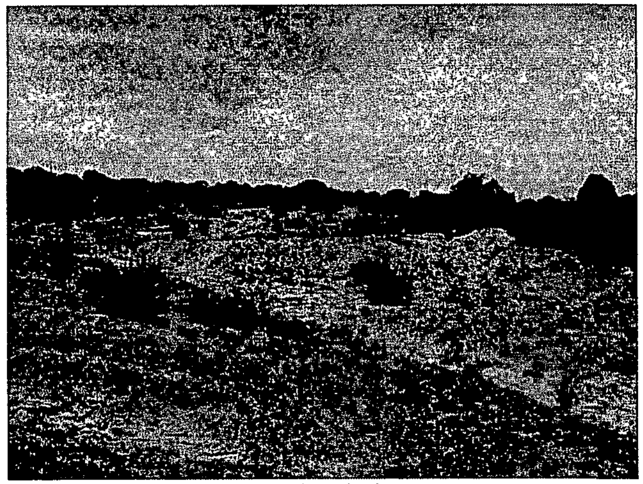



**Figure 1: Flea Mine—measurements taken on June 3, 2009.**

"Px" reference the location of photographs on pages following.

P1: Flea Mine waste pile at end of mine disturbance, eroding into arroyo.



P2: Flea Mine waste pile bordering arroyo

P3: Flea Mine waste pile bordering arroyo

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JON GOLDSTEIN
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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Doris Mine, McKinley County, New Mexico: Further action under CERCLA Recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Doris Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 20.24" | **Longitude** | 107° 47' 48.34" | | |

**Site physical description:** The Doris Mine is easily accessible from State Highway 605, and is located within 0.25 miles of San Mateo Creek. The site currently has a fenced open decline within a collapsing subsidence crater and a second unfenced and caved shaft approximately 0.25 miles south of the decline. Several waste material piles are scattered around the site. An archaeological site, marked by piles of rock and pottery shards, is located in the middle of the minesite. An erosional protection berm has been constructed parallel to the highway along most of the site perimeter.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The open decline shows recent evidence of subsidence, and is poorly protected from public access by a fence that will collapse as the crater containing the decline continues to enlarge. The highest radioactivity reading was measured at a waste rock pile (823 counts per second [cps]; background=32 cps). Contamination may be dispersed via precipitative erosion and wind, or may impact ground water via seepage through alluvium or through the open shaft and decline. The open decline is easily accessible from the paved road.

**Targets:** Residences are located near junction State Hwy. 605 and 509, approximately 1.0 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-34 (0.6 air-miles; 52.8 µg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 µg/l]).

**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by the Schmitt; mineral rights are held by Newmont Mining Company. M&M Mining Company reportedly last operated the mine in 1981.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open decline and shaft.

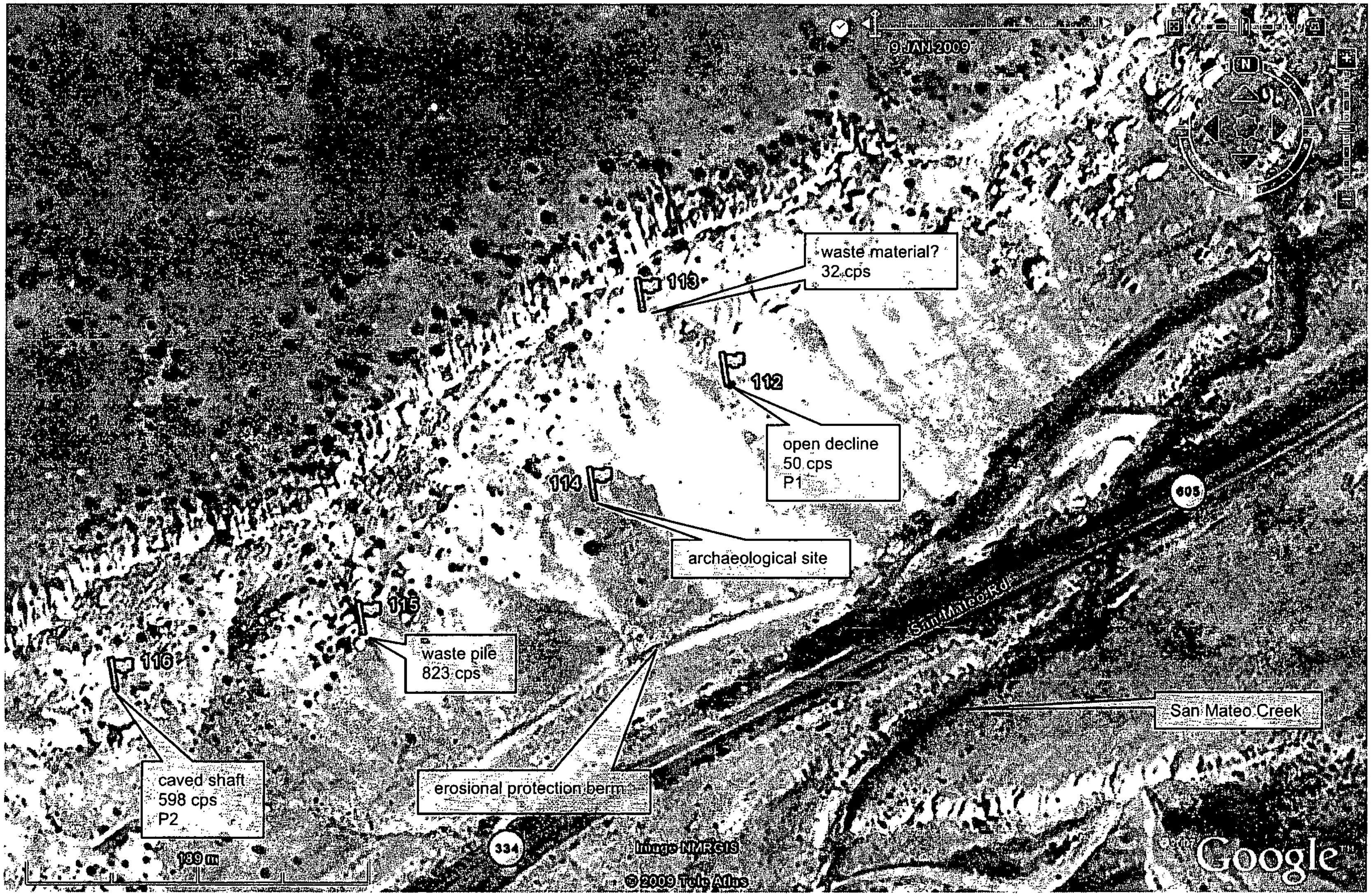


**Figure 1: Doris Mine**

"Px" reference the location of photographs on pages following.

P1: Doris mine open decline

P2: Doris mine caved shaft

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Faith Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Faith Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 41.30" | **Longitude** | 107° 48' 50.46" | | |

**Site physical description:** The Faith Mine currently has scattered waste material piles, some of which are located along an arroyo. The remains of a possible load-out structure also are located along the arroyo. A possible archaeological site, distinguished by the presence of pottery shards, is located near a concrete pad adjacent to double power poles, which may have been a transformer pad. Numerous roads cross the site, many of which show evidence of erosion.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The waste piles examined had elevated radioactivity (highest

reading=578 counts per second (cps); background=15 cps). Contamination might be dispersed by precipitative erosion and wind, and may enter the bedrock ground water system through alluvial interconnections.
**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.73 air-miles east-northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-33 (0.48 air-miles; 164 µg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 µg/l]).
**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by Schmitt; mineral rights are held by Newmont Mining Company. M&M Mining Company reportedly last operated the mine in 1981.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.

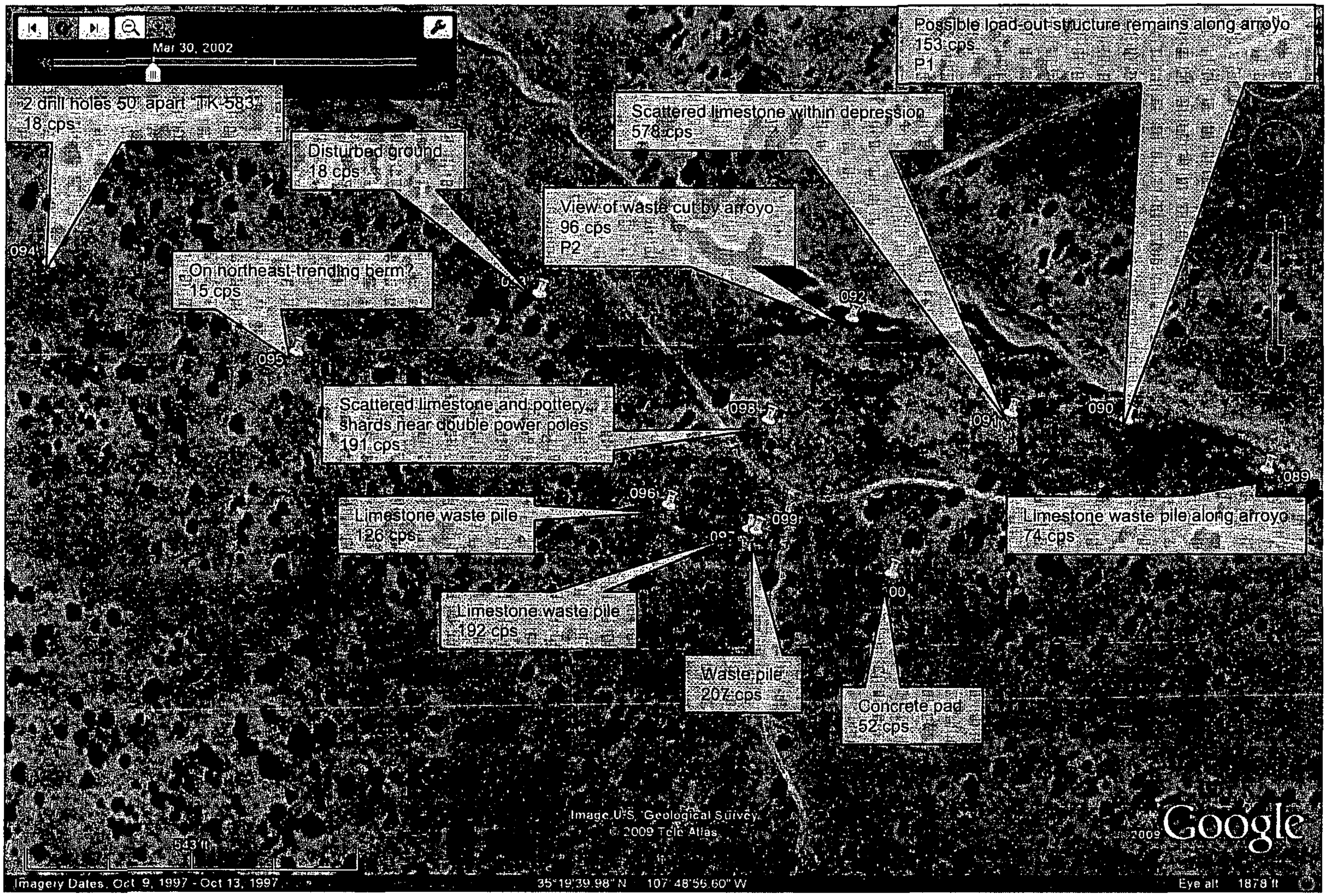
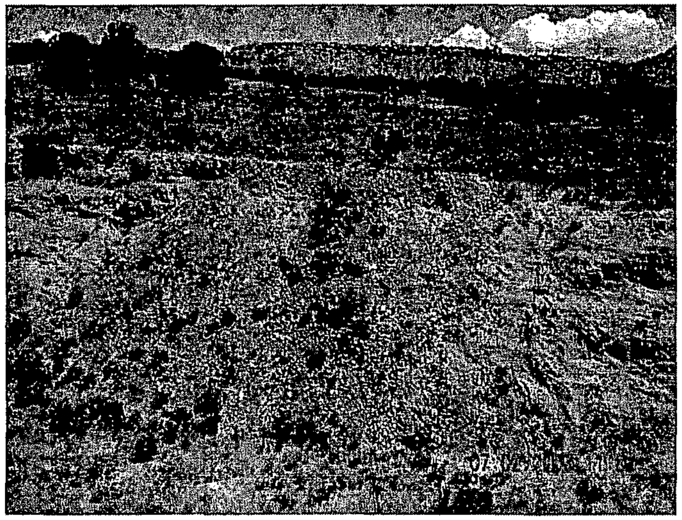



**Figure 1: Faith Mine—measurements taken on July 2, 2009.**

"Px" reference the location of photographs on pages following.

P1: Faith Mine Possible load-out structure remains along arroyo



P2: Faith Mine view to northeast; waste cut by arroyo

# REFERENCES

# 89-92

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Dog Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Dog Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 30.77" | **Longitude** | 107° 48' 44.51" | | |

**Site physical description:** The Dog Mine currently has a caved decline with wooden hoisting structure, at least 2 open vent holes, numerous waste rock piles bordering an arroyo and other minor drainages, and an impoundment measuring 100' by 50' bordering the main arroyo. A stock tank constructed in the arroyo just upstream of a major waste rock pile. Both the impoundment and the stock tank were dry at the time of reconnaissance. One small semi-underground structure is located near the decline.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. One area of stockpiled ore has elevated radioactivity of 5653 counts per second (cps). The highest radioactivity measured from a waste rock pile was

648 cps (background=28—46 cps). Most waste piles exhibit elevated radioactivity and are located within a major drainage; others nearby show evidence of erosion. The impoundment bordering the drainage has slightly elevated radioactivity. Potential contaminant dispersion pathways include downstream precipitative erosion, wind-blown dispersion, and ground water via entry through alluvium or via vent holes.
**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.78 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 2.0 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.37 air-miles; 48.2 µg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 µg/l]).
**Site ownership and Potentially Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Four Corners Exploration Company reportedly last operated the mine in 1975.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- Souder, Miller, and Associates, 2008. "Abandoned uranium mine field survey project."
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 3, 2009.
**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shafts and vent holes.

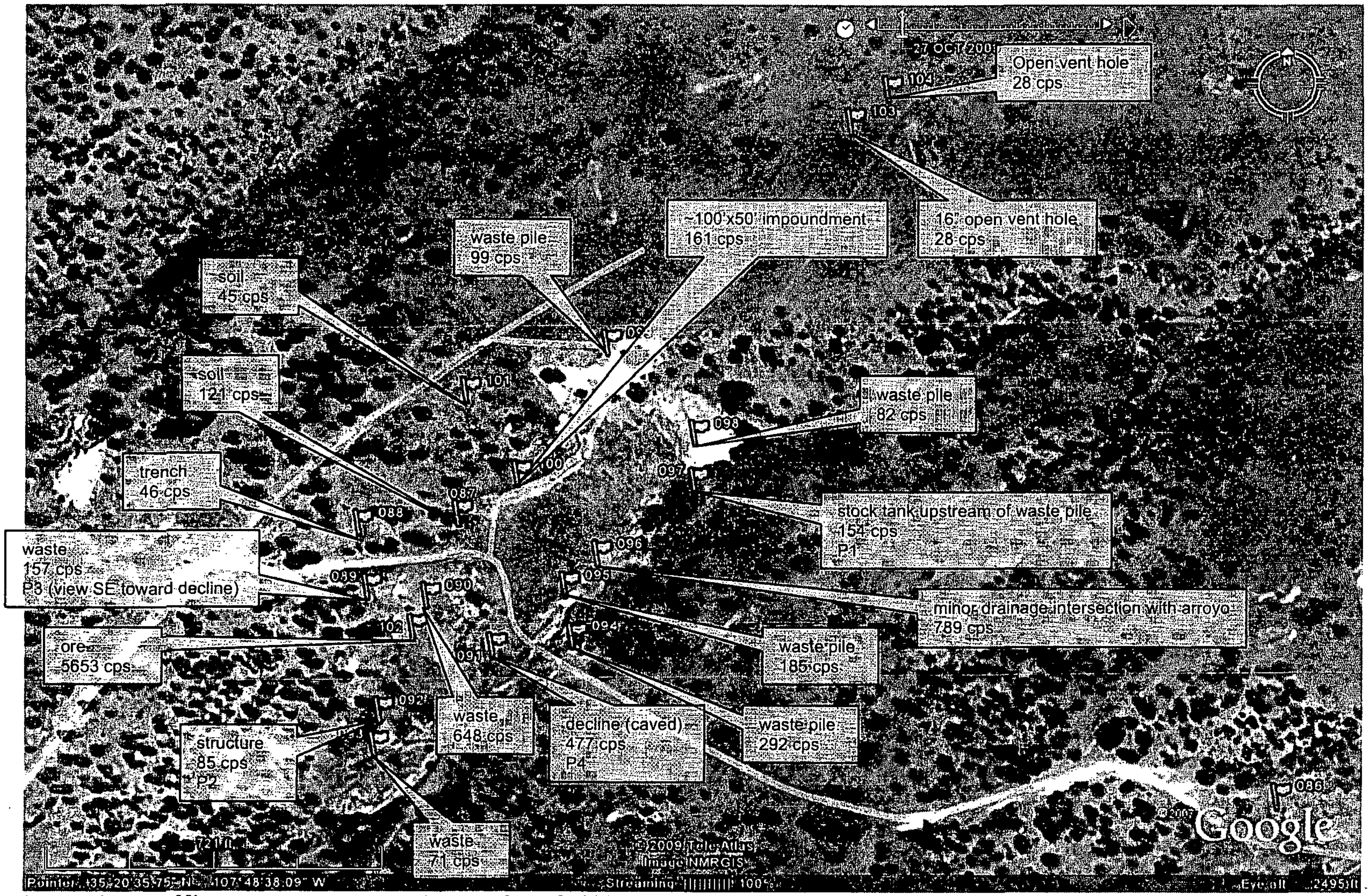
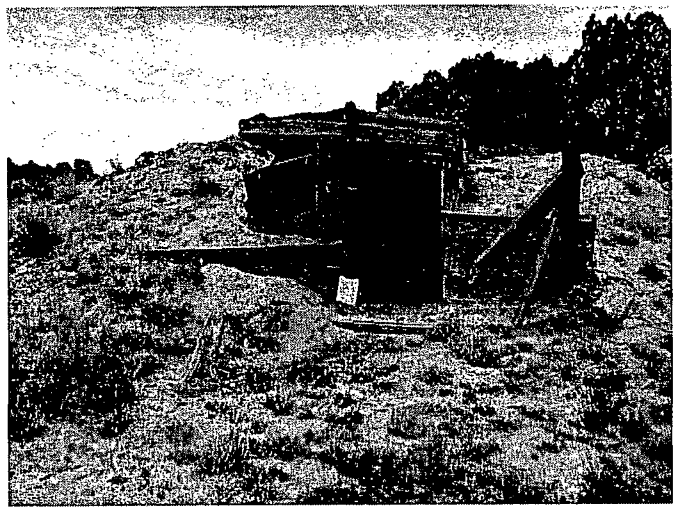


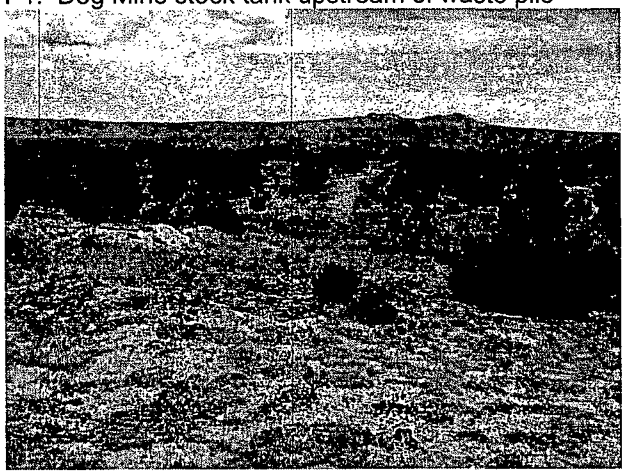

**Figure 1: Dog Mine—measurements taken on June 3, 2009**

"Px" reference the location of photographs on pages following.

P1: Dog Mine stock tank upstream of waste pile



P2: Dog Mine structure



P3: Dog Mine view SE toward decline

P4: Dog Mine decline (caved)

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Blue Peak Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Blue Peak Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 28.77" | **Longitude** | 107° 50' 41.92" | | |

**Site physical description:** The Blue Peak Mine currently has one partially-closed mine adit, and one remaining open adit along the south side of Mesa Montanosa along 2 major bench-cut roads approximately ¾ mile long approximately 50 feet below the mesa top; other adits that were used during the period of site operation reportedly have been reclaimed. An open vent shaft, which reportedly connects to the mine tunnels, also was located on the mesa top. The remaining adits emit elevated levels of radioactivity. The site is well-vegetated, and few distinct waste piles remain, although some have moderately elevated radioactivity in comparison to background (15-45 counts per second [cps]). An outcrop of unmined ore-bearing sandstone exposed along the upper bench road also exhibits elevated radioactivity (~1200 cps; see Figure 1).

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. One open adit and partially-open adit with radioactivity elevated above background are visible along the upper bench cut road. Most remaining waste rock has only slightly elevated radioactivity (maximum=679 cps; background=14-45 cps). Most waste appears to have been contoured to minimize erosion. An open vent shaft on the mesa top that is not well-marked could be hazardous to humans, livestock, and wildlife, and could provide an avenue for aquifer cross-contamination.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 3.65 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 0.7 air-miles south of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.58 air-miles; 48.2 µg/l total uranium in 2008 sampling [total uranium Maximum Contaminant Level=30 µg/l]).

**Site ownership and Potentially Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Garcia Mines reportedly last operated the mine in 1965.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- *Souder, Miller, and Associates, 2008. "Abandoned uranium mine field survey project."*
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 3, 2009.

**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

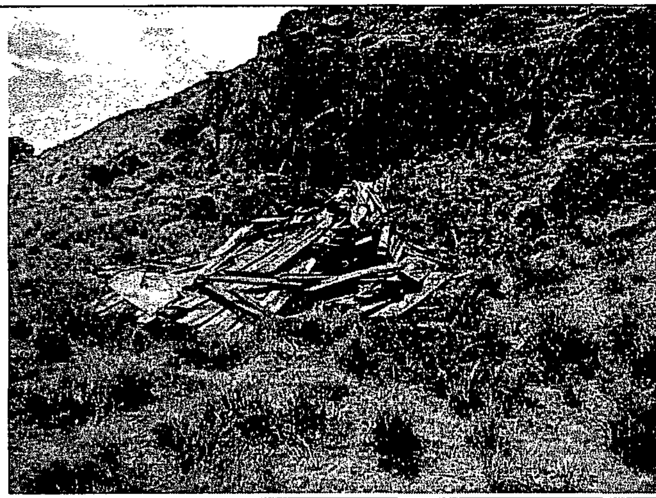
In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Seal open adits and vent hole.


**Figure 1: Blue Peak Mine—measurements taken June 3, 2009**

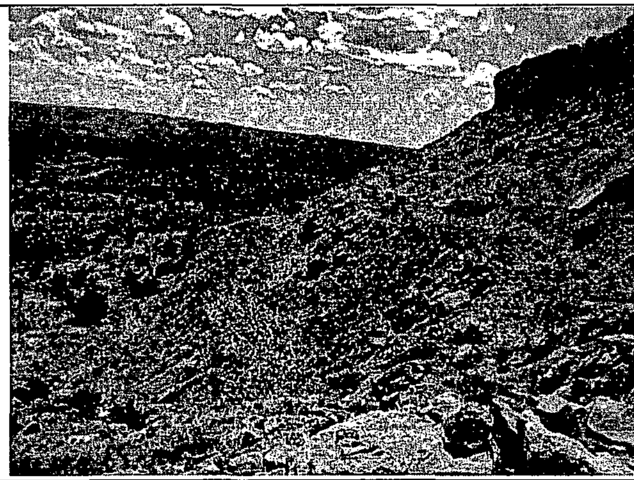
“Px” reference the location of photographs on pages following.

P1: Blue Peak mine open adit



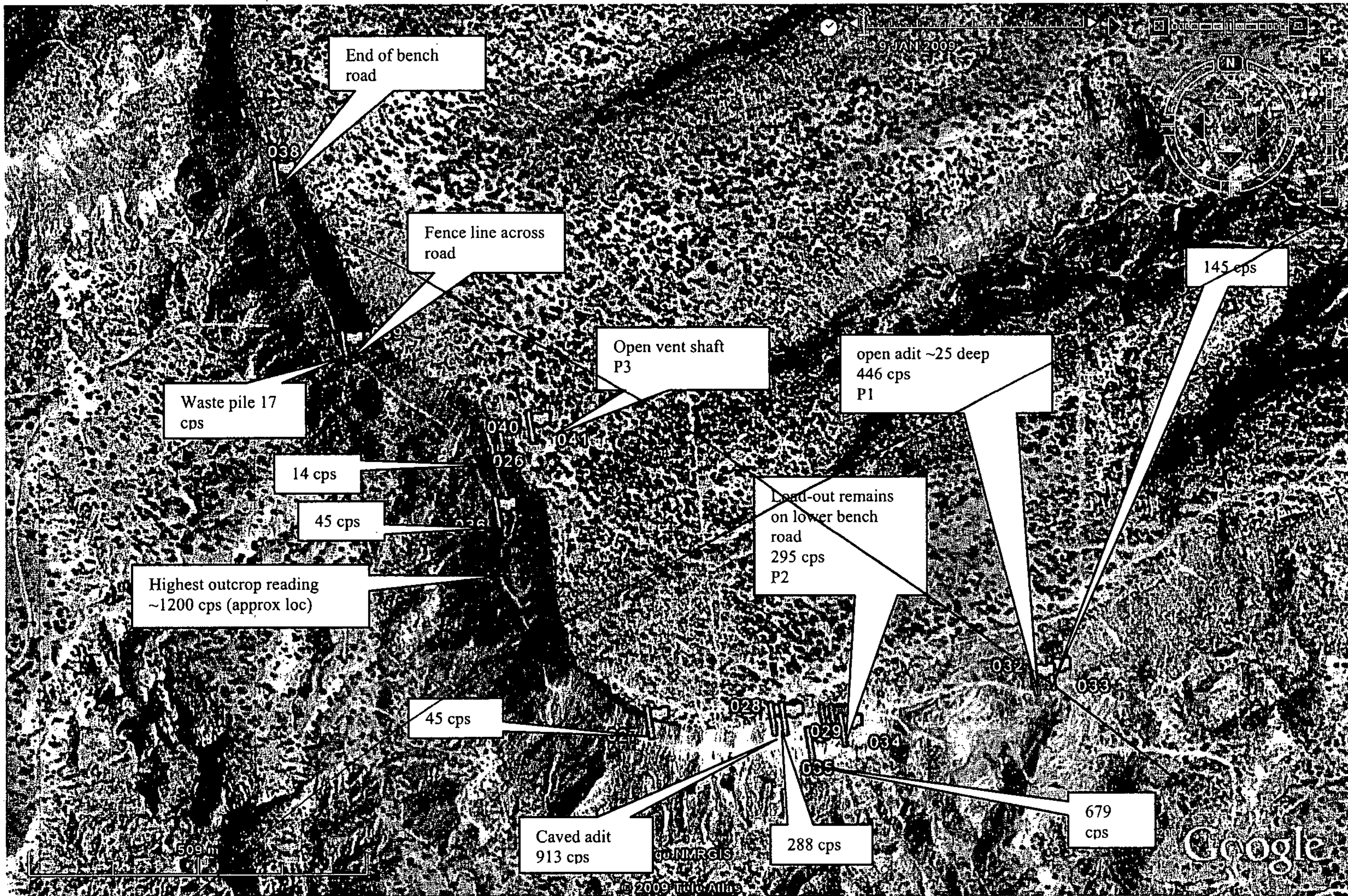
P2: Blue Peak mine load-out facility remains

P3: Blue Peak mine open vent shaft on mesa top.



Blue Peak mine: view towards southwest

Blue Peak mine view towards southwest showing residences (arrows)



End of bench road
038
Fence line across road
Waste pile 17 cps
Open vent shaft P3
open adit ~25 deep 446 cps P1
145 cps
040
041
026
14 cps
45 cps
on lower bench road 295 cps P2
Highest outcrop reading ~1200 cps (approx loc)
032
033
028
45 cps
029
034
Caved adit 913 cps
288 cps
679 cps
Google
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Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Davenport Mine, McKinley County, New Mexico: Further action under CERLCA Recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Davenport Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 27.10" | **Longitude** | 107° 49' 15.38" | | |

**Site physical description:** The Davenport Mine currently has waste rock piles and a collapsed frame structure. Little other evidence of the mine remains.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. One waste rock pile has slightly elevated radioactivity (230 counts per second [cps]; background=28 cps).

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 2.3 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 1.5 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.1 air-miles; 48.2 µg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 µg/l]).

**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by the Bureau of Land Management (BLM). Bailey and Fife reportedly last operated the mine in 1966.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED conducted a Site reconnaissance on June 3, 2009.

**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.

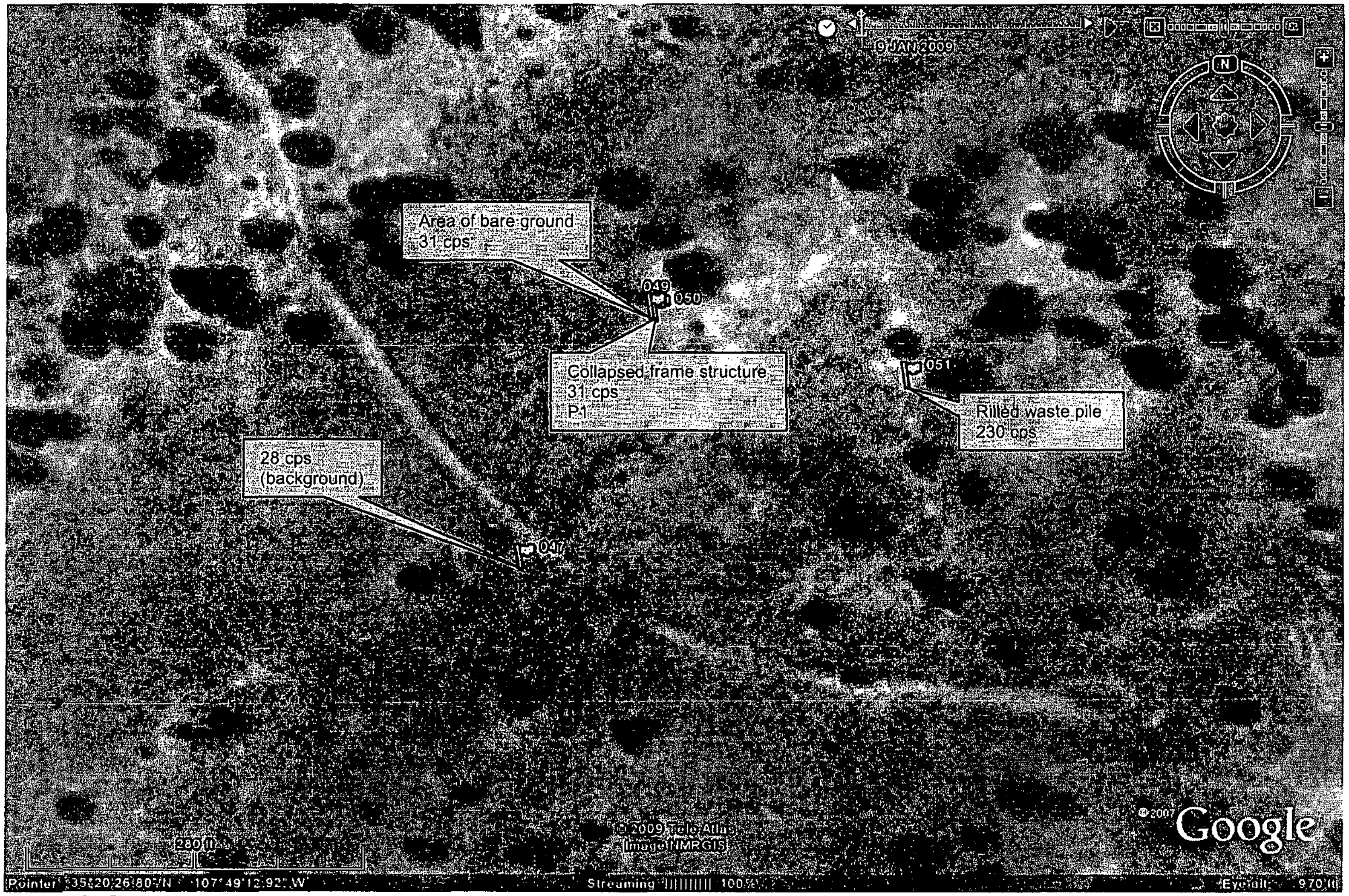


**Figure 1: Davenport Mine—measurements made on June 3, 2009**

"Px" reference the location of photographs on pages following.

P1: Davenport Mine collapsed frame structure

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Deputy Secretary

# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 10, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Subject:** **Pre-CERCLIS Screening Assessment of Barbara J #3 mine, McKinley County, New Mexico: Further action under CERCLA is recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Barbara J #3 mine | **Street address** | not applicable | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 53.52"" N | **Longitude** | 107° 49' 34.22" W | | |

**Site physical description:** The Barbara J #3 minesite currently has several waste piles, a concrete pad, a load-out area, a mine shaft, and a well or vent shaft remaining from uranium mining activities. The waste piles emit elevated levels of radioactivity in comparison to background values (assumed to be in the range of 10 to 40 counts per second [cps] from data collected at this and nearby sites), border drainage courses, and show evidence of erosion (see Figure 1).

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a July 1, 2009 site visit are shown on the accompanying figures. The highest radioactivity level was measured during site reconnaissance at the former ore load-out area (1924 cps). The shaft is covered by a rusted steel plate. The open well or vent hole was probed to a depth of 458' without hitting solid bottom. Waste piles with elevated radioactivity (highest radioactivity=436 cps; background=33 cps) were noted. The waste piles are marked by erosional rills, indicating that waste has been dispersed downstream. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open well and shafts.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 2.76 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 1.0 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (0.45 air-miles; 48.2 μg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 μg/l])

**Site ownership and Potential Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Todilto Exploration and Development Company last operated the mine in 1980.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- Golder Associates, 2009. "Findings of Barbara J Sites, Abandoned uranium mine lands pilot study conducted March—May 2009." Draft Technical Memorandum.
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 1, 2009.

**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shaft and well/vent holes.

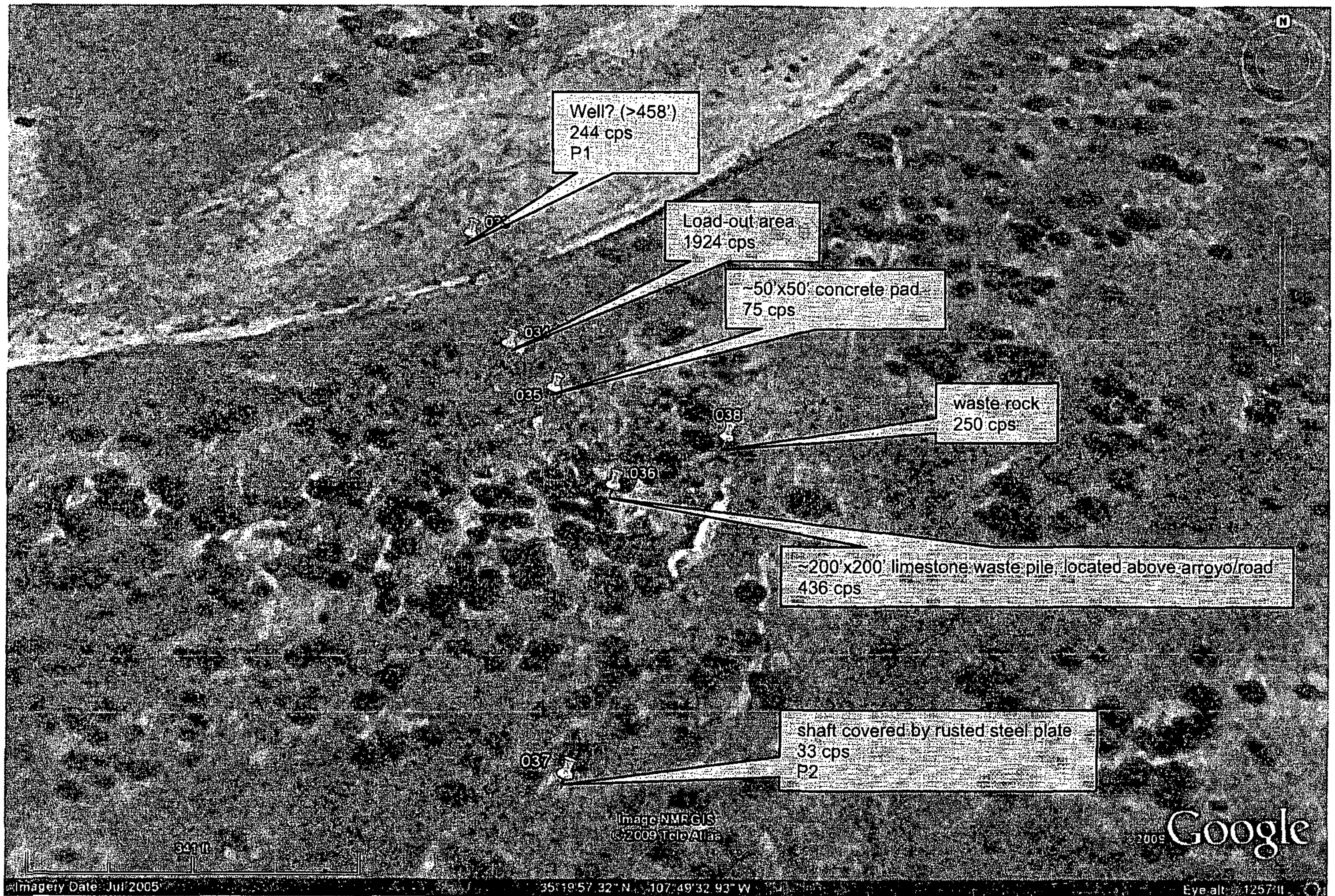
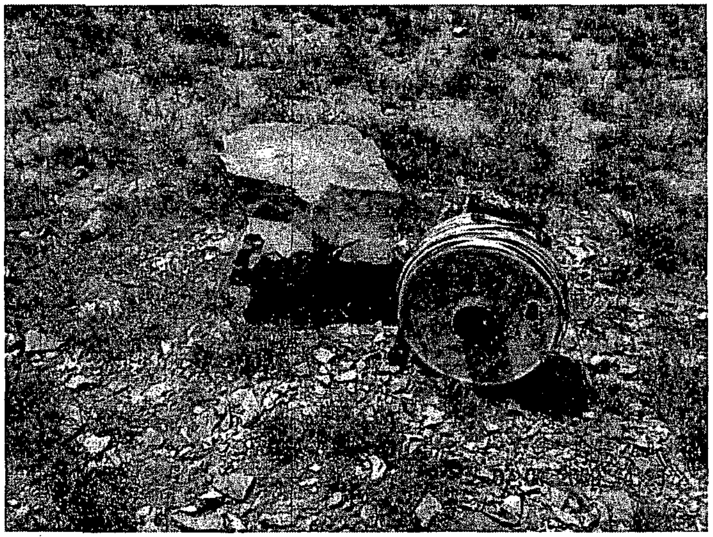


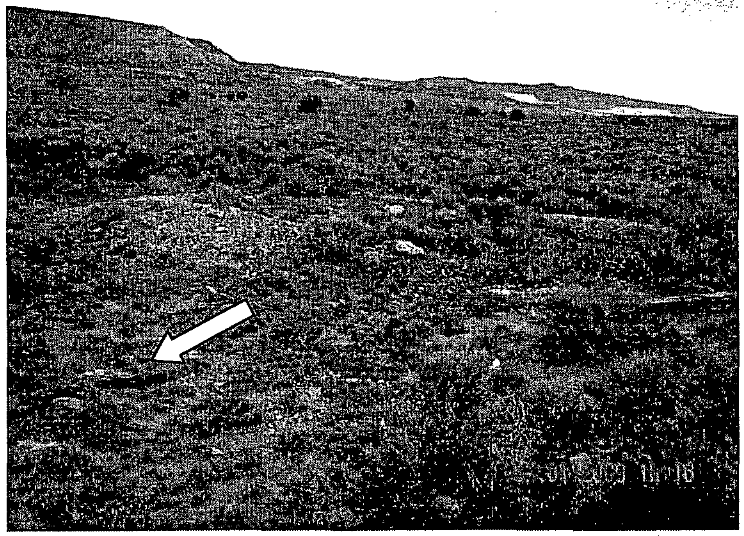

**Figure 1: Barbara J #3 Mine—measurements taken July 1, 2009**

"Px" reference the location of photographs on pages following.

Ms. LaDonna Turner, EPA Region 6 Site Assessment Manager
**RE:** Pre-CERCLIS screening Assessment of Barbara J #3 mine, McKinley County, New Mexico
September 10, 2009



P1: Barbara J #3 Mine well? >458' deep



P2: Barbara J #3 Mine shaft covered by rusted steel plate (arrow)

# REFERENCES

# 93-96

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 10, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Subject:** **Pre-CERCLIS Screening Assessment of Barbara J #2 mine, McKinley County, New Mexico: Further action under CERCLA is recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Barbara J #2 mine | **Street address** | not applicable | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 55.17" N | **Longitude** | 107° 49' 27.82" W | | |

**Site physical description:** The Barbara J #2 minesite currently has several waste piles, and concrete pads remaining from uranium mining activities. The waste piles emit elevated levels of radioactivity in comparison to background values (assumed to be in the range of 10 to 40 counts per second [cps] from data collected at this and nearby sites), border drainage courses, and show evidence of erosion (see Figure 1).

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a July 1, 2009 site visit are shown on the accompanying figure. Waste piles with elevated radioactivity (highest radioactivity=348 cps; background=40 cps) were noted. The waste piles are marked by erosional rills, indicating that waste has been dispersed downstream. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality through seepage through alluvium.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 2.3 air-miles east-northeast of the Site. Another residence is located along Haystack Road approximately 1.5 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.14 air-miles; 48.2 µg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 µg/l])

**Site ownership and Potential Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Mid-Continent Uranium Company last operated the mine in 1968.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007)
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Golder Associates, 2009. "Findings of Barbara J Sites, Abandoned uranium mine lands pilot study conducted March—May 2009." Draft Technical Memorandum.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 1, 2009

**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.

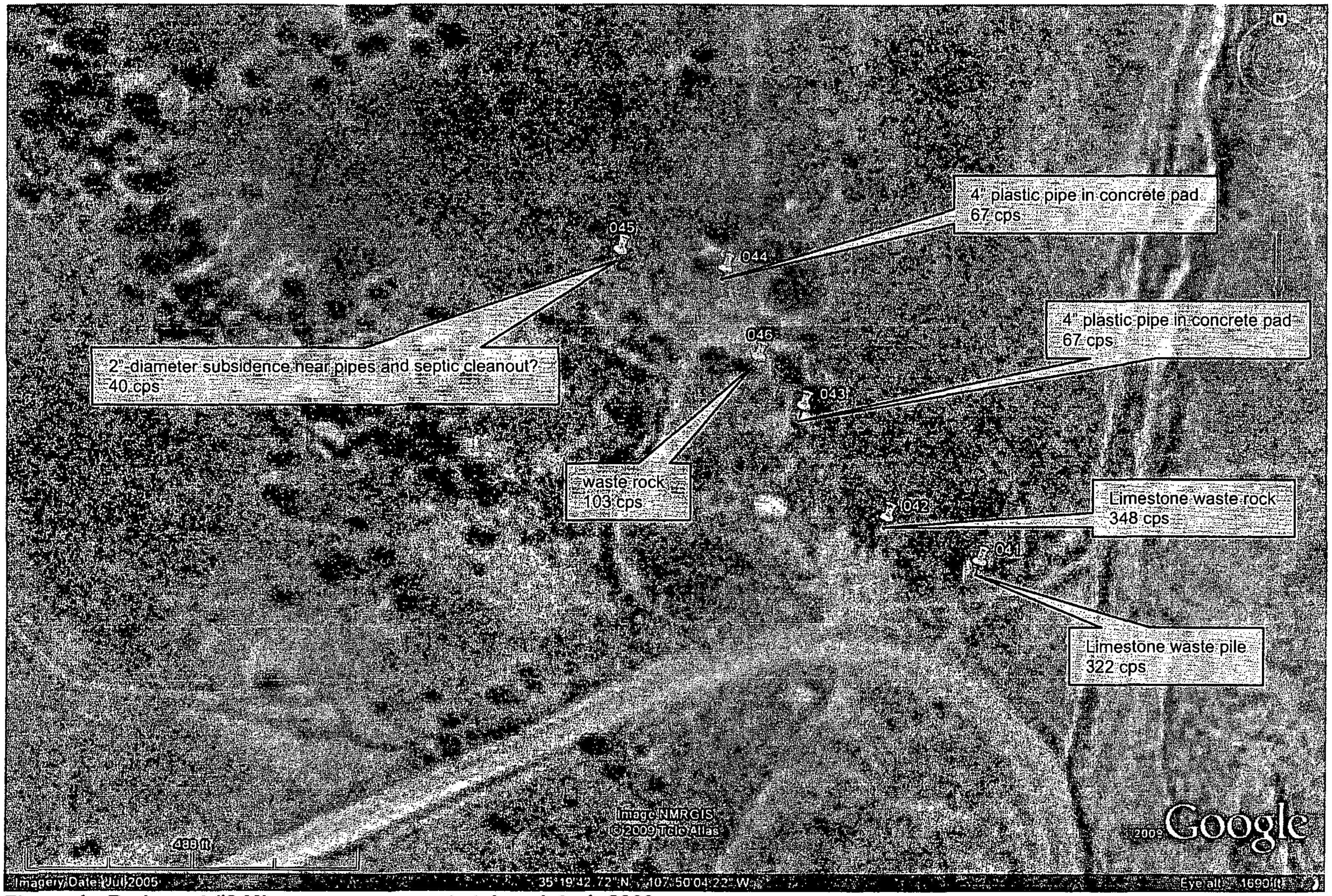


**Figure 1: Barbara J #2 Mine—measurements taken July 1, 2009**

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 10, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department**

**Subject:** **Pre-CERCLIS Screening Assessment of Barbara J #1 mine, McKinley County, New Mexico: Further action under CERCLA is recommended**

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| | | | |
|---|---|---|---|
| **Site name** | Barbara J #1 mine | **Street address** | not applicable |
| **City** | not applicable | **State** | New Mexico **Zip code** not applicable |
| **County** | McKinley | | |
| **Latitude** | 35° 19' 42.97" N | **Longitude** | 107° 49' 47.74" W |

**Site physical description:** The Barbara J #1 mine site currently has a partially-caved shaft, an open bore or vent hole, a sedimentation pond, a concrete pad, a core house site, and several waste limestone rock piles remaining from uranium mining activities. The waste piles emit elevated levels of radioactivity in comparison to background values (assumed to be in the range of 10 to 40 counts per second [cps] from data collected at nearby sites), border drainage courses, and show evidence of erosion.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a July 1, 2009 site visit are shown on the accompanying figure. The highest radioactivity level was measured during site reconnaissance at an area of waste limestone rock (625 cps). The waste piles are marked by erosional rills, indicating that waste may be dispersed downstream. The shaft is fenced, but the borehole is open and unfenced. Remnants of a liner are visible within the sedimentation pond. The area of the core house has slightly elevated radioactivity (92 cps), and is marked by numerous core remnants. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open hole and shaft.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 3.1 air-miles northeast of the Site. Another residence is located along Haystack Road approximately 0.9 air-miles west-northwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (0.28 air-miles; 48.2 µg/l total uranium in 2009 sampling [uranium Maximum Contaminant Level=30 µg/l]).

**Site ownership and Potential Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). The Mid-Continent Uranium Company last operated the site in 1968.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007)
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Golder Associates, 2009. "Findings of Barbara J Sites, Abandoned uranium mine lands pilot study conducted March—May 2009." Draft Technical Memorandum.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 1, 2009.

**Recommendations:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shaft and well/vent holes.

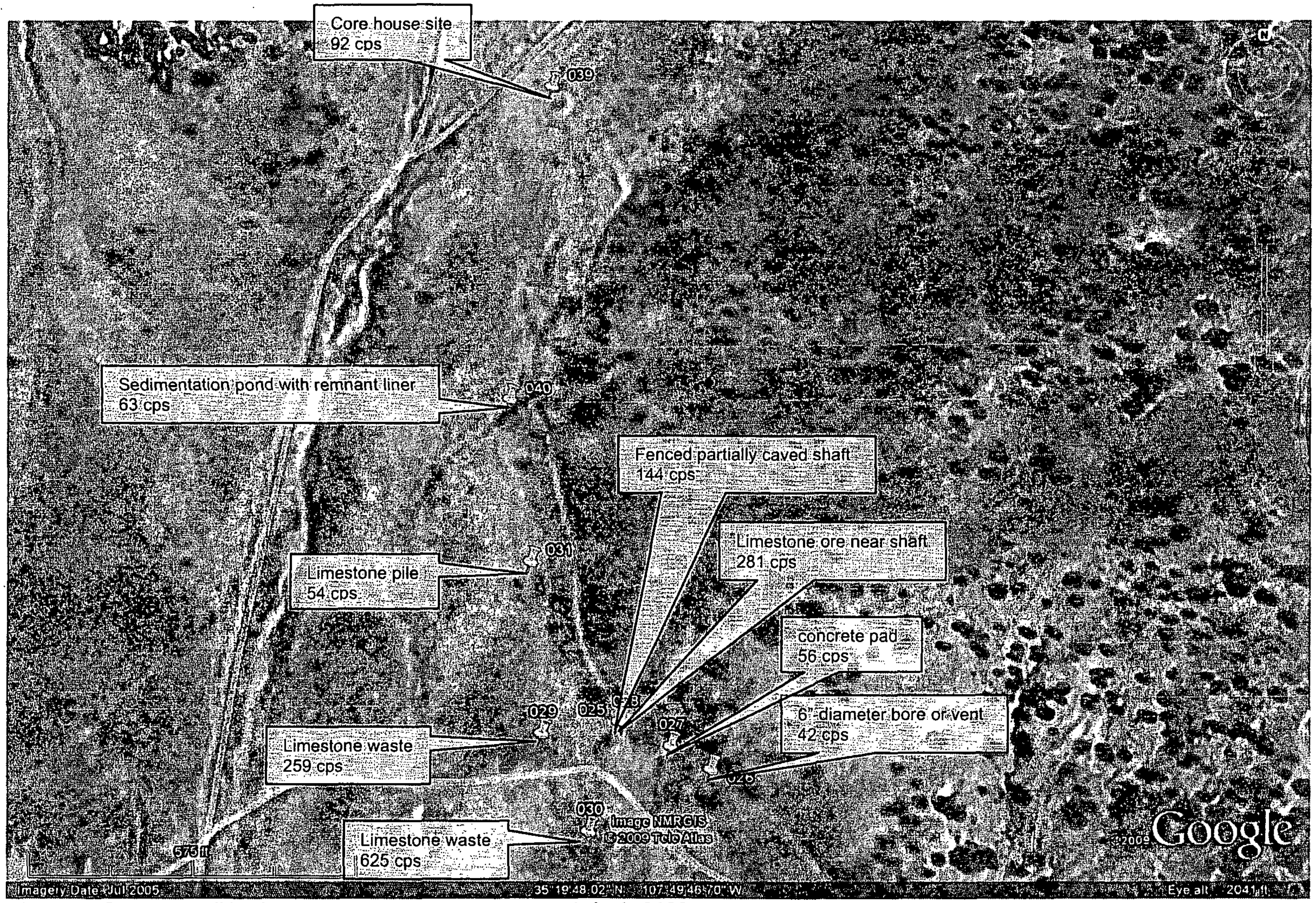


**Figure 1: Barbara J #1 Mine—measurements taken on July 1, 2009.**

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 1, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Section 25 SEQ Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Section 25 SEQ Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 16.92" | **Longitude** | 107° 50' 35.22" | | |

**Site physical description:** Site observations of the Section 25 SEQ Mine by NMED personnel were made from Haystack Road, from which only an active aggregate pit and an elongated waste dump were evident. Anderson (1980) describes the site as one of the most extensive strip complexes on the Todilto Limestone bench, comprising open pits, trenches, box cuts, and one decline extending over a distance of 5/8 mile. The box cuts are described as ranging in depth from 5 feet and 40 to 50 feet with shear walls. Anderson also observes that biomass production and carrying capacity across the site have been impaired by the large spoil piles.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. As indicated, little surface disturbance was visible from Haystack Road. Anderson (1980) includes pictures of extensive stripped areas and waste materials. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality through seepage through alluvium.
**Targets:** The closest residence to the Site is approximately 0.72 mile northwest of the site on Haystack Road; a second residence on Haystack Road is located approximately 1.0 miles northwest of this residence. Residences located near the junction of State Hwy. 605 and 509 are approximately 4 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (1 air-mile; 48.2 µg/l total uranium in 2009 sampling).
**Site ownership and Potentially Responsible Parties:** Surface rights for the site reportedly are held by Elkins Real Estate and Berryhill Ranch Ltd. Mineral rights reportedly are held by Newmont Mining Company. Amiran/Reserve Oil and Minerals reportedly last operated the mine in 1981.
**File review:** NMED staff reviewed the following files:
- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:
1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize surface water accumulations and ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:
1. Remove waste with elevated radioactivity.
2. Stabilize unstable pit highwalls

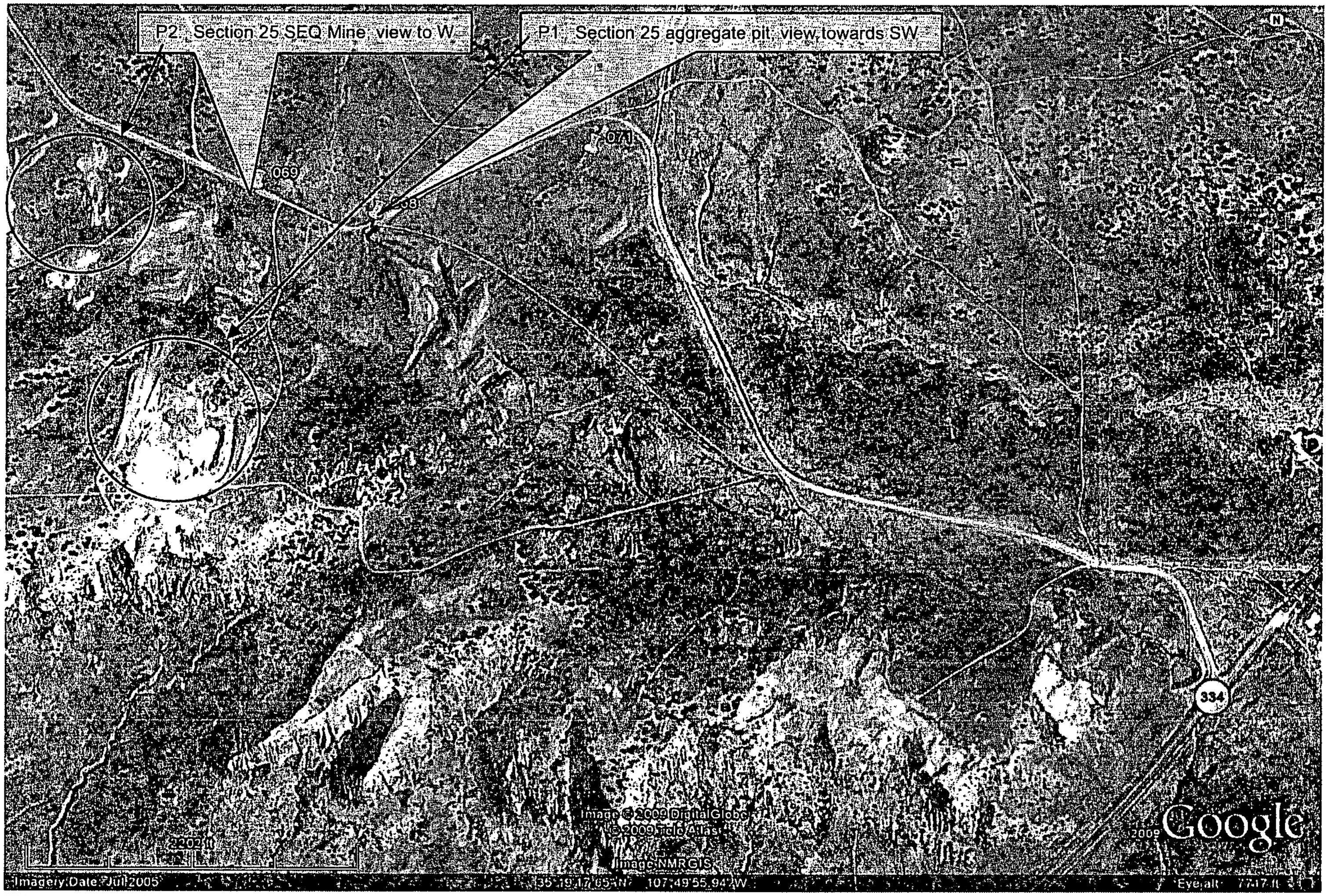
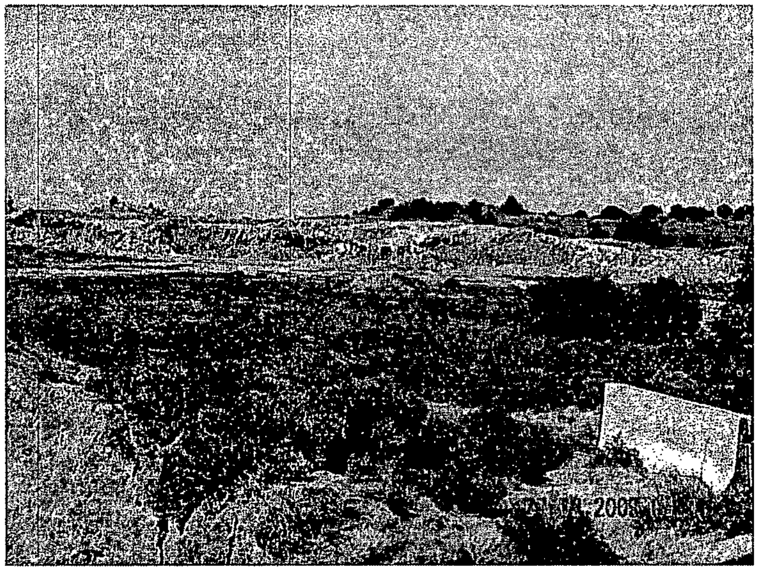



**Figure 1: Section 25 SEQ mine**

“Px” reference the location of photographs on pages following.



P1: Section 25 aggregate pit; view toward SW

P2: Section 25 SEQ Mine; view to W

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Section 25 Open Pits Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

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| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Section 25 Open Pits Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 58.00" | **Longitude** | 107° 51' 06.61" | | |

**Site physical description:** The Section 25 Open Pits Mine currently is an area of excavated pits and trenches, and includes an adit that has been excavated into the side of one pit. A residence recently has been built on part of the site.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. Most of the currently-visible land disturbances lie to the south of the residence; it is not known if the mining disturbance originally extended under residence. A bulldozer cut into limestone south of the residence is now used as a trash dump, and has slightly-elevated radioactivity, which may be due partly to "shine" effect within the excavation (142 counts per second (cps); background=40 cps). Radioactivity at a stock tank, which was created at the end of the drainage formed by the bulldozer cut, measured 177 cps. The highest radioactivity measured during the site reconnaissance was 558 cps at a waste rock pile cut by a drainage. The entire area borders a large surface water drainage that may have been created by mining activity. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open adit.

**Targets:** The closest residence to the Site is just to the north of evident mine-related surface disturbance. The occupant of this residence hauls water from Milan for residential use because ground water is reportedly deep at this location. Other residences are located approximately 0.4 miles southwest of the site and 1.4 miles to the west. Residences also are located near the junction of State Hwy. 605 and 509, approximately 4.1 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (1.5 air-miles; 48.2 µg/l total uranium in 2009 sampling).

**Site ownership and Potentially Responsible Parties:** Surface rights for some of the site are held by Chaffin; the rest is said by Chaffin to be held by Berryhill Ranch. Newmont Mining Company may still hold the mineral rights. Amiran Company Ltd. and Reserve Oil and Minerals Company reportedly last operated the mine in 1981.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize surface water accumulations and ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Close open adit
3. Assess on-Site residence and associated residence for radiological contamination.

Ms. LaDonna Turner, EPA Region 6 Site Assessment Manager
Pre-CERCLIS Screening Assessment of Section 25 Open Pits Mine, McKinley County, New Mexico
September 10, 2009

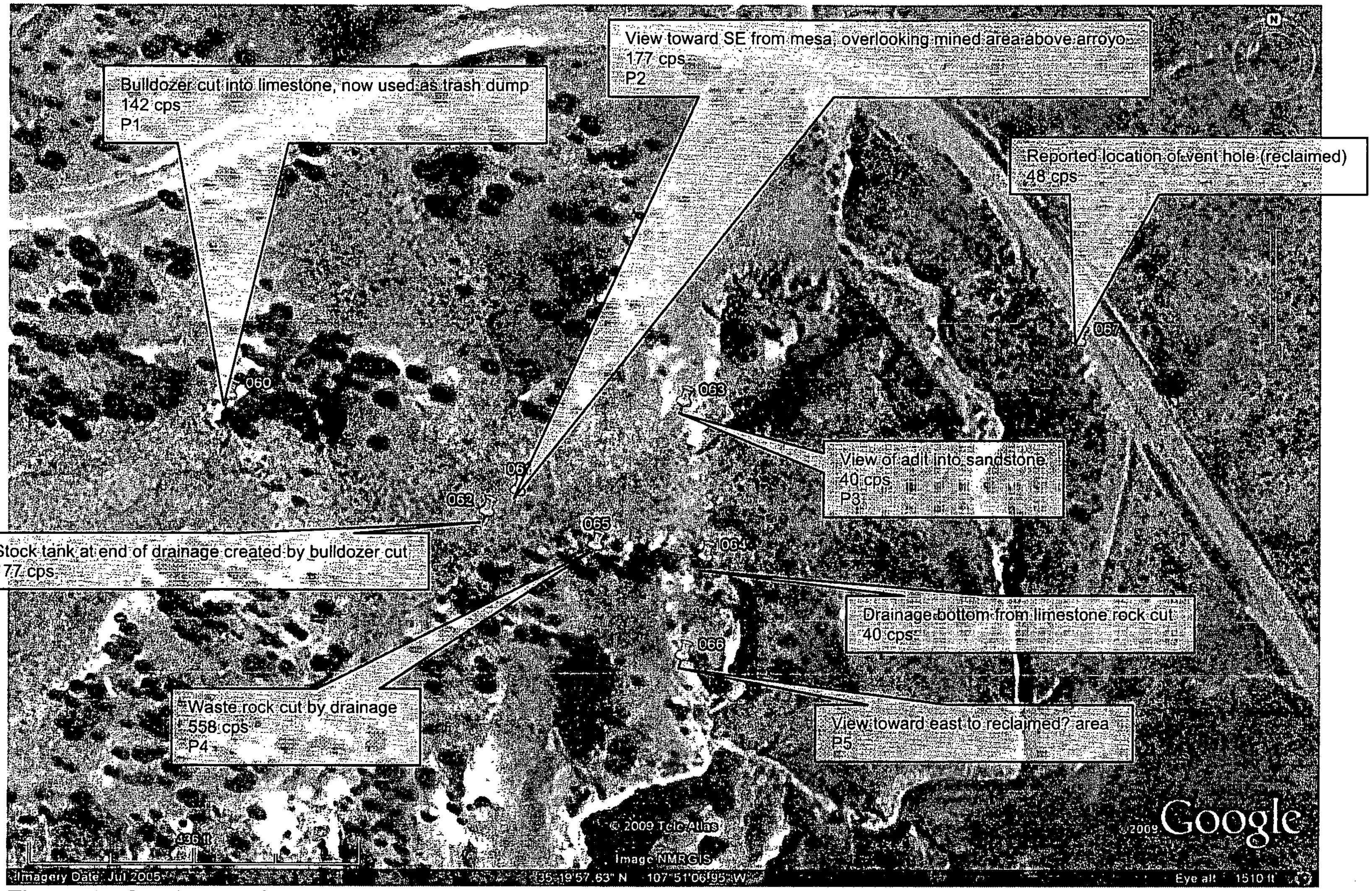
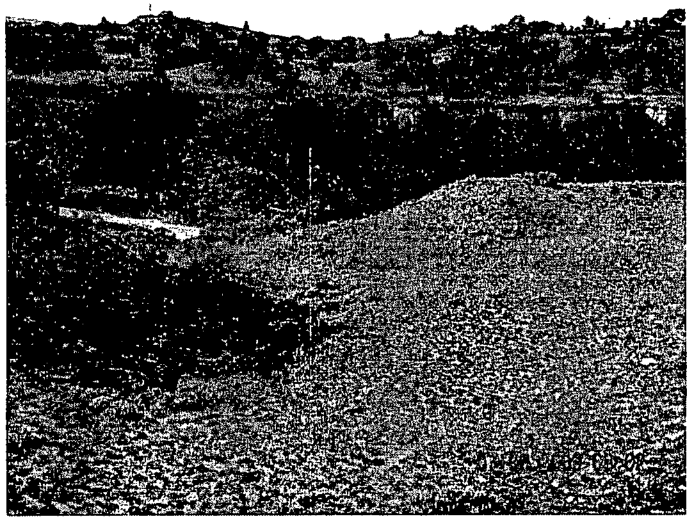


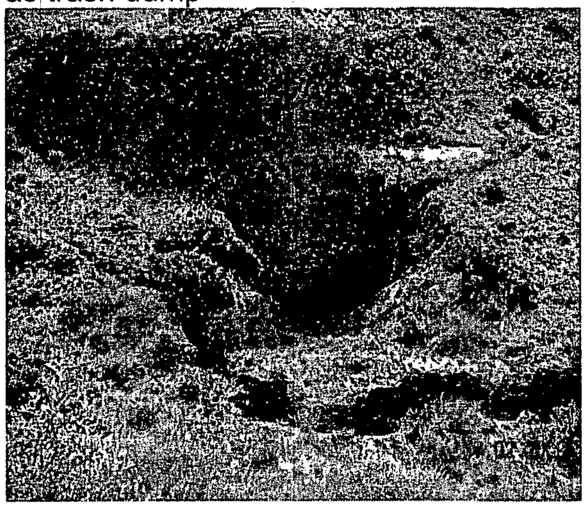
Figure 1: Section 25 Open Pit—measurements taken on July 2, 2009

"Px" reference the location of photographs on pages following.

P1: Section 25 open pit bulldozer cut into limestone, now used as trash dump

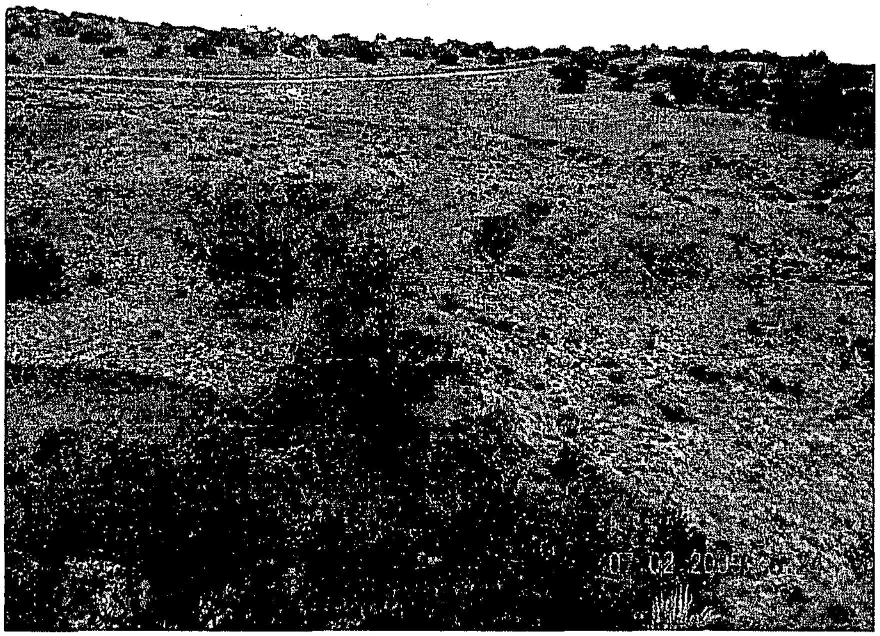


P2: Section 25 open pit view toward SE from mesa, overlooking mined area above arroyo



P3: Section 25 open pit view of adit into sandstone

P4: Section 25 open pit waste rock cut by drainage



P5: Section 25 open pit view toward east to reclaimed? area

# REFERENCES

# 97-100

NEW MEXICO
ENVIRONMENT DEPARTMENT

*Ground Water Quality Bureau*

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JON GOLDSTEIN
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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Roundy Shaft Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Roundy Shaft Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 19' 27.65" | **Longitude** | 107° 50' 00.63" | | |

**Site physical description:** The Roundy Shaft Mine currently is comprised of 2 open shafts, a concrete pad, and scattered limestone rock in an area south of Haystack Road. The Site borders the Piedre Trieste Mine.
**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.
**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The open shafts are unfenced; the highest radioactivity reading at one shaft was 102 counts per second (cps; background is presumed to be 15—40 cps from measurements taken at nearby sites). Limestone rock on the surface nearby was measured at 444 cps; other limestone waste rock piles emit lesser levels of

radioactivity. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open shafts.
**Targets:** The closest residence to the Site is located off of Haystack Road, approximately 0.80 air-miles to the northwest, from which another residence is visible further to the west. Residences also are located near the junction of State Hwy. 605 and 509, approximately 3.3 air-miles northeast of the Site. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-22 (0.44 air-miles; 48.2 µg/l total uranium in 2009 sampling).
**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are private. Todilto Exploration and Development Company reportedly last operated the mine in 1981, using shaft as a vent for the Piedre Trieste mine.
**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on July 2, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open shafts.

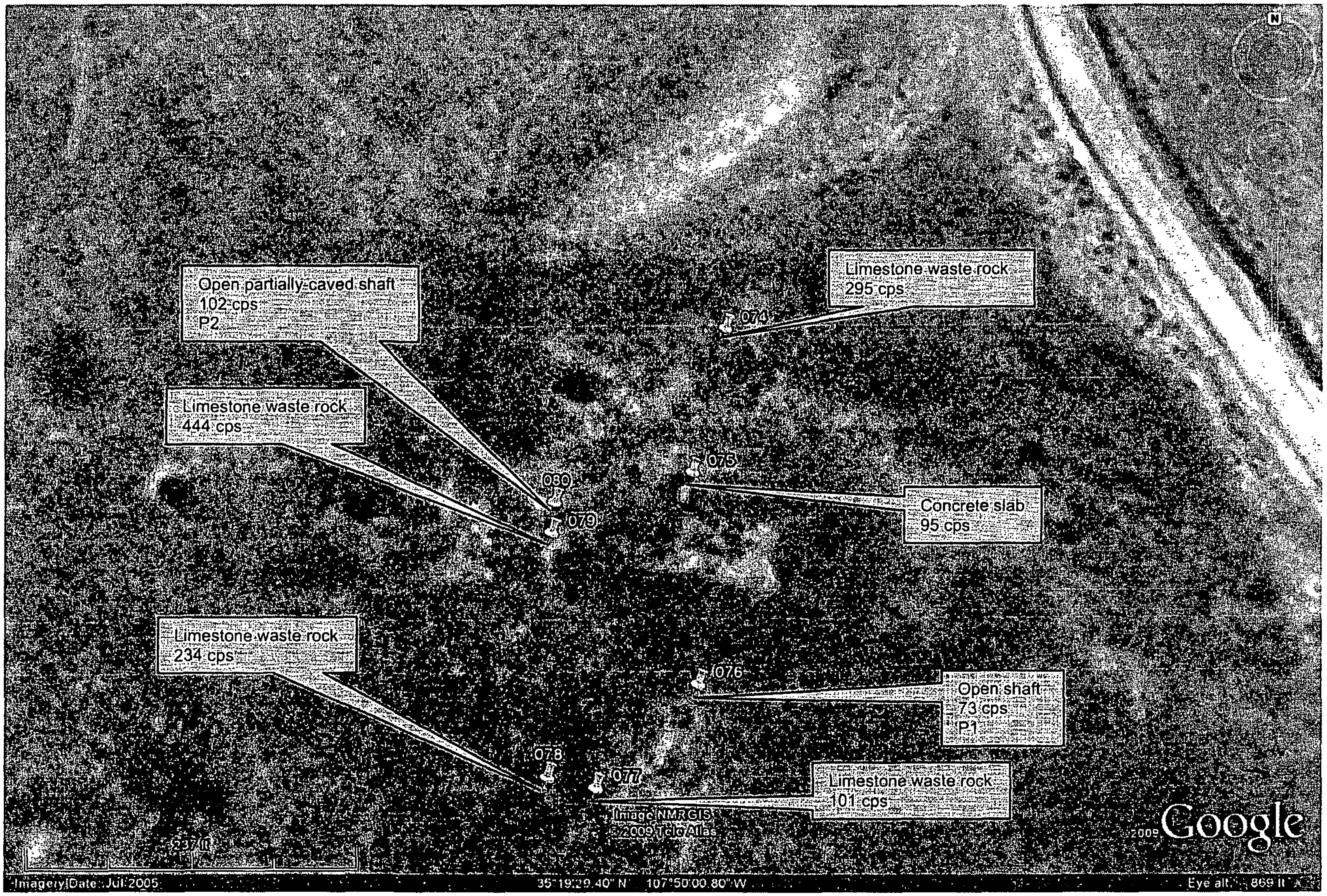
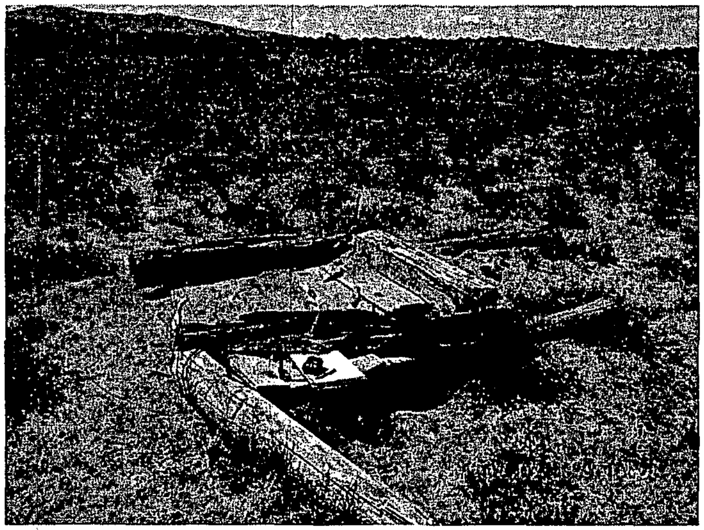
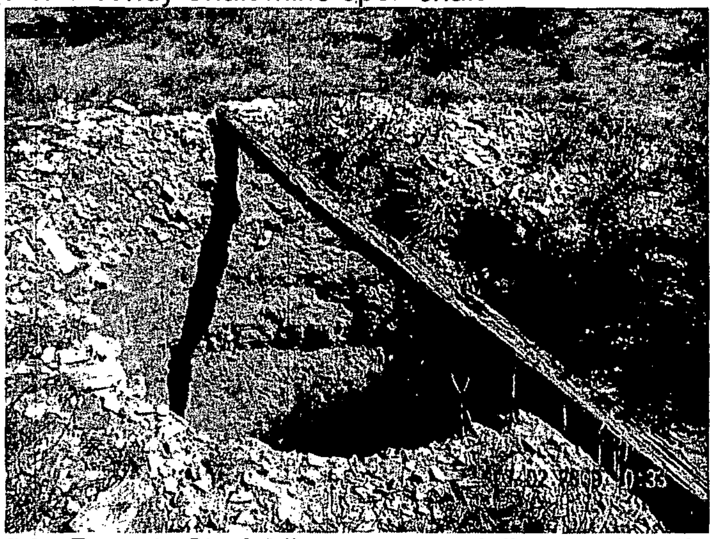



**Figure 1: Roundy Shaft—measurements taken on July 2, 2009.**

"Px" reference the location of photographs on pages following.



P1: Roundy Shaft mine open shaft



P2: Roundy Shaft Mine, open partially-caved shaft

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# Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Date:** **September 10, 2009**

**Subject:** **Pre-CERCLIS Screening Assessment of Schmitt Decline Mine, McKinley County, New Mexico: Further action under CERCLA recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Schmitt Decline Mine | | | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 54.55" | **Longitude** | 107° 48' 10.98" | | |

**Site physical description:** The Schmitt Decline Mine currently has an open and unfenced decline, surrounded by waste material piles that show evidence of erosional dispersion.
**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). NMED conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.
**Site summary:** Observations made during NMED's Site reconnaissance are shown on the accompanying figures. The decline appears to be structurally stable. One pile of sandstone material had the highest site-related radioactivity at 2687 counts per second (cps; background=21 cps). Other waste piles that were examined and the decline opening itself did not have significantly higher radioactivity than background. Contamination of

vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open decline.

This site may be the same as that identified as the Gossett Decline by Anderson (1980).
**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 1.22 air-miles east-southeast of the Site. Another residence is located along Haystack Road approximately 2.65 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: livestock well SMC-18 (0.1 air-miles; 2 µg/l total uranium in 2009 sampling).
**Site ownership and Potentially Responsible Parties:** Surface rights reportedly are held by Schmitt. Operational history of this site is not known.
**File review:** NMED staff reviewed the following files:
- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED staff conducted a Site reconnaissance on June 2, 2009.
**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:
1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:
1. Remove waste with elevated radioactivity.
2. Close open decline.

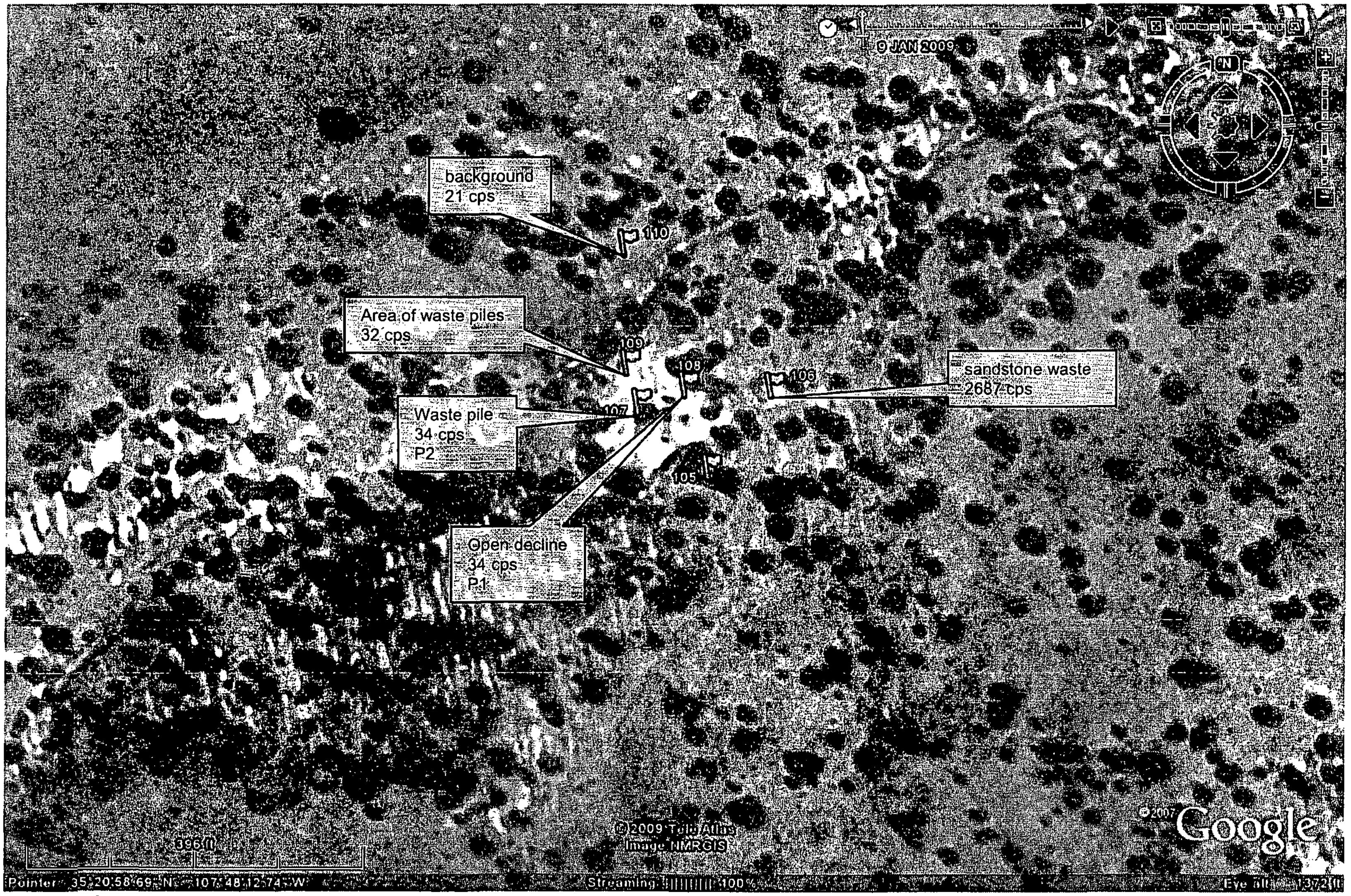


**Figure 1: "Schmitt" Decline**

"Px" reference the location of photographs on pages following.

P1: Schmitt Decline

P2: Schmitt Decline waste pile

99

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ENVIRONMENT DEPARTMENT

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Deputy Secretary

## Memorandum

**To:** **LaDonna Turner, Site Assessment Manager**
**Technical and Enforcement Branch**
**U.S. Environmental Protection Agency, Region 6**

**Date:** **September 10, 2009**

**From:** **Dana Bahar, Manager, Superfund Oversight Section**
**Ground Water Quality Bureau, New Mexico Environment Department.**

**Subject:** **Pre-CERCLIS Screening Assessment of Beacon Hill mine, McKinley County, New Mexico: Further action under CERCLA is recommended**

---

| | | | | | |
|---|---|---|---|---|---|
| **Site name** | Beacon Hill mine | **Street address** | not applicable | | |
| **City** | not applicable | **State** | New Mexico | **Zip code** | not applicable |
| **County** | McKinley | | | | |
| **Latitude** | 35° 20' 33.30" N | **Longitude** | 107° 49' 16.38" W | | |

**Site physical description:** The Beacon Hill minesite currently has several waste piles, and 2 open vent shafts remaining from uranium mining activities. Some waste piles emit elevated levels of radioactivity in comparison to background values (assumed to be in the range of 10 to 40 counts per second [cps] from data collected at this and nearby sites), and most waste piles show evidence of erosion.

**Site identification:** Potential alluvial ground water contamination within the Grants Mineral Belt was identified because background standards established for the contaminants of concern for ongoing remedial action associated with the Homestake Mining Company NPL site (CERCLIS NMD0007860935) are generally higher than Maximum Contaminant Levels (MCLs). The New Mexico Environment Department (NMED) conducted sampling of private residential wells in subdivisions located in the vicinity of the HMC site, and found that the majority had one or more contaminant concentrations exceeding MCLs.

**Site summary:** Observations made during a June 3, 2009 site visit are shown on the accompanying figures. Several waste piles and barren areas with elevated radioactivity (highest radioactivity=1005 cps; background=30 cps) were noted. Many waste piles are cut by erosional rills, indicating that waste has been dispersed down-stream. Contamination of vicinity soils and surface drainages by precipitative erosion and wind dispersion comprise the primary contaminant pathways that may be associated with this site. Additionally, site runoff of contaminated wastes may impact ground water quality either through seepage through alluvium or by direct entry to the subsurface via the open vent shafts.

**Targets:** Residences are located near the junction of State Hwy. 605 and 509, approximately 2.29 air-miles east of the Site. Another residence is located along Haystack Road approximately 1.5 air-miles southwest of the Site, from which another residence is visible further to the west. Other potential targets may include cattle and wildlife.

Closest well sampled to date: irrigation well SMC-22 (1.25 air-miles; 48.2 µg/l total uranium in 2009 sampling [total uranium Maximum Contaminant Level=30 µg/l])

**Site ownership and Potential Responsible Parties:** Surface and mineral rights reportedly are held by the Bureau of Land Management (BLM). Farris Mines last operated the mine in 1967.

**File review:** NMED staff reviewed the following files:

- Database compiled by Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department (07/20/2007).
- Anderson, Orin J., 1980. "Abandoned or inactive uranium mines in New Mexico".
- McLemore, Virginia T. and William L. Chenoweth, 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley Counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
- Rappaport, Linda, "Uranium deposits of the Poison Canyon ore trend, Grants District," in "Geology and technology of the Grants Uranium Region, 1963. State Bureau of Mines and Mineral Resources.
- U.S. Geological Survey, 1997. "Gallup quadrangle NURE HSSR study." OFR-97-492.

**Site reconnaissance:** NMED performed a Site reconnaissance on June 3, 2009.

**Recommendation:** A release of CERCLA hazardous substances has been documented at the site. NMED recommends further investigation under CERCLA to assess the risk posed by the site using the Hazard Ranking System.

NMED recommends that the investigation include the following:

1. Sample sediments along drainages to characterize extent of Site-derived waste dispersion.
2. Investigate and characterize ground water impacts.

In addition NMED recommends the following actions be performed to address immediate threats to public health and the environment:

1. Remove waste with elevated radioactivity.
2. Plug open vent shaft.

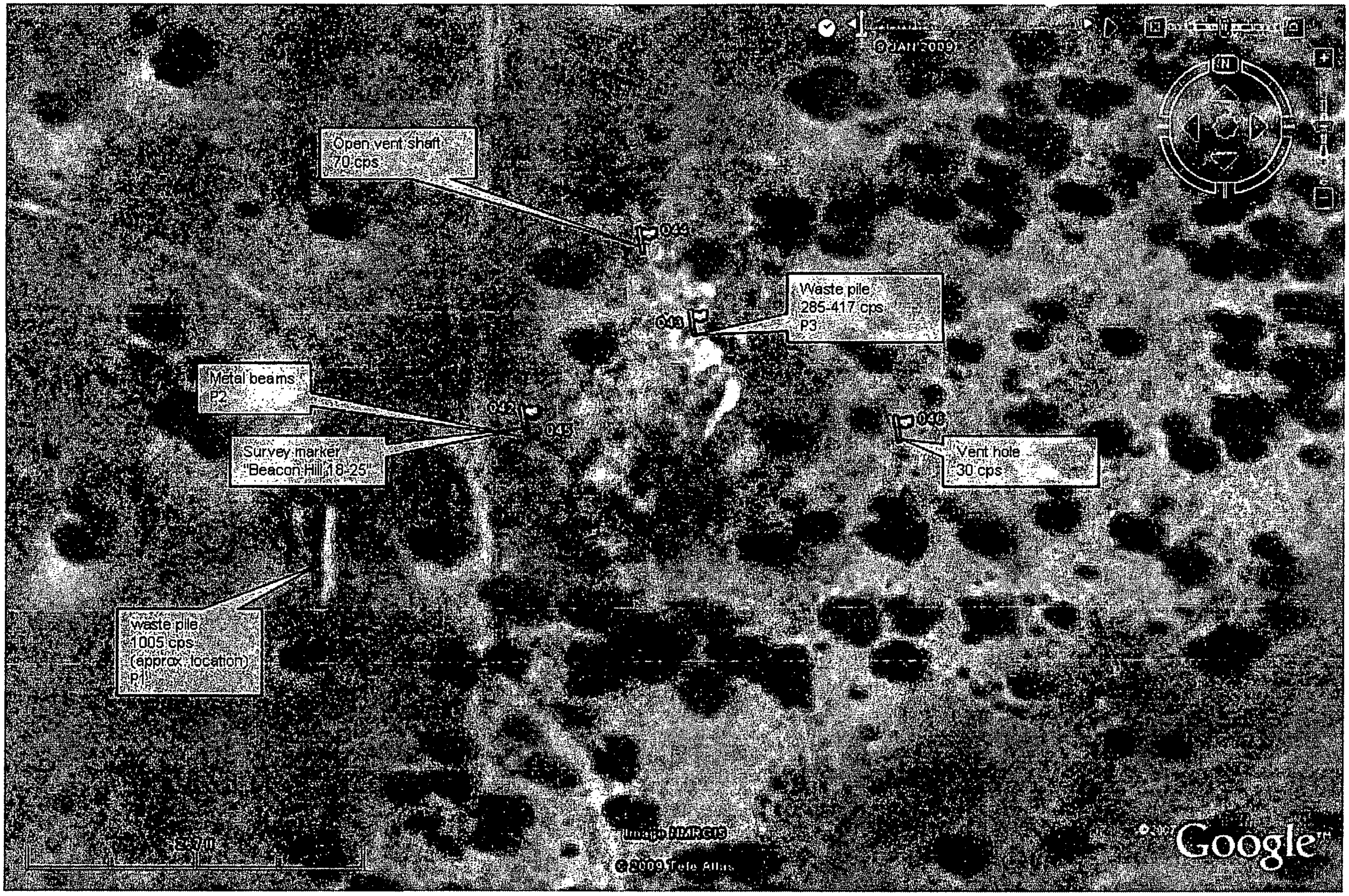


**Figure 1: Beacon Hill Mine—measurements taken on June 3, 2009**

"Px" reference the location of photographs on pages following.

Ms. LaDonna Turner, EPA Region 6 Site Assessment Manager
**RE:** Pre-CERCLIS screening Assessment of Beacon Hill mine, McKinley County, New Mexico
September 10, 2009

P1: Beacon Hill Mine waste pile

P2: Beacon Hill Mine metal beams

P3: Beacon Hill Mine waste pile

(1)

File Number: B 01636

# NEW MEXICO OFFICE OF THE STATE ENGINEER
## WELL RECORD

**1. OWNER OF WELL**

Name: MICHAEL GARCIA  Work Phone:
Contact:  Home Phone:
Address: P.O. Box 622

City: Grants  State: NM Zip: 87020

**2. LOCATION OF WELL (A, B, C, or D required, E or F if known)**

A. ___ 1/4 NE 1/4 NW 1/4 Section: 22 Township: 13N Range: 09W N.M.P.M. in McKinley County.

B. X = 515593 feet, Y = 1581972 feet, N.M. Coordinate System west Zone in the NON GRANT Grant.
U.S.G.S. Quad Map ______

C. Latitude: ___ d ___ m ___ s Longitude: ___ d ___ m ___ s

D. East ______ (m), North ______ (m), UTM Zone 13, NAD ___ (27 or 83)

E. Tract No. ___, Map No. ___ of the ______ Hydrographic Survey

F. Lot No. ___, Block No. ___ of Unit/Tract ______ of the ______ Subdivision recorded in McKinley County.

G. Other: HWY 605 and HWY 509

H. Give State Engineer File Number if existing well: ______

I. On land owned by (required): APPLICANT

**3. DRILLING CONTRACTOR**

License Number: WD-1451
Name: COYOTE DRILLING INC.  Work Phone:
Agent: WESTON BOHANNON  Home Phone:
Mailing Address:

City:  State:  Zip:

**4. DRILLING RECORD**

Drilling began: 4-27-05; Completed: 5-10-05; Type tools: milltooth bit
Size of hole: 6 3/4 in.; Total depth of well: 260 ft.;
Completed well is: 80' (shallow, ~~artesian~~);
Depth to water upon completion of well: 80' ft.

2005 DEC 13 PM 1:20
STATE ENGINEER OFFICE
ALBUQUERQUE, NEW MEXICO

2005 NOV 30 PM 3:16
STATE ENGINEER OFFICE
ALBUQUERQUE, NEW MEXICO



CORRECTED COPY

3

File Number: B B 01636

# NEW MEXICO OFFICE OF THE STATE ENGINEER
## WELL RECORD

**5. PRINCIPAL WATER-BEARING STRATA**

| Depth in Feet From | To | Thickness in feet | Description of water-bearing formation | Estimated Yield (GPM) |
|---|---|---|---|---|
| 220 | 260 | 40 | white sandstone | 5gpm |
| | | | | |
| | | | | |
| | | | | |

**6. RECORD OF CASING**

| Diameter (inches) | Pounds per ft. | Threads per in. | Depth in Feet Top | Bottom | Length (feet) | Type of Shoe | Perforations From | To |
|---|---|---|---|---|---|---|---|---|
| 4" | PVC | none | 0 | 260 | 260 | PVC | 220 | 260 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**7. RECORD OF MUDDING AND CEMENTING**

| Depth in Feet From | To | Hole Diameter | Sacks of mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**8. PLUGGING RECORD**

Plugging Contractor: __________

Address: __________

Plugging Method: __________

Date Well Plugged: __________

Plugging approved by: __________

State Engineer Representative

2005 DEC 13 PM 1:20
STATE ENGINEER OFFICE
ALBUQUERQUE, NEW MEXICO

| No. | Depth in Feet Top | Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

2005 NOV 30 PM 3:16
STATE ENGINEER OFFICE
ALBUQUERQUE, NEW MEXICO

File Number: B 01636
Form: wr-20



Trn Number: 330245

CORRECTED COPY

Identifying GPS file designation:

# Residential Well Questionnaire

bar well
SMC-23

1. Do you have a private well? **Yes** or **No**

If **NO**—***stop***; do not continue. If **YES**:

2. Does your well now in working condition (i.e., working pump)? **Yes** or **No**

If **YES**, complete full survey. If **NO**, complete **only** name and contact information below.

| | **Resident** | **Owner** ☐ same as resident |
|---|---|---|
| **Name** | Mike Garcia | |
| **Physical street address** | | |
| **Mailing address** | | |

3. Is your home hooked up to City water? **Yes** or **No** If **yes**, approximately what year was the home connected to the City water?

4. For what do you use the water from this well? Please include the general time frame over which each usage has been made:

**Private well usage information**

| | **Timeframe (e.g.,1999-2005)** |
|---|---|
| **Indoor uses** | |
| Drinking | |
| Showering or bathing | |
| Cooking | |
| Other (**please specify uses**) | |
| **Outdoor uses** | |
| Lawn and landscape | |
| Vegetable garden | |
| Livestock | |
| Pets | |
| Other (**please specify uses**) | |

5. Have you ever filtered or treated the well water you have used (e.g., Calgon water purifier, water softener)? If so, please describe the treatment and timeframe of use.

NO

6. What sources of water other than well water do you now rely or have you previously relied on for household uses? Please estimate the general timeframe for each.

| **Sources** | **Timeframe** | **Additional information** |
|---|---|---|
| Bottled water | | |
| City water | | |
| Other (please specify) | | |

7. Are there any other residences connected to this well? **Yes** or **No** If **yes**, please detail with address and contact information.

serves bar

| | |
|---|---|
| 8. Do you know when the well was constructed? | 2006 |
| 9. Do you know how deep the well is? | v/20' |
| 10. Do you know your well permit number? | — |

11. Do you have any concerns about your water supply?

Interviewer's name: ____________________

Date: ________________

Interviewee's initials: ____________________

North (4)

Identifying GPS file designation: Well #1 dry ~200'
Well #2 56' to water
Pic. 1

# Residential Well Questionnaire

1. Do you have a private well? **Yes** or **No**

If **NO**—***stop***; do not continue. If **YES**:

2. Does your well now in working condition (i.e., working pump)? **Yes** or **No**

If **YES**, complete full survey. If **NO**, complete **only** name and contact information below.

| | **Resident** | **Owner** ~~or~~ same as resident |
|---|---|---|
| **Name** | Mike Garcia | |
| **Physical street address** | 4033 San Mateo Rd. | |
| **Mailing address** | POB 622<br>Grants 87020 | |

3. Is your home hooked up to City water? **Yes** or **No** If **yes**, approximately what year was the home connected to the City water?

SMC-22

4. For what do you use the water from this well? Please include the general time frame over which each usage has been made:

**Private well usage information**

| | **Timeframe (e.g.,1999-2005)** | |
|---|---|---|
| **Indoor uses** | | |
| Drinking | ~~1960s~~ - | |
| Showering or bathing | 1960s | |
| Cooking | 1960s | |
| Other (**please specify uses**) | washing clothes | |
| **Outdoor uses** | | |
| Lawn and landscape | 1960s | |
| Vegetable garden | 1960s | |
| Livestock | no | |
| Pets | 1960s | |
| Other (**please specify uses**) | | |

5. Have you ever filtered or treated the well water you have used (e.g., Calgon water purifier, water softener)? If so, please describe the treatment and timeframe of use.

no

6. What sources of water other than well water do you now rely or have you previously relied on for household uses? Please estimate the general timeframe for each.

| **Sources** | **Timeframe** | **Additional information** |
|---|---|---|
| Bottled water | 1960s | |
| City water | no | |
| Other (please specify) | | |

7. Are there any other residences connected to this well? **Yes** or **No** If **yes**, please detail with address and contact information.

3 residences

| | |
|---|---|
| 8. Do you know when the well was constructed? | 1960s ~~1970s~~ |
| 9. Do you know how deep the well is? | ~~~200~~ 120? |
| 10. Do you know your well permit number? | no |

11. Do you have any concerns about your water supply?

hard water

sample from hydrant
~~well dry~~

Interviewer's name: DCM

Date: 7/30/2008

Interviewee's initials: ______

3

locked gate

Sec 30 Poison Cry 2003

Sec. 11 well 1990s

timer controlled
~~float valve~~?

~500' deep
timer + switch
~300' pic 5+6

Old well caved in S of hse

well near old "warehouse" in back of ~~bar~~ (not checked

(2)

Identifying GPS file designation:

# Residential Well Questionnaire

Verbal permission
pic 3 tank
pic 4 - res. well

1. Do you have a private well? Yes or No
   If NO—*stop*; do not continue. If YES:
2. Does your well now in working condition (i.e., working pump)? Yes or No
   If **YES**, complete full survey. If **NO**, complete **only** name and contact information below.

| | Resident | Owner ☐ same as resident |
|---|---|---|
| **Name** | Melvin Marquez | |
| **Physical street address** | 4064 San Mateo Rd, Grants | 87020 |
| **Mailing address** | Same | |

3. Is your home hooked up to City water? **Yes** or **No** If **yes**, approximately what year was the home connected to the City water?

4. For what do you use the water from this well? Please include the general time frame over which each usage has been made:

**Private well usage information**

| | Timeframe (e.g.,1999-2005) |
|---|---|
| **Indoor uses** | |
| Drinking | 1994 |
| Showering or bathing | 1994 |
| Cooking | 1994 |
| Other (**please specify uses**) | |
| **Outdoor uses** | |
| Lawn and landscape | 1994 |
| Vegetable garden | no |
| Livestock | 1994 |
| Pets | 1994 |
| Other (**please specify uses**) | |

5. Have you ever filtered or treated the well water you have used (e.g., Calgon water purifier, water softener)? If so, please describe the treatment and timeframe of use.

1994-2008 (house turned in April 2008)

6. What sources of water other than well water do you now rely or have you previously relied on for household uses? Please estimate the general timeframe for each.

| Sources | Timeframe | Additional information |
|---|---|---|
| Bottled water | 2003 | |
| City water | no | |
| Other (please specify) | no | |

7. Are there any other residences connected to this well? **Yes** or **No** If yes, please detail with address and contact information.

RV rental periodically

| | |
|---|---|
| 8. Do you know when the well was constructed? | 1994-1996 |
| 9. Do you know how deep the well is? | ~450 |
| 10. Do you know your well permit number? | |

11. Do you have any concerns about your water supply?

no

Interviewer's name: Dee

Date: 7/30/2008

Interviewee's initials: ____________

Identifying GPS file designation: 1

# Residential Well Questionnaire

1. Do you have a private well? **Yes** or **No**

If **NO**—***stop***; do not continue. If **YES**: residential

2. Does your well now in working condition (i.e., working pump)? **Yes** or **No**

If **YES**, complete full survey. If **NO**, complete **only** name and contact information below.

| | **Resident** | **Owner** ~~is~~ same as resident |
|---|---|---|
| **Name** | Justin Borris | |
| **Physical street address** | 3414 Hwy 605 | |
| **Mailing address** | 4214 San Mateo Rd<br>Grants 87020 | |

3. Is your home hooked up to City water? **Yes** or **No** If **yes**, approximately what year was the home connected to the City water?

4. For what do you use the water from this well? Please include the general time frame over which each usage has been made:

**Private well usage information**

| | **Timeframe (e.g.,1999-2005)** | |
|---|---|---|
| | **Indoor uses** | |
| Drinking | 2006 — | |
| Showering or bathing | 2006 — | |
| Cooking | 2006 | |
| Other (**please specify uses**) | washing clothes + dishes | |
| | **Outdoor uses** | |
| Lawn and landscape | | |
| Vegetable garden | | |
| Livestock | NO | |
| Pets | | |
| Other (**please specify uses**) | | |

5. Have you ever filtered or treated the well water you have used (e.g., Calgon water purifier, water softener)? If so, please describe the treatment and timeframe of use.

Charcoal filter

6. What sources of water other than well water do you now rely or have you previously relied on for household uses? Please estimate the general timeframe for each.

| **Sources** | **Timeframe** | **Additional information** |
|---|---|---|
| Bottled water | 2008- | |
| City water | NO | |
| Other (please specify) | | |

7. Are there any other residences connected to this well? **Yes** or **No** If **yes**, please detail with address and contact information.

| | |
|---|---|
| 8. Do you know when the well was constructed? | no 1970s |
| 9. Do you know how deep the well is? | ~200' |
| 10. Do you know your well permit number? | (near well) |

11. Do you have any concerns about your water supply?

no.

sampled by HMC
static WL ~28'
open hole
iron bacteria

Interviewer's name: ____________________

Date: ____________________

Interviewee's initials: JB

7/30/08 pcs 1+2

(3)

File Number: B 01636

# NEW MEXICO OFFICE OF THE STATE ENGINEER
## WELL RECORD

### 9. LOG OF HOLE

| Depth in Feet From | Depth in Feet To | Thickness in feet | Color and Type of Material Encountered |
|---|---|---|---|
| 0 | 5 | 5 | brown clay |
| 5 | 90 | 85 | blow sand |
| 90 | 120 | 30 | sand & gravel -dry |
| 120 | 220 | 100 | ~~black shale~~ |
| 220 | 260 | 40 | ~~white sand~~ |

STATE ENGINEER OFFICE ALBUQUERQUE, NEW MEXICO 2004 OCT 13 PM 1:20

STATE ENGINEER OFFICE ALBUQUERQUE, NEW MEXICO 2005 NOV 30 PM 3:16

File Number: B 01636 Trn Number: 330245
Form: wr-20



CORRECTED COPY

File Number: B 01636

NEW MEXICO OFFICE OF THE STATE ENGINEER
WELL RECORD

10. ADDITIONAL STATEMENTS OR EXPLANATIONS:

STATE ENGINEER OFFICE ALBUQUERQUE, NEW MEXICO 2005 DEC 13 AM 11:21

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Clifford Lopez
Driller

(mm/dd/year)

STATE ENGINEER OFFICE ALBUQUERQUE, NEW MEXICO 2005 NOV 30 PM 3:16

X=515593FT, Y=1531972FT
WEST ZONE, NON-GROUT

FOR STATE ENGINEER USE ONLY

Quad ____; FWL ____; FSL ____; Use DOM; Location No. ________

File Number: B 01636
Form: wr-20

page 4 of 4

Trn Number: 340245

CORRECTED COPY

Revised June 1972

4

222410

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well Melvin R. & Roberta Marquez Owner's Well No. ______
Street or Post Office Address Box 4064 San Mateo Rd.
City and State Grants, NM 87020

Well was drilled under Permit No. B-01485 and is located in the:

a. ____ ¼ NE ¼ NW ¼ SE ¼ of Section 30 Township 13N Range 09W N.M.P.M.

b. Tract No. ______ of Map No. 39 1 4 of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in McKinley County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System UTM Zone in the ______ Grant.

(B) Drilling Contractor Horace V. Bohannon dba Coyote Drilling Inc. License No. WD-1417

Address ______

Drilling Began 1-24-02 Completed 1-28-02 Type tools milltooth bit Size of hole 6¼" in.

Elevation of land surface or ______ at well is ______ ft. Total depth of well 580 ft.

Completed well is XX shallow ☐ artesian. Depth to water upon completion of well 280 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| 510 | 520 | 10 | Red course sand | 4 GPM |
| 550 | 560 | 10 | Red sandstone | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 4" | PVC | none | +2 | 580 | 582 | PVC | 500 | 560 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

02 JUL 15 FRI 3:45

## Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

| No. | Depth in Feet | | Cubic Feet of Cement |
|---|---|---|---|
| | Top | Bottom | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received 7-15-02

Quad ______ FWL ______ FSL ______

File No. B 1485 Use Dom Location No. 13N, 09W. 30. 412

5

| Depth in Feet From | To | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| 0 | 80 | 80 | blow sand |
| 80 | 160 | 80 | red shale |
| 160 | 200 | 40 | red sandstone |
| 200 | 250 | 50 | limestone |
| 250 | 400 | 150 | pink sand |
| 400 | 550 | 150 | red course sand |
| 550 | 580 | 30 | red sandstone |

**Section 7. REMARKS AND ADDITIONAL INFORMATION**

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Clifford Lopez
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

6

Revised June 1972

235806

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Arley Iverson Owner's Well No. 1
Street or Post Office Address PO Box 3799
City and State Milan N.M. 87021

Well was drilled under Permit No. B-659 and is located in the: DEC 13 PM 12 34

a. NW ¼ ___ ¼ ___ ¼ ___ ¼ of Section 22 Township 13N Range 9W N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___ STATE ENGINEER OFFICE SANTA FE, N.M. 87501

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in McKinley County.

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

(B) Drilling Contractor Jimmie R Saunders License No. WD 804

Address Po Box 3081 Milan N.M. 87021

Drilling Began 7-17-79 Completed 7-18-79 Type tools Rotary Size of hole 8 in.

Elevation of land surface or ___ at well is ___ ft. Total depth of well 220 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 190 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| 190 | 220 | 30 | Dakota Sandstone | 5 |
| | | | | |
| | | | | |
| | | | | |

Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet Top | Depth in Feet Bottom | Length (feet) | Type of Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Section 5. PLUGGING RECORD

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by: 79 NOV 5 A9:42

State Engineer Representative

| No. | Depth in Feet Top | Depth in Feet Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received November 5, 1979

Quad ___ FWL ___ FSL ___

File No. B-659 Use domestic Location No. 13N.9W.22 SW NW NW ~~XXXXXXXXXX~~ MCkinley

Section 6. LOG OF HOLE

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| 0 | 55 | 55 | SAND + Shale |
| 55 | 60 | 5 | Shale |
| 60 | 100 | 40 | SAND + shale |
| 100 | 122 | 22 | Gravel |
| 122 | 135 | 13 | SANdstone |
| 135 | 190 | 55 | Blue Shale (MANCOS?) |
| 190 | 220 | 30 | SANdstone (DAKota) |
| | | | |
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Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

J. R. Saunders
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, ex    Section 5, shall be answered as completely    accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Z34046 (8)

Revised June 1972

# STATE ENGINEER OFFICE

## WELL RECORD

### Section 1. GENERAL INFORMATION

(A) Owner of well Wayne & Karla Hale Owner's Well No. ______
Street or Post Office Address Box 3191
City and State Milan, N.M. 87021

84 SEP 24 AM 11 20

Well was drilled under Permit No. B-1072 and is located in the:

a. SE ¼ SE ¼ SE ¼ ______ ¼ of Section 3 Township 11N Range 10W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. 16 of Block No. 2 of the Los Altos Park
Subdivision, recorded in Cibola County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Garner Drilling Co License No. WD-595

Address Milan, N.M.

Drilling Began 8-14-84 Completed 8-20-84 Type tools Rotary Size of hole 8 in.

Elevation of land surface or ______ at well is ______ ft. Total depth of well 510 ft.

Completed well is XX shallow ☐ artesian. Depth to water upon completion of well 180 ft.

### Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| 484 | 496 | 12 | gray frac sandstone | 30 |
| | | | | |
| | | | | |
| | | | | |

### Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet Top | Depth in Feet Bottom | Length (feet) | Type of Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| 5 | 10.76 | weld | + 1 | 510 | 511 | open | 484 | 510 |
| | | | | | | | | |
| | | | | | | | | |

### Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

84 AUG 30 A 9:17
STATE ENGINEER OFFICE
DISTRICT I
ALBUQUERQUE, N.M.

### Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

| No. | Depth in Feet Top | Depth in Feet Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received 8/30/84

Quad ______ FWL ______ FSL ______

File No. B-1072 Use Dom Location No. 11N.10W.444 (Cibola)

## Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 8 | 8 | soil |
| 8 | 120 | 112 | green & purple shale |
| 120 | 160 | 40 | red hard sandy shale |
| 160 | 190 | 30 | tan & red sandstone |
| 190 | 290 | 100 | red & blue shale |
| 290 | 474 | 184 | chinle shale |
| 474 | 484 | 10 | hard red shale |
| 484 | 496 | 12 | gray frac. sandstone |
| 496 | 500 | 4 | soft red shale |
| 500 | 510 | 10 | red sandstone |

## Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

J. Gonzales
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this n is used as a plugging record, only Section 1( ıd Section 5 need be completed.

10

# New Mexico Office of the State Engineer
# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 00415 O-6 | 2 | 1 | 2 | 22 | 13N | 09W | 247820 | 3915089* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/11/1977 | **Drill Finish Date:** | 08/11/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 10 |
| **Depth Well:** | 90 feet | **Depth Water:** | 73 feet |

| **Water Bearing Stratifications:** | **Top** | **Bottom** | **Description** |
|---|---|---|---|
| | 80 | 90 | Other/Unknown |

***UTM location was derived from PLSS - see Help**

Form WR-23

STATE ENGINEER OFFICE

234019

(10)

# WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

(Plat of 640 acres)

(A) Owner of well L.E.Meeks
Street and Number Milan Station
City Grants. State New Mexico
Well was drilled under Permit No. B-115 and is located in the SE ¼ ¼ ¼ of Section 3 Twp. 11 N Rge. 10 W
(B) Drilling Contractor O.L.Ray License No. WD-302
Street and Number Box 536
City Grants. State New Mexico
Drilling was commenced September 22, 19 61
Drilling was completed October 5, 19 61

Elevation at top of casing in feet above sea level Total depth of well Deepened from 180 to 340 feet
State whether well is shallow or artesian shallow Depth to water upon completion 320 feet

Section 2 PRINCIPAL WATER-BEARING STRATA

| No. | Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation |
|---|---|---|---|---|
| 1 | 310 | 320 | 10 | lime |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

Section 3 RECORD OF CASING

| Dia in. | Pounds ft. | Threads in | Depth Top | Depth Bottom | Feet | Type Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| | | | 0 | 20 | 20 | | None | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Section 4 RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Diameter Hole in in. | Tons Clay | No. Sacks of Cement | Methods Used |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.
Street and Number City State
Tons of Clay used Tons of Roughage used Type of roughage
Plugging method used Date Plugged 19
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

| No. | Depth of Plug From | Depth of Plug To | No. of Sacks Used |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received

1961 OCT 24 AM 8:22

File No. B-115 Use domestic Location No. 11N.10W.3 400

Section 6

## LOG OF WELL

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Color | Type of Material Encountered |
|---|---|---|---|---|
| 180 | 260 | 80 | blue | Shale |
| 260 | 300 | 40 | red | shale |
| 300 | 320 | 20 | white | lime |
| 320 | 340 | 20 | red | shale |

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Well Driller

Revised June 1972

12

STATE ENGINEER OFFICE

# WELL RECORD

## Section 1. GENERAL INFORMATION

(A) Owner of well STATE OF NEW MEXICO - HED Owner's Well No. Sandoval-1
Street or Post Office Address P. O. Box 968
City and State Santa Fe, NM 87503

Well was drilled under Permit No. HC# 70729 B-415-0-5 and is located in the:

a. NW ¼ SE ¼ NW ¼ NE ¼ of Section 22 Township 13N Range 9W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Sandia Well Drilling - Vince Botarelli License No. ______

Address P. O. Box 593 - Cedar Crest, NM 87008

Drilling Began 8/10/77 Completed 8/10/77 Type tools Rotary Size of hole 8 in.

Elevation of land surface or estimated from topographic map at well is 6820 ft. Total depth of well 95 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 72 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| 80 | 95 | 15 | Buff silty sand | 2 gpm |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet Top | Depth in Feet Bottom | Length (feet) | Type of Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| 5 | Type 200 B2 PVC | | surface | 95 | 95 | | 85 | 95 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

78 JUN 13 P 1 43
STATE ENGINEER OFFICE DISTRICT 1 ALBUQUERQUE, N. MEX.

APR 3 A 8:53

## Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

| No. | Depth in Feet Top | Depth in Feet Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ______ FWL ______ FSL ______

File No. ______ Use ______ Location No. ______

C3

Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 15 | 15 | Gray buff sandy silt |
| 15 | 35 | 20 | Gray sandy clay |
| 35 | 80 | 45 | Clayed sand, some sandstone clasts |
| 80 | 95 | 15 | Buff silty sand |
| 95 | 120 | 25 | Light gray shale (Morrison Fm) |
| | | | |
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Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

John G. Dudley ~~Driller~~ Geohydrologist

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this fo[illegible]s used as a plugging record, only Section 1(a) Section 5 need be completed.

Revised June 1972

STATE ENGINEER OFFICE '78 MAY 22 AM 9 42 (14) 235732

WELL RECORD

STATE ENGINEER OFFICE SANTA FE, N.M. 87501

## Section 1. GENERAL INFORMATION

(A) Owner of well Fernandez Chavez Owner's Well No. 2
Street or Post Office Address P.O. Box 145
City and State Grants, NM 87020

Well was drilled under Permit No. B-524 and is located in the:

a. NW ¼ SE ¼ SE ¼ SW ¼ of Section 24 Township 13N Range 8W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Salazar Brothers Drilling, Inc License No. WD-748

Address P.O. BOX 2958 Milan, NM 87021

Drilling Began ______ Completed ______ Type tools $3^3/4$" Size of hole $8^3/4$" in.

Elevation of land surface or ______ at well is ______ ft. Total depth of well 520 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 260 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| 400 | 480 | 80 | Gray coarse sand | 100 |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| $5^9/16$ | - | - | 0 | 500 | 520 | Guide Shoe | 400 | 480 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| 520 | 620 | 5" | - | 50bags | Commercial pumper |
| | | | | | |
| | | | | | |

## Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

| No. | Depth in Feet | | Cubic Feet of Cement |
|---|---|---|---|
| | Top | Bottom | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

78 MAY 13 PM 4:15
STATE ENGINEER OFFICE ALBUQUERQUE DISTRICT I ALBUQUERQUE, N. MEX.

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ______ FWL ______ FSL ______

File No. B-524 Use Dom Location No. 13N-8W-24-344

## Section 6. LOG OF HOLE

| Depth in Feet | | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| From | To | | |
| 0 | 230 | 230 | Gray Black Shale |
| 230 | 300 | 70 | Gray Sand |
| 300 | 400 | 100 | Gray Shale |
| 400 | 480 | 80 | Gray Sand |
| 480 | 520 | 40 | Gray Shale |

## Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

#237709

Revised June 1972

15

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well ERNEST ORTEGA Owner's Well No. 1
Street or Post Office Address Gen. Del.
City and State SAN MATEO N.M. 87050

Well was drilled under Permit No. B 815 and is located in the:

a. NE ¼ SE ¼ SW ¼ ____ ¼ of Section 23 Township 13N Range 8W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in VALENCIA County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Saunders Drilling License No. WD 804
Address Box 3081 Milan N.M. 87021

Drilling Began ____ Completed ____ Type tools Rotary Size of hole 8" in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 300 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 260 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet | | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| From | To | | | |
| 270 | 290 | 20 | white sand stone | 12 GPM |
| | | | | |
| | | | | |
| | | | | |

Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet | | Length (feet) | Type of Shoe | Perforations | |
|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | From | To |
| 8 5/8 | PVC | — | 0 | 40 | 40 | — | — | — |
| 5 9/16 | PVC | | 0 | 300 | 300 | — | 270 | 290 |
| | | | | | | | | |

Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet | | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| From | To | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

STATE ENGINEER
SANTA FE, N.M.
'81 MAY 26 PM 1 22

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

| No. | Depth in Feet | | Cubic Feet of Cement |
|---|---|---|---|
| | Top | Bottom | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. B-815 Use dom/liv Location No. 13n.8w.23.342 Val. Co.

16

File Number: B 01520

# NEW MEXICO OFFICE OF THE STATE ENGINEER
## WELL RECORD

**1. OWNER OF WELL**

Name: Clark Williams Work Phone: ______
Contact: ______ Home Phone: ______
Address: P.O. Box 3816
City: Milan State: NM Zip: 87021

**2. LOCATION OF WELL (A, B, C, or D required, E or F if known)**

A. NE 1/4 SE 1/4 SE 1/4 Section 03 Township: 11N Range: 10W N.M.P.M. in Cibola County.

B. X = ______ feet, Y = ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.
U.S.G.S. Quad Map 39 2

C. Latitude: ___d ___m ___s Longitude: ___d ___m ___s

D. East ______ (m), North ______ (m), UTM Zone 13, NAD __ (27 or 83)

E. Tract No. ___, Map No. ___ of the ______ Hydrographic Survey

F. Lot No. 18 Block No. 2 of Unit/Tract ______ of the Los Altos Park Subdivision recorded in Cibola County.

G. Other: ______

H. Give State Engineer File Number if existing well: ______

I. On land owned by (required): ______

08 FEB 10 PM 3:49

STATE ENGINEER OFFICE ALBUQUERQUE, NEW MEXICO

**3. DRILLING CONTRACTOR**

License Number: WD-1451
Name: ~~Coyote Drilling Inc.~~ Work Phone: ______
Agent: ~~Weston Bohannon~~ Home Phone: ______
Mailing Address: ______
City: ______ State: __ Zip: ______

**4. DRILLING RECORD**

Drilling began: 9-20-02, Completed: 9-23-02 Type tools: mill tooth, bit
Size of hole: 6 1/4 in.; Total depth of well: 280 ft.;
Completed well is: shallow (shallow, ~~artesian~~);
Depth to water upon completion of well: 210 ft.

File Number: B-01520 Trn Number: 240739
Form: wr-20

File Number: B 01520

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# NEW MEXICO OFFICE OF THE STATE ENGINEER
## WELL RECORD

### 5. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | To | Thickness in feet | Description of water-bearing formation | Estimated Yield (GPM) |
|---|---|---|---|---|
| 240 | 280 | 40 | red sand | 7 GPM |
| | | | | |
| | | | | |

### 6. RECORD OF CASING

| Diameter (inches) | Pounds per ft. | Threads per in. | Depth in Feet Top | Bottom | Length (feet) | Type of Shoe | Perforations From | To |
|---|---|---|---|---|---|---|---|---|
| 4 | PVC | none | +2 | 280 | 282 | PVC | 240 | 280 |
| | | | | | | | | |
| | | | | | | | | |

### 7. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | To | Hole Diameter | Sacks of mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

### 8. PLUGGING RECORD

Plugging Contractor: ______
Address: ______
Plugging Method: ______
Date Well Plugged: ______

Plugging approved by: ______
State Engineer Representative

| No. | Depth in Feet Top | Bottom | Cubic Feetof Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

Revised June 1972

18

235921

**STATE ENGINEER OFFICE**

## WELL RECORD

### Section 1. GENERAL INFORMATION

(A) Owner of well Gallup State Welfare Farm Owner's Well No. 1
Street or Post Office Address Box 5246
City and State Milan New Mexico 87021

Well was drilled under Permit No. B-686 and is located in the:

a. SW ¼ SW ¼ SE ¼ ___ ¼ of Section 4 Township 11 N. Range 10 W N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in ___ County.

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

'79 NOV 5 PM 1 22
STATE ENGINEER OFFICE
SANTA FE, N.M. 87501

(B) Drilling Contractor J. R. Saunders License No. WD864

Address Box 3081 Milan N. M. 87021

Drilling Began 6-12-79 Completed 6-14-79 Type tools Rotary Size of hole 8 in.

Elevation of land surface or ___ at well is ___ ft. Total depth of well 138 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 81' ft.

### Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| 120 | 132 | 12 | Gravel + Sand | 40 |
| | | | | |
| | | | | |
| | | | | |

### Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet Top | Depth in Feet Bottom | Length (feet) | Type of Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| 5 9/16 | Plastic | | 0 | 138 | 138 | | 120 | 134 |
| | | | | | | | | |
| | | | | | | | | |

### Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

### Section 5. PLUGGING RECORD

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by:

___
State Engineer Representative

| No. | Depth in Feet Top | Depth in Feet Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

**FOR USE OF STATE ENGINEER ONLY**

Date Received July 22, 1979

Quad ___ FWL ___ FSL ___

File No. B-686 Use Dri-sai Location No. 433, 11N.10W.4

## Section 6. LOG OF HOLE

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Color and Type of Material Encountered |
|---|---|---|---|
| ~~0~~ | ~~12~~ | ~~12~~ | ~~Clay + Soil~~ |
| ~~12~~ | ~~95~~ | ~~83~~ | ~~LAVA~~ |
| ~~95~~ | ~~115~~ | ~~20~~ | ~~SAND + Gravel~~ |
| ~~115~~ | ~~120~~ | ~~5~~ | ~~Red Shale~~ |
| ~~120~~ | ~~132~~ | ~~12~~ | ~~Gravel + SAND~~ |
| ~~132~~ | ~~138~~ | ~~6~~ | ~~Red Shale~~ |

## Section 7. REMARKS AND ADDITIONAL INFORMATION

Well WAS Gravel Packed

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

J. R. Saunders
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, ex[illegible] Section 5, shall be answered as completely [illegible] accurately as possible when any well is drilled, repaired or deepened. When thi[illegible] n is used as a plugging record, only Section I[illegible] [illegible]d Section 5 need be completed.

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# New Mexico Office of the State Engineer
# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 00028 S-247 | 3 | 3 | 3 | 20 | 12N | 10W | 234013 | 3904479* |

| | | | |
|---|---|---|---|
| **Driller License:** | TECOLOTE GROUNDWATER INDUST. | | |
| **Driller Name:** | HOWARD SHEETS | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 11/30/1956 | **Drill Finish Date:** | 02/01/1957 |
| **Log File Date:** | 02/25/1957 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 12.00 | **Estimated Yield:** | |
| **Depth Well:** | 275 feet | **Depth Water:** | 152 feet |

| **Water Bearing Stratifications:** | **Top** | **Bottom** | **Description** |
|---|---|---|---|
| | 104 | 110 | Sandstone/Gravel/Conglomerate |
| | 138 | 149 | Shale/Mudstone/Siltstone |
| | 242 | 272 | Limestone/Dolomite/Chalk |

*UTM location was derived from PLSS - see Help

21

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 00686 | 3 | 3 | 4 | 04 | 11N | 10W | 236314 | 3899597* |

**Driller License:** SAUNDERS, JIMMIE RAY

**Driller Name:** J.R. SAUNDERS

**Source:** Shallow

**Drill Start Date:** 06/12/1979 **Drill Finish Date:** 06/14/1979

**Log File Date:** 07/22/1979 **PCW Received Date:**

**Pump Type:** **Pipe Discharge Size:**

**Casing Size:** 5.52 **Estimated Yield:** 40

**Depth Well:** 138 feet **Depth Water:** 81 feet

| Water Bearing Stratifications: | Top | Bottom | Description |
|---|---|---|---|
| | 120 | 132 | Sandstone/Gravel/Conglomerate |

| Casing Perforations: | Top | Bottom |
|---|---|---|
| | 120 | 134 |

***UTM location was derived from PLSS - see Help**

(22)

# New Mexico Office of the State Engineer
# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 01072 | 4 | 4 | 4 | 03 | 11N | 10W | 238522 | 3899520* |

| | | | |
|---|---|---|---|
| **Driller License:** | GARNER DRILLING CO. | | |
| **Driller Name:** | GARNER, JAMES B. | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/14/1984 | **Drill Finish Date:** | 08/20/1984 |
| **Log File Date:** | 08/30/1984 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 30 |
| **Depth Well:** | 510 feet | **Depth Water:** | 180 feet |

| Water Bearing Stratifications: | Top | Bottom | Description |
|---|---|---|---|
| | 484 | 496 | Sandstone/Gravel/Conglomerate |

| Casing Perforations: | Top | Bottom |
|---|---|---|
| | 484 | 510 |

***UTM location was derived from PLSS - see Help**

New Mexico Office of the State Engineer

# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 00415 O-13 | 1 | 2 | 1 | 13 | 12N | 10W | 240949 | 3907282* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/31/1977 | **Drill Finish Date:** | 08/31/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 7 |
| **Depth Well:** | 74 feet | **Depth Water:** | 50 feet |

***UTM location was derived from PLSS - see Help**

24

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 00415 O-12 | 2 | 2 | 2 | 14 | 12N | 10W | 240339 | 3907307* |

**Driller License:**

**Driller Name:** SANDIA WELL DRILLING

**Source:**

**Drill Start Date:** 08/31/1977 **Drill Finish Date:** 08/31/1977

**Log File Date:** 07/13/1978 **PCW Received Date:**

**Pump Type:** **Pipe Discharge Size:**

**Casing Size:** **Estimated Yield:** 0

**Depth Well:** 60 feet **Depth Water:**

***UTM location was derived from PLSS - see Help**

25

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 01115 | 4 | 4 | 3 | 15 | 13N | 09W | 247430 | 3915312* |

**Driller License:** AAA WATERWITCH, INC.
**Driller Name:** FREEMAN
**Source:** Shallow
**Drill Start Date:** 07/19/1986 **Drill Finish Date:** 07/21/1986
**Log File Date:** 12/12/1986 **PCW Received Date:**
**Pump Type:** **Pipe Discharge Size:**
**Casing Size:** 4.00 **Estimated Yield:** 30
**Depth Well:** 478 feet **Depth Water:** 204 feet

**Water Bearing Stratifications:**

| Top | Bottom | Description |
|---|---|---|
| 447 | 478 | Sandstone/Gravel/Conglomerate |

**Casing Perforations:**

| Top | Bottom |
|---|---|
| 458 | 478 |

***UTM location was derived from PLSS - see Help**

26

# New Mexico Office of the State Engineer
# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 00415 O-5 | 4 | 1 | 2 | 22 | 13N | 09W | 247820 | 3914889* |

**Driller License:**

**Driller Name:** SANDIA WELL DRILLING

**Source:** Shallow

**Drill Start Date:** 08/10/1977 **Drill Finish Date:** 08/10/1977

**Log File Date:** 04/03/1978 **PCW Received Date:**

**Pump Type:** **Pipe Discharge Size:**

**Casing Size:** 5.00 **Estimated Yield:** 2

**Depth Well:** 95 feet **Depth Water:** 72 feet

| Water Bearing Stratifications: | Top | Bottom | Description |
|---|---|---|---|
| | 80 | 95 | Shallow Alluvium/Basin Fill |

***UTM location was derived from PLSS - see Help**

27

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 00415 O-6 | 2 | 1 | 2 | 22 | 13N | 09W | 247820 | 3915089* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/11/1977 | **Drill Finish Date:** | 08/11/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 10 |
| **Depth Well:** | 90 feet | **Depth Water:** | 73 feet |

| Water Bearing Stratifications: | Top | Bottom | Description |
|---|---|---|---|
| | 80 | 90 | Other/Unknown |

***UTM location was derived from PLSS - see Help**

(30)

Revised June 1972

235732

STATE ENGINEER OFFICE

'78 MAY 22 AM 9 42

# WELL RECORD

## Section 1. GENERAL INFORMATION

STATE ENGINEER OFFICE SANTA FE, N.M. 87501

(A) Owner of well Fernandez Chavez Owner's Well No. 2
Street or Post Office Address P.O. Box 145
City and State Grants, NM 87020

Well was drilled under Permit No. B-524 and is located in the:

a. NW ¼ SE ¼ SE ¼ SW ¼ of Section 24 Township 13N Range 8W N.M.P.M.

b. Tract No. ______ of Map No. ______ of the ______

c. Lot No. ______ of Block No. ______ of the ______
Subdivision, recorded in ______ County.

d. X= ______ feet, Y= ______ feet, N.M. Coordinate System ______ Zone in the ______ Grant.

(B) Drilling Contractor Salazar Brothers Drilling, Inc License No. WD-748

Address P.O. BOX 2958 Milan, NM 87021

Drilling Began ______ Completed ______ Type tools 3 3/4" Size of hole 8 3/4" in.

Elevation of land surface or ______ at well is ______ ft. Total depth of well 520 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 260 ft.

## Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| 400 | 480 | 80 | Gray coarse sand | 100 |
| | | | | |
| | | | | |
| | | | | |

## Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet Top | Depth in Feet Bottom | Length (feet) | Type of Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| 5 9/16 | - | - | 0 | 500 | 520 | Guide Shoe | 400 | 480 |
| | | | | | | | | |
| | | | | | | | | |

## Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| 520 | 620 | 5" | - | 50bags | Commercial pumper |
| | | | | | |
| | | | | | |

## Section 5. PLUGGING RECORD

Plugging Contractor ______
Address ______
Plugging Method ______
Date Well Plugged ______
Plugging approved by:

______
State Engineer Representative

| No. | Depth in Feet Top | Depth in Feet Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

78 MAY 13 PM 4 15
STATE ENGINEER OFFICE
ALBUQUERQUE, N. MEX.

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ______ FWL ______ FSL ______

File No. B-524 Use Dom Location No. 13N.8W.24.344

28

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 00415 O-7 | 2 | 1 | 2 | 22 | 13N | 09W | 247820 | 3915089* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/12/1977 | **Drill Finish Date:** | 08/12/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 1 |
| **Depth Well:** | 80 feet | **Depth Water:** | 74 feet |

| Water Bearing Stratifications: | Top | Bottom | Description |
|---|---|---|---|
| | 75 | 80 | Shallow Alluvium/Basin Fill |

***UTM location was derived from PLSS - see Help**

#237709 (29)

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well ERNEST OrTegA Owner's Well No. 1
Street or Post Office Address Gen. Del.
City and State SAN MATEO N. M. 87050

Well was drilled under Permit No. B 815 and is located in the:

a. NE ¼ SE ¼ SW ¼ ¼ of Section 23 Township 13 N Range 8 W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____
Subdivision, recorded in VAlencia County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor SAUNders Drilling License No. WD 804
Address Box 3081 Milan N.M. 87021

Drilling Began ____ Completed ____ Type tools Rotary Size of hole 8" in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 300 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 260 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

| Depth in Feet From | Depth in Feet To | Thickness in Feet | Description of Water-Bearing Formation | Estimated Yield (gallons per minute) |
|---|---|---|---|---|
| 270 | 290 | 20 | white sand stone | 12 GPM |
| | | | | |
| | | | | |
| | | | | |

Section 3. RECORD OF CASING

| Diameter (inches) | Pounds per foot | Threads per in. | Depth in Feet Top | Depth in Feet Bottom | Length (feet) | Type of Shoe | Perforations From | Perforations To |
|---|---|---|---|---|---|---|---|---|
| 8 5/8 | PVC | — | 0 | 40 | 40 | — | — | — |
| 5 9/16 | PVC | | 0 | 300 | 300 | — | 270 | 290 |
| | | | | | | | — | — |

Section 4. RECORD OF MUDDING AND CEMENTING

| Depth in Feet From | Depth in Feet To | Hole Diameter | Sacks of Mud | Cubic Feet of Cement | Method of Placement |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

FEB 24 AM 10:37

'81 MAY 26 PM 1 22

STATE ENGINEER
SANTA FE, N.M.

Section 5. PLUGGING RECORD

Plugging Contractor ____
Address ____
Plugging Method ____
Date Well Plugged ____
Plugging approved by:

____
State Engineer Representative

| No. | Depth in Feet Top | Depth in Feet Bottom | Cubic Feet of Cement |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. B-815 Use dom/liv Location No. 13n.8w.23.342 Val. Co.

# New Mexico Office of the State Engineer
# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 00415 O-8 | 3 | 1 | 2 | 32 | 13N | 09W | 244344 | 3911793* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/30/1977 | **Drill Finish Date:** | 08/30/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 5 |
| **Depth Well:** | 54 feet | **Depth Water:** | 30 feet |

| **Water Bearing Stratifications:** | **Top** | **Bottom** | **Description** |
|---|---|---|---|
| | 30 | 54 | Shallow Alluvium/Basin Fill |

***UTM location was derived from PLSS - see Help**

32

# New Mexico Office of the State Engineer
# Point of Diversion Summary

| | (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) | | | | | | (NAD83 UTM in meters) | |
|---|---|---|---|---|---|---|---|---|
| **POD Number** | **Q64** | **Q16** | **Q4** | **Sec** | **Tws** | **Rng** | **X** | **Y** |
| B 00415 O-9 | 3 | 1 | 2 | 32 | 13N | 09W | 244344 | 3911793* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/30/1977 | **Drill Finish Date:** | 08/30/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 8 |
| **Depth Well:** | 57 feet | **Depth Water:** | 32 feet |

| **Water Bearing Stratifications:** | **Top** | **Bottom** | **Description** |
|---|---|---|---|
| | 50 | 57 | Shallow Alluvium/Basin Fill |

***UTM location was derived from PLSS - see Help**

37

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 00415 O-10 | 3 | 1 | 2 | 32 | 13N | 09W | 244344 | 3911793* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/30/1977 | **Drill Finish Date:** | 08/30/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 4 |
| **Depth Well:** | 59 feet | **Depth Water:** | 30 feet |

***UTM location was derived from PLSS - see Help**

34

# New Mexico Office of the State Engineer
# Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

| POD Number | Q64 | Q16 | Q4 | Sec | Tws | Rng | X | Y |
|---|---|---|---|---|---|---|---|---|
| B 00415 O-11 | 3 | 1 | 2 | 32 | 13N | 09W | 244344 | 3911793* |

| | | | |
|---|---|---|---|
| **Driller License:** | | | |
| **Driller Name:** | SANDIA WELL DRILLING | | |
| **Source:** | Shallow | | |
| **Drill Start Date:** | 08/30/1977 | **Drill Finish Date:** | 08/30/1977 |
| **Log File Date:** | 04/03/1978 | **PCW Received Date:** | |
| **Pump Type:** | | **Pipe Discharge Size:** | |
| **Casing Size:** | 5.00 | **Estimated Yield:** | 12 |
| **Depth Well:** | 72 feet | **Depth Water:** | 30 feet |

| Water Bearing Stratifications: | Top | Bottom | Description |
|---|---|---|---|
| | 35 | 45 | Other/Unknown |
| | 45 | 72 | Other/Unknown |

***UTM location was derived from PLSS - see Help**

# REFERENCES

# 101-104

National® Brand

# COMP BOOK

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David L. Meyerson

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1

KY - revise "wish list" by ~~next week~~ 2/6

2/2/09 Gae Zeller 290-3294
0821 left msg reviewing previous sample results from 2006

2/2/09 Deborah Letgrate
@0828 (505) 285 4695 (w)
Has new well. Have neighbors
Lot 8 Blk2 Los Altos Park
8 Margaret's Place, off Highway 605 @
mp 2
~1/8 to 1/4 mile from Padgett & Marquez.
Not connected to Milan water. Purchased property in April. Existing well went dry in July. New well is 340' deep. Drilled by Coyote drilling. Had tested for coliform.
Has another neighbor Donna.

2/2/2009 Milton Head - left msg re ~~Strathmore data~~
@ 0900

2/2/09 @ Al Cox.
1130 Village installed 3 lines under highway, but only 2 residents paid for extensions. Lange has not paid for this extension.

2/2/09 Milton Head
@ 1308 Wants 3rd & 4th quarters of gw data from Strathmore.

2

Charles [illegible] @ 0910 11/21/2006
Gay Zeller (505) 290 - 3294
Considering buying property near millsite ~2 miles from tailings pond South. Performed field test
nitrate 0.5
500-600' from property is racetrack.

Leon Bachman @ 1023
Asking about RO system.
Early 1980s
Gebol and Vigil (next door)

Gay Zeller @ 1120 11/21/2006
Were planning to close on house located on mountainside.
HMC is testing well. Sending sample "to state."
HMC did allow residences to obtain city water.
~2 miles from intersection w/ Milan Hwy.
Woman w/ contam well is ~0.6 mi. away.
Kathy Lange is neighbor.
Well may be 280' deep.
Well doesn't have Se
U is 0.0219 mg/L  Se is ND  TDS 600
Analysis by Assaigai  softness good.
Al Cox has arranged to test water.
Bank has given extension on closing.
Previously owned by Dr. Clark Williams
Jess Ward is investigating for Zeller.
600' to 1000' N of racetrack
? Does RO take out selenium

(2)

**NMED San Mateo Creek Basin Area, Cibola County, NM** **RESIDENTIAL WELL WATER SAMPLING SIGN-UP SHEET**

| Name<br>Physical Address<br>Phone Number(s)<br>Please print - thanks | Mailing Address (if different from physical address) | OK for NMED to sample your well (Signature required) | Best time of day to sample your well water | Has your well ever been sampled before (Y/N)? |
|---|---|---|---|---|
| Brokergait Rd<br>Directly across from BPH Billiton - directly across from paved entrance to mine. | 11 Ambrosia Lake<br>Grants, NM<br>87020<br>(5) | [signature]<br>505-285-2976 Home<br>812-972-0468 Cell<br>cell phone works at residence | Morning | 1200' deep well |
| Jo Anne Spurgeon<br>1410 Berryhill Rd<br>Milan, NM 87021 | P.O. Bx 3169<br>Milan, NM<br>87021<br>(6) ? | JoAnne Spurgeon<br>505-287-5430 | All Day | Yes - state may have copy of results<br>260' deep<br>SWL - 140' |
| Sandra Kinsman<br>4877 N St Hwy 605<br>San Mateo NM 87025 | 90517 San Mateo<br>San Mateo NM<br>87025<br>(7) | ~~Sandra~~<br>Sandra Kinsman<br>505 274 1696<br>Test for Bac-T. | All Day | no |
| Cathy Tommy Narquez<br>4873 Hwy 605<br>San Mateo N.M.<br>87020 | Same<br>(7) | Cathy Marquez<br>287-5143 | All Day | N |

Lymphocytic colitus
spring living 4 years

old well pump not work
that was sampled for WB

Disclaimer: Residents with private wells within the San Mateo Creek Basin (area covered by the Health Advisory) may sign up to have their well considered for sampling by NMED Staff at a later date for a more extensive list of analytes including uranium.

NMED San Mateo Creek Basin Area, Cibola County, NM RESIDENTIAL WELL WATER SAMPLING SIGN-UP SHEET

| Name<br>Physical Address<br>Phone Number(s)<br>Please print - thanks | Mailing Address (if different from physical address) | OK for NMED to sample your well (Signature required) | Best time of day to sample your well water | Has your well ever been sampled before (Y/N)? |
|---|---|---|---|---|
| Tom Jackson<br>Hwy 605 N. 17mm<br>San Mateo Nm. 87020<br>P.O. Box 279 Grants, nm | 505-290-0313<br>720' deep<br>60' screen bottom up<br>(9) | [signature] | morning | N |
| Dwayne Wilson<br>2812 Hwy 605<br>P.O. Box 2613<br>Milan, N.M.<br>87021 | 505-290-0631<br>150' Deep<br>P.V.C. Casing<br>(10) | Dwayne Wilson | Any | Yes |
| Charlie M Sandoval<br>P.O. Box 622<br>Grants NM 87020 | P O Bx 622<br>Grants<br>130'<br>(11) | Maralla Sandoval | any | N |
| Emilia Chavez<br>Behind Old San Mateo School<br>San Mateo, NM | PO 145<br>Grants NM<br>87020<br>(12) 505-287-5428 | Emilia Chavez<br>uncle Ruben Romero knows well specs. | anytime | N |

Disclaimer: Residents with private wells within the San Mateo Creek Basin (area covered by the Health Advisory) may sign up to have their well considered for sampling by NMED Staff at a later date for a more extensive list of analytes including uranium.

3

# NMED San Mateo Creek Basin Area, Cibola County, NM    RESIDENTIAL WELL WATER SAMPLING SIGN-UP SHEET

| **Name**<br>**Physical Address**<br>**Phone Number(s)**<br>Please print - thanks | **Mailing Address** (if different from physical address) | **OK for NMED to sample your well (Signature required)** | **Best time of day to sample your well water** | **Has your well ever been sampled before (Y/N)?** |
|---|---|---|---|---|
| John Sandoval<br>287-4228 | 90035 San Mateo<br>San Mateo NM<br>87020<br>1 on map | John Sandoval | morning | n |
| Nova Cornett/Harry L. Hall<br>505 290-2317 505-290 7599 | 2260 W. Hwy 66<br>Grants, NM<br>87020<br>2 | Nova Cornett | Eve. | ukn |
| VIRGINIA GATES<br>(505) 240.1195<br>1708 Zuni<br>Grants, NM | P.O. Box 3446<br>MILAN, NM<br>87020<br>3 | Virginia Gates | PM | Yes<br>Thinks it is on a PWS. |
| Michael Garcia<br>505-287-9786<br>*he was contacted by David M. before. | P.O Box 622<br>GRANTS NM<br>87020<br>4 | Michael Garcia | A.M | N |

Disclaimer: Residents with private wells within the San Mateo Creek Basin (area covered by the Health Advisory) may sign up to have their well considered for sampling by NMED Staff at a later date for a more extensive list of analytes including uranium.

(4)

NMED San Mateo Creek Basin Area, Cibola County, NM RESIDENTIAL WELL WATER SAMPLING SIGN-UP SHEET

| **Name**<br>**Physical Address**<br>**Phone Number(s)**<br>Please print - thanks | **Mailing Address** (if different from physical address) | **OK for NMED to sample your well (Signature required)** | **Best time of day to sample your well water** | **Has your well ever been sampled before (Y/N)?** |
|---|---|---|---|---|
| Phillip R. Sandoval<br>4070 San Mateo Rd<br>Grants N.M 87020 | Same<br>(13) | Phillip R Sandoval<br>287-7506 | Anytime wants to be there for sampling | No<br>590' deep<br>520 = SWL |
| | | | | |
| | | | | |
| | | | | |

Disclaimer: Residents with private wells within the San Mateo Creek Basin (area covered by the Health Advisory) may sign up to have their well considered for sampling by NMED Staff at a later date for a more extensive list of analytes including uranium.

# HYDROGEOLOGY AND WATER RESOURCES

# OF THE

# AMBROSIA LAKE-SAN MATEO AREA

# McKINLEY AND VALENCIA COUNTIES, NEW MEXICO

by

Robert C. Brod





Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Science in Geology

New Mexico Institute of Mining and Technology

Socorro, New Mexico

June, 1979

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## LIST OF PLATES

Table 3, Records of wells from the Ambrosia Lake-San Mateo Area

Explanation

Owner or name: Name of owner or name of well, based on available information.

Field number: Identification used in figures in this report, based on aquifer and location: A, alluvium; MF Menefee Formation; P, Point Lookout Sandstone; DA, Dalton Sandstone; MN, Mancos Shale; D, Dakota Sandstone; W, Westwater Canyon Sandstone; B, Bluff Sandstone; C, Chinle Formation; S, San Andres Limestone; U, unknown aquifer.

Location number: Well location and identification according to New Mexico system.

Water Depth: Measured and reported depths, and date of measurement; those prior to 1977 from other sources (see Table 4).

Principle Aquifer: Stratigraphic-unit symbols on geologic map, Plate 1.

Use: D, domestic; I, industrial; S, stock; PS, public supply; O, observation; U, unused.

Chemical Analysis: *, data in Appendix B.

| NAME OR OWNER'S NAME | FIELD NO. | LOCATION NUMBER | ELEV. (ft) | TD (ft) | WATER DEPTH (ft) | DATE | WATER SURF. ELEV. (ft) | PRIN. AQ. | YEAR CONSTRUC. | USE | CHEM ANAL. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G.P. Roundy | A1 | 12.9.6.312 | 6673 | 91 | 79.9 | 7/56 | 6593.1 | Qa | -- | S | -- | Abandoned |
| G.P. Roundy | A2 | 12.9.7.343 | 6640 | 98 | 58.0 | 11/55 | 6582.0 | Qa | 1945 | S | -- | Abandoned |
| G.P. Roundy | C1 | 12.9.8.431 | 6770 | 98 | 84.8 | 7/56 | 6685.2 | T̄Rc | 1917 | D | * | |
| G.P. Roundy | C2 | 12.10.1.222 | 6675 | 192 | 45.9 | 7/56 | 6629.1 | T̄Rc | 1952 | S | -- | Abandoned |
| G.P. Roundy | A3 | 12.10.12.221 | 6657 | 81 | 67.7 | 7/56 | 6589.3 | Qa | before 1917 | S | -- | |
| G.P. Roundy | A4 | 12.10.12.433 | 6625 | 100 | 58.1 | 7/56 | 6566.9 | Qa | 1945 | S | -- | |
| Wilson | A5 | 12.10.13.424 | 6640 | 100 | 54.5 | 8/77 | 6585.0 | Qa | 1961 | D,I | -- | |
| Wilson | A6 | 12.10.14.212 | 6621 | -- | 50.1 | 7/56 | 6570.9 | Qa | 1945 | S | -- | |
| T.A. Morris & Son | S2 | 12.10.23.233 | 6592 | 865 | 115.6<br>145.6 | 2/46<br>8/57 | 6476.4<br>6444.4 | Psa | 1945 | I | -- | Abandoned |

Table 3, cont.

| NAME OR OWNER'S NAME | FIELD NO. | LOCATION NUMBER | ELEV. (ft) | TD (ft) | WATER DEPTH (ft) | DATE | WATER SURF. ELEV. (ft) | PRIN. AQ. | YEAR CONSTRUC. | USE | CHEM ANAL. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G.P. Roundy | C5 | 12.10.23.233a | 6594 | 500 | 75' | 7/46 | 6519.0 | TRc | 1945 | S | -- | |
| Ranchers Expl. & Devel. | D1 | 13.8.7.434 | -- | -- | -- | -- | -- | Kd | -- | D,I | * | Johnny M Mine |
| E. Michael | MF1 | 13.8.14.422 | 7180 | 200 | 71.5 | 9/62 | 7108.5 | Kmf | -- | S | -- | |
| | | | | -- | 56 | 10/72 | 7124.0 | | | | -- | |
| F. Lee | U1 | 13.8.17.223 | 7174 | -- | -- | -- | -- | Unk | -- | | * | |
| Fernandez Co. | MF2 | 13.8.22.242 | 7110 | 157.3 | 37.5 | 10/62 | 7072.5 | Kmf | -- | D,S | * | Hdqtrs. |
| | | | | | 33.3 | 10/72 | 7076.7 | | | | -- | |
| T. Marquez | MF3 | 13.8.23.324 | 7165 | NA | NA | -- | -- | Kmf | -- | S | * | |
| B. Isidorg | MF4 | 13.8.23.342 | 7169 | 305 | 37.5 | 2/78 | 7131.5 | Kmf | -- | D | * | Trailer Court |
| T. Marquez | MF5 | 13.8.23.431 | 7180 | 92 | 38.2 | 9/62 | 7141.8 | Kmf | 1950 | D | * | |
| | | | | | 35 | 10/72 | 7145.0 | | | | | |
| Gulf Minerals | MF6 | 13.8.24.141 | 7248 | 250 | 59.0 | 2/78 | 7189 | Kmf | -- | D,S | * | Abandoned |
| A. Canderlaria | MF7 | 13.8.24.141a | 7270 | 280 | -- | -- | -- | kmf | 1972 | D | -- | |
| A. Canderlaria | MF8 | 13.8.24.223 | 7320 | -- | 140.7 | 9/62 | 7179.3 | Kmf | -- | D,S | * | |
| | | | | | 195 | 10/72 | | Kmf | | | | |
| Gulf Minerals | Mw | 12.8.24.234 | 7364 | 3550 | 1062 | 10/72 | 6302 | Jmw | -- | I | -- | Aquifer test hole |
| F. Gonzales | MF9 | 13.8.24.334 | 7290 | 200 | 50 | before 1962 | | Kmf | -- | D | -- | |
| | | | | | 87.75 | 2/78 | 7202.2 | | | | * | |
| S. Marquez | MF10 | 13.8.24.334a | 7300 | 140 | 89.5 | 9/62 | 7210.5 | Kmf | -- | N | -- | |
| S. Marquez | MF11 | 13.8.24.334b | 7295 | 200 | 40 | before 1962 | | Kmf | 1961 | D | -- | |
| | | | | | 88.1 | 2/78 | 7207.0 | | | | -- | |
| S. Mateo School | MF12 | 13.8.24.334 | 7300 | 120 | 101.0 | 2/78 | 7199.0 | Kmf | -- | PS | * | |
| F. Chavez | MF13 | 13.8.24.341 | 7308 | 250 | -- | -- | -- | Kmf | 1958 | D | -- | Abandoned |
| F. Chavez | MF14 | 13.8.24.341 | 7325 | 500 | 139.0 | 3/78 | 7186.0 | Kmf | 1978 | D | -- | |
| P. Pena | A7 | 13.8.75.111 | 7295 | 21 | 19.5 | 9/62 | 7275.5 | Qa | -- | D | -- | Abandoned |

Table 3, cont.

| NAME OR OWNER'S NAME | FIELD NO. | LOCATION NUMBER | ELEV. (ft) | TD (ft) | WATER DEPTH (ft) | DATE | WATER SURF. ELEV. (ft) | PRIN. AQ. | YEAR CONSTRUC. | USE | CHEM ANAL. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| √ J. Gonzales | MF15 | 13.8.25.112 | 7320 | 150 | 43.0 | 9/62 | 7277.0 | Kmf | -- | D | -- | |
| √ J. Hope | MF16 | 13.8.25.114 | 7290 | 35 | 27 | 10/72 | 7263.0 | Kmf | -- | D | -- | Broken, 1973 |
| √ E. Michael | MF17 | 13.8.25.114a | 7310 | 120 | 35.9 | 9/62 | 7274.1 | Kmf | -- | D | -- | |
| √ E. Michael | MF18 | 13.8.25.114b | 7310 | 250 | 80 | 10/72 | 7230.0 | Kmf | 1969 | D | -- | |
| √ P. Sandoval √ | MF19 | 13.8.26.211 | 7215 | 40 | 33.2<br>34 | 9/62<br>10/72 | 7181.8<br>7181.0 | Kmf | -- | D | --<br>-- | |
| √ Community of San Mateo | P1 | 13.8.25.122 | -- | -- | -- | -- | -- | Kpl | -- | PS | -- | Public supply, near tanks |
| √ N. Brookes | MF20 | 13.8.26.211a | 7207 | 180 | 36 | 8/73 | 7171 | Kmf | -- | D,S | * | |
| √ Community of San Mateo | P2 | 13.8.26.212 | 7240 | 336 | 281 | -- | 6959 | Kpl | -- | PS | -- | Old town well |
| √ Community of San Mateo | MF | 13.8.26.212a | 7240 | 200 | 32.8 | -- | -- | Kmf | -- | PS | -- | Modified old town well |
| √ Community of San Mateo | P3 | 13.8.26.212b | 7240 | -- | -- | -- | -- | Kpl | -- | PS | * | New town well (Not used 1978) |
| √ F. Salazar | MF21 | 13.8.26.222 | 7267 | 57.5 | 21.5 | 2/78 | 7245.5 | Kmf | -- | D | * | Used for trailers |
| √ Fernandez Co. | MF22 | 13.8.27.133 | 7072 | -- | 24.2 | 8/77 | 7047.8 | Kmf | -- | N | -- | Old CCC abandoned |
| √ F. Lee | MF23 | 13.8.33.234 | 7185 | 500 | 133 | 8/77 | 7052 | Kpl | -- | O | * | |
| √ Km 5-2 | A8 | 13.9.5.141 | 6896 | 34 | 19.7 | EPA 3/75 | 6876 | Qa | -- | O | * | |
| √ K-M 5-1 | A9 | 13.9.5.214 | 6904 | 34 | 23.9 | EPA 3/75 | 6880 | Qa | -- | O | * | |
| √ M. Marquez | D2 | 13.9.13.111 | 6935 | 155 | 142.9 | 2/58 | 6792.1 | Kd | -- | N | -- | |
| √ J.D. Ragland | W2 | 13.9.15.343 | 6840 | 260 | 223.7 | 12/57 | 6616.3 | Jmw | 1957 | D | -- | |
| √ B. Willcoxson | D3 | 13.9.16.333 | 6910 | 97 | 87.6 | 12/57 | 6822.4 | Kd | 1954 | N | -- | Exploration hole |
| √ B. Willcoxson | D4 | 13.916.341 | 6810 | 91 | 75.9 | 12/57 | 6734.1 | Kd | 1953 | N | -- | |
| √ B. Willcoxson | D5 | 13.9.16.341a | 6810 | 100 | -- | -- | -- | Kd | 1920 | S | -- | |
| √ B. Willcoxson | W3 | 13.9.16.411 | -- | 250 | -- | -- | -- | Kmw | -- | -- | * | |

Table 3, cont.

| NAME OR OWNER'S NAME | FIELD NO. | LOCATION NUMBER | ELEV. (ft) | TD (ft) | WATER DEPTH (ft) | DATE | WATER SURF. ELEV. (ft) | PRIN. AQ. | YEAR CONSTRUC. | USE | CHEM ANAL. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B. Willcoxson | W4 | 13.9.16.413 | 6820 | 250 | -- | -- | -- | Jmw | -- | S | -- | |
| Kop-Ran Dev. | T1 | 13.9.19.413 | 6990 | 595 | R360 | -- | 6630 | Jt | 1976 | | -- | |
| N. Marquez | W5 | 13.9.21.412 | 6785 | 165 | 141.7 | 10/57 | 6643 | Jmw | -- | S | -- | |
| N. Marquez | A10 | 13.9.21.414 | -- | 145 | 64.0 | EPA 3/75 | 6721 | Qa | -- | -- | * | |
| B. Jones | W6 | 13.9.22.111 | 6825 | -- | P220 | -- | 6605 | Jmw | 1975 | D | * | |
| Ingersoll-Rand | W7 | 13.9.22.121 | 6830 | 297 | 204.8 | 12/58 | 6625 | Jmw | 1958 | I | -- | |
| | | | | 297 | -- | | | | | | * | |
| Bingham | W8 | 13.9.22.121 | 6835 | 330 | 198.5 | 10/62 | 6636.5 | Jmw | -- | P | -- | Trailer Court |
| | | | | 260 | -- | -- | -- | | | | * | |
| C. Sandoval | A11 | 13.9.22.212 | 6830 | 95 | 87.5 | 12/57 | 6742.5 | Qa | 1955 | S | -- | |
| | | | | 130 | 37.1 | 3/75 | 6792.9 | | | | | |
| N. Marquez | W9 | 13.9.23.212 | 6653 | 280 | 50.5 | 3/75 | 6602.0 | Jmw | -- | -- | * | |
| N. Marquez | A12 | 13.9.24.221 | 6910 | 80 | 56.5 | 12/57 | 6853.5 | Qa | -- | S | -- | |
| Calvmet Hecla Inc. | A3 | 13.9.24.221a | 6910 | 80 | 56.6 | 12/57 | 6853.4 | Qa | 1955 | I,D | -- | |
| | A14 | 13.9.28.111 | 6780 | 125 | 58.2 | 8/5/77 | 6722.0 | Qa | | S | * | |
| Westvaco Min. Dev. | T2 | 13.9.29.341 | 6755 | 190 | dry | -- | -- | Jt | -- | -- | -- | Abandoned |
| Mt. Taylor Corp. | C6 | 13.9.29.341 | 6760 | 455 | -- | -- | -- | T c | 1958 | D | -- | |
| N. Otero | A15 | 13.9.32.112 | 6795 | 110 | 65 | 10/77 | 6730 | Qa | -- | D,I | -- | |
| Fernandez Co. | DA2 | 14.8.4.334 | 7050 | -- | 150.3 | 10/62 | 6899.7 | Kcda | -- | S | -- | Abandoned |
| Fernandez Co. | MN1 | 14.8.15.244 | 7210 | 1320 | 500 | (RPT) | 6710.0 | Km | 1924 | S | -- | |
| B. Willcoxson | MN2 | 14.9.5.341 | 7245 | 858 | 414.1 | 12/57 | 6830.9 | Km | 1952 | N | -- | |
| A. Berryhill | W10 | 14.9.18.243 | 7200 | 800 | 744 | -- | 6456.0 | Jmw | 1957 | D | -- | |
| Kerr-McGee | W11 | 14.9.28.143 | 6987 | 710 | 440.5 | 9/56 | 6546.5 | Jmw | 1956 | D,I | -- | |
| Kerr-McGee | W12 | 14.9.28.233 | 7003 | 700 | -- | -- | -- | Jmw | 1956 | O | -- | |

Table 3, cont.

| NAME OR OWNER'S NAME | FIELD NO. | LOCATION NUMBER | ELEV. (ft) | TD (ft) | WATER DEPTH (ft) | DATE | WATER SURF. ELEV. (ft) | PRIN. AQ. | YEAR CONSTRUC. | USE | CHEM ANAL. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kerr-McGee | W13 | 14.9.28.234 | 7022 | 801 | 529 | 10/57 | 6493.0 | Jmw | 1957 | I | -- | |
| Kerr-McGee | W14 | 14.9.28.234a | 7021 | 700 | -- | -- | -- | Jmw | 1956 | O | -- | |
| Kerr-McGee | W15 | 14.9.28.234b | 7022 | 835 | 445 | -- | 6577.0 | Jmw | 1956 | O | -- | |
| Kerr-McGee | W16 | 14.9.28.234c | 7032 | 840 | -- | -- | -- | Jmw | 1956 | O | -- | |
| Kerr-McGee | W17 | 14.9.28.412 | 7008 | 840 | -- | -- | -- | Jmw | 1956 | O | -- | |
| Kerr-McGee | S2 | 14.9.28.441 | 6982 | 3275 | 542 | 10/57 | 6440.0 | Psa | 1956 | I | -- | Water test well |
| A & J Trailer Park | W18 | 14.9.29.312 | 6980 | 735 | 450 | 2/58 | 6530.0 | Jmw | 1958 | D | -- | Abandoned |
| Kerr-McGee | W19 | 14.9.30.221 | 6984 | -- | 478 | 12/57 | 6506.0 | Jmw | -- | I | -- | |
| A. Berryhill | W20 | 14.9.30.222 | 6990 | 925 | -- | -- | -- | Jmw, Jb | -- | D,S | -- | Abandoned |
| K-M 46 | A16 | 14.9.30.331 | 6958 | 38 | 33.1 | 2/75 | 6924.9 | Qa | -- | O | * | |
| K-M 47 | A17 | 14.9.30.341 | 6947 | 62 | 23.9 | 2/75 | 6923.1 | Qa | -- | O | * | |
| K-M 48 | A18 | 14.9.30.432 | 6952 | 53 | 37.1 | 2/75 | 6914.9 | Qa | -- | O | * | |
| K-M B-2 | A19 | 14.9.31.421 | 6926 | 27 | 3.4 | 3/75 | 6922.6 | Qa | -- | O | * | |
| K-M 50 | A20 | 14.9.32.114 | 6936 | 55 | 45.9 | 2/75 | 6890.1 | Qa | -- | O | * | |
| United Nuclear-Homestake | W21 | 14.9.32.122 | 6942 | 644 | 413 | 4/57 | 6529.0 | Jmw | 1957 | N | -- | Now air vent |
| United Nuclear-Homestake | W22 | 14.9.32.122a | 6942 | 620 | 412 | 4/57 | 6530.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W23 | 14.9.32.122b | 6943 | 620 | 414 | 11/57 | 6529.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W24 | 14.9.32.122c | 6948 | 500 | -- | -- | -- | Jmw | -- | I | -- | |
| K-M S-12 | A21 | 14.9.32.313 | 6910 | 41.0 | 3.0 | 2/75 | 6907.0 | Qa | -- | O | * | |
| K-M 44 | KM 3 | 14.9.32.312 | 6923 | 138 | 108 | 2/75 | 6815.0 | Km | -- | O | * | |
| K-M 43 | A22 | 14.9.32.321 | 6922 | 53 | 21.0 | 2/75 | 6901.0 | Qa | -- | O | * | |
| K-M 51 | A23 | 14.9.32.322 | 6924 | 63 | 28.9 | 2/75 | 6895.1 | Qa | -- | O | * | |

| NAME OR OWNER'S NAME | FIELD NO. | LOCATION NUMBER | ELEV. (ft) | TD (ft) | WATER DEPTH (ft) | DATE | WATER SURF. ELEV. (ft) | PRIM. AQ. | YEAR CONSTRUC. | USE | CHEM ANAL. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. Berryhill | W25 | 14.9.32.314 | 6910 | 550 | 397.4 | 12/57 | 6512.6 | Jmw | -- | -- | -- | |
| A. Berryhill | W26 | 14.9.32.314a | 6910 | 550 | -- | -- | -- | Jmw | -- | S | -- | Abandoned |
| United Nuclear | W27 | 14.9.34.422 | 7008 | 508 | -- | 1958 | 6500.0 | Jmw | 1958 | N | -- | Exploration hole |
| United Nuclear | W28 | 14.9.36.313 wrong? | 7070 | 1500 | 582 | 1958 | 6488.0 | Jmw | 1958 | N | -- | Exploration hole |
| Hydro-Nuclear | B1 | 14.10.11.434 | 7060 | 750 | 460 | -- | 6600.0 | Jb | -- | D,I | -- | |
| B. Willcoxson | B2 | 14.10.14.221 | 7060 | 702 | -- | -- | -- | Jb | 1925 | S | -- | |
| United Nuclear-Homestake | W29 | 14.10.23.114 | 7053 | 796 | 502 | 5/57 | 6551.0 | Jmw | 1956 | I | -- | |
| United Nuclear-Homestake | W30 | 14.10.23.132 | 7034 | 780 | 485 | 5/57 | 6549.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W31 | 14.10.23.134 | 7030 | 875 | 481 | 5/57 | 6549.0 | Jmw | 1956 | O | -- | |
| United Nuclear-Homestake | W32 | 14.10.23.141 | 7047 | 770 | 498 | 5/57 | 6549.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W33 | 14.10.23.142 | 7037 | 707 | 489 | 5/57 | 6548.0 | Jmw | 1955 | O | -- | |
| United Nuclear-Homestake | W34 | 14.10.23.232 | 7022 | 720 | 473 | 5/57 | 6549.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W35 | 14.10.23.232a | 7022 | 715 | 479 | 5/57 | 6543.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W36 | 14.10.23.2326 | 7022 | 720 | 477 | 5/57 | 6545.0 | Jmw | 1957 | O | -- | |
| Kerr-McGee | W37 | 14.10.24.423 | 6980 | -- | 449 | 2/57 | 6531.0 | Jmw | -- | N | -- | |
| United Nuclear-Homestake | W38 | 14.10.25.132 | 6476 | 766 | 431 | 4/57 | 6045.0 | Jmw | 1956 | O | -- | |
| United Nuclear-Homestake | W39 | 14.10.25.132a | 6974 | 720 | 424 | 4/57 | 6550.0 | Jmw | 1956 | O | -- | |
| United Nuclear-Homestake | W40 | 14.10.25.132b | 6974 | 735 | 425 | 4/57 | 6549.0 | Jmw | 1956 | O | -- | |
| United Nuclear-Homestake | W41 | 14.10.25.132c | 6974 | 735 | 424 | 4/57 | 6550.0 | Jmw | 1956 | O | -- | |
| United Nuclear-Homestake | W42 | 14.10.25.132d | 6975 | 725 | 426 | 4/57 | 6549.0 | Jmw | 1956 | O | -- | |
| United Nuclear-Homestake | W43 | 14.10.25.321 | 6971 | 735 | 430 | 5/57 | 6541.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W44 | 14.10.25.411 | 6970 | 753 | 430 | 5/57 | 6540.0 | Jmw | 1957 | O | -- | |
| United Nublear-Homestake | W45 | 14.10.25.411a | 6971 | 750 | 432 | 5/57 | 6539.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W46 | 14.10.25.413 | 6971 | 722 | 432 | 5/57 | 6539.0 | Jmw | 1957 | O | -- | |
| United Nuclear-Homestake | W47 | 14.10.35.221 | 7015 | 760 | 461 | 12/57 | 6554.0 | Jmw | 1954 | S | -- | |
| KM 36 2 | MN4 | 14.10.36.422 | 7010 | 57 | 33.2 | 3/75 | 6977.0 | Km | -- | O | * | |

Table 4 Chemical Analysis of Ground Water Samples from the Ambrosia Lake-San Mateo Area

Explanation

Location: Location numbers identify wells according to New Mexico well-numbering system.

Field Number: Well identification used in figures in this report, as listed in the table of well records, Appendix A.
W(m) and D(m) indicate ground-water samples taken from mines, from the Westwater Canyon Sandstone and Dakota Sandstone, respectively.

Data Source: *: This report. Analysis by New Mexico Bureau of Mines and Mineral Resources.
SE-20: Gordon (1961)
EPA: Kaufmann and others (1975)
R: Mark Malkoski, Ranchers Exploration and Development, Grants, personal communication.
G: Gulf Minerals Corp. (1974)
SE-35: Cooper and John (1967)
B: Nancy Brooks, San Mateo Water-Users Association, San Mateo, written communication.

Chemical constiuents in parts per million.

| LOCATION | FIELD NUMBER | SAMPLE DATE | DATA SOURCE | $HCO_3$ | Cl | $SO_4$ | $NO_3$ | Na | K | Mg | Ca | TDS | SP. COND. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| √12.9.8.431 | C1 | 7/25/56 | SE-20 | 246 | 53 | 57 | -- | 163 | | -- | -- | -- | -- | |
| √ | | 8-24-77 | * | 271 | 55 | 60 | 115 | 200 | 0.8 | 0.4 | 5.0 | 580 | 960 | |
| √12.10.1.222 | C2 | 7-24-56 | SE-20 | 34 | 9590 | 1350 | -- | 5740 | | -- | -- | -- | 27,600 | |
| √12.10.12.221 | A3 | 8/4/77 | * | 395 | 125 | 752 | 1.2 | 518 | 3.5 | 5.3 | 36 | 1780 | 2,600 | |
| √12.10.12.433 | A4 | 2/75 | EPA | -- | 56 | -- | 14 | -- | -- | -- | -- | 2100 | 2,200 | |
| √12.10.13.424 | A5 | 8/24/77 | * | 293 | 24 | 49 | 16 | 134 | 0.5 | 3.9 | 14 | 445 | 780 | |
| √12.10.12.212 | A6 | 8/4/77 | * | 278 | 84 | 288 | 2.9 | 309 | 3.1 | 0.1 | 14 | 1030 | 1,540 | |
| √13.8.7.434 | D1 | 10/20/75 | R | --- | 38 | 78 | 0.1 | -- | -- | -- | -- | 659 | -- | |
| | | 3/10/78 | * | 386 | 19 | 90.5 | 0.0 | 89 | 4.6 | 17.8 | 4 | 494 | 960 | |
| √13.8.14.442 | MF1 | 10/11/72 | G | 515 | 18.1 | 430 | -- | 350 | 4.6 | 36 | 79 | 1445 | 2,123 | |
| √13.8.17.223 | U | 8/23/77 | * | 254 | 7.3 | 289 | 2.9 | 170 | 5.5 | 22 | 29 | 669 | 1,100 | |

Table 4, cont.

| LOCATION | FIELD NUMBER | SAMPLE DATE | DATA SOURCE | $HCO_3$ | Cl | $SO_4$ | $NO_3$ | Na | K | Mg | Ca | TDS | SP. COND. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.8.18.400 | U | 3/10/78 | * | 258 | 6 | 145 | 0.35 | 104 | 4 | 6.3 | 43 | 438 | 680 | Johnny M Mine |
| 13.8.18.400 | W(ma) | 3/10/78 | * | 223 | 4 | 163 | 0 | 108 | 4.5 | 5.6 | 34 | 700 | 700 | Johnny M Mine |
| 13.8.22.242 | MF2 | 10/18/72 | G | 217 | 4 | 8 | -- | 60 | 1.3 | 2.1 | 6.1 | 323 | 332 | |
| | | 8/23/77 | * | 207 | 4.9 | 22 | 0.8 | 76 | 1.5 | 1.7 | 7 | 240 | 360 | |
| 13.8.23.324 | MF3 | 2/9/78 | * | 188 | 5 | -- | 0.0 | 21 | 3.3 | 3.2 | 45 | 172 | 460 | |
| 13.8.23.431 | MF5 | 10/17/72 | G | 198 | 8 | 9.5 | -- | 20 | 3.4 | 6.4 | 42 | 358 | 315 | |
| | | 2/11/78 | * | 188 | 0.14 | | 0 | 20.1 | 3.3 | 6.1 | 40.0 | 169 | 310 | |
| 13.8.24.141 | MF6 | 2/21/78 | * | 431 | 6 | 185 | 0.0 | 268 | 1.1 | 0.8 | 3.0 | 680 | 1,150 | |
| 13.8.24.141a | MF7 | 3/9/78 | * | 385 | 4 | 99 | 0.1 | 206 | 1.1 | 0.4 | 1.2 | 510 | 880 | |
| 13.8.24.223 | MF8 | 9/10/62 | SE-35 | 379 | 4.2 | 70 | 0.4 | 206 | 0.9 | 0.0 | 1.6 | 517 | 833 | |
| | | 10/17/72 | G | 417 | 12 | 48 | -- | 190 | 0.9 | 0.5 | 3.0 | 685 | 800 | |
| 13.8.24.234 | W1 | 1974 | G | 280 | 10 | 265 | 0.8 | 240 | 2.0 | 0.5 | 4.0 | 650 | 900 | |
| 13.8.24.334 | MF9 | 2/9/78 | * | 365 | 18 | 96 | 0.0 | 154 | 1.5 | 9.2 | 26.4 | 448 | 790 | |
| 13.8.24.334a | MF10 | 2/9/78 | * | 381 | 42 | 169 | 13 | 131 | 1.5 | 25 | 74 | 647 | 1,000 | |
| 13.8.24.334b | MF11 | 9/10/62 | SE-35 | 370 | 14 | 102 | 8.3 | 179 | 1.7 | 3.4 | 14 | 516 | 814 | |
| 13.8.24.334c | MF12 | 2/21/78 | * | 401 | 32 | 316 | 5.3 | 249 | 1.6 | 22 | 44 | 870 | 1,400 | |
| 13.8.24 ?-22 | | 2/78 | * | 279 | 12 | 228 | 0.1 | 226 | 2.2 | 0.3 | 4.7 | 613 | 1,020 | Gulf Discharge |
| 13.8.25.114b | MF18 | 10/11/72 | G | 264 | 17 | 11 | -- | 70 | 22 | 5.7 | 23 | 434 | 509 | |
| 13.8.26.211 | MF19 | 10/72 | G | 639 | 8.0 | 8.3 | -- | 235 | 2.0 | 2.7 | 10.2 | 928 | 954 | |
| 13.8.26.211a | MF20 | 7/76 | B | 375 | 10 | 71 | 1.4 | 74 | 3.1 | 27 | 54 | 460 | 729 | |
| 13.8.26.212 | P2 | 9/11/62 | SE-35 | 365 | 22 | 103 | -- | 76 | 3.0 | 24 | 74 | 695 | 808 | Community Well |
| 13.8.26.212a | | 10/24/72 | B | 654 | 8.0 | 9.9 | -- | 258 | 1.3 | 0.9 | 3.1 | 953 | 964 | Community Well |
| 13.8.26.222 | MF21 | 2/21/78 | * | 244 | 8.0 | 37 | 0.65 | 27 | 5.4 | 9.5 | 55 | 265 | 450 | |
| 13.8.27.133 | MF22 | 8/22/77 | * | 502 | 15 | 1.1 | -- | 205 | 2.0 | 1.4 | 4.0 | 531 | 850 | |

Table 4, cont.

| LOCATION | FIELD NUMBER | SAMPLE DATE | DATA SOURCE | $HCO_3$ | Cl | $SO_4$ | $NO_3$ | Na | K | Mg | Ca | TDS | SP. COND. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.8.30.100 | W(mb) | 4/63 | SE-35 | 249 | 3.5 | 88 | 0.2 | 69 | 3.2 | 7.2 | 45 | 362 | 572 | San Mateo Mine |
| 13.8.200 | D(ma) | 4/63 | SE-35 | 346 | 11 | 206 | 0.9 | 48 | 4.8 | 25 | 124 | 124 | 912 | San Mateo Mine |
| 13.8.33.234 | P4 | 8/22/77 | * | 561 | 20 | 10 | 0.0 | 218 | 4.0 | 0.4 | 2.0 | 538 | 940 | |
| 13.9.5.141 | A8 | 3/3/75 | EPA | -- | 1300 | -- | 1.3 | -- | -- | -- | -- | 6700 | 8,000 | |
| 13.9.5.214 | A9 | 3/3/75 | EPA | -- | 61 | -- | 0.40 | -- | -- | -- | -- | 4800 | 5,000 | |
| 13.9.15.343 | W2 | 2/13/58 | SE-35 | 451 | 21 | 405 | 7.7 | 153 | | -- | 169 | 1010 | 1,430 | |
| | | 2/26/75 | EPA | -- | 34 | -- | 4.4 | -- | -- | -- | -- | 1900 | 2,050 | |
| 13.9.16.411 | W3 | 2/26/75 | EPA | -- | 23 | -- | 0.09 | -- | -- | -- | -- | 1900 | 3,250 | |
| 13.9.21.414 | A10 | 3/1/75 | EPA | -- | 43 | -- | 24 | -- | -- | -- | -- | 2200 | 4,250 | |
| 13.9.22.111 | W6 | 8/24/77 | -- | 192 | 54 | 1188 | 47 | 230 | 9.2 | 91 | 285 | 2255 | 2,720 | |
| 13.9.22.121 | W7 | 2/26/75 | EPA | -- | 36 | -- | 18 | -- | -- | -- | -- | 2200 | 2,150 | |
| 13.9.22.121 | W8 | 2/26/75 | EPA | -- | 40 | -- | 4.7 | -- | -- | -- | -- | 2000 | 3,100 | |
| 13.9.22.212 | A11 | 12/6/57 | SE-35 | 292 | 20 | 189 | 12 | 159 | | 9.5 | 37 | 592 | 917 | |
| | | 3/1/75 | EPA | -- | 27 | -- | 1.2 | -- | -- | -- | -- | 660 | 1,300 | |
| 13.9.23.212 | W9 | | | | | | | | | | | | | |
| 13.9.23.212 | W9 | 3/75 | EPA | -- | 4.8 | -- | 0.06 | -- | -- | -- | -- | 720 | 1,300 | |
| 13.9.28.111 | A14 | 8/5/77 | * | 59 | 46.3 | 565 | 0.6 | 186 | 10.2 | 46 | 40 | 950 | 1,480 | |
| 13.9.29.144 | T1 | 2/28/58 | SE-35 | 194 | 22 | 1130 | 25 | 324 | 3.2 | 9.7 | 264 | 1890 | 2,340 | |
| 13.9.32.112 | A15 | 8/5/77 | * | 180 | 56 | 1420 | 47 | 261 | 7.3 | 69 | 352 | 2460 | 2,700 | |
| 14.8.4.334 | DA1 | 10/16/62 | SE-35 | 383 | 50 | 2880 | 14 | 691 | 13 | 200 | 420 | 4470 | 4,950 | |
| 14.8.15.244 | MN1 | 10/1/62 | SE-35 | 194 | 76 | 1940 | 5.8 | 1120 | 0.1 | 1.8 | 3.1 | 3340 | 4,610 | |
| 14.9.17.400 | W(mc) | 8/8/62 | SE-35 | 275 | 8.8 | 230 | 0.1 | 172 | 6.0 | 6.2 | 29 | 606 | 926 | K/M Mine |
| | D(mb) | 8/8/62 | SE-35 | 296 | 14 | 772 | 0.2 | 356 | 6.5 | 27 | 71 | 1410 | 1,980 | K/M Mine |
| 14.9.30.331 | A16 | 3/3/75 | EPA | -- | 100 | -- | 2.0 | -- | -- | -- | -- | 3200 | 3,250 | |

Table 4, cont.

| LOCATION | FIELD NUMBER | SAMPLE DATE | DATA SOURCE | $HCO_3$ | Cl | $SO_4$ | $NO_3$ | Na | K | Mg | Ca | TDS | SP. COND. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14.9.30.341 | A17 | 3/3/75 | EPA | -- | 74 | -- | 2.6 | -- | -- | -- | -- | 2600 | 3,200 | |
| 14.9.30.432 | A18 | 2/27/75 | EPA | -- | 31 | -- | 1.3 | -- | -- | -- | -- | 4100 | 4,200 | |
| 14.9.31.421 | A19 | 3/3/75 | EPA | -- | 3400 | -- | 0.25 | -- | -- | -- | -- | 8900 | 8,000 | |
| 14.9.31.442 | -- | 3/3/75 | EPA | -- | 3100 | -- | 12 | -- | -- | -- | -- | 36,000 | 8,000 | Seepage Return |
| 14.9.32.114 | A20 | 3/3/75 | EPA | -- | 470 | -- | 16 | -- | -- | -- | -- | 4700 | 5,750 | |
| 14.9.32.122 | W22 | 2/14/58 | SE-35 | 238 | 6.0 | 123 | 0.0 | 145 | 2.4 | 0.5 | 5.6 | 426 | 667 | Homestake Mine |
| 14.9.32.312 | MN3 | 2/27/75 | EPA | -- | 17 | -- | 11 | -- | -- | -- | -- | 2700 | 3,100 | |
| 14.9.32.313 | A21 | 2/27/75 | EPA | -- | 3100 | -- | 0.04 | -- | -- | -- | -- | 14,000 | 8,000 | |
| 14.9.32.314 | W26 | 8/11/59 | SE-35 | 220 | 8.0 | 218 | 0.0 | 114 | 7.6 | 12 | 46 | 512 | 796 | |
| 14.9.32.321 | A22 | 2/27/75 | EPA | -- | 3.8 | -- | -- | -- | -- | -- | -- | 7800 | 7,000 | |
| 14.9.32.322 | A23 | 2/27/75 | EPA | -- | 44 | -- | 79 | -- | -- | -- | -- | 6300 | 6,000 | |
| 14.9.34.422 | W28 | 4/24/63 | SE-35 | 252 | 7.7 | 322 | 0.2 | 226 | 3.7 | 4.9 | 15 | 718 | 1,103 | Sandstone Mine |
| 14.9.36.313 | D(mc) | 5/6/53 | SE-35 | 340 | 25 | 500 | 0.7 | 200 | 4.2 | 33 | 102 | 1050 | 1,490 | Cliffside Mine |
| | W29 | 4/24/63 | SE-35 | 209 | 8.7 | 536 | 0.3 | 252 | 5.2 | 13 | 53 | 945 | 1,360 | Cliffside Mine |
| 14.10.11.434 | B1 | 10/18/60 | SE-35 | 168 | 60 | 1360 | 1.1 | 700 | 3.6 | 3.9 | 26 | 2260 | 2,830 | |
| 14.10.25.132 | W40 | 9/28/56 | SE-35 | 306 | 11 | 306 | -- | -- | -- | -- | -- | 721 | 1,090 | |
| 14.10.36.422 | MN4 | 3/3/75 | EPA | -- | 1700 | -- | 8.0 | -- | -- | -- | -- | 9100 | 8,000 | |

Identifying GPS file designation:

# Residential Well Questionnaire

1. Do you have a private well? **Yes** or **No**

If **NO**—***stop***; do not continue. If **YES**: residential

2. Does your well now in working condition (i.e., working pump)? **Yes** or **No**

If **YES**, complete full survey. If **NO**, complete **only** name and contact information below.

| | Resident | Owner ~~is~~ same as resident |
|---|---|---|
| **Name** | Justin Borris | |
| **Physical street address** | 3414 Hwy 605 | |
| **Mailing address** | 4294 San Mateo Rd<br>Grants 87020 | |

3. Is your home hooked up to City water? **Yes** or **No** If **yes**, approximately what year was the home connected to the City water?

4. For what do you use the water from this well? Please include the general time frame over which each usage has been made:

**Private well usage information**

| | Timeframe (e.g.,1999-2005) |
|---|---|
| **Indoor uses** | |
| Drinking | 2006 — |
| Showering or bathing | 2006 — |
| Cooking | 2006 |
| Other (**please specify uses**) | washing clothes + dishes |
| **Outdoor uses** | |
| Lawn and landscape | |
| Vegetable garden | |
| Livestock | NO |
| Pets | |
| Other (**please specify uses**) | |

5. Have you ever filtered or treated the well water you have used (e.g., Calgon water purifier, water softener)? If so, please describe the treatment and timeframe of use.

Charcoal filter

6. What sources of water other than well water do you now rely or have you previously relied on for household uses? Please estimate the general timeframe for each.

| Sources | Timeframe | Additional information |
|---|---|---|
| Bottled water | 2008- | |
| City water | NO | |
| Other (please specify) | | |

7. Are there any other residences connected to this well? **Yes** or **No** If **yes**, please detail with address and contact information.

| | |
|---|---|
| 8. Do you know when the well was constructed? | no 1970s |
| 9. Do you know how deep the well is? | ~200' |
| 10. Do you know your well permit number? | (new well) |

11. Do you have any concerns about your water supply?

no.

sampled by HMC
static WL ~ 28'
open hole
iron bacteria

Interviewer's name: ____________________

Date: ____________________

Interviewee's initials: JB

7/30/08 pics 1+2

# REFERENCES

# 105-107

TECHNICAL REPORT 20

New Mexico State Engineer
Santa Fe, N. Mex.

# GEOLOGY AND GROUND-WATER RESOURCES OF THE GRANTS-BLUEWATER AREA, VALENCIA COUNTY, NEW MEXICO

By

Ellis D. Gordon

*Prepared in cooperation with*
*the United States Geological Survey*

CONTENTS

CONTENTS (continued)



ILLUSTRATIONS

TABLE 4 (continued)

533 B-24

532 B-23

| Location number | Owner or name | Driller | Year completed | Altitude | Depth of well (ft) | Diameter of casing (in) | Principal water-bearing bed: Character of material | Principal water-bearing bed: Stratigraphic unit | Water level: Depth below surface (ft) | Water level: Date of measurement | Yield: Rate (gpm) | Yield: Date of measurement | Pumping level: Depth below surface (ft) | Pumping level: Date of measurement | Type of pump | Type of power | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11.10.17.222 | Salvador Milan | Turner Drlg.Co. | 1945 | 6,525T | 125 | 12 | Sandrock | San Andres ls. | 46.9<br>65.3 | 5- 9-46<br>2- 7-56 | 1,050M | 8- 4-48 | - | - | T | E | I | L |
| 20.242 | do. | E.A. Tietjen | 1915 | 6,545T | 180(?) | 6 | - | do. | - | - | - | - | - | - | C | W | S | |
| 21.144 | do. | Turner Drlg.Co. | 1953 | 6,520T | 126 | 12 | Sand and gravel | Alluvium | 66.5 | 11-25-57 | 160M | 11- 7-57 | 73.1 | 11- 7-57 | T | E | Mu | L; Milan village supply well. |
| 21.212 | Stewart Bros. & Parker | Stewart Bros. | 1955 | 6,515T | 135 | 7 | do. | do. | 64.7 | 9-27-56 | 25E | 1955 | - | - | J | E | D | |
| 21.214 | George E. Failing Co. | do. | 1955 | 6,515T | 125 | 6 | do. | do. | 65.1 | 9-27-56 | 6 | 1956 | - | - | J | E | D | L |
| 21.221 | Salvador Milan | Turner Drlg.Co. | 1947 | 6,520T | 150 | 14 | do. | do. | 54.1<br>70.0 | 10- 2-47<br>10- 3-56 | 1,110 | 9- 1-53 | - | - | T | E | Mu | An; L; test hole for well drilled to 185 ft.; Milan village supply well. |
| 21.232 | Standard Bulk Station | Oscar Carter | 1953 | 6,510T | 104 | - | - | Alluvium(?) | 54.0 | 4- 9-54 | 28 | 1954 | - | - | T | E | D | Well bail-tested at 125 gpm when drilled with no appreciable drawdown. |
| 21.242 | Salvador Milan | Turner Drlg.Co. | 1948 | 6,515T | 90 | 8 | Gravel | Alluvium | 48.0 | 6-13-49 | - | - | - | - | T | E | Ind | An; L |
| 22.311 | W.A. Thigpen | do. | 1946 | 6,515T | 140 | 7 | - | do. | 48.8<br>61.8 | 6-13-49<br>11-13-57 | - | - | - | - | J | E | D | An; L |
| 25.221 | Mr.Hawkinson | - | 1955 | - | 138M | 6 | - | Alluvium(?) | 18.6 | 8-28-56 | - | - | - | - | J | E | D | |
| 26.133 | Grants Lumber & Box Co. | - | 1944(?) | 6,480T | 135(?) | 8 | - | - | 31.3 | 8-19-57 | 200 | 1957 | 35 | 1957 | T | E | Ind | |
| 26.321 | Grants City Well 3 | L.V.Fitzwater | 1946 | 6,465T | 110 | 16 | Alluvium | Alluvium | 7.4<br>28.6 | 3-11-47<br>2-12-57 | 500 | 1946 | - | - | T | E | Mu | An; L; municipal supply well. |
| 26.321a | Grants City Well 2 | A.D. Turner | 1940(?) | 6,465T | 100± | 8 | do. | do. | 33.8 | 9- 5-57 | 540 | 4- 48 | - | - | T | E | Mu | An; municipal supply well. |
| 26.321b | Grants City Well 1 | Howard Sheets | 1929(?) | 6,465T | 95 | 8 | do. | do. | - | - | 100 | 5- 56 | - | - | T | E | Mu | Do. |
| 26.321c | Grants City Well 4 | E. T. Hoard | 1958 | 6,465T | 245 | 16 | Sandstone and limestone | San Andres ls. | 22.0 | 6-26-58 | 2,100 | 6-26-58 | 34 | 6-26-58 | T | E | Mu | An; L; muncipal supply well. |
| 26.321d | A.T.& S.F. Railroad | A. D. Turner | 1941 | 6,460T | 120 | 10 | - | - | - | - | 100 | 1941 | - | - | N | - | N | Pumping equipment removed. |
| 26.322 | do. | Dug well | 1896 | 6,460T | 40 | 30 ft.* | Basalt(?) | Basalt(?) | 23.3<br>24.2 | 9-28-56<br>9-21-57 | - | - | - | - | N | - | N | Do. |
| 26.322a | do. | Roscoe Moss | 1941 | 6,460T | 150 | 18 | - | - | - | - | - | - | - | - | N | - | N | Do. |
| 26.411 | do. | Dug well | - | 6,455T | - | 30 ft.* | Basalt(?) | Basalt(?) | 18.8<br>20.2 | 9-28-56<br>9-21-57 | - | - | - | - | N | - | N | Do. |
| 26.412 | do. | do. | 1906 | 6,450T | 42 | 30 ft.* | do. | do. | - | - | - | - | - | - | N | - | N | Do. |
| 26.414 | do. | do. | 1906 | 6,450T | 40 | 30 ft.* | do. | do. | 14.9<br>15.9 | 9-28-56<br>9-20-57 | - | - | - | - | N | - | N | Do. |
| 26.441 | Mrs.Tony Mace | - | 1953 | 6,450T | - | 8 | Alluvium | Alluvium | 15.4 | 9-20-57 | - | - | - | - | T | G | I | |
| 27.241 | Growers Association | Turner Drlg.Co. | 1952 | 6,480T | 158 | 16 | Sandstone | San Andres ls. | 19.9<br>28.2 | 2-20-53<br>2-12-57 | 970M | 6-21-52 | 50.0 | 6-21-52 | T | E | Ind | L |
| 27.414 | KMIM Radio Station | Oscar Carter | 1946 | 6,495T | 55(?) | 8 | Alluvium and basalt | Alluvium and basalt | 35.8<br>49.9 | 1- 3-47<br>11-14-57 | - | - | - | - | N | - | N | |
| 27.441 | Navajo Butane Gas Co. | H. B. Miller | 1956 | 6,495T | 54M | 4 | do. | do. | 41.0<br>42.8 | 7-25-56<br>8-17-57 | - | - | - | - | J | E | D | L |
| 11.11. 5.232 | P. Schneeman | Hubbell Bros. | 1951 | 6,998L | 360 | 7 | - | Yeso fm. | - | - | 50 | 1951 | - | - | C | W | S | L |
| 12.411 | do. | Oscar Carter | 1949 | 6,700T | 254 | 6 | Sandstone | Glorieta ss. | 227.4 | 8-25-49 | 12 | 1949 | - | - | C | W | S | |
| 23.333 | do. | Hubbell Bros. | 1952 | 7,305T | 980 | 6 | - | Yeso or Abo fm | 940 | 3- 52 | - | - | - | - | C | W | S | L |
| 12. 9. 6.312 | G.P. Roundy | - | - | 6,673L | 91M | 5 | - | Alluvium | 73.9 | 7-25-56 | - | - | - | - | N | - | N | Former owner of well reported water of good quality. |
| 7.343 | do. | Turner Drlg.Co. | 1945 | 6,640T | 98M | 8 | Sand and gravel | do. | 58.0 | 11-30-55 | - | - | - | - | C | W | S | L |
| 8.431 | do. | Joe Lewis | 1917 | 6,770T | 98M | 6 | White fine sand | Chinle fm. | 84.8 | 7-25-56 | - | - | - | - | C | W | S,D | An |
| 12.10. 1.222 | do. | Hubbell Bros. | 1952 | 6,675T | 192 | 6 | - | do. | 45.9 | 7-24-56 | - | - | - | - | C | E | S | An |
| 1.244 | do. | - | 1954 | 6,675T | 200 | 3 | - | do. | - | - | - | - | - | - | C | - | N | Owner reported water to be quite salty. |
| 5.341 | Duane Berryhill | Oscar Carter | - | 6,705T | 351 | - | - | Middle Chinle fm. | 64.0 | 5-18-49 | - | - | - | - | N | - | N | |
| 5.341a | do. | Hubbell Bros. | 1957 | 6,700T | 725 | 4 | - | San Andres ls. | 245.7 | 1- 8-58 | 55 | 1957 | 246 | 1957 | C | W | S | L |
| 7.143 | do. | Ballard Drlg.Co. | 1952 | 6,635L | 250 | 7 | - | do. | 177.0 | 10-15-55 | - | - | - | - | C | W | S | An |
| 12.221 | G.P. Roundy | - | Prior to 1917 | 6,657L | 81M | 6 | - | Alluvium(?) | 67.7 | 7-26-56 | - | - | - | - | C | W | S | |

Check if entered

TABLE 4 (continued)

| Location number | Owner or name | Driller | Year completed | Altitude | Depth of well (ft) | Diameter of casing (in) | Principal water-bearing bed: Character of material | Principal water-bearing bed: Stratigraphic unit | Water level: Depth below surface (ft) | Water level: Date of measurement | Yield: Rate (gpm) | Yield: Date of measurement | Pumping level: Depth below surface (ft) | Pumping level: Date of measurement | Type of pump | Type of power | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.10.12.433 | G. P. Roundy | Turner Drlg.Co. | 1945 | 6,625T | 100 | 8 | Alluvium | Alluvium | 58.6<br>58.1 | 11-30-55<br>7-25-56 | - | - | - | - | C | W | S | |
| 14.212 | Wilson | Tom Allen | 1945(?) | 6,621L | - | 6 | - | - | | | 1 | 1956 | 89.3 | 7-25-56 | C | W | S | Water level in abandoned well 15 ft. SW, 50.1 ft., 7-25-56. |
| 20.333a | Fred Freas | Howard Sheets | 1957 | 6,570T | 275 | 10 | Limestone | San Andres ls. | 118.4<br>124.4 | 2-13-57<br>8-17-57 | - | - | - | - | N | - | N | L; bailed at 30 gpm; no appreciable drawdown. |
| 23.233 | T.A. Morris & Son | Aubrey Lyons | 1945 | 6,592L | 865 | 20 | Sandstone | do. | 115.6<br>147.6 | 2-26-46<br>8- 1-57 | 1,900 | 1946 | 169.2 | 6-22-51 | T | D | I | An; L |
| 23.233a | G. P. Roundy | Turner Drlg.Co. | 1944 | 6,594L | 500 | 10 | - | Chinle fm. | 75 | 7-11-46 | - | - | - | - | C | W | S | An; reported to have been test pumped at 300 gpm. |
| 26.242 | Homestake-Sapin Partners | H. P. Doty | 1958 | 6,595T | 980 | 12 | - | San Andres ls. | 133.8 | 5-22-58 | 1,550 | 5-21-58 | 165 | 5-21-58 | T | E | Ind | An; L |
| 26.322 | Homestake-New Mexico Partners | C. T. Henderson | 1950 | 6,573L | 400 | 20 | - | Chinle fm. | 70.9 | 5-26-56 | - | - | - | - | Su | E | D | Original depth 844 ft.; casing collapsed at 400 ft. during pumping test. |
| 26.322a | do. | do. | 1955 | 6,572L | 870 | 20 | Sandstone | San Andres ls. | 122.4<br>124.4 | 10-13-55<br>11-14-57 | - | - | - | - | T | E | I | An; L |
| 27.244 | Tom Morris | Turner Drlg.Co. | 1945 | 6,574L | 371M | 6 | - | Alluvium | 90.5<br>88.6 | 7-25-56<br>2-13-57 | - | - | - | - | C | E | D,S | An |
| 27.333 | Stanley & Card | Roscoe Moss | 1949 | 6,557T | 551 | 20 | Limestone | San Andres ls. | 87.0<br>103.7 | 4-18-50<br>4-12-58 | 1,500E | 10- 2-56 | 120.2 | 10- 2-56 | T | E,NG | I | An; L |
| 27.431 | W.A. Murray | C.T. Henderson | 1955 | 6,567L | 584 | 16 | Sandstone | do. | 112.2<br>117.7 | 10-15-55<br>10- 2-56 | - | - | 156.0 | 7-17-56 | T | D | I | An; L |
| 935 29.434 | Stanley & Card | Turner Drlg.Co. | 1944 | 6,552T | 152 | 16 | Alluvium | Alluvium | 65.5<br>98.7 | 10-14-44<br>2-13-57 | 1,000E | 6-28-56 | 101.2 | 8-18-49 | T | D | I | An; L; test hole drilled to 205 ft. |
| 29.434a | do. | Roscoe Moss | 1948 | 6,554T | 398 | 18 | - | San Andres ls. | 84.7<br>101.2 | 2-15-51<br>2-13-57 | 1,716M | 5-11-48 | 107.0 | 8- 1-56 | T | E | I | An; L |
| 30.112 | The Anaconda Co. | E.A. Tietjen | 1929± | 6,590T | 280 | 6 | Sandstone | do. | 108.0<br>143.1 | 2- 3-47<br>6-28-56 | - | - | 125.1 | 2-11-55 | C | W | D,S | An |
| 30.242 | Jack Freas | do. | 1930± | 6,569T | 160 | 5 | Sand and gravel | Alluvium | 88.4<br>106.7 | 5-10-46<br>2-11-55 | - | - | 108.9 | 10- 8-53 | C | G | D,S | An; L |
| 30.332 | Hardenburg Commissary Co. | - | - | 6,585T | 230 | 8 | - | San Andres ls. | 106.5<br>111.3 | 2- 4-47<br>2-10-49 | 375 | 1950 | - | - | T | E | D,I | Old oil-test hole. Cleaned out and cased to 230 ft. in 1948 by Turner Drlg. Co. |
| 30.333 | E.E. Hardin | B. J. Brooks | 1915 | 6,591T | 175 | 6 | Sandstone | do. | - | - | - | - | - | - | C | W | D | |
| 30.412 | Fred Freas | Turner Drlg.Co. | 1945 | 6,578L | 225 | 16 | do. | do. | 90.0<br>112.6 | 2-26-46<br>2-13-57 | 1,745E | 2-10-50 | 128.8 | 8- 1-56 | T | E | I | An; L |
| 30.421 | Milton Harding | do. | 1946 | 6,576T | 245 | 14 | Sandrock and shells | do. | 88.4<br>118.8 | 2-26-46<br>2-13-57 | 1,110M | 6- 4-47 | 121.4 | 6- 5-56 | T | E | I | An; L |
| 30.433 | Fred Freas | - | - | 6,572T | 135 | - | Sandstone | do. | - | - | - | - | - | - | - | - | N | An |
| 31.211 | Bar-X Trailer Lodge | E. O. Cleaver | 1957 | 6,575T | 175 | 8 | - | do. | 121.9 | 11-17-57 | 50 | 1957 | - | - | S | E | D | L |
| 32.111 | The Anaconda Co. | L. G. Stearns | 1946 | 6,566T | 253 | 20 | Sandstone | do. | 82.1<br>112.5 | 2-26-46<br>2-13-57 | 1,520M | 8-25-52 | 119.5 | 10- 2-56 | T | E | I | An; L |
| 32.211 | Eugene Chapman | E. A. Tietjen | 1909 | 6,555T | 135 | 5 | Gravel | Alluvium | 75.5 | 1-4-47 | - | - | - | - | C | W | D,S | |
| 33.444 | Stanley & Card | Turner Drlg.Co. | 1943 | 6,542T | 195 | 6 | - | Chinle fm. | - | - | 25E | 1943 | - | - | C | E | D | An; L |
| 34.214 | W. A. Murray | C.T. Henderson | 1951 | 6,558T | 275 | 12 | - | do. | 81.8 | 10- 2-56 | 500E | - | - | - | C | W | D | An; former irrigation well. |
| 34.412 | Bruce Church | L.G. Stearns | 1952 | 6,557L | 978 | 16 | - | Chinle fm. & San Andres ls. | 101.4 | 2-13-57 | - | - | - | - | T | D | I | An; L |
| 12.11. 3.112a | F. M. Gibbs | N. H. Wade | 1957 | 6,700T | 200 | 7 | Sandstone | Chinle fm. | 63.8 | 1-28-58 | - | - | - | - | Su | E | D | An; L |
| 3.342 | C. M. Gibbs | Turner Drlg.Co. | 1944 | 6,660T | 180 | 4 | - | do. | 126.6 | 8-31-56 | - | - | - | - | Su | E | D | |
| 4.243 | W.C. Andrews | E.A. Tietjen(?) | - | 6,663L | 64 | 6 | - | Chinle fm.(?) | - | - | - | - | - | - | C | W | D,S | |
| 5.343 | Church and Hardin | L. G. Stearns | 1946 | 6,710T | 255 | - | Sandstone | Chinle fm. | 170 | 2-27-46 | 225 | 2-23-46 | - | - | N | - | N | L |
| 5.413 | J.C. Church | Turner Drlg.Co. | 1948 | 6,710T | 365 | 8 | - | do. | 192.0<br>237.2 | 2-11-49<br>2-12-57 | - | - | - | - | N | - | N | L |
| 9.114a | do. | do. | 1948 | 6,662T | 523 | 18 | Limestone | San Andres ls. | 136.1<br>175.5 | 2-11-49<br>2-12-57 | - | - | - | - | N | - | N | An (sample from 145 to 178 ft. during drilling) |
| 9.221 | do. | L.G. Stearns | 1945 | 6,649L | 500 | 20 | Sandstone | do. | 115.7<br>172.3 | 2-27-46<br>2-11-57 | - | - | - | - | N | - | N | L; equipped with water level recorder in 6-in. casing. |
| 9.424 | Geo. W. Rowley | Turner Drlg.Co. | 1946 | 6,641T | 500 | 16 | do. | San Andres ls. & Yeso fm. | 93.8<br>134.5 | 5-10-46<br>2-12-57 | - | - | - | - | N | - | N | An; L; abandoned irrigation well. |
| 10.334 | J. W. Price | L.G. Stearns | 1952 | 6,636L | 464 | 18 | Limestone | San Andres ls. | 127 | 2- 51 | 2,500 | 1954 | - | - | T | E | I | An; L |

# TABLE 4 (continued)

| Location number | Owner or name | Driller | Year completed | Altitude | Depth of well (ft) | Diameter of casing (in) | Principal water-bearing bed | | Water level | | Yield | | Pumping level | | Type of pump | Type of power | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Character of material | Stratigraphic unit | Depth below surface (ft) | Date of measurement | Rate (gpm) | Date of measurement | Depth below surface (ft) | Date of measurement | | | | |
| 12.11.10.344 | J.C. Church | Turner Drlg.Co. | 1948 | 6,636T | 378 | 8 | Sandstone | San Andres ls. | 121.7 | 4- 6-48 | - | - | - | - | T | E | D,I | L |
| 10.411 | Claude M. Bowlin | Charles Barnes | 1938 | 6,650T | 216 | 4 | - | Chinle fm. | 118.3 | 5-10-46 | - | - | - | - | N | - | N | Well went dry in 1953. |
| 10.411a | do. | J. H. Wright | 1951 | 6,640T | 238 | 6 | - | do. | 160 | 10- 55 | - | - | - | - | C | E | D | |
| 10.431 | Burton C. Johns | Howard Sheets | 1945 | 6,635L | 500 | 14 | Yellow sand | San Andres ls. | 103.7<br>169.0 | 2-27-46<br>9- 5-57 | 2,110M | 6- 5-47 | - | - | T | E | I | An; L |
| 11.334 | Duane Berryhill | Turner Drlg.Co. | 1946 | 6,632A | 150 | 8 | - | Alluvium and basalt | 121.6 | 6-27-56 | - | - | - | - | J | E | D,S | An |
| 14.213 | do. | Cecil Schrader | 1949 | 6,605L | 115 | 4 | Sand, gravel | do. | 98.3<br>100.5 | 2- 8-50<br>2- 6-56 | - | - | - | - | N | - | N | An; test hole. |
| 14.311 | Fred W.Freas | - | - | 6,625T | 140 | 6 | do. | do. | - | - | - | - | - | - | N | - | N | An; L; well destroyed by highway construction 1953. |
| 14.331 | G. P. Roundy | Hubbell Bros. | 1955 | 6,615T | 130 | 6 | - | do. | - | - | - | - | - | - | J | E | D | An |
| 15.111 | John Church | Turner Drlg.Co. | 1944 | 6,635T | 200 | 7 | - | Chinle fm. | 116.2 | 3-11-47 | - | - | - | - | C | - | N | L |
| 15.211 | G. P. Roundy | J. F. Kimmell | 1954 | 6,632T | 450 | 16 | Sandstone | San Andres ls. | 156.5 | 2-13-57 | 2,000E | 7-19-56 | 175.3 | 7-19-56 | T | E | I | An; L |
| 15.214 | do. | Bert Brooks | - | 6,630T | 98 | 4 | Sand and gravel | Alluvium | 80 | 1944 | - | - | - | - | N | - | N | L; well abandoned. |
| 15.223 | A.T.&S.F. Railroad | Gus Mulholland | 1906 | 6,630T | 735 | 12 | Sandstone | San Andres ls. | 120 | 1906 | 60 | 1906 | 120 | 1906 | N | - | N | L; well abandoned about 1935. Plugged back to 660 ft. |
| 15.321a | Harmon & Reid | L.V.Fitzwater | 1948 | 6,631L | 178 | - | - | do. | 109 | 12- 3-49 | 1,900M | 8-19-49 | - | - | T | E | I | Affected by pumping well 12.11.10.334. |
| 15.341 | Edward Freas | Turner Drlg.Co. | 1946 | 6,627T | 457 | 14 | Sandstone | Glorieta ss. | 106.1<br>149.4 | 2- 4-47<br>2-13-57 | - | - | - | - | N | - | N | An; L; drilled to 300 ft. depth in Aug. 1946; deepened to 457 ft. in Oct. 1951. |
| 15.422 | Myerick Bros. | Oscar Carter | 1930 | 6,625T | 137 | 4 | - | Chinle fm.(?) | 92 | 10-13-44 | - | - | - | - | C | W | D | L |
| 16.230 | E.B. Bowlin | Henry Brock | - | 6,640T | 180 | 6 | - | Yeso fm.(?) | 123.7 | 2- 3-47 | - | - | - | - | C | W | S | An; L |
| 20.422 | J.F. Neilson | Mr. Brasher | 1946 | 6,670A | 310 | 18 | Sandstone | do. | 244.0<br>275.2 | 1- 3-47<br>2-13-57 | - | - | - | - | C | E | S | An; L |
| 22.144 | T.J. McNeill | T.J. McNeill | 1906 | 6,640T | 376 | 6 | - | - | 110 | 10-13-44 | - | - | - | - | C | G | S | |
| 22.230 | J.F. Neilson | - | 1902 | 6,615T | 170 | 6 | - | Glorieta ss.(?) | 100 | 10-12-44 | - | - | - | - | C | W | S | |
| 22.234 | Church of Latter Day Saints | E.A. Tietjen | - | 6,615T | 260 | 8 | - | San Andres ls. | 77.1<br>91.4 | 5-10-46<br>12- 3-46 | - | - | - | - | S | E | Mu | An; serves as muncipal supply well for Bluewater village. Deepened by Turner Drlg.Co. |
| 22.242 | J.F. Neilson | do. | 1940 | 6,614T | 298 | 8 | Sandstone | do. | 90 | 10-12-44 | - | - | - | - | C | W | S | L |
| 22.322 | Geo.W.Rowley | Turner Drlg.Co. | 1941 | 6,670T | 583 | 8 | - | - | 130 | 10-20-44 | - | - | - | - | C | W | S | An |
| 22.414 | Hassell | - | 1946 | 6,629T | 544 | 20 | - | San Andres ls.(?) | 110.6<br>140.5 | 2-27-46<br>2-19-53 | - | - | - | - | N | - | N | Well deepened from 520 ft. to 544 ft. spring 1948. |
| 22.420 | E.A. Tietjen | E.A. Tietjen | 1914 | 6,615T | 120 | 12 | Sandstone | San Andres ls. | 60 | 1914 | - | - | - | - | C | W | D,S | An |
| 22.444 | G.P. Roundy | do. | 1909 | 6,614T | 300 | 8 | do. | do. | 60 | 10-12-44 | - | - | - | - | C | W | S | L |
| 23.111 | do. | E.T. Hoard (?) | - | 6,610T | 1,048 | 16 | - | - | 88.6 | 7-20-56 | - | - | - | - | Su | E | S | Yield insufficient for irrigation well. |
| 23.231 | do. | Turner Drlg.Co. | 1944 | 6,606T | 300 | 8 | - | San Andres ls. | 69.5<br>71.6 | 1- 3-47<br>11- 4-57 | - | - | - | - | C | W | S | An; L |
| 23.333 | do. | Ernest Boardman | 1950 | 6,620T | 350 | 16 | - | - | - | - | 15 | 1957 | - | - | N | - | N | Yield insufficient for irrigation well. |
| 24.233 | The Anaconda Company | Howard Sheets | 1955 | 6,613L | 386M | 16 | - | San Andres ls. | 157<br>156 | 1-14-55<br>1-13-56 | 2,100M | 2- 7-55 | 224 | 2- 7-55 | T | E | Ind | An |
| 24.334 | Peter Chalamidas | Mr. Meyers | 1953 | 6,598T | 250 | 6 | - | do. | 160 | 1953 | 18 | 1953 | - | - | Su | E | D | An |
| 24.334a | do. | Turner Drlg.Co. | 1953 | 6,595T | 502 | 10 | Limestone | do. | 160 | 1953 | - | - | - | - | Su | E | D | L |
| 24.411 | The Anaconda Company | Howard Sheets | 1951 | 6,612L | 360 | 12 | do. | do. | 149.3<br>161.4 | 2-18-53<br>2- 8-56 | 600 | 7-18-56 | 155.3 | 2-11-55 | T | E | Ind | An; L |
| 24.424 | do. | E.A. Tietjen | - | 6,590T | - | 5 | - | - | 110.4 | 5-10-46 | - | - | - | - | C | W | S | |
| 25.122 | do. | Turner Drlg.Co. | - | 6,595T | 260 | 8 | Limestone | San Andres ls. | 48.3 | 4- 6-48 | - | - | - | - | T | E | D | An; well deepened from 140 ft. to 260 ft. April 1, 1948 |
| 25.122a | do. | - | - | 6,595T | 135 | 6 | - | - | 119.5<br>119.8 | 7- 46<br>9-17-56 | - | - | - | - | C | W | S | |
| 25.213 | do. | L.G. Stearns | 1946 | 6,583T | 236 | 18 | Limestone | San Andres ls. | 106.8<br>129.5 | 2- 3-47<br>2-16-56 | 2,170M | 8-26-52 | 138.8 | 2-13-57 | T | E | Ind | An; L |
| 25.214 | do. | Turner Drlg.Co. | 1945 | 6,581T | 238 | 18 | do. | do. | 100.2<br>132.6 | 2-27-46<br>2-13-57 | 1,800E | 8-27-53 | 137.0 | 6-14-55 | T | E | Ind | An; L |
| 25.313 | Harmon & Reid | do. | 1946 | 6,605T | 365 | 18 | do. | do. | 124.5<br>150.2 | 2- 3-47<br>2-13-57 | 2,000M | 6- 4-47 | - | - | T | G | I | An |
| 26.224a | G. P. Roundy | Oscar Carter | 1954 | 6,600T | 199M | 6 | - | - | 158.1 | 7-19-56 | - | - | - | - | Su | E | D | |
| 26.244 | do. | T.J. McNeill | 1912 | 6,605T | 200 | 6 | Sandstone | Glorieta ss. | - | - | - | - | - | - | C | W | D,S | Well deepened from 165 ft. to 200 ft. in 1954. |
| 26.424 | do. | Hubbell Bros. | 1952 | 6,605T | 225 | 6 | - | - | 160.1 | 10- 3-56 | - | - | - | - | C | W | S | |
| 27.222 | Harold Prewitt | Turner Drlg.Co. | 1936 | 6,630T | 170 | 6 | Sandstone | Glorieta ss. | 156.1<br>179.3 | 2- 3-48<br>2- 7-56 | - | - | - | - | C | W | S | |
| 28.222 | J.E. Neilson | E.A. Tietjen | 1911 | 6,710T | 212 | 6 | - | do. | - | - | - | - | - | - | C | W | S | Water encountered at 210 ft. when well was drilled. |

* Hand-dug well with no casing.

TABLE 10

CHEMICAL ANALYSES OF WATER FROM WELLS AND SPRINGS IN THE GRANTS-BLUEWATER AREA, VALENCIA COUNTY, N. MEX.

| Location number | Owner or name | Date collected | Stratigraphic unit | Temperature (°F) | Silica ($SiO_2$) | Calcium (Ca) | Magnesium (Mg) | Sodium and Potassium (Na+K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Hardness as $CaCO_3$: Calcium, Magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio (SAR) | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10. 9. 6. 442 | Sidney Gottlieb (spring) | 5-13-58 | Basalt | 51 | 41 | 206 | 107 | 418 | 595 | 0 | 944 | 275 | 1.0 | 1.6 | - | 2,290 | 3.11 | 954 | 466 | 49 | 5.9 | 3,110 | 7.7 |
| 17.113 | Sidney Gottlieb | 12- 8-50 | Alluvium | 57 | 30 | 330 | 380 | 931 | 469 | 0 | 2,840 | 754 | .7 | 3.1 | - | 5,500 | 7.48 | 2,390 | 2,000 | 46 | 8.3 | 6,840 | - |
| 23.134 | do. | 12- 8-50 | Chinle fm. | 61 | 8.4 | 22 | 9.4 | 142 | 321 | 0 | 116 | 12 | .8 | .3 | - | 469 | .64 | 94 | 0 | 77 | 6.4 | 754 | - |
| 23.400 | Horace Springs | 5-13-57 | Basalt | 61 | 30 | 79 | 40 | 125 | 236 | 4 | 293 | 88 | .8 | 2.5 | - | 778 | 1.06 | 362 | 162 | 43 | 2.9 | 1,170 | 8.3 |
| 26.433 | Sidney Gottlieb | 12- 8-50 | Chinle fm. | 67 | 18 | 30 | 14 | 104 | 290 | 0 | 100 | 90 | .4 | 4.9 | - | 423 | .58 | 132 | 0 | 63 | 3.9 | 668 | - |
| 10.10. 3.423 | Ojo del Gallo (spring) | 12-11-33 | San Andres ls. | 61 | - | 124 | 42 | 86 | 338 | 0 | 300 | 55 | .0 | 2.8 | - | 776 | 1.06 | 482 | 205 | 28 | 1.7 | - | - |
| Do. | do. | 10-21-44 | do. | - | - | 117 | 40 | 82 | 336 | 0 | 278 | 48 | - | 3.8 | - | 734 | 1.00 | 456 | 181 | 28 | 1.7 | 1,120 | - |
| Do. | do. | 7-12-46 | do. | 61 | - | 110 | 41 | 76 | 319 | 0 | 268 | 44 | .7 | 5.2 | 0.18 | 702 | .95 | 443 | 182 | 27 | 1.6 | 1,070 | - |
| 3.433a | San Rafael Village well | 5- 7-57 | do. | 60 | 20 | 107 | 39 | 72 | 320 | 0 | 248 | 42 | .4 | 3.9 | - | 719 | .94 | 428 | 166 | 27 | 1.5 | 1,040 | 7.4 |
| 26.331 | Monico Mirabal | 6-15-55 | do. | 62 | 21 | 109 | 42 | 75 | 314 | 0 | 251 | 60 | .8 | 2.7 | - | 716 | .97 | 444 | 187 | 27 | 1.5 | 1,100 | 7.2 |
| Do. | do. | 6- 7-57 | do. | 63 | - | - | - | 70 | 318 | 0 | 249 | 56 | - | 2.8 | .24 | - | - | 448 | 165 | 25 | 1.4 | 1,320 | 7.6 |
| Do. | do. | 5-15-58 | do. | 61 | - | - | - | 76* | 318 | 0 | 260 | 63 | - | - | - | - | - | 456 | 196 | 27 | 1.6 | 1,110 | 7.4 |
| 27.333a | Nabor Mirabal | 6- 7-57 | do. | 63 | - | - | - | 16 | 250 | 0 | 199 | 22 | - | 11 | .00 | - | - | 418 | 213 | 8 | .3 | 1,000 | 7.5 |
| 10.11.17.231 | Malpais Spring | 12-12-33 | Basalt | 40 | - | 36 | 8.0 | 5.8 | 48 | 0 | 6 | 3.0 | .4 | 3.0 | - | 135 | .18 | 123 | 2 | 9 | .2 | - | - |
| 11. 9.30.122a | O. H. Hawkinson | 8- 2-56 | Alluvium | - | - | - | - | - | 575 | 0 | - | 408 | - | - | - | - | - | 550 | 79 | - | - | 3,760 | 7.7 |
| 11.10. 4.211 | John Evans | 8- 5-48 | San Andres ls. | 58 | - | - | - | - | 296 | 0 | - | 28 | - | - | - | - | - | - | - | - | - | 972 | - |
| Do. | do. | 8-10-53 | do. | - | - | - | - | - | 296 | 0 | - | 31 | - | - | - | - | - | - | - | - | - | 1,040 | - |
| Do. | do. | 6-15-55 | do. | 58 | - | - | - | - | 296 | 0 | - | 33 | - | - | - | - | - | 480 | 242 | - | - | 1,070 | 7.3 |
| Do. | do. | 7-17-56 | do. | 58 | - | - | - | 54 | 286 | 0 | 291 | 31 | - | 14 | - | - | - | 436 | 202 | 26 | 1.5 | 1,050 | 7.5 |
| Do. | do. | 6- 7-57 | do. | 59 | - | - | - | - | 284 | 0 | 277 | 31 | - | 17 | .04 | - | - | 490 | 258 | 15 | .8 | 1,300 | 7.6 |
| 4.311 | do. | 7-24-56 | do. | 57 | - | - | - | 38 | 258 | 0 | 252 | 28 | - | 19 | - | - | - | 446 | 234 | 16 | .8 | 932 | 8.2 |
| 5.212 | do. | 7-17-56 | do. | 56 | - | - | - | 40 | 261 | 0 | 253 | 21 | - | 15 | - | - | - | 432 | 218 | 17 | .8 | 930 | 7.5 |
| Do. | do. | 6- 7-57 | do. | 55 | - | - | - | 33 | 262 | 0 | 255 | 22 | - | 12 | .04 | - | - | 448 | 234 | 14 | .7 | - | 7.5 |
| 8.111 | Salvador Milan | 7-11-46 | do. | 58 | - | 60 | 32 | 20 | 225 | 0 | 122 | 8 | .7 | .7 | .04 | 354 | .48 | 281 | 96 | 14 | .5 | 581 | - |
| 8.111a | do. | 10-21-44 | do. | - | - | 80 | 40 | 39 | 253 | 0 | 200 | 18 | - | 10 | - | 512 | .70 | 364 | 156 | 19 | .9 | 805 | - |
| 8.221 | do. | 5-29-54 | do. | - | - | - | - | 38 | 268 | 0 | 207 | 20 | .3 | 12 | - | - | - | 390 | 170 | 18 | .8 | 866 | - |
| Do. | do. | 7-17-56 | do. | 56 | - | - | - | 33 | 263 | 0 | 212 | 22 | - | 21 | - | - | - | 412 | 196 | 15 | .7 | 864 | 7.6 |
| 8.343 | do. | 7-17-56 | do. | 62 | - | - | - | 22 | 230 | 0 | 119 | 8 | - | 8.4 | - | - | - | 284 | 96 | 14 | .6 | 609 | 7.8 |
| 9.221 | Stanley and Card | 7-11-46 | do. | 55 | - | 101 | 31 | 61 | 287 | 0 | 211 | 20 | .7 | 7.3 | .07 | 563 | .77 | 380 | 144 | 23 | 1.1 | 856 | - |
| Do. | do. | 7-19-56 | do. | 56 | - | - | - | 62 | 284 | 0 | 285 | 29 | - | 10 | - | - | - | 444 | 212 | 23 | 1.3 | 1,030 | 7.6 |
| Do. | do. | 6- 7-57 | do. | 59 | - | - | - | 47 | 290 | 0 | 286 | 29 | - | 10 | .16 | - | - | 482 | 244 | 17 | .9 | - | 7.5 |
| 16.121** | Frank Wilson | 1945(?) | do. | - | - | 113 | 30 | 55 | 281 | 0 | 230 | 34 | - | 9 | - | 752 | 1.02 | 404 | - | 23 | 1.2 | - | - |
| Do. | do. | 7-12-46 | do. | 55 | - | 110 | 30 | 45 | 271 | 0 | 218 | 16 | .7 | 27 | .07 | 580 | .79 | 398 | 176 | 20 | 1.0 | 872 | - |
| Do. | do. | 9- 51 | do. | 55 | - | - | - | - | 272 | 0 | - | 17 | - | - | - | - | - | - | - | - | - | 801 | - |
| 16.121a | Lee Banosh | 8-11-53 | do. | - | - | - | - | - | 269 | 0 | - | 18 | - | - | - | - | - | - | - | - | - | 799 | - |
| Do. | do. | 7-17-56 | do. | 56 | - | - | - | 35 | 266 | 0 | 191 | 18 | - | 13 | - | - | - | 376 | 158 | 17 | .8 | 812 | 7.6 |
| 21.221 | Salvador Milan | 6- 7-57 | Alluvium | - | 25 | 39 | 51 | 39 | 256 | 0 | 147 | 15 | .4 | 8.2 | .03 | 451 | .61 | 307 | 97 | 22 | 1.0 | 898 | 7.6 |
| 21.242 | do. | 7-24-56 | do. | 62 | - | - | - | 29* | 254 | 0 | 168 | 21 | - | - | - | - | - | 350 | 142 | 15 | .7 | 761 | 7.6 |
| 22.311 | W. A. Thigpen | 7-24-56 | do. | 62 | - | - | - | 38* | 214 | 0 | 238 | 57 | - | - | - | - | - | 422 | 246 | 16 | .8 | 942 | 7.6 |
| 26.321 | Grants City Well 3 | 5- 7-57 | do. | 60 | - | - | - | 77 | 347 | 0 | 285 | 53 | - | 3.1 | .07 | - | - | 490 | 206 | 26 | 1.5 | 1,170 | 7.4 |
| 26.321a | Grants City Well 2 | 10-21-44 | do. | - | - | 97 | 32 | 52 | 289 | 0 | 199 | 27 | .3 | 5.7 | - | 555 | .75 | 374 | 136 | 23 | 1.2 | 863 | - |
| Do. | do. | 6-15-55 | do. | 59 | 28 | 118 | 38 | 67 | 328 | 0 | 255 | 41 | .6 | 3.8 | - | 712 | .97 | 450 | 182 | 25 | 1.4 | 1,070 | 7.4 |
| 26.321b | Grants City Well 1 | 12-16-33 | do. | - | - | 134 | 46 | 115 | 370 | 0 | 350 | 75 | .4 | 0 | - | 903 | 1.23 | 524 | 220 | 32 | 2.2 | - | - |
| 26.321c | Grants City Well 4 | 6-27-58 | San Andres ls. | - | - | - | - | 236* | 541 | 0 | 557 | 155 | - | - | - | - | - | 730 | 286 | 42 | 3.9 | 2,110 | 6.9 |
| Do. | do. | 12-15-58 | do. | 73 | 15 | 175 | 57 | 192 | 472 | 0 | 498 | 129 | .2 | 1.0 | - | 1,350 | 1.77 | 671 | 284 | 38 | 3.2 | 1,880 | 7.0 |
| 12. 9. 8.431 | C. P. Roundy | 7-25-56 | Chinle fm. | 58 | - | - | - | 163* | 246 | 18 | 57 | 53 | - | - | - | - | - | 12 | 0 | 97 | 20 | 852 | 8.9 |
| 12.10. 1.222 | do. | 7-24-56 | do. | 57 | - | - | - | 5,740* | 34 | 0 | 1,350 | 9,590 | - | - | - | - | - | 2,470 | 2,440 | 83 | 50 | 27,600 | 6.8 |
| 7.143 | Duane Berryhill | 6-27-56 | San Andres ls. | - | - | - | - | 198 | 502 | 0 | 553 | 126 | - | .3 | - | - | - | 735 | 324 | 37 | 3.2 | 2,020 | 7.1 |
| 23.233 | T. A. Morris & Son | 7-12-46 | do. | - | - | 254 | 88 | 379 | 702 | 0 | 829 | 270 | .4 | .6 | .28 | 2,170 | 2.95 | 996 | 420 | 45 | 5.2 | 3,040 | - |
| Do. | do. | 6- 4-47 | do. | - | - | - | - | - | 669 | 0 | 794 | 238 | - | - | - | - | - | - | - | - | - | 2,880 | - |
| Do. | do. | 8- 4-48 | do. | 68 | - | - | - | - | 688 | 0 | - | 250 | - | - | - | - | - | - | - | - | - | 2,960 | - |
| Do. | do. | 8-18-49 | do. | 68 | - | - | - | - | 686 | 0 | - | 254 | - | - | - | - | - | - | - | - | - | 2,960 | - |

See footnotes at end of table.

# TABLE 10 (continued)

| Location number | Owner or name | Date collected | Stratigraphic unit | Temperature (°F) | Silica ($SiO_2$) | Calcium (Ca) | Magnesium (Mg) | Sodium and Potassium (Na+K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids | | Hardness as $CaCO_3$ | | Percent sodium | Sodium adsorption ratio (SAR) | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | Parts per million | Tons per acre-foot | Calcium, Magnesium | Noncarbonate | | | | |
| 12.10.23.233 | T. A. Morris & Son | 10-16-50 | San Andres ls. | 68 | - | - | - | - | 668 | 0 | - | 239 | - | - | - | - | - | - | - | - | - | 2,900 | - |
| Do. | do. | 6-25-52 | do. | 69 | - | - | - | - | 682 | 0 | - | 245 | - | - | - | - | - | - | - | - | - | 2,930 | - |
| Do. | do. | 8-25-52 | do. | 69 | - | - | - | - | 675 | 0 | - | 250 | - | - | - | - | - | - | - | - | - | 2,910 | - |
| Do. | do. | 10- 6-54 | do. | - | - | - | - | 426* | 360 | 0 | 604 | 53 | - | 0 | - | - | - | 72 | 0 | 93 | 22 | 1,930 | - |
| Do. | do. | 8-10-55 | do. | - | - | - | - | 348* | 656 | 0 | 772 | 242 | - | - | - | - | - | 930 | 392 | 45 | 4.9 | 2,860 | 6.8 |
| 23.233a | G. P. Roundy | 7-12-46 | Chinle fm. | - | - | 40 | 11 | 458 | 392 | 0 | 733 | 37 | 0.4 | 4.4 | 0.55 | 1,480 | 2.01 | 145 | 0 | 87 | 17 | 2,130 | - |
| 26.242 | Homestake-Sapin Partners | 5-22-58 | San Andres ls. | 68 | 16 | 214 | 74 | 302 | 617 | 0 | 671 | 205 | .5 | 1.2 | - | 1,790 | 2.43 | 838 | 333 | 44 | 4.5 | 2,500 | - |
| 26.322a | Homestake-New Mexico Partners | 10-15-56 | do. | - | 15 | 65 | 128 | 153 | 466 | 0 | 467 | 106 | .7 | 3.2 | - | 1,170 | 1.59 | 688 | 306 | 33 | 2.5 | 1,810 | 7.0 |
| 27.244 | T. A. Morris & Son | 7-25-56 | Alluvium | 57 | - | - | - | 250 | 284 | 0 | 808 | 86 | - | 10 | - | - | - | 660 | 428 | 45 | 4.2 | 2,060 | 7.7 |
| 27.333 | Stanley and Card | 10- 6-54 | San Andres ls. | - | - | - | - | 106 | 377 | 0 | 394 | 65 | - | 11 | - | - | - | 590 | 281 | 28 | 1.9 | 1,430 | - |
| Do. | do. | 7-17-56 | do. | 60 | - | - | - | 102 | 377 | 0 | 407 | 65 | - | 9.5 | - | - | - | 610 | 301 | 27 | 1.8 | 1,450 | 7.3 |
| Do. | do. | 5- 7-57 | do. | 60 | - | - | - | 107 | 377 | 0 | 407 | 65 | - | 9.1 | .33 | - | - | 598 | 289 | 28 | 1.9 | 1,440 | 7.3 |
| 27.431 | W. A. Murray | 7-25-56 | do. | 59 | - | - | - | 118 | 392 | 0 | 392 | 72 | - | 6.9 | - | - | - | 580 | 259 | 31 | 2.1 | 1,450 | 7.3 |
| 29.434 | Stanley and Card | 7-12-46 | Alluvium | 55 | - | 94 | 26 | 40 | 232 | 0 | 194 | 16 | .5 | 14 | .04 | 499 | .68 | 342 | 152 | 20 | .9 | 765 | - |
| 29.434a | do. | 6-28-56 | San Andres ls. | 55 | - | - | - | 97 | 257 | 0 | 517 | 58 | - | 31 | - | - | - | 645 | 434 | 25 | 1.7 | 1,460 | 7.4 |
| Do. | do. | 5-14-58 | do. | 56 | - | - | - | 93* | 263 | 0 | 504 | 58 | - | - | - | - | - | 620 | 404 | 25 | 1.6 | 1,460 | 7.6 |
| 30.112 | The Anaconda Co. | 7-18-56 | do. | - | - | - | - | 32 | 291 | 0 | 134 | 16 | - | 32 | - | - | - | 356 | 118 | 17 | .7 | 779 | 7.7 |
| Do. | do. | 5- 8-57 | do. | 60 | - | - | - | 31 | 286 | 0 | 135 | 24 | - | 58 | - | - | - | 388 | 154 | 15 | .7 | 835 | 7.4 |
| 30.242 | Jack Freas | 8-12-53 | Alluvium | - | - | - | - | - | 366 | 0 | - | 22 | - | - | - | - | - | - | - | - | - | 981 | - |
| Do. | do. | 6-28-56 | do. | - | - | - | - | 18 | 325 | 0 | 178 | 24 | - | 26 | - | - | - | 468 | 202 | 8 | .4 | 906 | 7.5 |
| Do. | do. | 5- 7-57 | do. | 62 | - | - | - | 20 | 327 | 0 | 172 | 24 | - | 20 | - | - | - | 454 | 186 | 9 | .4 | 885 | 7.7 |
| 30.412** | Fred W. Freas | 1945(?) | San Andres ls. | - | - | 158 | 75 | 6 | 386 | 0 | 300 | 46 | - | 26 | - | 997 | 1.35 | 702 | - | - | - | - | - |
| 30.412 | do. | 5-10-46 | do. | 55 | - | 130 | 41 | 29 | 251 | 0 | 259 | 38 | .3 | 32 | - | 653 | .89 | 493 | 288 | 11 | .6 | 1,000 | - |
| Do. | do. | 8- 5-48 | do. | 55 | - | - | - | - | 346 | 0 | - | 38 | - | - | - | - | - | - | - | - | - | 1,100 | - |
| Do. | do. | 8-18-49 | do. | 55 | - | - | - | - | 349 | 0 | - | 37 | - | - | - | - | - | - | - | - | - | 1,130 | - |
| Do. | do. | 9- 51 | do. | 56 | - | - | - | - | 344 | 0 | - | 36 | - | - | - | - | - | - | - | - | - | 1,160 | - |
| Do. | do. | 6-25-52 | do. | - | - | - | - | - | 350 | 0 | - | 38 | - | - | - | - | - | - | - | - | - | 1,140 | - |
| Do. | do. | 8-10-55 | do. | 56 | - | - | - | 36* | 342 | 0 | 270 | 38 | - | - | - | - | - | 536 | 256 | 13 | .7 | 1,150 | 7.3 |
| Do. | do. | 6- 5-56 | do. | - | - | - | - | 86* | 354 | 0 | 394 | 65 | - | - | - | - | - | 605 | 315 | 24 | 1.5 | 1,450 | 7.6 |
| Do. | do. | 7-18-56 | do. | 56 | - | - | - | 55 | 330 | 0 | 304 | 39 | - | 30 | - | - | - | 546 | 280 | 18 | 1.0 | 1,170 | 7.5 |
| 30.421 | Milton Harding | 8-11-53 | do. | - | - | - | - | - | 352 | 0 | - | 37 | - | - | - | - | - | - | - | - | - | 1,160 | - |
| Do. | do. | 7-18-56 | do. | 56 | - | - | - | 40 | 323 | 0 | 317 | 38 | - | 27 | - | - | - | 570 | 306 | 15 | .8 | 1,170 | 7.5 |
| Do. | do. | 5- 7-57 | do. | 59 | - | - | - | 46 | 315 | 0 | 282 | 36 | - | 26 | .07 | - | - | 524 | 266 | 16 | .9 | 1,100 | 7.4 |
| 30.433 | Fred W. Freas | 10-21-44 | do. | - | - | 98 | 39 | 51 | 299 | 0 | 190 | 33 | - | 32 | - | 590 | .80 | 405 | 160 | 21 | 1.1 | 919 | - |
| 32.111 | The Anaconda Co. | 7-12-46 | do. | - | - | 126 | 42 | 50 | 308 | 0 | 288 | 32 | .5 | 21 | .07 | 691 | .94 | 487 | 234 | 18 | 1.0 | 1,050 | - |
| Do. | do. | 6-15-55 | do. | 55 | - | - | - | - | 295 | 0 | - | 30 | - | 22 | - | - | - | 520 | 278 | - | - | 1,100 | 7.3 |
| Do. | do. | 7-18-56 | do. | 56 | - | - | - | 41 | 281 | 0 | 295 | 23 | - | 14 | - | - | - | 492 | 262 | 15 | .8 | 1,040 | 7.5 |
| 33.444 | Stanley and Card | 6-28-56 | Chinle fm. | 55 | - | - | - | 265 | 404 | 0 | 327 | 12 | - | 2.4 | - | - | - | 115 | 0 | 83 | 11 | 1,310 | 8.2 |
| Do. | do. | 5- 7-57 | do. | 58 | - | - | - | 254 | 420 | 0 | 307 | 13 | - | .2 | - | - | - | 130 | 0 | 81 | 9.7 | 1,270 | 7.8 |
| 34.214 | W. A. Murray | 7-17-56 | do. | 56 | - | - | - | 719 | 189 | 0 | 1,590 | 74 | - | 14 | - | - | - | 364 | 209 | 81 | 16 | 3,530 | 7.9 |
| 34.412 | J. E. Church | 6-26-56 | Chinle and San Andres fms. | 55 | - | - | - | 378 | 305 | 0 | 563 | 88 | - | .6 | - | - | - | 138 | 0 | 86 | 14 | 1,900 | 7.8 |
| 12.11. 3.112a | Floyd M. Gibbs | 1-28-58 | Chinle fm. | - | - | - | - | 168* | 251 | 27 | 109 | 33 | - | - | - | - | - | 46 | 0 | 89 | 11 | 782 | 9.1 |
| 9.114a | Bruce Church | 2- 3-48 | San Andres ls. | - | 13 | 160 | 105 | 150 | 450 | 0 | 632 | 91 | .2 | 1.5 | - | 1,370 | 1.86 | 830 | 462 | 28 | 2.3 | 1,940 | - |
| 9.424 | George W. Rowley | 7-12-46 | San Andres and Yeso fms. | - | - | 700 | 131 | 1,220 | 1,620 | 0 | 2,300 | 860 | 2.1 | 1.3 | .73 | 6,010 | 8.17 | 2,280 | 958 | 54 | 11 | 7,680 | - |
| 9.424† | do. | 1- 47 | do. | - | - | - | - | - | 305§ | 0 | - | 925 | - | - | - | - | - | - | - | - | - | 6,790 | - |
| 9.424‖ | do. | 2- 47 | do. | - | - | 254 | 121 | 1,250 | 270§ | 0 | 2,270 | 900 | - | .4 | - | 4,930 | 6.70 | 1,130 | 910 | 71 | 16 | 6,610 | - |
| 9.424 | do. | 6-13-55 | do. | - | - | - | - | - | 1,600 | 0 | - | 865 | - | - | - | - | - | 2,250 | 939 | 54 | 11 | 7,490 | 6.6 |
| 10.334 | J. W. Price | 6-16-55 | San Andres ls. | - | - | - | - | - | 528 | 0 | 693 | 165 | - | - | - | - | - | 880 | 448 | 37 | 3.4 | 2,360 | 7.0 |
| Do. | do. | 6- 7-57 | do. | 60 | - | - | - | 235 | 558 | 0 | 752 | 184 | - | 2.0 | .48 | - | - | 990 | 532 | 34 | 3.3 | 3,110 | 7.0 |
| 10.431 | Burton C. Johns | 5-10-46 | do. | 59 | - | 178 | 47 | 155 | 429 | 0 | 462 | 98 | .3 | 3.6 | - | 1,160 | 1.58 | 638 | 286 | 35 | 2.7 | 1,700 | - |
| Do. | do. | 6- 5-47 | do. | - | - | - | - | - | 468 | 0 | 525 | 112 | - | - | - | - | - | - | - | - | - | 1,880 | - |

See footnotes at end of table.

# TABLE 10 (continued)

| Location number | Owner or name | Date collected | Stratigraphic unit | Temperature (°F) | Silica ($SiO_2$) | Calcium (Ca) | Magnesium (Mg) | Sodium and Potassium (Na+K) | Bicarbonate ($HCO_3$) | Carbonate ($CO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Boron (B) | Dissolved solids: Parts per million | Dissolved solids: Tons per acre-foot | Hardness as $CaCO_3$: Calcium, Magnesium | Hardness as $CaCO_3$: Noncarbonate | Percent sodium | Sodium adsorption ratio (SAR) | Specific conductance (micromhos at 25° C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.11.10.431 | Burton C. Johns | 8-11-53 | San Andres ls. | - | - | - | - | - | 536 | 0 | - | 158 | - | - | - | - | - | - | - | - | - | 2,310 | - |
| Do. | do. | 6-16-55 | do. | 59 | - | - | - | - | 530 | 0 | - | 164 | - | - | - | - | - | 830 | 396 | - | - | 2,300 | 7.0 |
| 11.334 | Duane Berryhill | 6-27-56 | Alluvium and basalt | - | - | - | - | 33 | 247 | 0 | 258 | 32 | - | 16 | - | - | - | 458 | 256 | 13 | 0.7 | 960 | 7.3 |
| Do. | do. | 5- 9-57 | do. | 60 | - | - | - | 29 | 243 | 0 | 252 | 32 | - | 14 | - | - | - | 454 | 255 | 12 | .6 | 925 | 7.7 |
| 13.233# | The Anaconda Co. | 7-18-56 | - | - | 32 | 679 | 276 | 1,170 | 177 | 0 | 3,940 | 86 | 0.5 | 1,250 | - | 7,520 | 10.2 | 2,830 | 2,680 | 47 | 9.6 | 7,580 | 7.6 |
| 13.431# | do. | 7-25-56 | - | - | - | - | - | - | - | - | - | - | - | 353 | - | - | - | - | - | - | - | 5,720 | - |
| 14.213 | Duane Berryhill | 7-23-56 | Alluvium and basalt | 57 | - | - | - | *22* | *232* | *0* | *119* | *8* | - | *.9* | - | - | - | *278* | *88* | *15* | *.6* | *604* | 7.4 |
| Do. | do. | 6- 7-57 | do. | 66 | 24 | 102 | 34 | 33 | 264 | 0 | 211 | 17 | .4 | 6.6 | 0 | 558 | .76 | 394 | 178 | 15 | .7 | 1,020 | 7.5 |
| 14.311 | Fred W. Freas | 10-21-44 | do. | - | - | 114 | 28 | 24 | 264 | 0 | 184 | 10 | - | 36 | - | 526 | .72 | 400 | 183 | 11 | .5 | 786 | - |
| Do. | do. | 7-12-46 | do. | - | - | 118 | 31 | 19 | 261 | 0 | 199 | 12 | .7 | 30 | .04 | 538 | .73 | 422 | 208 | 9 | .4 | 810 | - |
| Do. | do. | 8-11-53 | do. | - | - | - | - | - | 283 | 0 | - | 52 | - | - | - | - | - | - | - | - | - | 1,120 | - |
| 14.331 | G. P. Roundy | 7-18-56 | do. | 57 | - | - | - | 11 | 256 | 0 | 188 | 28 | - | 16 | - | - | - | 435 | 225 | 5 | .2 | 844 | 7.6 |
| Do. | do. | 5- 8-57 | do. | 60 | - | - | - | 17 | 261 | 0 | 198 | 31 | - | 16 | - | - | - | 440 | 226 | 8 | .3 | 858 | 7.9 |
| 15.211 | do. | 6-27-56 | San Andres ls. | 58 | - | - | - | 225 | 515 | 0 | 675 | 162 | - | 7.0 | - | - | - | 870 | 448 | 36 | 3.3 | 2,320 | 6.9 |
| Do. | do. | 5- 6-57 | do. | 59 | - | - | - | 220 | 514 | 0 | 668 | 161 | - | 6.6 | 1.2 | - | - | 870 | 449 | 36 | 3.2 | 2,290 | 7.0 |
| Do. | do. | 5-14-58 | do. | 59 | - | - | - | 254* | 542 | 0 | 741 | 175 | - | - | - | - | - | 910 | 466 | 38 | 3.7 | 2,430 | 7.0 |
| 15.341 | E. C. Freas | 5- 6-47 | do. | 55 | - | 153 | 45 | 96 | 354 | 0 | 379 | 59 | .4 | 8.1 | - | 915 | 1.24 | 566 | 276 | 27 | 1.8 | 1,340 | - |
| Do. | do. | 8- 5-48 | do. | 55 | - | - | - | - | 396 | 0 | - | 79 | - | - | - | - | - | - | - | - | - | 1,540 | - |
| 16.230 | E. B. Bowlin | 1- 47 | Yeso(?) fm. | - | - | 228 | 100 | 1,840 | 920 | 0 | 3,370 | 505 | - | .5 | - | 6,500 | 8.84 | 980 | 226 | 80 | 26 | 7,940 | - |
| 20.422 | J. F. Nielson | 12- 46 | do. | - | - | 68 | 35 | 14 | 295 | 13 | 46 | 20 | - | 5.3 | - | 346 | .47 | 314 | 50 | 9 | .3 | 596 | - |
| Do. | do. | 8-12-53 | do. | - | - | - | - | - | 329 | 0 | - | 20 | - | - | - | - | - | - | - | - | - | 615 | - |
| Do. | do. | 7-19-56 | do. | 57 | - | - | - | 12 | 323 | 0 | 35 | 19 | - | .1 | - | - | - | 303 | 38 | 8 | .3 | 601 | 7.5 |
| 22.234 | Church of Latter Day Saints | 6- 5-47 | San Andres ls. | - | - | 266 | 68 | 18 | 161 | 0 | 800 | 12 | - | .4 | - | 1,240 | 1.69 | 943 | 811 | 4 | .3 | 1,520 | - |
| Do. | do. | 8-11-53 | do. | - | - | - | - | - | 267 | 0 | - | 26 | - | - | - | - | - | - | - | - | - | 1,370 | - |
| 22.322 | George W. Rowley | 10-21-44 | - | - | - | 168 | 53 | 99 | 359 | 0 | 379 | 56 | - | 105 | - | 1,040 | 1.41 | 638 | 344 | 25 | 1.7 | 1,470 | - |
| 22.420 | A. Tietgen | 12-14-33 | San Andres(?) ls. | - | - | 172 | 46 | 76 | 352 | 0 | 356 | 50 | 0 | 68 | - | 941 | 1.28 | 618 | 330 | 21 | 1.3 | - | - |
| 23.231 | G. P. Roundy | 6- 4-47 | San Andres ls. | - | - | 121 | 30 | 9.4 | 305 | 0 | 158 | 12 | - | 18 | - | 499 | .68 | 426 | 176 | 5 | .2 | 794 | - |
| Do. | do. | 9- 51 | do. | 56 | - | - | - | - | 294 | 0 | - | 16 | - | - | - | - | - | - | - | - | - | - | - |
| Do. | do. | 10-28-52 | do. | - | 23 | 137 | 32 | 1.2 | 288 | 0 | 164 | 22 | .2 | 47 | - | 568 | .77 | 474 | 238 | 1 | 0 | 899 | - |
| Do. | do. | 8-12-53 | do. | - | - | - | - | - | 300 | 0 | - | 20 | - | - | - | - | - | - | - | - | - | 925 | - |
| Do. | do. | 6-27-56 | do. | - | - | - | - | 12 | 283 | 0 | 207 | 32 | - | 76 | - | - | - | 528 | 296 | 5 | .2 | 1,010 | 7.2 |
| Do. | do. | 7-18-56 | do. | - | - | - | - | - | - | 0 | - | 31 | - | 75 | - | - | - | - | - | - | - | 997 | - |
| Do. | do. | 5- 8-57 | do. | 60 | - | - | - | 10 | 293 | 0 | 212 | 36 | - | 73 | - | - | - | 548 | 308 | 4 | .2 | 1,030 | 7.4 |
| 24.233 | The Anaconda Co. | 12- 6-55 | do. | 58 | - | - | - | 84* | 346 | 0 | 330 | 57 | - | - | - | - | - | 524 | 240 | 26 | 1.6 | 1,270 | 7.2 |
| Do. | do. | 7-18-56 | do. | 59 | 15 | 142 | 42 | 105 | 351 | 0 | 351 | 60 | .5 | 19 | - | 908 | 1.23 | 527 | 240 | 30 | 2.0 | 1,330 | 7.4 |
| Do. | do. | 5- 7-57 | do. | - | - | - | - | 134 | 338 | 0 | 482 | 65 | - | 56 | - | - | - | 624 | 347 | 32 | 2.3 | 1,590 | 7.3 |
| 24.334 | Peter Chalamidas | 6-28-56 | do. | - | - | - | - | 90 | 392 | 0 | 386 | 79 | - | 13 | - | - | - | 650 | 329 | 23 | 1.5 | 1,470 | 7.2 |
| Do. | do. | 6- 7-57 | do. | - | - | - | - | 87 | 414 | 0 | 382 | 75 | - | 15 | - | - | - | 665 | 326 | 22 | 1.5 | - | 7.4 |
| 24.411 | The Anaconda Co. | 4-23-52 | do. | 56 | 15 | 165 | 49 | 103 | 402 | 0 | 380 | 70 | .5 | 15 | - | 996 | 1.35 | 613 | 284 | 27 | 1.8 | 1,460 | 7.2 |
| Do. | do. | 12- 6-55 | do. | 56 | - | - | - | - | 363 | 0 | 355 | 63 | - | - | - | - | - | 556 | 258 | 26 | 1.7 | 1,350 | 7.5 |
| Do. | do. | 6- 4-56 | do. | - | - | - | - | - | 326 | 0 | 282 | 38 | - | - | - | - | - | 540 | 273 | 10 | .5 | 1,140 | 7.4 |
| Do. | do. | 7-18-56 | do. | 58 | 16 | 139 | 45 | 95 | 348 | 0 | 342 | 59 | .3 | 18 | - | 885 | 1.20 | 532 | 247 | 28 | 1.8 | 1,320 | 7.4 |
| Do. | do. | 5- 7-57 | do. | 60 | 20 | 160 | 56 | 141 | 295 | 0 | 523 | 68 | .3 | 65 | - | 1,180 | 1.60 | 630 | 388 | 33 | 2.4 | 1,630 | 7.5 |
| Do. | do. | 5-14-58 | do. | 58 | - | - | - | - | 387 | 0 | 552 | 79 | - | - | - | - | - | 725 | 408 | - | - | 1,790 | 7.3 |
| 25.122 | do. | 6-27-56 | do. | - | - | - | - | 42 | 326 | 0 | 278 | 47 | - | 35 | - | - | - | 560 | 293 | 14 | .8 | 1,150 | 7.4 |
| 25.213 | do. | 7-11-46 | do. | - | - | 147 | 49 | 95 | 366 | 0 | 356 | 57 | .6 | 29 | .15 | 614 | 1.24 | 568 | 268 | 27 | 1.7 | 1,320 | - |
| Do. | do. | 9- 51 | do. | 56 | - | - | - | - | 361 | 0 | - | 57 | - | - | - | - | - | - | - | - | - | 1,340 | - |
| Do. | do. | 7-18-56 | do. | 57 | 17 | 145 | 52 | 88 | 338 | 0 | 365 | 55 | .3 | 40 | - | 928 | 1.26 | 576 | 299 | 25 | 1.6 | 1,340 | 7.4 |
| Do. | do. | 5- 7-57 | do. | 60 | 21 | 145 | 49 | 84 | 341 | 0 | 353 | 54 | .8 | 27 | .33 | 902 | 1.23 | 564 | 284 | 25 | 1.5 | 1,320 | 7.2 |
| 25.214 | do. | 8-12-53 | do. | - | - | - | - | - | 358 | 0 | - | 55 | - | - | - | - | - | - | - | - | - | 1,320 | - |
| 25.312 | Harmon and Reid | 6- 4-47 | do. | - | - | 119 | 46 | 66 | 323 | 0 | 266 | 52 | - | 18 | - | 726 | .99 | 486 | 222 | 23 | 1.3 | 1,120 | - |
| Do. | do. | 7-19-56 | do. | 57 | 17 | 77 | 34 | 27 | 266 | 0 | 138 | 16 | .4 | 7.6 | - | 443 | .61 | 332 | 114 | 15 | .6 | 722 | 7.7 |

* Sodium and potassium concentration computed without regard to fluoride and nitrate concentrations.

** *Analyzed by University of Arizona.*

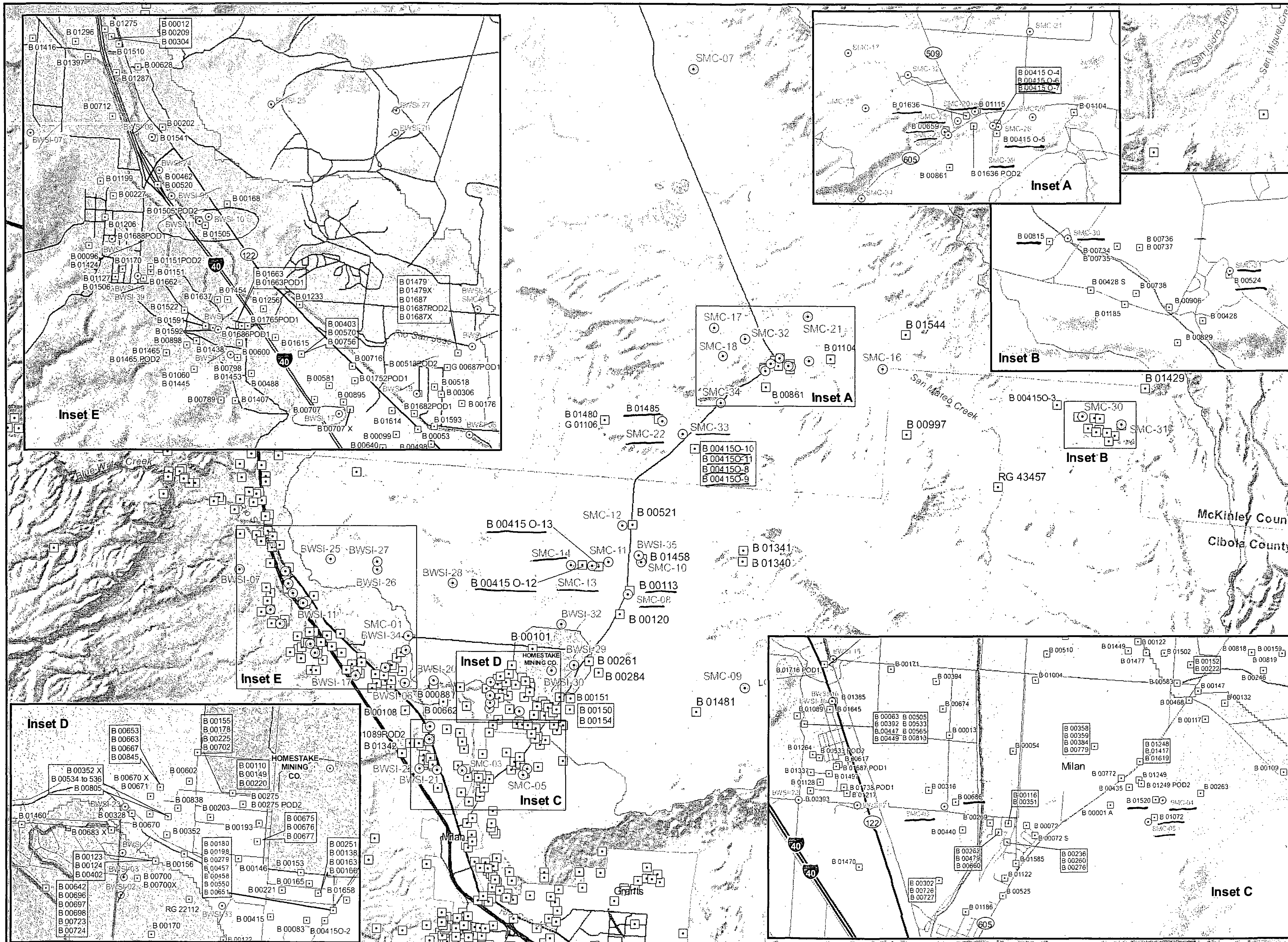
✗ Sample collected during well drilling process at depth of 178 feet; well completed at 523 feet.

✗ Sample collected just after pump was started.

§ Sample contained precipitated $CaCO_3$ at time of analysis.

|| *Sample collected after 10 hours of continuous pumping.*

\# Effluent from mill pond, The Anaconda Co.




# Drinking Water Wells San Mateo Creek Milan, NM

## Legend

- NMED Well
- OSE Well*
- Homestake Mill
- San Mateo Watershed

* Wells identified as Domestic, Community Use, and Municipal.

N
W E
S

0 0.5 1 2 3

Miles

Sources:
Wells from NMED are from the New Mexico Environment Department, 2009.
Wells from OSE are the the New Mexico Office of the State Engineer, Nov. 2008.
San Mateo Creek watershed was created by EPA Region 6 from the catchment layer in the NHDPlus dataset.
Homestake boundary is from EPA Region 6.
Base data (roads, water, and boundaries) is from ESRI.

EPA Region 6
GIS Support
Dallas, TX
May 7, 2009

LOCKHEED MARTIN

20090507ML01

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 1 | 13.8.30.100 | 13.08.30.100 | San Mateo Mine | 16 | 2126.93514 | NMED Well | SMC-16 |
| 2 | 13.8.30.100 | 13.08.30.100 | | 16 | 2126.93514 | NMED Well | SMC-16 |
| 3 | 14.10.24.100 | 14.10.24.100 | Kermac Nuclear Fuels Corp. | 6 | 2943.04394 | NMED Well | SMC-07 |
| 4 | 14.10.25.100 | 14.10.25.100 | Homestake-Sapin Partners | 6 | 3901.47022 | NMED Well | SMC-07 |
| 5 | 15.13.13.100 | 15.13.13.100 | U.S. Bureau of Indian Affairs | 6 | 32933.3275 | NMED Well | SMC-07 |
| 6 | 16.8.1.100 | 16.08.01.100 | Petro Minerals Inc | 6 | 28362.4299 | NMED Well | SMC-07 |
| 7 | 9.10.33.110 | 09.10.33.110 | Alfreso Mirabal | 20 | 26052.0437 | NMED Well - BWSI | BWSI-21 |
| 8 | 10.9.17.113 | 10.09.17.113 | Sidney S. Gottlieb | 4 | 12602.8494 | NMED Well | SMC-05 |
| 9 | 10.10.25.114 | 10.10.25.114 | Sidney S. Gottlieb | 4 | 14883.1791 | NMED Well | SMC-05 |
| 10 | 11.10.2.111 | 11.10.02.111 | Republic Supply Co | 3 | 1127.17698 | NMED Well | SMC-04 |
| 11 | 11.10.4.111 | 11.10.04.111 | John Evans | 14 | 767.826757 | NMED Well - BWSI | BWSI-15 |
| 12 | 11.10.8.111 | 11.10.08.111 | Salvador Milan | 21 | 606.949811 | NMED Well - BWSI | BWSI-22 |
| 13 | 11.10.8.111a | 11.10.08.111a | Salvador Milan | 21 | 606.949811 | NMED Well - BWSI | BWSI-22 |
| 14 | 11.10.10.111 | 11.10.10.111 | Milton Harding | 2 | 1049.37524 | NMED Well | SMC-03 |
| 15 | 11.10.10.111a | 11.10.10.111a | Milton Harding | 2 | 1049.37524 | NMED Well | SMC-03 |
| 16 | 12.10.30.112 | 12.10.30.112 | The Anaconda Co | 18 | 1197.37366 | NMED Well - BWSI | BWSI-19 |
| 17 | 12.10.30.112 | 12.10.30.112 | The Anaconda Co | 18 | 1197.37366 | NMED Well - BWSI | BWSI-19 |
| 18 | 12.10.32.111 | 12.10.32.111 | The Anaconda Co. | 5 | 196.984611 | NMED Well - BWSI | BWSI-06 |
| 19 | 12.10.32.111 | 12.10.32.111 | The Anaconda Co. | 5 | 196.984611 | NMED Well - BWSI | BWSI-06 |
| 20 | 12.10.32.111 | 12.10.32.111 | The Anaconda Co. | 5 | 196.984611 | NMED Well - BWSI | BWSI-06 |
| 21 | 12.11.3.112a | 12.11.03.112a | F M Gibbs | 6 | 4261.10389 | NMED Well - BWSI | BWSI-07 |
| 22 | 12.11.9.114a | 12.11.09.114a | J C Church | 6 | 2935.08823 | NMED Well - BWSI | BWSI-07 |
| 23 | 12.11.15.111 | 12.11.15.111 | John Church | 6 | 1038.72782 | NMED Well - BWSI | BWSI-07 |
| 24 | 12.11.23.111 | 12.11.23.111 | G P Roundy | 23 | 212.730123 | NMED Well - BWSI | BWSI-24 |
| 25 | 13.8.75.111 | 13.08.75.111 | P. Pena | 30 | 622.370732 | NMED Well | SMC-31 |
| 26 | 13.8.25.112 | 13.08.25.112 | J Gonzales | 30 | 622.370732 | NMED Well | SMC-31 |
| 27 | 13.8.25.114 | 13.08.25.114 | J Hope | 30 | 622.370732 | NMED Well | SMC-31 |
| 28 | 13.8.25.114a | 13.08.25.114a | E. Michael | 30 | 622.370732 | NMED Well | SMC-31 |
| 29 | 13.8.25.114b | 13.08.25.114b | E. Michael | 30 | 622.370732 | NMED Well | SMC-31 |
| 30 | 13.9.13.111 | 13.09.13.111 | N. Marquez | 21 | 1779.78919 | NMED Well | SMC-21 |
| 31 | 13.9.22.111 | 13.09.22.111 | B. Jones | 26 | 150.220104 | NMED Well | SMC-25 |
| 32 | 13.9.28.111 | 13.09.28.111 | Calvmet Hecla Inc. | 33 | 98.999509 | NMED Well | SMC-34 |
| 33 | 13.9.32.112 | 13.09.32.112 | R. Otero | 32 | 477.827154 | NMED Well | SMC-33 |
| 34 | 14.9.32.114 | 14.09.32.114 | K-M 50 | 6 | 4053.48954 | NMED Well | SMC-07 |
| 35 | 14.10.23.114 | 14.10.23.114 | United Nuclear-Homestake | 6 | 4589.16434 | NMED Well | SMC-07 |
| 36 | 13.4.31.114 | 13.04.31.114 | Community of Marquez | 30 | 30012.6074 | NMED Well | SMC-31 |
| 37 | 13.8.25.111 | 13.08.25.111 | Pablo Pena | 30 | 622.370732 | NMED Well | SMC-31 |
| 38 | 13.8.25.112 | 13.08.25.112 | Jose T. Gonzalez | 30 | 622.370732 | NMED Well | SMC-31 |
| 39 | 13.8.25.114 | 13.08.25.114 | Ernest Michael | 30 | 622.370732 | NMED Well | SMC-31 |
| 40 | 13.9.13.111 | 13.09.13.111 | Nabor Marquez | 21 | 1779.78919 | NMED Well | SMC-21 |
| 41 | 13.9.22.112 | 13.09.22.112 | Ingersoll-Rand Co. | 26 | 150.220104 | NMED Well | SMC-25 |
| 42 | 13.11.17.113 | 13.11.17.113 | El Paso Natural Gas Co. | 6 | 11236.2442 | NMED Well - BWSI | BWSI-07 |
| 43 | 13.11.17.113a | 13.11.17.113a | El Paso Natural Gas Co. | 6 | 11236.2442 | NMED Well - BWSI | BWSI-07 |
| 44 | 13.11.17.114 | 13.11.17.114 | El Paso Natural Gas Co. | 6 | 11236.2442 | NMED Well - BWSI | BWSI-07 |
| 45 | 13.11.17.114a | 13.11.17.114a | El Paso Natural Gas Co. | 6 | 11236.2442 | NMED Well - BWSI | BWSI-07 |
| 46 | 13.13.5.114 | 13.13.05.114 | Donald Kimbler | 6 | 26608.4453 | NMED Well - BWSI | BWSI-07 |
| 47 | 14.10.9.112 | 14.10.09.112 | Buck Wilcoxson | 6 | 7954.16003 | NMED Well | SMC-07 |
| 48 | 14.10.23.114 | 14.10.23.114 | Homestake -Sapin Partners | 6 | 4589.16434 | NMED Well | SMC-07 |
| 49 | 14.12.20.111 | 14.12.20.111 | U.S. Bureau of Indian Affairs | 6 | 22950.0979 | NMED Well - BWSI | BWSI-07 |
| 50 | 14.12.20.111a | 14.12.20.111a | U.S. Bureau of Indian Affairs | 6 | 22950.0979 | NMED Well - BWSI | BWSI-07 |
| 51 | 14.12.20.112 | 14.12.20.112 | Christian Reformed Mission | 6 | 22950.0979 | NMED Well - BWSI | BWSI-07 |
| 52 | 14.13.33.113 | 14.13.33.113 | A J Mahler | 6 | 26218.6995 | NMED Well - BWSI | BWSI-07 |
| 53 | 16.8.14.111 | 16.08.14.111 | Fernandez Co. | 6 | 24848.0717 | NMED Well | SMC-07 |
| 54 | 12.10.30.112 | 12.10.30.112 | Mexican Camp | 18 | 1197.37366 | NMED Well - BWSI | BWSI-19 |
| 55 | 10.10.15.124 | 10.10.15.124 | Ted Ortiz | 4 | 11532.0006 | NMED Well | SMC-05 |
| 56 | 11.9.30.122 | 11.09.30.122 | O H Hawkins | 4 | 6379.47661 | NMED Well | SMC-05 |
| 57 | 11.9.30.122a | 11.09.30.122a | O H Hawkins | 4 | 6379.47661 | NMED Well | SMC-05 |
| 58 | 11.10.8.122 | 11.10.08.122 | Salvador Milan | 21 | 262.111343 | NMED Well - BWSI | BWSI-22 |
| 59 | 11.10.16.121 | 11.10.16.121 | Frank Wilson | 2 | 1858.31942 | NMED Well | SMC-03 |
| 60 | 11.10.16.121 | 11.10.16.121 | Frank Wilson | 2 | 1858.31942 | NMED Well | SMC-03 |
| 61 | 11.10.16.121 | 11.10.16.121 | Frank Wilson | 2 | 1858.31942 | NMED Well | SMC-03 |
| 62 | 11.10.16.121a | 11.10.16.121a | Lee Hanosh | 2 | 1858.31942 | NMED Well | SMC-03 |
| 63 | 11.10.16.121a | 11.10.16.121a | Lee Hanosh | 2 | 1858.31942 | NMED Well | SMC-03 |
| 64 | 12.11.25.122 | 12.11.25.122 | The Anaconda Company | 12 | 1052.76129 | NMED Well - BWSI | BWSI-13 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 65 | 12.11.25.122a | 12.11.25.122a | The Anaconda Company | 12 | 1052.76129 | NMED Well - BWSI | BWSI-13 |
| 66 | 13.8.25.122 | 13.08.25.122 | Comm. Of San Mateo | 30 | 371.420167 | NMED Well | SMC-31 |
| 67 | 13.9.22.121 | 13.09.22.121 | Ingersol Rand | 26 | 279.824444 | NMED Well | SMC-25 |
| 68 | 13.9.22.121 | 13.09.22.121 | Bingham | 26 | 279.824444 | NMED Well | SMC-25 |
| 69 | 13.9.22.121 | 13.09.22.121 | Bingham* | 26 | 279.824444 | NMED Well | SMC-25 |
| 70 | 14.9.32.122 | 14.09.32.122 | United Nuclear Homestake | 6 | 4324.43669 | NMED Well | SMC-07 |
| 71 | 14.9.32.122a | 14.09.32.122a | United Nuclear Homestake | 6 | 4324.43669 | NMED Well | SMC-07 |
| 72 | 14.9.32.122b | 14.09.32.122b | United Nuclear Homestake | 6 | 4324.43669 | NMED Well | SMC-07 |
| 73 | 14.9.32.122c | 14.09.32.122c | United Nuclear Homestake | 6 | 4324.43669 | NMED Well | SMC-07 |
| 74 | 13.5.7.123 | 13.05.07.123 | Fernandez Co. | 30 | 21237.3221 | NMED Well | SMC-31 |
| 75 | 13.7.20.121 | 13.07.20.121 | | 30 | 3287.79763 | NMED Well | SMC-31 |
| 76 | 13.9.22.121 | 13.09.22.121 | James McAvoy | 26 | 279.824444 | NMED Well | SMC-25 |
| 77 | 13.11.17.123 | 13.11.17.123 | El Paso Natural Gas Co. | 6 | 11122.5976 | NMED Well - BWSI | BWSI-07 |
| 78 | 13.11.18.122 | 13.11.18.122 | El Paso Natural Gas Co. | 6 | 11710.4868 | NMED Well - BWSI | BWSI-07 |
| 79 | 13.11.18.122a | 13.11.18.122a | Volton Tietjen | 6 | 11710.4868 | NMED Well - BWSI | BWSI-07 |
| 80 | 13.12.8.121 | 13.12.08.121 | C Williams | 6 | 17644.1197 | NMED Well - BWSI | BWSI-07 |
| 81 | 13.13.30.122 | 13.13.30.122 | Donald Kimbler | 6 | 24944.4526 | NMED Well - BWSI | BWSI-07 |
| 82 | 14.9.32.122 | 14.09.32.122 | Homestake New Mexico Partners | 6 | 4324.43669 | NMED Well | SMC-07 |
| 83 | 14.9.32.122a | 14.09.32.122a | Homestake New Mexico Partners | 6 | 4324.43669 | NMED Well | SMC-07 |
| 84 | 14.9.32.122b | 14.09.32.122b | Homestake New Mexico Partners | 6 | 4324.43669 | NMED Well | SMC-07 |
| 85 | 14.9.32.122c | 14.09.32.122c | Homestake New Mexico Partners | 6 | 4324.43669 | NMED Well | SMC-07 |
| 86 | 14.11.19.124 | 14.11.19.124 | Henry E Andrews | 6 | 19351.6953 | NMED Well - BWSI | BWSI-07 |
| 87 | 14.12.20.121 | 14.12.20.121 | Christian Reformed Mission | 6 | 22718.4248 | NMED Well - BWSI | BWSI-07 |
| 88 | 14.13.28.123 | 14.13.28.123 | U.S. Bureau of Indian Affairs | 6 | 26914.8945 | NMED Well - BWSI | BWSI-07 |
| 89 | 14.13.28.123 | 14.13.28.123 | U.S. Bureau of Indian Affairs | 6 | 26914.8945 | NMED Well - BWSI | BWSI-07 |
| 90 | 14.13.33.123 | 14.13.33.123 | McKinley County | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 91 | 14.13.33.124 | 14.13.33.124 | U.S. Bureau of Indian Affairs | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 92 | 14.13.33.124 | 14.13.33.124 | U.S. Bureau of Indian Affairs | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 93 | 14.13.33.124 | 14.13.33.124 | U.S. Bureau of Indian Affairs | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 94 | 14.13.33.124 | 14.13.33.124 | U.S. Bureau of Indian Affairs | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 95 | 14.13.33.124a | 14.13.33.124a | U.S. Bureau of Indian Affairs | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 96 | 14.13.33.124a | 14.13.33.124a | U.S. Bureau of Indian Affairs | 6 | 25899.3807 | NMED Well - BWSI | BWSI-07 |
| 97 | 15.6.20.1210 | 15.06.20.1210 | | 30 | 24211.1959 | NMED Well | SMC-31 |
| 98 | 15.12.17.123 | 15.12.17.123 | U.S. Bureau of Indian Affairs | 6 | 29774.4626 | NMED Well | SMC-07 |
| 99 | 15.12.17.123 | 15.12.17.123 | U.S. Bureau of Indian Affairs | 6 | 29774.4626 | NMED Well | SMC-07 |
| 100 | 15.12.17.123a | 15.12.17.123a | U.S. Bureau of Indian Affairs | 6 | 29774.4626 | NMED Well | SMC-07 |
| 101 | 16.9.14.121 | 16.09.14.121 | Fernandez Co. | 6 | 20849.9545 | NMED Well | SMC-07 |
| 102 | 16.11.5.121 | 16.11.05.121 | U.S. Bureau of Indian Affairs | 6 | 29698.3187 | NMED Well | SMC-07 |
| 103 | 10.9.23.130 | 10.09.23.130 | Sidney S. Gottlieb | 4 | 16728.172 | NMED Well | SMC-05 |
| 104 | 10.9.23.134 | 10.09.23.134 | Sidney S. Gottlieb | 4 | 16728.172 | NMED Well | SMC-05 |
| 105 | 10.9.29.132 | 10.09.29.132 | Sidney S. Gottlieb | 4 | 15992.7239 | NMED Well | SMC-05 |
| 106 | 10.10.34.131 | 10.10.34.131 | Augustine Garcia | 2 | 16808.633 | NMED Well | SMC-03 |
| 107 | 11.10.26.133 | 11.10.26.133 | Grants Lumber & Box Co. | 4 | 5364.43312 | NMED Well | SMC-05 |
| 108 | 13.8.27.133 | 13.08.27.133 | Fernandez Co. | 29 | 2353.37398 | NMED Well | SMC-30 |
| 109 | 14.10.23.132 | 14.10.23.132 | United Nuclear-Homestake | 6 | 4692.53289 | NMED Well | SMC-07 |
| 110 | 14.10.23.134 | 14.10.23.134 | United Nuclear-Homestake | 6 | 4692.53289 | NMED Well | SMC-07 |
| 111 | 14.10.25.132 | 14.10.25.132 | United Nuclear-Homestake | 6 | 4188.06287 | NMED Well | SMC-07 |
| 112 | 14.10.25.132a | 14.10.25.132a | United Nuclear-Homestake | 6 | 4188.06287 | NMED Well | SMC-07 |
| 113 | 14.10.25.132b | 14.10.25.132b | United Nuclear-Homestake | 6 | 4188.06287 | NMED Well | SMC-07 |
| 114 | 14.10.25.132c | 14.10.25.132c | United Nuclear-Homestake | 6 | 4188.06287 | NMED Well | SMC-07 |
| 115 | 14.10.25.132d | 14.10.25.132d | United Nuclear-Homestake | 6 | 4188.06287 | NMED Well | SMC-07 |
| 116 | 13.5.26.134 | 13.05.26.134 | | 30 | 27169.3387 | NMED Well | SMC-31 |
| 117 | 13.11.17.133 | 13.11.17.133 | El Paso Natural Gas Co. | 6 | 10925.2933 | NMED Well - BWSI | BWSI-07 |
| 118 | 13.13.22.133 | 13.13.22.133 | Clay Hardin | 6 | 21267.1879 | NMED Well - BWSI | BWSI-07 |
| 119 | 13.13.28.131 | 13.13.28.131 | V.O. Stalling | 6 | 22145.1787 | NMED Well - BWSI | BWSI-07 |
| 120 | 13.13.28.131 | 13.13.28.131 | V.O. Stalling | 6 | 22145.1787 | NMED Well - BWSI | BWSI-07 |
| 121 | 14.10.23.132 | 14.10.23.132 | Homestake -Sapin Partners | 6 | 4692.53289 | NMED Well | SMC-07 |
| 122 | 14.10.23.134 | 14.10.23.134 | Homestake -Sapin Partners | 6 | 4692.53289 | NMED Well | SMC-07 |
| 123 | 14.10.25.132 | 14.10.25.132 | Homestake-Sapin Partners | 6 | 4188.06287 | NMED Well | SMC-07 |
| 124 | 14.10.25.132a | 14.10.25.132a | Homestake-Sapin Partners | 6 | 4188.06287 | NMED Well | SMC-07 |
| 125 | 14.10.25.132b | 14.10.25.132b | Homestake-Sapin Partners | 6 | 4188.06287 | NMED Well | SMC-07 |
| 126 | 14.10.25.132c | 14.10.25.132c | Homestake-Sapin Partners | 6 | 4188.06287 | NMED Well | SMC-07 |
| 127 | 14.10.25.132d | 14.10.25.132d | Homestake-Sapin Partners | 6 | 4188.06287 | NMED Well | SMC-07 |
| 128 | 14.11.11.134 | 14.11.11.134 | Adrian Berryhill | 6 | 14172.354 | NMED Well | SMC-07 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 129 | 14.13.25.133 | 14.13.25.133 | U.S. Bureau of Indian Affairs | 6 | 23409.924 | NMED Well - BWSI | BWSI-07 |
| 130 | 14.13.33.132 | 14.13.33.132 | U.S. Bureau of Indian Affairs | 6 | 25975.0014 | NMED Well - BWSI | BWSI-07 |
| 131 | 14.13.33.132a | 14.13.33.132a | Elmer Bowman | 6 | 25975.0014 | NMED Well - BWSI | BWSI-07 |
| 132 | 15.7.23.132 | 15.07.23.132 | | 30 | 22129.0014 | NMED Well | SMC-31 |
| 133 | 15.10.13.131 | 15.10.13.131 | R E Alberts & Son | 6 | 10300.3268 | NMED Well | SMC-07 |
| 134 | 15.10.13.133 | 15.10.13.133 | Midwest Refining Co | 6 | 10300.3268 | NMED Well | SMC-07 |
| 135 | 16.8.20.131 | 16.08.20.131 | Fernandez Co. | 6 | 20523.683 | NMED Well | SMC-07 |
| 136 | 16.8.33.134 | 16.08.33.134 | Fernandez Co. | 6 | 18640.3565 | NMED Well | SMC-07 |
| 137 | 16.9.1.132 | 16.09.01.132 | Fernandez Co. | 6 | 23923.4459 | NMED Well | SMC-07 |
| 138 | 10.9.28.142 | 10.09.28.142 | Maria Payaso | 4 | 16735.6155 | NMED Well | SMC-05 |
| 139 | 11.10.16.142 | 11.10.16.142 | Lee Hanosh | 2 | 2258.50085 | NMED Well | SMC-03 |
| 140 | 11.10.16.142a | 11.10.16.142a | Lee Hanosh | 2 | 2258.50085 | NMED Well | SMC-03 |
| 141 | 11.10.21.144 | 11.10.21.144 | Salvador Milan | 2 | 3862.78509 | NMED Well | SMC-03 |
| 142 | 12.10.7.143 | 12.10.07.143 | Duane Berryhill | 26 | 1562.63979 | NMED Well - BWSI | BWSI-27 |
| 143 | 12.11.22.144 | 12.11.22.144 | T J McNeil | 13 | 723.11965 | NMED Well - BWSI | BWSI-14 |
| 144 | 13.8.24.141 | 13.08.24.141 | Gulf Minerals | 30 | 869.998822 | NMED Well | SMC-31 |
| 145 | 13.8.24.141a | 13.08.24.141a | A. Candelaria | 30 | 869.998822 | NMED Well | SMC-31 |
| 146 | 13.9.5.214 | 13.09.5.214 | Km 5-1 | 17 | 3260.59085 | NMED Well | SMC-17 |
| 147 | 13.9.29.144 | 13.09.29.144 | | 32 | 798.405626 | NMED Well | SMC-33 |
| 148 | 14.9.28.143 | 14.09.28.143 | Kerr McGee | 6 | 3821.42802 | NMED Well | SMC-07 |
| 149 | 14.10.23.141 | 14.10.23.141 | United Nuclear-Homestake | 6 | 4321.69144 | NMED Well | SMC-07 |
| 150 | 14.10.23.142 | 14.10.23.142 | United Nuclear-Homestake | 6 | 4321.69144 | NMED Well | SMC-07 |
| 151 | 13.9.29.144 | 13.09.29.144 | | 32 | 798.405626 | NMED Well | SMC-33 |
| 152 | 13.11.17.141 | 13.11.17.141 | El Paso Natural Gas Co. | 6 | 10738.5283 | NMED Well - BWSI | BWSI-07 |
| 153 | 13.12.3.142 | 13.12.03.142 | Elkins Ranch Inc. | 6 | 16504.6404 | NMED Well - BWSI | BWSI-07 |
| 154 | 13.12.12.142 | 13.12.12.142 | Elkins Ranch Inc. | 6 | 13424.0498 | NMED Well - BWSI | BWSI-07 |
| 155 | 13.13.4.144 | 13.13.04.144 | Dave Huffman | 6 | 24710.2755 | NMED Well - BWSI | BWSI-07 |
| 156 | 13.13.26.143 | 13.13.26.143 | Ford & Williams Ranch | 6 | 18809.1163 | NMED Well - BWSI | BWSI-07 |
| 157 | 14.9.28.143 | 14.09.28.143 | Phillips Petr. Co. | 6 | 3821.42802 | NMED Well | SMC-07 |
| 158 | 14.10.23.141 | 14.10.23.141 | Homestake -Sapin Partners | 6 | 4321.69144 | NMED Well | SMC-07 |
| 159 | 14.10.23.142 | 14.10.23.142 | Homestake -Sapin Partners | 6 | 4321.69144 | NMED Well | SMC-07 |
| 160 | 14.12.14.142 | 14.12.14.142 | Elkins Ranch Inc. | 6 | 21506.2223 | NMED Well - BWSI | BWSI-07 |
| 161 | 14.13.33.141 | 14.13.33.141 | O Carter | 6 | 25652.602 | NMED Well - BWSI | BWSI-07 |
| 162 | 14.13.33.143 | 14.13.33.143 | Clay Hardin | 6 | 25652.602 | NMED Well - BWSI | BWSI-07 |
| 163 | 14.13.33.143a | 14.13.33.143a | AT&SF Railroad | 6 | 25652.602 | NMED Well - BWSI | BWSI-07 |
| 164 | 15.7.13.142 | 15.07.13.142 | Fernandez Co. | 30 | 24027.4877 | NMED Well | SMC-31 |
| 165 | 15.9.13.144 | 15.09.13.144 | Pablo Pena & Sons | 6 | 12092.8128 | NMED Well | SMC-07 |
| 166 | 15.9.13.145 | 15.09.13.145 | Pablo Pena & Sons | 6 | 12092.8128 | NMED Well | SMC-07 |
| 167 | 15.12.19.141 | 15.12.19.141 | Mrs. Ollie Morris | 6 | 30681.488 | NMED Well | SMC-07 |
| 168 | 15.13.12.144 | 15.13.12.144 | Lance Corp | 6 | 33215.4787 | NMED Well | SMC-07 |
| 169 | 15.13.12.144a | 15.13.12.144a | Lance Corp | 6 | 33215.4787 | NMED Well | SMC-07 |
| 170 | 16.10.12.144 | 16.10.12.144 | Hogback Oil Co. | 6 | 21491.6945 | NMED Well | SMC-07 |
| 171 | 12.10.7.143 | 12.10.07.143 | North Well (Anaconda Co.) | 26 | 1562.63979 | NMED Well - BWSI | BWSI-27 |
| 172 | 13.8.200 | 13.08.30.200 | San Mateo Mine | 16 | 2470.54356 | NMED Well | SMC-16 |
| 173 | 13.8.30.200 | 13.08.30.200 | | 16 | 2470.54356 | NMED Well | SMC-16 |
| 174 | 14.9.30.200 | 14.09.30.200 | Kermac Nuclear Fuels Corp. | 6 | 2846.07902 | NMED Well | SMC-07 |
| 175 | 14.10.22.200 | 14.10.22.200 | Kermac Nuclear Fuels Corp. | 6 | 5228.02101 | NMED Well | SMC-07 |
| 176 | 9.9.5.214 | 09.09.05.214 | Sidney S. Gottlieb | 4 | 18937.3351 | NMED Well | SMC-05 |
| 177 | 9.10.15.212 | 09.10.15.212 | Alfreso Mirabal | 4 | 21299.6923 | NMED Well | SMC-05 |
| 178 | 10.10.22.210 | 10.10.22.210 | Charles Boren | 4 | 13112.5221 | NMED Well | SMC-05 |
| 179 | 10.10.22.211 | 10.10.22.211 | R D Worthen | 4 | 13112.5221 | NMED Well | SMC-05 |
| 180 | 10.10.22.211a | 10.10.22.211a | R D Worthen | 4 | 13112.5221 | NMED Well | SMC-05 |
| 181 | 10.10.24.212 | 10.10.24.212 | Sidney S. Gottlieb | 4 | 13390.3198 | NMED Well | SMC-05 |
| 182 | 11.9.30.211 | 11.09.30.211 | L C McClusky | 4 | 6633.53964 | NMED Well | SMC-05 |
| 183 | 11.10.4.211 | 11.10.04.211 | John Evans | 1 | 1195.80451 | NMED Well - BWSI | BWSI-02 |
| 184 | 11.10.4.211 | 11.10.04.211 | John Evans | 1 | 1195.80451 | NMED Well - BWSI | BWSI-02 |
| 185 | 11.10.4.211 | 11.10.04.211 | John Evans | 1 | 1195.80451 | NMED Well - BWSI | BWSI-02 |
| 186 | 11.10.4.211 | 11.10.04.211 | John Evans | 1 | 1195.80451 | NMED Well - BWSI | BWSI-02 |
| 187 | 11.10.4.211 | 11.10.04.211 | John Evans | 1 | 1195.80451 | NMED Well - BWSI | BWSI-02 |
| 188 | 11.10.5.212 | 11.10.05.212 | John Evans | 14 | 178.832548 | NMED Well - BWSI | BWSI-15 |
| 189 | 11.10.5.212 | 11.10.05.212 | John Evans | 14 | 178.832548 | NMED Well - BWSI | BWSI-15 |
| 190 | 11.10.5.213 | 11.10.05.213 | Vidal Mirabel | 14 | 178.832548 | NMED Well - BWSI | BWSI-15 |
| 191 | 11.10.16.214 | 11.10.16.214 | Atomic Energy Commission | 2 | 1863.18792 | NMED Well | SMC-03 |
| 192 | 11.10.21.212 | 11.10.21.212 | Stewart Bros & Parker | 2 | 3462.89082 | NMED Well | SMC-03 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 193 | 11.10.21.214 | 11.10.21.214 | George E Failing Co. | 2 | 3462.89082 | NMED Well | SMC-03 |
| 194 | 12.10.12.212 | 12.10.12.212 | G.P. Roundy | 11 | 266.454388 | NMED Well | SMC-12 |
| 195 | 12.10.14.212 | 12.10.14.212 | Wilson | 14 | 127.487196 | NMED Well | SMC-14 |
| 196 | 12.10.31.211 | 12.10.31.211 | Bar-X Traler Lodge | 18 | 621.0298 | NMED Well - BWSI | BWSI-19 |
| 197 | 12.10.32.211 | 12.10.32.211 | Eugene Chapman | 19 | 297.108633 | NMED Well - BWSI | BWSI-20 |
| 198 | 12.10.34.214 | 12.10.34.214 | W A Murray | 31 | 652.566502 | NMED Well - BWSI | BWSI-33 |
| 199 | 12.11.14.213 | 12.11.14.213 | Duane Berryhill | 24 | 798.714137 | NMED Well - BWSI | BWSI-25 |
| 200 | 12.11.14.213 | 12.11.14.213 | Duane Berryhill | 24 | 798.714137 | NMED Well - BWSI | BWSI-25 |
| 201 | 12.11.15.211 | 12.11.15.211 | G P Roundy | 7 | 1160.07624 | NMED Well - BWSI | BWSI-08 |
| 202 | 12.11.15.211 | 12.11.15.211 | G P Roundy | 7 | 1160.07624 | NMED Well - BWSI | BWSI-08 |
| 203 | 12.11.15.211 | 12.11.15.211 | G P Roundy | 7 | 1160.07624 | NMED Well - BWSI | BWSI-08 |
| 204 | 12.11.15.214 | 12.11.15.214 | G P Roundy | 7 | 1160.07624 | NMED Well - BWSI | BWSI-08 |
| 205 | 12.11.25.213 | 12.11.25.213 | The Anaconda Company | 12 | 1385.09583 | NMED Well - BWSI | BWSI-13 |
| 206 | 12.11.25.213 | 12.11.25.213 | The Anaconda Company | 12 | 1385.09583 | NMED Well - BWSI | BWSI-13 |
| 207 | 12.11.25.213 | 12.11.25.213 | The Anaconda Company | 12 | 1385.09583 | NMED Well - BWSI | BWSI-13 |
| 208 | 12.11.25.213 | 12.11.25.213 | The Anaconda Company | 12 | 1385.09583 | NMED Well - BWSI | BWSI-13 |
| 209 | 12.11.25.214 | 12.11.25.214 | The Anaconda Company | 12 | 1385.09583 | NMED Well - BWSI | BWSI-13 |
| 210 | 13.8.26.211 | 13.08.26.211 | P. Sandoval | 29 | 566.373098 | NMED Well | SMC-30 |
| 211 | 13.8.26.211 | 13.08.26.211 | P. Sandoval* | 29 | 566.373098 | NMED Well | SMC-30 |
| 212 | 13.8.26.211a | 13.08.26.211a | N. Brookes | 29 | 566.373098 | NMED Well | SMC-30 |
| 213 | 13.8.26.212 | 13.08.26.212 | Comm. Of San Mateo | 29 | 566.373098 | NMED Well | SMC-30 |
| 214 | 13.8.26.212a | 13.08.26.212a | Comm. Of San Mateo | 29 | 566.373098 | NMED Well | SMC-30 |
| 215 | 13.8.26.212b | 13.08.26.212b | Comm. Of San Mateo | 29 | 566.373098 | NMED Well | SMC-30 |
| 216 | 13.9.22.212 | 13.09.22.212 | C. Sandoval | 36 | 57.5476535 | NMED Well | SMC-39 |
| 217 | 13.9.22.212 | 13.09.22.212 | C. Sandoval* | 36 | 57.5476535 | NMED Well | SMC-39 |
| 218 | 13.9.23.212 | 13.09.23.212 | N. Marquez | 28 | 852.236049 | NMED Well | SMC-28 |
| 219 | 13.8.26.211 | 13.08.26.211 | Procopio Sandoval | 29 | 566.373098 | NMED Well | SMC-30 |
| 220 | 13.9.22.212 | 13.09.22.212 | P.O. and Carlos Sandoval | 36 | 57.5476535 | NMED Well | SMC-39 |
| 221 | 13.10.8.211 | 13.10.08.211 | U.S. Bureau of Indian Affairs | 22 | 9967.88693 | NMED Well | SMC-22 |
| 222 | 13.11.8.212 | 13.11.08.212 | Elkins Ranch Inc. | 6 | 12581.4636 | NMED Well - BWSI | BWSI-07 |
| 223 | 13.13.5.214 | 13.13.05.214 | Wilson Brock | 6 | 25934.8528 | NMED Well - BWSI | BWSI-07 |
| 224 | 13.13.30.214 | 13.13.30.214 | Charles Bass | 6 | 24564.8991 | NMED Well - BWSI | BWSI-07 |
| 225 | 14.10.22.214 | 14.10.22.214 | Kermac Nuclear Fuels Corp. | 6 | 5383.49652 | NMED Well | SMC-07 |
| 226 | 14.11.30.211 | 14.11.30.211 | Elkins Ranch Inc. | 6 | 17681.0497 | NMED Well - BWSI | BWSI-07 |
| 227 | 14.13.33.211 | 14.13.33.211 | U.S. Bureau of Indian Affairs | 6 | 25582.285 | NMED Well - BWSI | BWSI-07 |
| 228 | 14.13.33.211 | 14.13.33.211 | U.S. Bureau of Indian Affairs | 6 | 25582.285 | NMED Well - BWSI | BWSI-07 |
| 229 | 15.9.6.213 | 15.09.06.213 | Pablo Pena & Sons | 6 | 13565.2912 | NMED Well | SMC-07 |
| 230 | 15.9.6.213 | 15.09.06.213 | Pablo Pena & Sons | 6 | 13565.2912 | NMED Well | SMC-07 |
| 231 | 15.10.32.214 | 15.10.32.214 | U.S. Bureau of Indian Affairs | 6 | 10056.5739 | NMED Well | SMC-07 |
| 232 | 15.12.19.212 | 15.12.19.212 | Mrs. Ollie Morris | 6 | 30408.796 | NMED Well | SMC-07 |
| 233 | 15.13.8.213 | 15.13.08.213 | Tidewater oil Co | 6 | 38622.8785 | NMED Well - BWSI | BWSI-07 |
| 234 | 12.11.25.214 | 12.11.25.214 | Monitor Well # 4 (Anaconda Co.) | 12 | 1385.09583 | NMED Well - BWSI | BWSI-13 |
| 235 | 12.11.14.213 | 12.11.14.213 | Engineer's Well | 24 | 798.714137 | NMED Well - BWSI | BWSI-25 |
| 236 | 12.10.32.211 | 12.10.32.211 | Leroy Chapman | 19 | 297.108633 | NMED Well - BWSI | BWSI-20 |
| 237 | 9.9.29.224 | 09.09.29.224 | R B Candelaria | 4 | 25307.1423 | NMED Well | SMC-05 |
| 238 | 10.9.21.222 | 10.09.21.222 | Sidney S. Gottlieb | 4 | 15352.206 | NMED Well | SMC-05 |
| 239 | 10.9.21.223 | 10.09.21.223 | Sidney S. Gottlieb | 4 | 15352.206 | NMED Well | SMC-05 |
| 240 | 10.9.26.224 | 10.09.26.224 | Sidney S. Gottlieb | 4 | 18326.4663 | NMED Well | SMC-05 |
| 241 | 11.10.4.222 | 11.10.04.222 | John Evans | 1 | 1050.30003 | NMED Well - BWSI | BWSI-02 |
| 242 | 11.10.8.221 | 11.10.08.221 | Salvador Milan | 20 | 190.798823 | NMED Well - BWSI | BWSI-21 |
| 243 | 11.10.8.221 | 11.10.08.221 | Salvador Milan | 20 | 190.798823 | NMED Well - BWSI | BWSI-21 |
| 244 | 11.10.9.221 | 11.10.09.221 | Stanley and Card | 2 | 668.33001 | NMED Well | SMC-03 |
| 245 | 11.10.9.221 | 11.10.09.221 | Stanley and Card | 2 | 668.33001 | NMED Well | SMC-03 |
| 246 | 11.10.9.221 | 11.10.09.221 | Stanley and Card | 2 | 668.33001 | NMED Well | SMC-03 |
| 247 | 11.10.17.222 | 11.10.17.222 | Salvador Milan | 20 | 1797.07607 | NMED Well - BWSI | BWSI-21 |
| 248 | 11.10.21.221 | 11.10.21.221 | Salvador Milan | 2 | 3509.86159 | NMED Well | SMC-03 |
| 249 | 11.10.25.221 | 11.10.25.221 | Mr Hawkinson | 4 | 5921.67584 | NMED Well | SMC-05 |
| 250 | 12.10.1.222 | 12.10.01.222 | G.P. Roundy | 11 | 1563.40407 | NMED Well | SMC-12 |
| 251 | 12.10.12.221 | 12.10.12.221 | G.P. Roundy | 11 | 162.444672 | NMED Well | SMC-12 |
| 252 | 12.11.9.221 | 12.11.09.221 | J C Church | 6 | 2626.25059 | NMED Well - BWSI | BWSI-07 |
| 253 | 12.11.15.223 | 12.11.15.223 | A T & S F Railroad | 7 | 994.892874 | NMED Well - BWSI | BWSI-08 |
| 254 | 12.11.26.224a | 12.11.26.224a | G P Roundy | 11 | 389.652412 | NMED Well - BWSI | BWSI-12 |
| 255 | 12.11.27.222 | 12.11.27.222 | Howard Prewitt | 8 | 398.190085 | NMED Well - BWSI | BWSI-09 |
| 256 | 12.11.28.222 | 12.11.28.222 | J F Neilson | 13 | 1644.13244 | NMED Well - BWSI | BWSI-14 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 257 | 13.8.17.223 | 13.08.17.223 | F. Lee | 16 | 3544.33881 | NMED Well | SMC-16 |
| 258 | 13.8.24.223 | 13.08.24.223 | A. Candelaria | 30 | 1454.98116 | NMED Well | SMC-31 |
| 259 | 13.8.24.223 | 13.08.24.223 | A. Candelaria | 30 | 1454.98116 | NMED Well | SMC-31 |
| 260 | 13.8.26.222 | 13.08.26.222 | F. Salazar | 29 | 766.301243 | NMED Well | SMC-30 |
| 261 | 13.9.24.221a | 13.09.24.221a | Calvmet Hecla Inc. | 16 | 215.345891 | NMED Well | SMC-16 |
| 262 | 14.9.30.221 | 14.09.30.221 | Kerr McGee | 6 | 2628.32738 | NMED Well | SMC-07 |
| 263 | 14.9.30.222 | 14.09.30.222 | A. Berryhill | 6 | 2628.32738 | NMED Well | SMC-07 |
| 264 | 14.10.14.221 | 14.10.14.221 | B. Wilcoxson | 6 | 3409.31767 | NMED Well | SMC-07 |
| 265 | 14.10.35.221 | 14.10.35.221 | United Nuclear-Homestake | 6 | 5372.30679 | NMED Well | SMC-07 |
| 266 | 13.8.24.223 | 13.08.24.223 | Arthur Candelaria | 30 | 1454.98116 | NMED Well | SMC-31 |
| 267 | 13.8.26.221 | 13.08.26.221 | Community of San Mateo | 29 | 766.301243 | NMED Well | SMC-30 |
| 268 | 13.9.24.221 | 13.09.24.221 | Nabor Marquez | 16 | 215.345891 | NMED Well | SMC-16 |
| 269 | 13.9.24.221a | 13.09.24.221a | Calumet Hecla Inc. | 16 | 215.345891 | NMED Well | SMC-16 |
| 270 | 13.11.18.221 | 13.11.18.221 | El Paso Natural Gas Co. | 6 | 11362.8468 | NMED Well - BWSI | BWSI-07 |
| 271 | 13.11.18.223 | 13.11.18.223 | El Paso Natural Gas Co. | 6 | 11362.8468 | NMED Well - BWSI | BWSI-07 |
| 272 | 13.11.18.224 | 13.11.18.224 | El Paso Natural Gas Co. | 6 | 11362.8468 | NMED Well - BWSI | BWSI-07 |
| 273 | 13.13.1.221 | 13.13.01.221 | AT&SF Railroad | 6 | 20571.245 | NMED Well - BWSI | BWSI-07 |
| 274 | 13.13.1.222 | 13.13.01.222 | AT&SF Railroad | 6 | 20571.245 | NMED Well - BWSI | BWSI-07 |
| 275 | 13.13.1.222a | 13.13.01.222a | AT&SF Railroad | 6 | 20571.245 | NMED Well - BWSI | BWSI-07 |
| 276 | 13.13.1.222a | 13.13.01.222a | AT&SF Railroad | 6 | 20571.245 | NMED Well - BWSI | BWSI-07 |
| 277 | 13.13.1.222a | 13.13.01.222a | AT&SF Railroad | 6 | 20571.245 | NMED Well - BWSI | BWSI-07 |
| 278 | 13.13.5.221 | 13.13.05.221 | Wilson Brock | 6 | 25600.5286 | NMED Well - BWSI | BWSI-07 |
| 279 | 13.13.20.223 | 13.13.20.223 | Clay Hardin | 6 | 23245.418 | NMED Well - BWSI | BWSI-07 |
| 280 | 14.9.30.221 | 14.09.30.221 | Kermac Nuclear Fuels Corp. | 6 | 2628.32738 | NMED Well | SMC-07 |
| 281 | 14.9.30.222 | 14.09.30.222 | Adrian Berryhill | 6 | 2628.32738 | NMED Well | SMC-07 |
| 282 | 14.10.14.221 | 14.10.14.221 | Buck Wilcoxson | 6 | 3409.31767 | NMED Well | SMC-07 |
| 283 | 14.10.35.221 | 14.10.35.221 | G.P. Roundy | 6 | 5372.30679 | NMED Well | SMC-07 |
| 284 | 14.12.9.221 | 14.12.09.221 | Elkins Ranch Inc. | 6 | 24348.5967 | NMED Well - BWSI | BWSI-07 |
| 285 | 15.11.18.222 | 15.11.18.222 | U.S. Bureau of Indian Affairs | 6 | 21815.4637 | NMED Well | SMC-07 |
| 286 | 15.11.18.222 | 15.11.18.222 | U.S. Bureau of Indian Affairs | 6 | 21815.4637 | NMED Well | SMC-07 |
| 287 | 15.12.19.223 | 15.12.19.223 | Mrs. Ollie Morris | 6 | 30022.636 | NMED Well | SMC-07 |
| 288 | 16.7.13.224 | 16.07.13.224 | Fernandez Co. | 6 | 33586.1262 | NMED Well | SMC-07 |
| 289 | 16.7.26.221 | 16.07.26.221 | Fernandez Co. | 30 | 30181.8112 | NMED Well | SMC-31 |
| 290 | 16.9.17.222 | 16.09.17.222 | Fernandez Co. | 6 | 20201.3473 | NMED Well | SMC-07 |
| 291 | 16.10.15.222 | 16.10.15.222 | R E Alberts & Son | 6 | 20674.0158 | NMED Well | SMC-07 |
| 292 | 16.11.33.224 | 16.11.33.224 | D R Smouse | 6 | 22044.3661 | NMED Well | SMC-07 |
| 293 | 10.5.9.224 | 10.05.09.224 | New Shop Well (Anaconda Co.) | 30 | 34900.0705 | NMED Well | SMC-31 |
| 294 | 11.10.9.221 | 11.10.09.221 | C. Connerly | 2 | 668.33001 | NMED Well | SMC-03 |
| 295 | 11.10.21.221 | 11.10.21.221 | Milan Well #1 | 2 | 3509.86159 | NMED Well | SMC-03 |
| 296 | 11.10.5.232 | 11.10.05.232 | Evans & Ellenger | 15 | 123.388164 | NMED Well - BWSI | BWSI-16 |
| 297 | 11.10.16.233 | 11.10.16.233 | Mrs Tom Elkins | 2 | 2262.57881 | NMED Well | SMC-03 |
| 298 | 11.10.21.232 | 11.10.21.232 | Standard Bulk Station | 2 | 3863.68267 | NMED Well | SMC-03 |
| 299 | 11.11.5.232 | 11.11.05.232 | P Schneeman | 8 | 5522.03972 | NMED Well - BWSI | BWSI-09 |
| 300 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 301 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 302 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 303 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 304 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 305 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 306 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 307 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 308 | 12.10.23.233 | 12.10.23.233 | T.A. Morris | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 309 | 12.10.23.233a | 12.10.23.233a | G.P. Roundy | 30 | 173.319988 | NMED Well - BWSI | BWSI-32 |
| 310 | 12.11.16.230 | 12.11.16.230 | E B Bowlin | 6 | 819.606732 | NMED Well - BWSI | BWSI-07 |
| 311 | 12.11.22.230 | 12.11.22.230 | J F Neilson | 13 | 441.59402 | NMED Well - BWSI | BWSI-14 |
| 312 | 12.11.22.234 | 12.11.22.234 | Church of Latter Day Saints | 13 | 441.59402 | NMED Well - BWSI | BWSI-14 |
| 313 | 12.11.22.234 | 12.11.22.234 | Church of Latter Day Saints | 13 | 441.59402 | NMED Well - BWSI | BWSI-14 |
| 314 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 315 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 316 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 317 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 318 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 319 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 320 | 12.11.23.231 | 12.11.23.231 | G P Roundy | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 321 | 12.11.24.233 | 12.11.24.233 | The Anaconda Company | 25 | 1635.57705 | NMED Well - BWSI | BWSI-26 |
| 322 | 12.11.24.233 | 12.11.24.233 | The Anaconda Company | 25 | 1635.57705 | NMED Well - BWSI | BWSI-26 |
| 323 | 12.11.24.233 | 12.11.24.233 | The Anaconda Company | 25 | 1635.57705 | NMED Well - BWSI | BWSI-26 |
| 324 | 13.8.24.234 | 13.08.24.234 | S. Marquez | 30 | 951.196201 | NMED Well | SMC-31 |
| 325 | 12.8.24.234 (?) | 12.08.24.234 (?) | Gulf Minerals | 30 | 951.196201 | NMED Well | SMC-31 |
| 326 | 13.8.33.234 | 13.08.33.234 | F Lee | 29 | 3994.37545 | NMED Well | SMC-30 |
| 327 | 14.9.28.233 | 14.09.28.233 | Kerr McGee | 6 | 4008.71376 | NMED Well | SMC-07 |
| 328 | 14.9.28.234 | 14.09.28.234 | Kerr McGee | 6 | 4008.71376 | NMED Well | SMC-07 |
| 329 | 14.9.28.234a | 14.09.28.234a | Kerr McGee | 6 | 4008.71376 | NMED Well | SMC-07 |
| 330 | 14.9.28.234b | 14.09.28.234b | Kerr McGee | 6 | 4008.71376 | NMED Well | SMC-07 |
| 331 | 14.9.28.234c | 14.09.28.234c | Kerr McGee | 6 | 4008.71376 | NMED Well | SMC-07 |
| 332 | 14.10.23.232 | 14.10.23.232 | United Nuclear-Homestake | 6 | 3945.39644 | NMED Well | SMC-07 |
| 333 | 14.10.23.232a | 14.10.23.232a | United Nuclear-Homestake | 6 | 3945.39644 | NMED Well | SMC-07 |
| 334 | 14.10.23.2326 | 14.10.23.2326 | United Nuclear-Homestake | 6 | 3945.39644 | NMED Well | SMC-07 |
| 335 | 13.13.34.233 | 13.13.34.233 | | 6 | 19393.5243 | NMED Well - BWSI | BWSI-07 |
| 336 | 14.9.28.233 | 14.09.28.233 | Phillips Petr. Co. | 6 | 4008.71376 | NMED Well | SMC-07 |
| 337 | 14.9.28.234 | 14.09.28.234 | Phillips Petr. Co. | 6 | 4008.71376 | NMED Well | SMC-07 |
| 338 | 14.9.28.234 | 14.09.28.234 | Phillips Petr. Co. | 6 | 4008.71376 | NMED Well | SMC-07 |
| 339 | 14.9.28.234a | 14.09.28.234a | Phillips Petr. Co. | 6 | 4008.71376 | NMED Well | SMC-07 |
| 340 | 14.9.28.234b | 14.09.28.234b | Phillips Petr. Co. | 6 | 4008.71376 | NMED Well | SMC-07 |
| 341 | 14.9.28.234c | 14.09.28.234c | Phillips Petr. Co. | 6 | 4008.71376 | NMED Well | SMC-07 |
| 342 | 14.10.23.232 | 14.10.23.232 | Homestake -Sapin Partners | 6 | 3945.39644 | NMED Well | SMC-07 |
| 343 | 14.10.23.232a | 14.10.23.232a | Homestake-Sapin Partners | 6 | 3945.39644 | NMED Well | SMC-07 |
| 344 | 14.10.23.232b | 14.10.23.232b | Homestake-Sapin Partners | 6 | 3945.39644 | NMED Well | SMC-07 |
| 345 | 14.13.33.231 | 14.13.33.231 | Southwest Indian Mission | 6 | 25333.1372 | NMED Well - BWSI | BWSI-07 |
| 346 | 16.5.15.233 | 16.05.15.233 | | 30 | 40957.5405 | NMED Well | SMC-31 |
| 347 | 16.6.29.231 | 16.06.29.231 | | 30 | 31438.2802 | NMED Well | SMC-31 |
| 348 | 16.8.25.233 | 16.08.25.233 | Fernandez Co. | 6 | 23610.6022 | NMED Well | SMC-07 |
| 349 | 16.10.22.232 | 16.10.22.232 | R E Alberts & Son | 6 | 18781.7663 | NMED Well | SMC-07 |
| 350 | 12.11.24.234 | 12.11.24.234 | Monitor Well # 2 (Anaconda Co.) | 25 | 1635.57705 | NMED Well - BWSI | BWSI-26 |
| 351 | 12.11.22.234 | 12.11.22.234 | LDS Church-Bluewater | 13 | 441.59402 | NMED Well - BWSI | BWSI-14 |
| 352 | 12.11.23.231 | 12.11.23.231 | Roundy House Well | 9 | 68.844417 | NMED Well - BWSI | BWSI-10 |
| 353 | 11.10.9.241 | 11.10.09.241 | Stanley and Card | 2 | 897.463078 | NMED Well | SMC-03 |
| 354 | 11.10.20.242 | 11.10.20.242 | Salvador Milan | 20 | 3809.05238 | NMED Well - BWSI | BWSI-21 |
| 355 | 11.10.21.242 | 11.10.21.242 | Salvador Milan | 2 | 3905.2128 | NMED Well | SMC-03 |
| 356 | 11.10.27.241 | 11.10.27.241 | Growers Association | 4 | 5291.23583 | NMED Well | SMC-05 |
| 357 | 12.10.1.244 | 12.10.01.244 | G.P. Roundy | 11 | 1157.25036 | NMED Well | SMC-12 |
| 358 | 12.10.26.242 | 12.10.26.242 | Homestake-Sapin Partners | 28 | 65.2149526 | NMED Well - BWSI | BWSI-29 |
| 359 | 12.10.27.244 | 12.10.27.244 | Tom Morris | 29 | 864.401138 | NMED Well - BWSI | BWSI-30 |
| 360 | 12.10.30.242 | 12.10.30.242 | Jack Freas | 17 | 216.515293 | NMED Well - BWSI | BWSI-18 |
| 361 | 12.10.30.242 | 12.10.30.242 | Jack Freas | 17 | 216.515293 | NMED Well - BWSI | BWSI-18 |
| 362 | 12.10.30.242 | 12.10.30.242 | Jack Freas | 17 | 216.515293 | NMED Well - BWSI | BWSI-18 |
| 363 | 12.11.4.243 | 12.11.04.243 | W C Andrews | 6 | 3843.28173 | NMED Well - BWSI | BWSI-07 |
| 364 | 12.11.22.242 | 12.11.22.242 | J F Neilson | 13 | 431.939442 | NMED Well - BWSI | BWSI-14 |
| 365 | 12.11.26.244 | 12.11.26.244 | G P Roundy | 11 | 227.473775 | NMED Well - BWSI | BWSI-12 |
| 366 | 13.8.22.242 | 13.08.22.242 | Fernandez Co. | 29 | 1240.69168 | NMED Well | SMC-30 |
| 367 | 13.8.22.242 | 13.08.22.242 | Fernandez Co. | 29 | 1240.69168 | NMED Well | SMC-30 |
| 368 | 14.8.15.244 | 14.08.15.244 | Fernandez Co. | 29 | 12059.8844 | NMED Well | SMC-30 |
| 369 | 14.9.18.243 | 14.09.18.243 | A. Berryhill | 6 | 191.68485 | NMED Well | SMC-07 |
| 370 | 13.8.22.242 | 13.08.22.242 | Fernandez Co. | 29 | 1240.69168 | NMED Well | SMC-30 |
| 371 | 13.10.11.242 | 13.10.11.242 | Adrian Berryhill | 17 | 5056.61335 | NMED Well | SMC-17 |
| 372 | 13.12.10.242 | 13.12.10.242 | U.S. Bureau of Indian Affairs | 6 | 14647.1735 | NMED Well - BWSI | BWSI-07 |
| 373 | 14.8.15.244 | 14.08.15.244 | Fernandez Co. | 29 | 12059.8844 | NMED Well | SMC-30 |
| 374 | 14.9.18.243 | 14.09.18.243 | Adrian Berryhill | 6 | 191.68485 | NMED Well | SMC-07 |
| 375 | 14.13.32.242 | 14.13.32.242 | Maria Ramirez | 6 | 26298.885 | NMED Well - BWSI | BWSI-07 |
| 376 | 15.9.9.243 | 15.09.09.243 | Pablo Pena & Sons | 6 | 11934.7312 | NMED Well | SMC-07 |
| 377 | 11.5.32.241 | 11.05.32.241 | Paguate Municipal Well | 30 | 31787.3464 | NMED Well | SMC-31 |
| 378 | 11.10.26.244 | 11.10.26.244 | Grants City Hall, Municipal Water Supply | 4 | 5597.34098 | NMED Well | SMC-05 |
| 379 | 12.10.30.242 | 12.10.30.242 | Jack Fres | 17 | 216.515293 | NMED Well - BWSI | BWSI-18 |
| 380 | 11.10.4.311 | 11.10.04.311 | John Evans | 20 | 717.754362 | NMED Well - BWSI | BWSI-21 |
| 381 | 11.10.22.311 | 11.10.22.311 | W A Thigpen | 4 | 4380.51557 | NMED Well | SMC-05 |
| 382 | 12.9.6.312 | 12.09.06.312 | G.P. Roundy | 11 | 915.968273 | NMED Well | SMC-12 |
| 383 | 12.11.14.311 | 12.11.14.311 | Fred W Freas | 7 | 199.833683 | NMED Well - BWSI | BWSI-08 |
| 384 | 12.11.14.311 | 12.11.14.311 | Fred W Freas | 7 | 199.833683 | NMED Well - BWSI | BWSI-08 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 385 | 12.11.14.311 | 12.11.14.311 | Fred W Freas | 7 | 199.833683 | NMED Well - BWSI | BWSI-08 |
| 386 | 12.11.25.313 | 12.11.25.313 | Harmon Reid | 12 | 434.221789 | NMED Well - BWSI | BWSI-13 |
| 387 | 12.11.25.313 | 12.11.25.313 | Harmon Reid | 12 | 434.221789 | NMED Well - BWSI | BWSI-13 |
| 388 | 14.9.29.312 | 14.09.29.312 | A & J Trailer Park | 6 | 3456.47044 | NMED Well | SMC-07 |
| 389 | 14.9.32.313 | 14.09.32.313 | K-M S-12 | 17 | 4551.97119 | NMED Well | SMC-17 |
| 390 | 14.9.32.312 | 14.09.32.312 | K-M 44 | 17 | 4551.97119 | NMED Well | SMC-17 |
| 391 | 14.9.32.314 | 14.09.32.314 | A. Berryhill | 17 | 4551.97119 | NMED Well | SMC-17 |
| 392 | 14.9.32.314a | 14.09.32.314a | A. Berryhill | 17 | 4551.97119 | NMED Well | SMC-17 |
| 393 | 14.9.36.313 (?) | 14.09.36.313 (?) | United Nuclear | 21 | 4110.89863 | NMED Well | SMC-21 |
| 394 | 13.11.6.313 | 13.11.06.313 | Elkins Ranch Inc. | 6 | 14030.0908 | NMED Well - BWSI | BWSI-07 |
| 395 | 13.11.27.314 | 13.11.27.314 | Elkins Ranch Inc. | 6 | 6694.35213 | NMED Well - BWSI | BWSI-07 |
| 396 | 14.7.16.314 | 14.07.16.314 | Fernandez Co. | 30 | 12626.4497 | NMED Well | SMC-31 |
| 397 | 14.9.29.312 | 14.09.29.312 | A & J Trailer Park | 6 | 3456.47044 | NMED Well | SMC-07 |
| 398 | 14.9.32.314 | 14.09.32.314 | Adrian Berryhill | 17 | 4551.97119 | NMED Well | SMC-17 |
| 399 | 14.9.32.314a | 14.09.32.314a | Adrian Berryhill | 17 | 4551.97119 | NMED Well | SMC-17 |
| 400 | 14.9.36.313 | 14.09.36.313 | Phillips Petr. Co. | 21 | 4110.89863 | NMED Well | SMC-21 |
| 401 | 14.9.36.314 | 14.09.36.314 | Phillips Petr. Co. | 21 | 4110.89863 | NMED Well | SMC-21 |
| 402 | 14.13.33.314 | 14.13.33.314 | J J Rodosevich | 6 | 25683.8811 | NMED Well - BWSI | BWSI-07 |
| 403 | 14.13.34.311 | 14.13.34.311 | U.S. Bureau of Indian Affairs | 6 | 24448.3998 | NMED Well - BWSI | BWSI-07 |
| 404 | 15.6.22.312 | 15.06.22.312 | Albert Michael | 30 | 25192.0877 | NMED Well | SMC-31 |
| 405 | 16.10.8.312 | 16.10.08.312 | U.S. Bureau of Indian Affairs | 6 | 22805.4444 | NMED Well | SMC-07 |
| 406 | 16.11.33.311 | 16.11.33.311 | U.S. Bureau of Indian Affairs | 6 | 22406.1761 | NMED Well | SMC-07 |
| 407 | 12.10.8.314 | 12.10.08.314 | Injection Well (Ananconda Co.) | 26 | 1859.69862 | NMED Well - BWSI | BWSI-27 |
| 408 | 10.9.31.324 | 10.09.31.324 | Sidney S. Gottlieb | 4 | 17641.6054 | NMED Well | SMC-05 |
| 409 | 10.10.10.322 | 10.10.10.322 | Rosalio Candelaria | 4 | 10724.2283 | NMED Well | SMC-05 |
| 410 | 11.10.26.321 | 11.10.26.321 | Grants City Well 3 | 4 | 5906.77222 | NMED Well | SMC-05 |
| 411 | 11.10.26.321a | 11.10.26.321a | Grants City Well 2 | 4 | 5906.77222 | NMED Well | SMC-05 |
| 412 | 11.10.26.321a | 11.10.26.321a | Grants City Well 2 | 4 | 5906.77222 | NMED Well | SMC-05 |
| 413 | 11.10.26.321b | 11.10.26.321b | Grants City Well 1 | 4 | 5906.77222 | NMED Well | SMC-05 |
| 414 | 11.10.26.321c | 11.10.26.321c | Grants City Well 4 | 4 | 5906.77222 | NMED Well | SMC-05 |
| 415 | 11.10.26.321c | 11.10.26.321c | Grants City Well 4 | 4 | 5906.77222 | NMED Well | SMC-05 |
| 416 | 11.10.26.321d | 11.10.26.321d | A T & S F Railroad | 4 | 5906.77222 | NMED Well | SMC-05 |
| 417 | 11.10.26.322 | 11.10.26.322 | A T & S F Railroad | 4 | 5906.77222 | NMED Well | SMC-05 |
| 418 | 11.10.26.322a | 11.10.26.322a | A T & S F Railroad | 4 | 5906.77222 | NMED Well | SMC-05 |
| 419 | 12.10.26.322 | 12.10.26.322 | Homestake-New Mexico Partners | 29 | 171.590689 | NMED Well - BWSI | BWSI-30 |
| 420 | 12.10.26.322a | 12.10.26.322a | Homestake-New Mexico Partners | 29 | 171.590689 | NMED Well - BWSI | BWSI-30 |
| 421 | 12.11.15.321a | 12.11.15.321a | Harmon Reid | 6 | 667.362099 | NMED Well - BWSI | BWSI-07 |
| 422 | 12.11.22.322 | 12.11.22.322 | Geo. W Rowley | 13 | 615.003028 | NMED Well - BWSI | BWSI-14 |
| 423 | 13.8.23.324 | 13.08.23.324 | T. Marquez | 29 | 362.324771 | NMED Well | SMC-30 |
| 424 | 14.9.32.321 | 14.09.32.321 | K-M 43 | 17 | 4468.37727 | NMED Well | SMC-17 |
| 425 | 14.9.32.322 | 14.09.32.322 | K-M 51 | 17 | 4468.37727 | NMED Well | SMC-17 |
| 426 | 14.10.25.321 | 14.10.25.321 | United Nuclear-Homestake | 6 | 4247.93861 | NMED Well | SMC-07 |
| 427 | 13.7.9.323 | 13.07.09.323 | | 30 | 5965.1998 | NMED Well | SMC-31 |
| 428 | 13.11.23.324 | 13.11.23.324 | Elkins Ranch Inc. | 24 | 7814.11306 | NMED Well - BWSI | BWSI-25 |
| 429 | 14.10.25.321 | 14.10.25.321 | Homestake-Sapin Partners | 6 | 4247.93861 | NMED Well | SMC-07 |
| 430 | 14.11.19.322 | 14.11.19.322 | Henry E Andrews | 6 | 18565.3773 | NMED Well - BWSI | BWSI-07 |
| 431 | 14.13.32.322 | 14.13.32.322 | Charles Bass | 6 | 26657.9111 | NMED Well - BWSI | BWSI-07 |
| 432 | 14.13.32.322a | 14.13.32.322a | Paul Dunning | 6 | 26657.9111 | NMED Well - BWSI | BWSI-07 |
| 433 | 15.7.10.321 | 15.07.10.321 | | 30 | 24032.3041 | NMED Well | SMC-31 |
| 434 | 15.11.26.323 | 15.11.26.323 | U.S. Bureau of Indian Affairs | 6 | 15028.3597 | NMED Well | SMC-07 |
| 435 | 9.9.3.331 | 09.09.03.331 | Sidney S. Gottlieb | 4 | 20912.5114 | NMED Well | SMC-05 |
| 436 | 10.10.26.331 | 10.10.26.331 | Monico Mirabel | 4 | 15959.3804 | NMED Well | SMC-05 |
| 437 | 10.10.26.332 | 10.10.26.332 | Monico Mirabel | 4 | 15959.3804 | NMED Well | SMC-05 |
| 438 | 10.10.26.333 | 10.10.26.333 | Monico Mirabel | 4 | 15959.3804 | NMED Well | SMC-05 |
| 439 | 10.10.27.333 | 10.10.27.333 | Nabor Mirabel | 2 | 15986.3846 | NMED Well | SMC-03 |
| 440 | 10.10.27.333a | 10.10.27.333a | Nabor Mirabel | 2 | 15986.3846 | NMED Well | SMC-03 |
| 441 | 11.10.4.333 | 11.10.04.333 | Dow Chmical Co. | 20 | 426.781123 | NMED Well - BWSI | BWSI-21 |
| 442 | 11.11.23.333 | 11.11.23.333 | P Schneeman | 21 | 7041.36197 | NMED Well - BWSI | BWSI-22 |
| 443 | 12.10.20.333a | 12.10.20.333a | Fred Freas | 32 | 236.870256 | NMED Well - BWSI | BWSI-34 |
| 444 | 12.10.20.333a | 12.10.20.333a | Fred Freas | 32 | 236.870256 | NMED Well - BWSI | BWSI-34 |
| 445 | 12.10.27.333 | 12.10.27.333 | Stanley & Card | 22 | 187.616842 | NMED Well - BWSI | BWSI-23 |
| 446 | 12.10.27.333 | 12.10.27.333 | Stanley & Card | 22 | 187.616842 | NMED Well - BWSI | BWSI-23 |
| 447 | 12.10.27.333 | 12.10.27.333 | Stanley & Card | 22 | 187.616842 | NMED Well - BWSI | BWSI-23 |
| 448 | 12.10.30.332 | 12.10.30.332 | Hardenburg Commissary Co. | 16 | 461.005498 | NMED Well - BWSI | BWSI-17 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 449 | 12.10.30.333 | 12.10.30.333 | E E Hardin | 16 | 461.005498 | NMED Well - BWSI | BWSI-17 |
| 450 | 12.11.10.334 | 12.11.10.334 | J W Price | 6 | 1435.02015 | NMED Well - BWSI | BWSI-07 |
| 451 | 12.11.10.334 | 12.11.10.334 | J W Price | 6 | 1435.02015 | NMED Well - BWSI | BWSI-07 |
| 452 | 12.11.10.334a | 12.11.10.334a | J C Church | 6 | 1435.02015 | NMED Well - BWSI | BWSI-07 |
| 453 | 12.11.11.334 | 12.11.11.334 | Duane Berryhill | 7 | 1374.26526 | NMED Well - BWSI | BWSI-08 |
| 454 | 12.11.11.334 | 12.11.11.334 | Duane Berryhill | 7 | 1374.26526 | NMED Well - BWSI | BWSI-08 |
| 455 | 12.11.14.331 | 12.11.14.331 | G P Roundy | 23 | 193.619726 | NMED Well - BWSI | BWSI-24 |
| 456 | 12.11.14.331 | 12.11.14.331 | G P Roundy | 23 | 193.619726 | NMED Well - BWSI | BWSI-24 |
| 457 | 12.11.23.333 | 12.11.23.333 | G P Roundy | 8 | 198.314523 | NMED Well - BWSI | BWSI-09 |
| 458 | 12.11.24.334 | 12.11.24.334 | Peter Chalamidas | 11 | 954.781353 | NMED Well - BWSI | BWSI-12 |
| 459 | 12.11.24.334a | 12.11.24.334a | Peter Chalamidas | 11 | 954.781353 | NMED Well - BWSI | BWSI-12 |
| 460 | 13.8.24.334 | 13.08.24.334 | F. Gonzales | 30 | 509.065336 | NMED Well | SMC-31 |
| 461 | 13.8.24.334 | 13.08.24.334 | F. Gonzales | 30 | 509.065336 | NMED Well | SMC-31 |
| 462 | 13.8.24.334a | 13.08.24.334a | S. Marquez | 30 | 509.065336 | NMED Well | SMC-31 |
| 463 | 13.8.24.334b | 13.08.24.334b | S. Marquez | 30 | 509.065336 | NMED Well | SMC-31 |
| 464 | 13.8.24.334c | 13.08.24.334c | S. Marquez | 30 | 509.065336 | NMED Well | SMC-31 |
| 465 | 13.8.24.334 (?) | 13.08.24.334 (?) | S. Mateo School | 30 | 509.065336 | NMED Well | SMC-31 |
| 466 | 13.9.16.333 | 13.09.16.333 | B. Wilcoxson | 18 | 219.496614 | NMED Well | SMC-18 |
| 467 | 14.8.4.334 | 14.08.04.334 | Fernandez Co. | 6 | 11709.5242 | NMED Well | SMC-07 |
| 468 | 14.9.30.331 | 14.09.30.331 | K-M 46 | 6 | 4063.9149 | NMED Well | SMC-07 |
| 469 | 13.8.24.334 | 13.08.24.334 | F. Gonzalez | 30 | 509.065336 | NMED Well | SMC-31 |
| 470 | 13.8.24.334a | 13.08.24.334a | Nabor Marquez | 30 | 509.065336 | NMED Well | SMC-31 |
| 471 | 13.8.24.334b | 13.08.24.334b |  | 30 | 509.065336 | NMED Well | SMC-31 |
| 472 | 13.9.16.333 | 13.09.16.333 | Buck Wilcoxson | 18 | 219.496614 | NMED Well | SMC-18 |
| 473 | 13.12.34.331 | 13.12.34.331 | Carrol Gunderson | 6 | 10904.2126 | NMED Well - BWSI | BWSI-07 |
| 474 | 13.12.34.332 | 13.12.34.332 | H. C. Jones | 6 | 10904.2126 | NMED Well - BWSI | BWSI-07 |
| 475 | 13.12.34.334 | 13.12.34.334 | T. F. Ray | 6 | 10904.2126 | NMED Well - BWSI | BWSI-07 |
| 476 | 13.13.21.331 | 13.13.21.331 | Clay Hardin | 6 | 22417.0643 | NMED Well - BWSI | BWSI-07 |
| 477 | 14.8.4.334 | 14.08.04.334 | Fernandez Co. | 6 | 11709.5242 | NMED Well | SMC-07 |
| 478 | 14.11.3.334 | 14.11.03.334 | Adrian Berryhill | 6 | 15869.387 | NMED Well | SMC-07 |
| 479 | 14.12.8.331 | 14.12.08.331 | U.S. Bureau of Indian Affairs | 6 | 24631.4486 | NMED Well - BWSI | BWSI-07 |
| 480 | 14.12.17.333 | 14.12.17.333 |  | 6 | 23286.8268 | NMED Well - BWSI | BWSI-07 |
| 481 | 14.13.33.333 | 14.13.33.333 | El Paso Natural Gas Co. | 6 | 25500.4757 | NMED Well - BWSI | BWSI-07 |
| 482 | 14.13.33.334 | 14.13.33.334 | El Paso Natural Gas Co. | 6 | 25500.4757 | NMED Well - BWSI | BWSI-07 |
| 483 | 15.6.20.331 | 15.06.20.331 | Albert Michael | 30 | 23039 | NMED Well | SMC-31 |
| 484 | 15.11.25.334 | 15.11.25.334 | U.S. Bureau of Indian Affairs | 6 | 13768.8015 | NMED Well | SMC-07 |
| 485 | 16.7.9.333 | 16.07.09.333 | Fernandez Co. | 6 | 29301.9241 | NMED Well | SMC-07 |
| 486 | 16.11.16.331 | 16.11.16.331 | U.S. Bureau of Indian Affairs | 6 | 25504.753 | NMED Well | SMC-07 |
| 487 | 12.11.24.334 | 12.11.24.334 | Auro's Bar & Hotel, Cowell House | 11 | 954.781353 | NMED Well - BWSI | BWSI-12 |
| 488 | 12.10.8.332 | 12.10.08.332 | Monitor Well (Anaconda Co.) | 26 | 1650.02079 | NMED Well - BWSI | BWSI-27 |
| 489 | 12.11.11.334 | 12.11.11.334 | Berryhill House | 7 | 1374.26526 | NMED Well - BWSI | BWSI-08 |
| 490 | 10.10.15.344 | 10.10.15.344 | Eddie Chavez | 4 | 12727.9499 | NMED Well | SMC-05 |
| 491 | 11.10.4.344 | 11.10.04.344 | John Evans | 2 | 237.279143 | NMED Well | SMC-03 |
| 492 | 11.10.8.343 | 11.10.08.343 | Salvador Milan | 21 | 1410.13928 | NMED Well - BWSI | BWSI-22 |
| 493 | 12.9.7.343 | 12.09.07.343 | G.P. Roundy | 9 | 141.705796 | NMED Well | SMC-10 |
| 494 | 12.10.5.341 | 12.10.05.341 | Duane Berryhill | 26 | 2999.19417 | NMED Well - BWSI | BWSI-27 |
| 495 | 12.10.5.341a | 12.10.05.341a | Duane Berryhill | 26 | 2999.19417 | NMED Well - BWSI | BWSI-27 |
| 496 | 12.11.3.342 | 12.11.03.342 | C M Gibbs | 6 | 3099.95583 | NMED Well - BWSI | BWSI-07 |
| 497 | 12.11.5.343 | 12.11.05.343 | Church and Hardin | 6 | 3924.14692 | NMED Well - BWSI | BWSI-07 |
| 498 | 12.11.15.341 | 12.11.15.341 | Edward Freas | 6 | 662.848731 | NMED Well - BWSI | BWSI-07 |
| 499 | 12.11.15.341 | 12.11.15.341 | Edward Freas | 6 | 662.848731 | NMED Well - BWSI | BWSI-07 |
| 500 | 12.11.15.341 | 12.11.15.341 | Edward Freas | 6 | 662.848731 | NMED Well - BWSI | BWSI-07 |
| 501 | 13.8.23.342 | 13.08.23.342 | B. Isidorg | 29 | 290.962767 | NMED Well | SMC-30 |
| 502 | 13.8.24.341 | 13.08.24.341 | F. Chavez | 30 | 105.537888 | NMED Well | SMC-31 |
| 503 | 13.8.24.341 | 13.08.24.341 | F. Chavez | 30 | 105.537888 | NMED Well | SMC-31 |
| 504 | 13.9.15.343 | 13.09.15.343 | J.D. Ragland | 20 | 121.159537 | NMED Well | SMC-20 |
| 505 | 13.9.15.343 | 13.09.15.343 | J.D. Ragland | 20 | 121.159537 | NMED Well | SMC-20 |
| 506 | 13.9.16.341 | 13.09.16.341 | B. Wilcoxson | 18 | 521.790296 | NMED Well | SMC-18 |
| 507 | 13.9.16.341a | 13.09.16.341a | B. Wilcoxson | 18 | 521.790296 | NMED Well | SMC-18 |
| 508 | 13.9.29.341 | 13.09.29.341 | Westvaco Min. Dev | 32 | 195.871112 | NMED Well | SMC-33 |
| 509 | 13.9.29.341 | 13.09.29.341 | Mt. Taylor Corp. | 32 | 195.871112 | NMED Well | SMC-33 |
| 510 | 14.9.5.341 | 14.09.05.341 | B. Wilcoxson | 6 | 2714.07595 | NMED Well | SMC-07 |
| 511 | 14.9.30.341 | 14.09.30.341 | K-M 47 | 6 | 3952.94493 | NMED Well | SMC-07 |
| 512 | 13.9.15.343 | 13.09.15.343 | J.D. Ragland | 20 | 121.159537 | NMED Well | SMC-20 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 513 | 13.9.16.341 | 13.09.16.341 | Buck Wilcoxson | 18 | 521.790296 | NMED Well | SMC-18 |
| 514 | 13.9.16.341a | 13.09.16.341a | Buck Wilcoxson | 18 | 521.790296 | NMED Well | SMC-18 |
| 515 | 13.9.29.341 | 13.09.29.341 | Westvaco Min. Dev. | 32 | 195.871112 | NMED Well | SMC-33 |
| 516 | 13.9.29.343 | 13.09.29.343 | Mount Taylor Corp. | 32 | 195.871112 | NMED Well | SMC-33 |
| 517 | 13.11.7.344 | 13.11.07.344 | Justin La Font | 6 | 12023.7289 | NMED Well - BWSI | BWSI-07 |
| 518 | 13.12.4.343 | 13.12.04.343 | U.S. Bureau of Indian Affairs | 6 | 16828.3987 | NMED Well - BWSI | BWSI-07 |
| 519 | 14.5.3.342 | 14.05.03.342 | Evans Ranch | 30 | 29280.3104 | NMED Well | SMC-31 |
| 520 | 14.9.5.341 | 14.09.05.341 | Buck Wilcoxson | 6 | 2714.07595 | NMED Well | SMC-07 |
| 521 | 14.13.27.342 | 14.13.27.342 | U.S. Bureau of Indian Affairs | 6 | 24906.9327 | NMED Well - BWSI | BWSI-07 |
| 522 | 15.8.3.342 | 15.08.03.342 | Fernandez Co. | 6 | 18170.4998 | NMED Well | SMC-07 |
| 523 | 11.10.22.341 | 11.10.22.341 | C&E Concrete | 4 | 4720.0394 | NMED Well | SMC-05 |
| 524 | 12.10.5.341 | 12.10.05.341 | Berryhill, Sec. 5 (Anaconda Co.) | 26 | 2999.19417 | NMED Well - BWSI | BWSI-27 |
| 525 | 10.9.23.400 | 10.09.23.400 | Horace Springs | 4 | 17798.0049 | NMED Well | SMC-05 |
| 526 | 13.8.18.400 | 13.08.18.400 | F. Lee | 16 | 1495.35733 | NMED Well | SMC-16 |
| 527 | 13.8.18.400 | 13.08.18.400 | F. Lee | 16 | 1495.35733 | NMED Well | SMC-16 |
| 528 | 14.9.17.400 | 14.09.17.400 |  | 6 | 1375.45396 | NMED Well | SMC-07 |
| 529 | 14.9.17.400 | 14.09.17.400 | Kermac Nuclear Fuels Corp. | 6 | 1375.45396 | NMED Well | SMC-07 |
| 530 | 14.9.17.401 | 14.09.17.401 | Kermac Nuclear Fuels Corp. | 6 | 1375.45396 | NMED Well | SMC-07 |
| 531 | 14.9.17.402 | 14.09.17.402 | Kermac Nuclear Fuels Corp. | 6 | 1375.45396 | NMED Well | SMC-07 |
| 532 | 14.9.18.400 | 14.09.18.400 | Kermac Nuclear Fuels Corp. | 6 | 512.435302 | NMED Well | SMC-07 |
| 533 | 14.10.24.400 | 14.10.24.400 | Kermac Nuclear Fuels Corp. | 6 | 2764.44703 | NMED Well | SMC-07 |
| 534 | 9.10.10.414 | 09.10.10.414 | Alfreso Mirabal | 4 | 20484.258 | NMED Well | SMC-05 |
| 535 | 11.10.26.411 | 11.10.26.411 | A T & S F Railroad | 4 | 5967.17918 | NMED Well | SMC-05 |
| 536 | 11.10.26.412 | 11.10.26.412 | A T & S F Railroad | 4 | 5967.17918 | NMED Well | SMC-05 |
| 537 | 11.10.26.414 | 11.10.26.414 | A T & S F Railroad | 4 | 5967.17918 | NMED Well | SMC-05 |
| 538 | 11.10.27.414 | 11.10.27.414 | KMIM Radio Station | 4 | 5882.34892 | NMED Well | SMC-05 |
| 539 | 11.11.12.411 | 11.11.12.411 | P Schneeman | 21 | 3113.44851 | NMED Well - BWSI | BWSI-22 |
| 540 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 541 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 542 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 543 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 544 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 545 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 546 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 547 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 548 | 12.10.30.412 | 12.10.30.412 | Fred Freas | 18 | 249.608414 | NMED Well - BWSI | BWSI-19 |
| 549 | 12.10.34.412 | 12.10.34.412 | Bruce Church | 31 | 236.385977 | NMED Well - BWSI | BWSI-33 |
| 550 | 12.11.5.413 | 12.11.05.413 | J C Church | 6 | 4107.75764 | NMED Well - BWSI | BWSI-07 |
| 551 | 12.11.10.411 | 12.11.10.411 | Claude M Bowlin | 7 | 1881.18151 | NMED Well - BWSI | BWSI-08 |
| 552 | 12.11.10.411a | 12.11.10.411a | Claude M Bowlin | 7 | 1881.18151 | NMED Well - BWSI | BWSI-08 |
| 553 | 12.11.22.414 | 12.11.22.414 | Hassell | 13 | 215.790524 | NMED Well - BWSI | BWSI-14 |
| 554 | 12.11.24.411 | 12.11.24.411 | The Anaconda Company | 9 | 1715.50501 | NMED Well - BWSI | BWSI-10 |
| 555 | 12.11.24.411 | 12.11.24.411 | The Anaconda Company | 9 | 1715.50501 | NMED Well - BWSI | BWSI-10 |
| 556 | 12.11.24.411 | 12.11.24.411 | The Anaconda Company | 9 | 1715.50501 | NMED Well - BWSI | BWSI-10 |
| 557 | 12.11.24.411 | 12.11.24.411 | The Anaconda Company | 9 | 1715.50501 | NMED Well - BWSI | BWSI-10 |
| 558 | 12.11.24.411 | 12.11.24.411 | The Anaconda Company | 9 | 1715.50501 | NMED Well - BWSI | BWSI-10 |
| 559 | 12.11.24.411 | 12.11.24.411 | The Anaconda Company | 9 | 1715.50501 | NMED Well - BWSI | BWSI-10 |
| 560 | 13.9.5.141 | 13.09.5.141 | Km 5-2 | 17 | 2798.95571 | NMED Well | SMC-17 |
| 561 | 13.9.16.411 | 13.09.16.411 | B. Wilcoxson | 31 | 145.536015 | NMED Well | SMC-32 |
| 562 | 13.9.16.413 | 13.09.16.413 | B. Wilcoxson | 31 | 145.536015 | NMED Well | SMC-32 |
| 563 | 13.9.19.413 | 13.09.19.413 | Kop-Ran Dev | 22 | 1596.55531 | NMED Well | SMC-22 |
| 564 | 13.9.21.412 | 13.09.21.412 | M. Marquez | 24 | 941.133275 | NMED Well | SMC-23 |
| 565 | 13.9.21.414 | 13.09.21.414 | N. Marquez | 24 | 941.133275 | NMED Well | SMC-23 |
| 566 | 14.9.28.412 | 14.09.28.412 | Kerr McGee | 6 | 4331.66914 | NMED Well | SMC-07 |
| 567 | 14.10.25.411 | 14.10.25.411 | United Nuclear-Homestake | 6 | 4028.18912 | NMED Well | SMC-07 |
| 568 | 14.10.25.411a | 14.10.25.411a | United Nuclear-Homestake | 6 | 4028.18912 | NMED Well | SMC-07 |
| 569 | 14.10.25.413 | 14.10.25.413 | United Nuclear-Homestake | 6 | 4028.18912 | NMED Well | SMC-07 |
| 570 | 13.7.31.414 | 13.07.31.414 |  | 30 | 3027.04803 | NMED Well | SMC-31 |
| 571 | 13.9.16.413 | 13.09.16.413 | Buck Wilcoxson | 31 | 145.536015 | NMED Well | SMC-32 |
| 572 | 13.9.21.412 | 13.09.21.412 | Nabor Marquez | 24 | 941.133275 | NMED Well | SMC-23 |
| 573 | 13.11.17.411 | 13.11.17.411 | Zuni Mt. Trading Post | 6 | 10294.2617 | NMED Well - BWSI | BWSI-07 |
| 574 | 13.13.9.411 | 13.13.09.411 | Clay Hardin | 6 | 23300.7882 | NMED Well - BWSI | BWSI-07 |
| 575 | 14.9.28.412 | 14.09.28.412 | Phillips Petr. Co. | 6 | 4331.66914 | NMED Well | SMC-07 |
| 576 | 14.10.10.413 | 14.10.10.413 | Kermac Nuclear Fuels Corp. | 6 | 5437.91431 | NMED Well | SMC-07 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 577 | 14.10.22.414 | 14.10.22.414 | Kermac Nuclear Fuels Corp. | 6 | 5539.44238 | NMED Well | SMC-07 |
| 578 | 14.10.25.411 | 14.10.25.411 | Homestake-Sapin Partners | 6 | 4028.18912 | NMED Well | SMC-07 |
| 579 | 14.10.25.411a | 14.10.25.411a | Homestake-Sapin Partners | 6 | 4028.18912 | NMED Well | SMC-07 |
| 580 | 14.10.25.413 | 14.10.25.413 | Homestake-Sapin Partners | 6 | 4028.18912 | NMED Well | SMC-07 |
| 581 | 14.13.20.413 | 14.13.20.413 | Transwestern Pipeline Co. | 6 | 28409.0861 | NMED Well - BWSI | BWSI-07 |
| 582 | 14.13.20.414 | 14.13.20.414 | Transwestern Pipeline Co. | 6 | 28409.0861 | NMED Well - BWSI | BWSI-07 |
| 583 | 15.6.4.411 | 15.06.04.411 | Richfield Oil Corp | 30 | 28958.5605 | NMED Well | SMC-31 |
| 584 | 16.5.19.414 | 16.05.19.414 | Joe Montoya | 30 | 36412.2654 | NMED Well | SMC-31 |
| 585 | 16.7.32.413 | 16.07.32.413 | Fernandez Co. | 6 | 24722.982 | NMED Well | SMC-07 |
| 586 | 16.11.33.411 | 16.11.33.411 | U.S. Bureau of Indian Affairs | 6 | 21858.9816 | NMED Well | SMC-07 |
| 587 | 10.5..4.413 | 10.05.04.413 | Well P-10 (Anaconda Co.) | 30 | 34027.1942 | NMED Well | SMC-31 |
| 588 | 11.10.4.422 | 11.10.04.422 | John Evans | 2 | 831.504243 | NMED Well | SMC-03 |
| 589 | 11.10.9.424 | 11.10.09.424 | A R Card | 2 | 1213.21206 | NMED Well | SMC-03 |
| 590 | 12.10.13.424 | 12.10.13.424 | Wilson | 7 | 223.958819 | NMED Well | SMC-08 |
| 591 | 12.10.30.421 | 12.10.30.421 | Milton Harding | 17 | 549.987518 | NMED Well - BWSI | BWSI-18 |
| 592 | 12.10.30.421 | 12.10.30.421 | Milton Harding | 17 | 549.987518 | NMED Well - BWSI | BWSI-18 |
| 593 | 12.10.30.421 | 12.10.30.421 | Milton Harding | 17 | 549.987518 | NMED Well - BWSI | BWSI-18 |
| 594 | 12.11.9.424 | 12.11.09.424 | Geo. W Rowley | 6 | 1820.37426 | NMED Well - BWSI | BWSI-07 |
| 595 | 12.11.9.424 | 12.11.09.424 | Geo. W Rowley | 6 | 1820.37426 | NMED Well - BWSI | BWSI-07 |
| 596 | 12.11.9.424 | 12.11.09.424 | Geo. W Rowley | 6 | 1820.37426 | NMED Well - BWSI | BWSI-07 |
| 597 | 12.11.9.424 | 12.11.09.424 | Geo. W Rowley | 6 | 1820.37426 | NMED Well - BWSI | BWSI-07 |
| 598 | 12.11.15.422 | 12.11.15.422 | Myerick Bros | 7 | 303.41559 | NMED Well - BWSI | BWSI-08 |
| 599 | 12.11.20.422 | 12.11.20.422 | J F Neilson | 6 | 2267.26623 | NMED Well - BWSI | BWSI-07 |
| 600 | 12.11.20.422 | 12.11.20.422 | J F Neilson | 6 | 2267.26623 | NMED Well - BWSI | BWSI-07 |
| 601 | 12.11.20.422 | 12.11.20.422 | J F Neilson | 6 | 2267.26623 | NMED Well - BWSI | BWSI-07 |
| 602 | 12.11.20.422 | 12.11.20.422 | J F Neilson | 6 | 2267.26623 | NMED Well - BWSI | BWSI-07 |
| 603 | 12.11.22.420 | 12.11.22.420 | E A Tietjen | 13 | 185.310712 | NMED Well - BWSI | BWSI-14 |
| 604 | 12.11.24.424 | 12.11.24.424 | The Anaconda Company | 25 | 1858.85217 | NMED Well - BWSI | BWSI-26 |
| 605 | 12.11.26.424 | 12.11.26.424 | G P Roundy | 12 | 141.338763 | NMED Well - BWSI | BWSI-13 |
| 606 | 13.8.14.422 | 13.08.14.422 | E. Michael | 29 | 1957.28646 | NMED Well | SMC-30 |
| 607 | 13.8.14.422 | 13.08.14.422 | E. Michael | 29 | 1957.28646 | NMED Well | SMC-30 |
| 608 | 14.9.31.421 | 14.09.31.421 | K-M B-2 | 17 | 4665.39803 | NMED Well | SMC-17 |
| 609 | 14.9.34.422 | 14.09.34.422 | United Nuclear | 21 | 3773.35829 | NMED Well | SMC-21 |
| 610 | 14.10.24.423 | 14.10.24.423 | Kerr-McGee | 6 | 2481.01444 | NMED Well | SMC-07 |
| 611 | 14.10.36.422 | 14.10.36.422 | KM 36 2 | 6 | 5341.79836 | NMED Well | SMC-07 |
| 612 | 13.8.14.422 | 13.08.14.422 | Ernest Michael | 29 | 1957.28646 | NMED Well | SMC-30 |
| 613 | 13.11.6.424 | 13.11.06.424 | Elkins Ranch Inc. | 6 | 13656.5458 | NMED Well - BWSI | BWSI-07 |
| 614 | 13.11.6.424a | 13.11.06.424a | Elkins Ranch Inc. | 6 | 13656.5458 | NMED Well - BWSI | BWSI-07 |
| 615 | 13.12.12.424 | 13.12.12.424 | B. B. South | 6 | 12704.2743 | NMED Well - BWSI | BWSI-07 |
| 616 | 14.5.14.422 | 14.05.14.422 | Evans Ranch | 30 | 30225.6442 | NMED Well | SMC-31 |
| 617 | 14.9.34.422 | 14.09.34.422 | Phillips Petr. Co. | 21 | 3773.35829 | NMED Well | SMC-21 |
| 618 | 14.10.22.422 | 14.10.22.422 | Kermac Nuclear Fuels Corp. | 6 | 5203.9174 | NMED Well | SMC-07 |
| 619 | 14.10.24.423 | 14.10.24.423 | Kermac Nuclear Fuels Corp. | 6 | 2481.01444 | NMED Well | SMC-07 |
| 620 | 15.6.4.423 | 15.06.04.423 | Ignacio Chavez Grant | 30 | 29128.4914 | NMED Well | SMC-31 |
| 621 | 15.10.6.242 | 15.10.6.242 | U.S. Bureau of Indian Affairs | 6 | 15955.5924 | NMED Well | SMC-07 |
| 622 | 11.5.27.421 | 11.05.27.421 | Well #4 (Ananconda Co.) | 30 | 33372.7294 | NMED Well | SMC-31 |
| 623 | 10.9.26.433 | 10.09.26.433 | Sidney S. Gottlieb | 4 | 19154.8683 | NMED Well | SMC-05 |
| 624 | 10.10.3.433 | 10.10.03.433 | Joe Padilla | 4 | 9483.75716 | NMED Well | SMC-05 |
| 625 | 10.10.3.433a | 10.10.03.433a | San Rafael Villiage | 4 | 9483.75716 | NMED Well | SMC-05 |
| 626 | 10.10.10.433 | 10.10.10.433 | Elfego Barela | 4 | 11106.188 | NMED Well | SMC-05 |
| 627 | 11.10.16.434 | 11.10.16.434 | Jack turner | 2 | 3062.21717 | NMED Well | SMC-03 |
| 628 | 12.9.8.431 | 12.09.08.431 | G.P. Roundy | 9 | 2104.49898 | NMED Well | SMC-10 |
| 629 | 12.9.8.431 | 12.09.08.431 | G.P. Roundy | 9 | 2104.49898 | NMED Well | SMC-10 |
| 630 | 12.10.12.433 | 12.10.12.433 | G.P. Roundy | 10 | 196.858625 | NMED Well | SMC-11 |
| 631 | 12.10.27.431 | 12.10.27.431 | W S Murray | 22 | 988.031256 | NMED Well - BWSI | BWSI-23 |
| 632 | 12.10.29.434 | 12.10.29.434 | Stanley B Card | 19 | 157.041544 | NMED Well - BWSI | BWSI-20 |
| 633 | 12.10.29.434a | 12.10.29.434a | Stanley B Card | 19 | 157.041544 | NMED Well - BWSI | BWSI-20 |
| 634 | 12.10.29.434a | 12.10.29.434a | Stanley B Card | 19 | 157.041544 | NMED Well - BWSI | BWSI-20 |
| 635 | 12.10.30.433 | 12.10.30.433 | Fred Freas | 18 | 246.047207 | NMED Well - BWSI | BWSI-19 |
| 636 | 12.11.10.431 | 12.11.10.431 | Burton C Johns | 7 | 1509.37407 | NMED Well - BWSI | BWSI-08 |
| 637 | 12.11.10.431 | 12.11.10.431 | Burton C Johns | 7 | 1509.37407 | NMED Well - BWSI | BWSI-08 |
| 638 | 12.11.10.431 | 12.11.10.431 | Burton C Johns | 7 | 1509.37407 | NMED Well - BWSI | BWSI-08 |
| 639 | 12.11.10.431 | 12.11.10.431 | Burton C Johns | 7 | 1509.37407 | NMED Well - BWSI | BWSI-08 |
| 640 | 13.8.7.434 | 13.08.07.434 | Ranchers Expl & Devel | 16 | 2214.74394 | NMED Well | SMC-16 |

| Unique ID | Original Location Number | Modified Location Number | Owners Name | ID of Nearest NMED Well | Distance to NMED Well (meters) | Source Layer | Sample ID |
|---|---|---|---|---|---|---|---|
| 641 | 13.8.23.431 | 13.08.23.431 | T. Marquez | 29 | 203.166793 | NMED Well | SMC-30 |
| 642 | 13.8.23.431 | 13.08.23.431 | T. Marquez | 29 | 203.166793 | NMED Well | SMC-30 |
| 643 | 14.9.30.432 | 14.09.30.432 | K-M 48 | 6 | 3881.17703 | NMED Well | SMC-07 |
| 644 | 14.10.11.434 | 14.10.11.434 | Hydro Nuclear | 6 | 3869.81356 | NMED Well | SMC-07 |
| 645 | 13.8.23.432 | 13.08.23.432 | Horacio Marquez | 29 | 203.166793 | NMED Well | SMC-30 |
| 646 | 13.11.7.431 | 13.11.07.431 | Elkins Ranch Inc. | 6 | 11876.335 | NMED Well - BWSI | BWSI-07 |
| 647 | 13.11.7.433 | 13.11.07.433 | Justin La Font | 6 | 11876.335 | NMED Well - BWSI | BWSI-07 |
| 648 | 13.11.34.433 | 13.11.34.433 | Henry Andrews Jr | 6 | 4696.76095 | NMED Well - BWSI | BWSI-07 |
| 649 | 13.13.27.434 | 13.13.27.434 | V.O. Stalling | 6 | 19639.3017 | NMED Well - BWSI | BWSI-07 |
| 650 | 13.13.33.431 | 13.13.33.431 | | 6 | 20727.5659 | NMED Well - BWSI | BWSI-07 |
| 651 | 14.10.11.434 | 14.10.11.434 | Rio De Oro Uranium Mines | 6 | 3869.81356 | NMED Well | SMC-07 |
| 652 | 14.12.19.431 | 14.12.19.431 | Crosslands Foundation Inc | 6 | 22430.1014 | NMED Well - BWSI | BWSI-07 |
| 653 | 14.12.32.434 | 14.12.32.434 | Elkins Ranch Inc. | 6 | 18891.8881 | NMED Well - BWSI | BWSI-07 |
| 654 | 14.13.20.431 | 14.13.20.431 | Transwestern Pipeline Co. | 6 | 28151.7654 | NMED Well - BWSI | BWSI-07 |
| 655 | 15.9.34.431 | 15.09.34.431 | Pablo Pena & Sons | 6 | 5963.84032 | NMED Well | SMC-07 |
| 656 | 15.10.6.243 | 15.10.6.243 | U.S. Bureau of Indian Affairs | 6 | 15873.2535 | NMED Well | SMC-07 |
| 657 | 15.13.5.431 | 15.13.05.431 | Tidewater oil Co | 6 | 38951.2433 | NMED Well - BWSI | BWSI-07 |
| 658 | 12.10.30.433 | 12.10.30.433 | Fred Fres | 18 | 246.047207 | NMED Well - BWSI | BWSI-19 |
| 659 | 10.9.21.444 | 10.09.21.444 | Sidney S. Gottlieb | 4 | 16378.1194 | NMED Well | SMC-05 |
| 660 | 10.9.23.443 | 10.09.23.443 | Sidney S. Gottlieb | 4 | 18003.1068 | NMED Well | SMC-05 |
| 661 | 10.9.23.443a | 10.09.23.443a | Sidney S. Gottlieb | 4 | 18003.1068 | NMED Well | SMC-05 |
| 662 | 11.10.26.441 | 11.10.26.441 | Mrs Tony Mace | 4 | 6446.69259 | NMED Well | SMC-05 |
| 663 | 11.10.27.441 | 11.10.27.441 | Navajo Butane Gas Co. | 4 | 6268.44033 | NMED Well | SMC-05 |
| 664 | 12.10.33.444 | 12.10.33.444 | Stanley & Card | 1 | 665.119909 | NMED Well - BWSI | BWSI-02 |
| 665 | 12.10.33.444 | 12.10.33.444 | Stanley & Card | 1 | 665.119909 | NMED Well - BWSI | BWSI-02 |
| 666 | 12.11.22.444 | 12.11.22.444 | G P Roundy | 8 | 225.358312 | NMED Well - BWSI | BWSI-09 |
| 667 | 14.9.28.441 | 14.09.28.441 | Kerr McGee | 6 | 4969.18519 | NMED Well | SMC-07 |
| 668 | 14.9.31.442 | 14.09.31.442 | | 17 | 4277.71588 | NMED Well | SMC-17 |
| 669 | 13.10.33.443 | 13.10.33.443 | Duane Berryhill | 27 | 4698.2192 | NMED Well - BWSI | BWSI-28 |
| 670 | 13.11.17.442 | 13.11.17.442 | F. H. Hubbel and Lawrence Elkins | 6 | 9760.00198 | NMED Well - BWSI | BWSI-07 |
| 671 | 13.11.17.442a | 13.11.17.442a | F. H. Hubbel | 6 | 9760.00198 | NMED Well - BWSI | BWSI-07 |
| 672 | 13.11.18.444 | 13.11.18.444 | Roy Navarre | 6 | 10239.6043 | NMED Well - BWSI | BWSI-07 |
| 673 | 13.12.12.441 | 13.12.12.441 | U.S. Bureau of Indian Affairs | 6 | 12327.5593 | NMED Well - BWSI | BWSI-07 |
| 674 | 13.13.8.444 | 13.13.08.444 | Clay Hardin | 6 | 24144.7038 | NMED Well - BWSI | BWSI-07 |
| 675 | 14.9.28.441 | 14.09.28.441 | Phillips Petr. Co. | 6 | 4969.18519 | NMED Well | SMC-07 |
| 676 | 14.10.11.441 | 14.10.11.441 | Ambrosia Investment Co. | 6 | 3501.97328 | NMED Well | SMC-07 |
| 677 | 15.8.13.444 | 15.08.13.444 | Fernandez Co. | 6 | 19550.5346 | NMED Well | SMC-07 |
| 678 | 15.8.21.442 | 15.08.21.442 | Fernandez Co. | 6 | 14545.1217 | NMED Well | SMC-07 |
| 679 | 16.6.20.443 | 16.06.20.443 | Fernandez Co. | 30 | 32219.4951 | NMED Well | SMC-31 |
| 680 | 16.9.22.444 | 16.09.22.444 | Fernandez Co. | 6 | 17885.663 | NMED Well | SMC-07 |
| 681 | 16.13.11.440 | 16.13.11.440 | U.S. Bureau of Indian Affairs | 6 | 37953.7891 | NMED Well | SMC-07 |
| 682 | 16.13.11.440 | 16.13.11.440 | U.S. Bureau of Indian Affairs | 6 | 37953.7891 | NMED Well | SMC-07 |
| 683 | 11.10.5.442 | 11.10.05.442 | Mt. Taylor Mill Works | 20 | 215.972234 | NMED Well - BWSI | BWSI-21 |
| 684 | 13.8.24 | 13.08.24 | T. Marquez | 30 | 673.322213 | NMED Well | SMC-31 |