FINAL
BASELINE AIR AND SOIL
QUALITY ASSURANCE SAMPLING PLAN

FOR

CAMP MINDEN AND SURROUNDING COMMUNITY
1600 JAVA ROAD
MINDEN, WEBSTER AND BOSSIER PARISHES, LOUISIANA

U.S. Environmental Protection Agency Region 6
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1. INTRODUCTION

The Superfund Technical Assessment and Response Team (START-3) Contractor has been tasked by the U.S. Environmental Protection Agency (EPA) Region 6 Prevention and Response Branch (PRB) under Contract Number EP-W-06-042, to conduct baseline air and soil sampling at the former Louisiana Army Ammunition Plant (also referred to as Camp Minden) and in the surrounding community. Camp Minden is located at 1600 Java Road, Minden, Webster Parish, Louisiana. Site coordinates are Latitude 32.55200° North and Longitude 93.41245° West. A Site Location Map is provided as Figure 1-1. All figures are provided as separate portable document format (PDF) files. This Quality Assurance Sampling Plan (QASP) has been prepared to describe the technical scope of work to be completed as part of the air and soil baseline sampling effort.

1.1 PROJECT OBJECTIVES

START-3 is providing technical assistance to EPA Region 6 to collect baseline air and soil samples at Camp Minden and in the nearby community. The primary objective is to determine baseline amounts of particulates (2.5 microns and smaller), Volatile Organic Compounds (VOCs), semi-volatile organic compounds (SVOCs), dioxin/furans, and explosive residues in air. Air monitoring of criteria pollutants including: $PM_{2.5}$ $PM_{10,}$ NOx, $S0_2$, and CO will also be conducted. Soil samples collected will be analyzed for baseline concentrations of VOCs, SVOCs, Toxicity Characteristics Leaching Procedure (TCLP) metals, dioxin/furans, explosives, nitrocellulose, and pH.

1.2 PROJECT TEAM

The field team will consist of the Project Team Leader (PTL); Field Safety Officer (FSO); Project Chemist; Sample Coordinator and Field Data Manager (DM); and additional support personnel as necessary. The PTL will be responsible for the technical quality of work performed in the field and will serve as the liaison to EPA Region 6 personnel during the field activities.

The field team will also utilize internal expertise from the Integrated Air Services (IAS) Team, working in conjunction with the EPA Environmental Response Team (ERT), which specializes in compliance-related air quality management services, air quality testing, and meteorological monitoring.

EPA will determine the Camp Minden sample locations. EPA, with input from local and state officials, will determine the exact locations for community sample locations. Sampling locations may be relocated or added upon determination of the removal method as needed or warranted by the operation. Locations are based on several factors, such as:

- Points around Camp Minden
- Population Center
- Electric Power Availability
- Site Security
- Site Access

The field team will collect samples, log the activities at each sample location in the field logbook, and verify the sample documentation. The sample coordinator will be responsible for entering all samples collected into SCRIBE; producing accurate chain-of-custody documentation during the sampling event; and entering daily operations and sample collection data into the SCRIBE database. The PTL and FSO will oversee the packaging and shipping of samples to the designated laboratory. The FSO will be responsible for providing overall site health and safety support during the field activities.

1.3 QASP FORMAT

This QASP has been organized in a format that is intended to facilitate and effectively meet the project objectives. The QASP is organized in the following sections:

- Section 1 - Introduction
- Section 2 - Site Background
- Section 3 - Sampling Approach and Procedures
- Section 4 - Analytical Approach
- Section 5 - Quality Assurance

Appendices are attached with the following information:

- Appendix A Standard Operating Procedures
- Appendix B Data Quality Objectives
- Appendix C Laboratory Reporting

2. SITE BACKGROUND

Information about the site location and description and history is included in the following subsections.

2.1 SITE LOCATION AND DESCRIPTION

Camp Minden is located in the northwestern portion of the State of Louisiana in Webster and Bossier Parishes. Camp Minden encompasses approximately 15,000 acres of land in a rectangular shape running approximately 9 miles east to west and 3 miles north to south. Camp Minden is completely fenced and public access is restricted by site security. Bordering Camp Minden is U.S. Highway 80 to the north, U.S. Highway 164 to the south, Dorcheat Bayou to the east, and Clarke Bayou to the west. A Site Area Map and Site Plan are provided as Figures 2-1 and 2-2, respectively.

The City of Doyline, Louisiana is located within 0.75 mile south of Camp Minden. The City of Haughton is located approximately 3 miles west of Camp Minden. The town of Sibley is located just over 2 miles east and southeast of the Camp Minden. The City of Minden is located within 3.0 miles northeast of Camp Minden. All distances are estimates from the Camp Minden property boundary.

Based on topographic maps, surface water in the area drains to Bayou Dorcheat and Clarke Bayou that eventually drains into Lake Bistineau located approximately 3 miles south of Camp Minden. Lake Bistineau, which is used for fishing and outdoor recreation, drains into the Red River which drains into the Mississippi River.

The majority of the land surface is covered by vegetation. The area is mostly rural; flat valley floors and rolling timbered hills; is well drained; and has a humid, subtropical climate. Groundwater is the principal source of freshwater in the Minden area. The aquifers in the area are recharged principally from rainfall on outcrop areas. Recharge is by vertical infiltration of rainfall through the surface soils, and most discharge is by lateral movement of water to nearby streams (USGS, 1982).

2.2 SITE HISTORY

Explo Systems, Inc. is a former explosives recycling company that has operated at Camp Minden for approximately 7 years. On 15 October 2012, one of 98 storage bunkers at Camp Minden exploded prompting investigations by the EPA, Louisiana Department of Environmental Quality (LDEQ), and the LSP. The explosion shattered windows in the City of Minden, Louisiana and generated a 7,000-foot mushroom cloud. The residents of Doyline were put under a voluntary evacuation order for several days following the explosion.

In August 2013, Explo Systems, Inc. declared bankruptcy and the Louisiana Military Department (LMD) took ownership of the explosives at the site. While some of the material left by Explo Systems, Inc. is being addressed by other responsible parties, over 15 million pounds of M6 propellant and over 300,000 pounds of clean burning igniter remains to be addressed by the Louisiana Military Department.

3. SAMPLING APPROACH AND PROCEDURES

The specific field activities that will be conducted as part of the baseline sampling are presented in the following subsections. Relevant Standard Operating Procedures (SOPs) for field sampling methods are included in Appendix A.

3.1 OVERVIEW OF SAMPLING ACTIVITIES

EPA developed a sampling strategy to collect data necessary to evaluate baseline air and soil conditions at Camp Minden and in off-site community locations. Data quality objectives (DQOs) and an overview of the health and safety protocols including field activities required to complete these tasks are presented in the following subsections.

3.1.1 Data Quality Objectives

The primary objective of the field activities is to determine baseline air and soil conditions at Camp Minden and in off-site community locations. This will be done through the use of equipment that can monitor/sample and analyze constituents associated with the destruction of propellants at levels below national or state standards. Air and soil data DQOs have been established and are included in Appendix B. The DQOs presented were developed using the seven-step process set out in the EPA *Guidance on Systematic Planning using the Data Quality Objectives Process, EPA QA/G-4*.

3.1.2 Health and Safety Plan Implementation

The field activities will be conducted in accordance with a site-specific Health and Safety Plan (HASP). Level D Personal Protective Equipment (PPE) will be utilized for routine field activities.

The FSO will be responsible for implementation of the HASP during all field activities. The field team will be required to conduct work according to the guidelines and requirements of the HASP. In accordance with the general health and safety operating procedures, the field team will also drive the route to the hospital specified in the HASP prior to initiating field activities.

3.1.3 Community Relations

It is anticipated that the EPA will be on-site at all times and any community relations issues will be directed to the EPA OSC. If the EPA OSC is not present, the sampling team, under the guidance of the Assessment/Inspection Manager, will manage community relations in the field as directed by the EPA OSC. The field team will work as directed by the EPA OSC to obtain access to all designated sampling locations.

3.2 AIR SAMPLING AND AIR MONITORING APPROACH

Baseline air sampling will be conducted on Camp Minden and in surrounding community locations. Figure 3-1 illustrates the baseline air and soil sampling locations.

The baseline locations will be evaluated in pairs using two complete sets of equipment that will be periodically relocated to cover all locations. The equipment will be stationed at each location approximately three days, with a day taken between locations to allow for moving the equipment. Also, one full set of QA samples will be collected during the baseline evaluation. Continuous air monitors will be run for all days at each location. Meteorological data will be collected during the entire duration of the field sampling effort. Table 3-1 summarizes analytical parameters, type of sample collected, analytical method, equipment type, and sample duration and estimated turn-around times (TAT) from the laboratory.

Table 3-1
Baseline Air Operations

Parameters	Type	Analytical Method	Equipment	No. of Primary Samples per Location	Sample Duration (hours)	Time Interval	Sample Shipments to Laboratory / Data Updates	Laboratory TAT
SVOCs	Sample	TO13A	PS-1 PUF Sampler	2	24	Noon to Noon	1/week	2 Weeks
Dioxin/ Furans	Sample	TO9A	PS-1 PUF Sampler	1	48	Noon to Noon	1/week	2 Weeks
PM2.5	Sample	40 CFR	BGI PQ200	2	24	Noon to Noon	1/week	2 Weeks
PM10	Sample	40 CFR	BGI PQ200	2	24	Noon to Noon	1/week	2 Weeks
VOCs	Sample	TO15	Summa Canister	2	24	Noon to Noon	1/week	2 Weeks
PM2.5	Monitor	40 CFR	MetOne BAM1020	NA	Continuous	60-min ave	Daily	NA
NOx	Monitor	40 CFR	Thermo 42i	NA	Continuous	1, 15 & 60 min ave(s)	Daily	NA
SO2	Monitor	40 CFR	Thermo 43i	NA	Continuous	1, 15 & 60 min ave(s)	Daily	NA
CO	Monitor	40 CFR	Thermo 48iTLE	NA	Continuous	1, 15 & 60 min ave(s)	Daily	NA
CO2	Monitor	40 CFR	Teledyne-API Model 360E	NA	Continuous	1, 15 & 60 min ave(s)	Daily	NA

3.2.1 Sampling Locations and Target Parameters

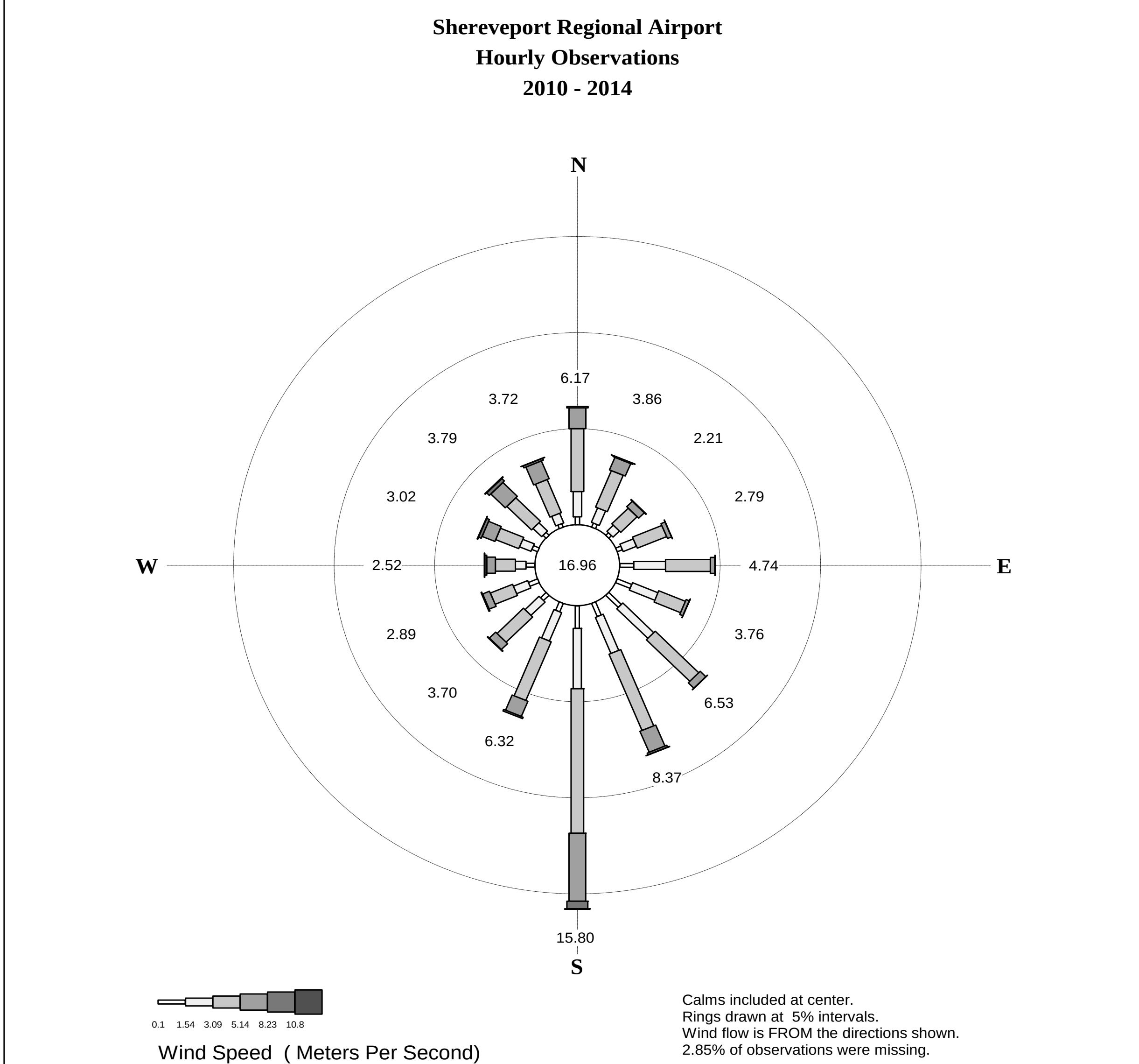
A wind rose for the nearby Shreveport, Louisiana Regional Airport representing the annual prevailing winds is illustrated on page 3-5. The lengths of the "petals" of the rose represent the portion of hours when the wind at the observation time was coming from the indicated direction sector. The prevailing winds in the area are generally from the south, with a secondary peak of frequency from the north. This orientation is the basis for the strategy to provide coverage at Camp Minden and in the community.

Table 3-2 summarizes the air measurements that will be collected in each area.

Table 3-2
Air Measurement Locations

	Monitoring		Sampling			
Area	**$PM_{2.5}$**	**$NO_x/SO_2/CO/CO_2$**	**$PM_{10}//PM_{2.5}$**	**VOCs**	**SVOCs**	**Dioxin/Furans**
Camp Minden	X	X	X	X	X	X
Community Locations	X	X	X	X	X	X

Wind Rose



PERCENT OCCURRENCE: Wind Speed (Meters Per Second)
LOWER BOUND OF CATEGORY

DIR	0.1	1.54	3.09	5.14	8.23	10.8
N	0.41	1.32	3.27	1.08	0.09	0.00
NNE	0.24	0.81	2.05	0.71	0.05	0.01
NE	0.19	0.44	1.15	0.40	0.02	0.00
ENE	0.27	0.72	1.58	0.21	0.01	0.00
E	0.69	1.59	2.23	0.23	0.01	0.00
ESE	0.78	1.37	1.43	0.16	0.01	0.00
SE	0.89	2.18	3.06	0.39	0.01	0.00
SSE	0.74	2.03	4.29	1.19	0.11	0.01

TOTAL OBS = 43824 MISSING OBS = 1249

PERCENT OCCURRENCE: Wind Speed (Meters Per Second)
LOWER BOUND OF CATEGORY

DIR	0.1	1.54	3.09	5.14	8.23	10.8
S	1.18	3.13	7.52	3.54	0.40	0.02
SSW	0.47	1.59	3.31	0.86	0.09	0.00
SW	0.39	0.99	1.87	0.43	0.03	0.00
WSW	0.49	0.77	1.20	0.38	0.05	0.00
W	0.44	0.53	1.00	0.43	0.09	0.02
WNW	0.30	0.62	1.24	0.68	0.15	0.03
NW	0.21	0.61	1.72	1.02	0.18	0.03
NNW	0.20	0.55	1.86	1.01	0.10	0.02

CALM OBS = 7434 PERCENT CALM = 16.96

Particulate matter less than 2.5 microns aerodynamic diameter ($PM_{2.5}$) is a criteria air pollutant primarily associated with combustion, such as diesel engines and power plants. The $PM_{2.5}$ particles in that size range can penetrate more deeply into the respiratory tract. Due the significance of $PM_{2.5}$, both continuous monitoring and time-integrated sampling will be performed. The sampling will provide direct measurement of 24-hour average $PM_{2.5}$ mass and provide equivalent quality time-resolved hourly concentration measurements.

Particulate matter less than 10 microns aerodynamic diameter (PM_{10}) is the size range of particles that is predominantly associated with fugitive dust from unpaved roads and material handling. Nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon monoxide (CO) are criteria pollutants.

Other compounds of concern are the explosive residues 2,4 and 2,6 dinitrotoluene (DNT), dibutylphthalate (DBP), and diphenylamine (DPA). The propellants at Camp Minden do not contain chlorine; therefore, dioxins and furans are not expected from the destruction of the material. However, due to local concerns, baseline dioxin and furan samples, or more specifically, polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzo-p-furans (PCDF), a subcategory of SVOCs will be collected. Because many PCDD and PCDF compounds are present at extremely low levels in the atmosphere, greater volumes of air must be sampled to collect detectable quantities of these compounds. SVOC samples to be analyzed for dioxin/furans will be run for 48 hours.

In addition to the compounds of concern noted above, carbon dioxide (CO_2) is a compound of interest. A continuous CO_2 analyzer will be included to collect baseline concentration data at all locations.

The field team will employ several types of air sampling and monitoring equipment to collect baseline air concentration data. The air program will use EPA-designed air methods where applicable. For the gaseous criteria pollutants, continuous analyzers designed to measure parts per billion (ppb) levels will be used. These analyzers differ significantly from direct-reading instruments used by first responders in both technology and sensitivity.

In the following sections, “ambient air” is used to refer to typical outdoor air. The methods used for time-integrated ambient air sampling are detailed in Section 3.2.2. The continuous ambient air monitoring methods are described in detail in Section 3.2.3. Meteorological monitoring is described in Section 3.2.4.

3.2.2 Air Sampling Methods

VOC Sampling

Sampling for VOCs will be done using clean, evacuated stainless steel SUMMA canisters designed for use with EPA Method TO-15 analysis. The laboratory will certify that the canisters have been cleaned to the standards required for achieving the low ambient-air sample detection limits. After cleaning, air from the canisters will be evacuated. The canisters will have a 6-liter capacity and an initial vacuum of approximately negative 30 inches mercury (” Hg). A 7-micron pre-filter will be attached to the canister to minimize entry of particulates.

A vacuum gauge will be used to measure the initial and final vacuum of the canister and to monitor the filling of the canister. The gauges will be used to provide a relative measure of pressure change. Before sampling, the gauge will confirm the pressure reads between negative 29” Hg and negative 30” Hg for each canister.

Fixed-rate flow controllers preceded with micron particulate filters will be placed on the canisters after the initial canister pressure check. The flow-controllers will be pre-set by the laboratory to meter the flow of air into the canister at a relatively constant rate over the course of the sampling period to fill approximately two thirds of the canister capacity (a 5-liter sample for a 6-liter canister). The flow controller and the filters will be cleaned and supplied by the laboratory and will be dedicated for each sample. If necessary, in order to collect breathing zone (3 to 5 feet aboveground or floor level) air samples, a metal cane or tripod may be used to elevate a sampling canister. All air samples will be collected at a uniform height and will be positioned (if possible) to avoid direct sunlight during the sampling (excessive solar heating can affect the micro-orifice sampling rate).

To begin sampling, the flow controller will be attached to the sampler. All connections between the canister and the flow controller must be tight enough so that the various pieces of equipment (flow controller, gauge, etc.) when assembled cannot be rotated by hand, and a leak check performed. Any leaks in these connections will be corrected prior to sampling or the canister will be replaced. After the canister has been placed at the sample location, the canister inlet valve will be opened to begin sampling.

At the end of the sampling period, the final canister pressure will be measured using a vacuum gauge. The target final pressure is between negative 4" Hg and negative 12"Hg. The SUMMA canisters will be sent to the laboratory for air analysis by EPA Method TO-15A.

SVOC Sampling

Sampling for SVOCs will be done using plugs of polyurethane foam (PUF) and XAD resin. The main SVOC compounds of interest are 2,4-dinitrotoluene (2,4-DNT), 2,6-dinitrotoluene (2,6-DNT), dibutyl phthalate (DBP), and diphenylamine (DPA).

High-volume SVOC samples will be collected at all on-site and off-site locations using General Metal Works (GMW) Model PS-1 high-volume air samplers following EPA Method TO-13A for SVOCs and Method TO-9A for PCDD/PCDF. Both methods use the PS-1 samplers to draw air through a sampling train consisting of a 102-millimeter-diameter microquartz filter first to collect the semi-volatile aerosols and particulates and then a glass cylinder holding a PUF plug to collect the semi-volatile vapors. In order to maximize collection efficiency of vapors, 1 inch of XAD-2 adsorbent resin is used in the middle of the PUF sampling media. The entire sampling train (filter, XAD-2, and PUF plugs) is extracted together and analyzed for speciated SVOC compounds using gas chromatography/mass spectrometry according to EPA Method 8270D and PCDD/PCDF by EPA Method 8290A. The samplers will be set to run at approximately 250 liters per minute resulting in a total air volume of 360 m^3 over a 24-hour sampling period or 120 m^3 over an 8-hour sample period. Sampling duration for PCDD/PCDF will be extended to 48-72 hours to enhance and/or lower laboratory detection limit sensitivity.

PM_{10} and $PM_{2.5}$ Sampling

BGI PQ200 Ambient Air Samplers will be used to collect ambient air samples for PM_{10} and $PM_{2.5}$ samples for gravimetric analysis.

The PQ200 has a size-selective inlet head that limits the particles collected to the desired PM_{10} size range. When configured for $PM_{2.5}$, the PQ200 includes a cyclone downstream of the PM_{10} inlet to further limit the particle sizes. The PQ200 has a standard airflow rate of 16.7 liters per minute (L/min). The PM_{10} or $PM_{2.5}$ will be collected on a 47 mm diameter PTFE membrane filter, and the particle mass collected determined gravimetrically. Use of the PTFE filter will allow the samples to be analyzed for EPA Method IO-3.3 for sulfite determination using ion chromatography.

3.2.3 Air Monitoring Methods

Particulates

Continuous monitoring for PM2.5 will be conducted using beta attenuation monitors (BAM) manufactured by Met One Instruments, Inc. (Met One). For community and on-site monitoring, Model BAM1020 units will be deployed for continuous (24/7) coverage for PM2.5.

The beta attenuation process uses a small source of beta particles (carbon-14, 60 microcuries) coupled to a sensitive detector that counts the emitted beta particles. The dust particles are collected on a filter tape that is placed between the beta source and the detector. Dust on the filter will intercept some of the beta particles. The reduction of beta particles is proportional to the amount of dust on the filter, which allows the mass of dust to be determined from the beta particle counts. The dust mass is combined with the air volume collected during the filter exposure time to determine the PM concentration.

The BAM1020 monitors will be equipped with particle-size selective inlets. The design of the inlets is such that particles larger than the desired size range will be removed from the air flow, based on the air-flow rate. The units will be equipped with an inlet head to separate PM10 followed inline by a PM2.5 cyclone. Sampling flow rate is critical to maintain the proper particle size cut points of the inlets. Flow rates are maintained at 16.7 liters per minute (LPM) in both monitors using an integral flow meter, pressure sensor, and ambient temperature sensor on board each monitor.

The data from the BAM1020 units will be recorded by digital data loggers using the analog signal outputs of the monitors. The BAM1020 can only record hourly average PM2.5 data.

Gaseous Criteria Pollutants

The gaseous pollutants (NO_x, SO_2, and CO) will be monitored with continuous gas analyzers. The analyzers to be used will be appropriate to monitor for each pollutant. It is important to note that the gas analyzers used for monitoring are not similar to the "direct-reading instruments" (such as Multi-RAEs) used by first responders. The most significant differences are that the analyzers are more sensitive and designed for continuous operation.

The gas analyzers will be housed in climate-controlled monitoring trailers that will require AC line power. Each trailer will also be equipped with a sample inlet and manifold to draw in outdoor air and distribute it to the analyzers, along with a dilution calibration system, calibration gas cylinders, and a digital data acquisition system. The data acquisition systems will record average concentrations over 1-, 15-, and 60-minute intervals.

3.2.4 Meteorology

On-site continuous meteorological data will be collected during the field activities. The baseline air sampling and monitoring program will use the prevailing, forecasted, and current winds to ensure the most accurate measurements and coverage.

On-site meteorology will also be collected to establish and document the current conditions. A tripod weather station will be deployed to measure wind speed and direction, air temperature, and barometric pressure. The weather station will follow EPA guidelines for siting of meteorological monitoring as closely as site logistics allow, ensuring the data collected accurately represent the actual on-site conditions.

The meteorological monitoring component of the baseline air sampling and monitoring program will consist of equipment designed to continuously record wind speed, wind direction, standard deviation of wind direction (sigma theta), and air temperature from an 18-foot-tall tripod. The meteorological monitoring will be conducted continuously for the duration of the air monitoring program. Meteorological monitoring quality assurance (QA) will be conducted in accordance with the "On-site Meteorological Program Guidance for Regulatory Modeling Applications" (EPA, 1987b) and the "Quality Assurance Handbook for Air Pollution Measurements Systems, Volume IV - Meteorological Measurements" (EPA, 1995), as actual site conditions allow.

The meteorological station will consist of a tripod, instrumentation, and a data logger. The tripod will have an 18-foot-tall mast, mounted on a tilt-down base to provide convenient access to instruments at the top of the tripod. The meteorological tripod will be located on the site in an unobstructed area closely following EPA siting criteria. This location will provide data representative of atmospheric conditions at the operations area site.

The meteorological variables to be monitored are:

- Wind speed
- Wind direction
- Precipitation
- Standard deviation of horizontal wind direction (sigma theta)
- Ambient air temperature
- Relative humidity
- Barometric pressure

The sensors for the meteorological monitoring component of the program have been selected to meet or exceed EPA monitoring criteria. The equipment specifications and quality assurance/quality control (QA/QC) procedures to be used are consistent with EPA requirements.

All sensors will be connected to a data logging system. The data logger will measure the sensor responses and telemeter averaged data to an on-site data collection computer at regular intervals. The meteorological station will be located in a secure area within radio telemetry distance of the main site trailer. The meteorological system will include wind sensors at the 18-foot level and barometric pressure and air temperature at the 6-foot level.

Wind measurements will be made using a sonic anemometer. The sonic anemometer uses the travel time of a sound pulse between an emitter and a receiver to measure the wind speed. The anemometer measures the wind speed 40 times per second along two perpendicular axes, referred to as the north-south and east-west components. The averaged relative magnitudes of the two components are added together as vectors to obtain resultant wind speed and direction, output once per second. The speed data are also used to calculate a standard deviation of the horizontal wind direction, referred to as sigma theta. The sonic anemometer can measure wind speeds from 0.02 mph up to 134 mph with an accuracy of ±2% at 27 mph. The wind direction accuracy is ±3°.

Air temperature measurements will be made with an expanded range, two-thermistor composite sensor encased in stainless steel. A naturally aspirated radiation shield will be used to reduce errors due to solar radiation.

3.3 SOIL SAMPLING

Soil sampling will be conducted in general accordance with the EPA *Emergency Response Team (ERT) Soil Sampling* and supporting SOPs (Appendix A). The specific sampling, decontamination, and sample handling procedures, including disposition of investigation-derived waste (IDW), is described in the following subsections.

Up to 20 soil samples (including quality assurance/quality control samples) from locations on-site and off-site of Camp Minden (Figure 3-1). The community locations will be at the locations described in Section 1.2 and the Camp Minden locations will be taken in the potential operational area.

Grab soil samples will be collected at the surface (0 to 1 inch) at the above-selected locations as directed by the EPA OSC. Soil samples for SVOCs, dioxin/furan, TCLP metals, and pH will be collected using dedicated plastic scoops. Samples obtained for VOCs will be collected using Encore sampling equipment. Samples will be placed in dedicated sample containers and placed on ice prior to shipping to the designated laboratory. At the end of each day, each sample shipping container will be packed with ice and sufficient packing material (e.g., bubble wrap) to prevent cooler movement and breakage upon shipment.

The field team will utilize SCRIBE software to generate chain-of-custody forms and to manage and track sample information. Information regarding sample analysis is summarized in Section 4.

3.4 INVESTIGATION-DERIVED WASTE (IDW)

Non-dedicated sampling equipment (i.e., plastic scoops) will be used where applicable. Attempts will be made to eliminate or minimize generation of IDW during this investigation. Non-dedicated equipment will be rinsed with soap and water and attempts will be made to dispose of decontamination fluids on-site. The analytical data from collected samples will be reviewed after completion of the field activities, and disposal options will be evaluated accordingly. It is anticipated that minimal amounts of IDW will be generated during this activity.

3.5 SAMPLING AND SAMPLE HANDLING PROCEDURES

Samples will be collected using equipment and procedures appropriate to the matrix, parameters, and sampling objectives. The volume of the sample collected must be sufficient to perform the laboratory analysis requested. Samples must be stored in the proper types of containers and preserved in a manner appropriate to the analysis to be performed.

All clean, decontaminated sampling equipment and sample containers will be maintained in a clean, segregated area. All samples will be collected with clean decontaminated equipment. All samples collected for laboratory analysis will be placed directly into pre-cleaned, unused glass or plastic containers. Sampling personnel will change gloves between each sample collection/handling. All samples will be assembled and catalogued prior to shipping to the designated laboratory.

3.6 FIELD QUALITY CONTROL SAMPLES

Quality assurance/quality control (QA/QC) samples will be collected according to the following:

3.6.1 Field Quality Control for Soil Samples

- Blind field duplicate samples will be collected during sampling activities. The data obtained from these samples will be used to assist in the quality assurance of the sampling procedures and laboratory analytical data by allowing an evaluation of reproducibility of results. Blind field duplicate samples will be collected at the rate of 1 duplicate for every 10 samples collected.

- Equipment rinsate blanks will be prepared by pouring laboratory-grade deionized water over non-disposable sampling equipment after it has been decontaminated and collecting the rinse water in sample containers for analyses. These samples will be prepared to demonstrate that the equipment decontamination procedures for the sampling equipment were performed effectively.

- Temperature blanks will be prepared in the field and will consist of one 40-milliliter glass sample container with Teflon-lined septum cap. The temperature blank will be packaged along with the field samples in the shipping cooler and will represent the temperature of the incoming cooler upon receipt at the laboratory. Use of these samples within a shipping container enables the laboratory to assess the temperature of the shipment without disturbing any of the field samples.

- Laboratory-prepared trip blanks will be submitted with each shipment containing samples for VOC analysis. The laboratory prepared trip blanks will consist of two 40-milliliter glass sample containers with Teflon-lined septum caps. The trip blanks will be prepared with deionized water prior to leaving the laboratory. Trip blanks are used to evaluate the potential cross-contamination that may occur during the shipment of samples. Trip blanks will be included in each sample cooler containing VOC samples.

- As needed or requested, MS/MSD samples will be collected during sampling activities. The data obtained from these samples will be used to assist in the quality assurance of the sampling procedures and laboratory analytical data by allowing an evaluation of reproducibility of results. Efforts will be made to collect MS/MSD samples in locations where there is no visual evidence of contamination or where contamination is not suspected. MS/MSD samples will be collected at the rate of one MS/MSD sample per matrix for every 20 samples collected.

3.6.2 Field Quality Control for Air Matrix Samples

Field QA/QC samples for air sampling are inherently different from soil matrix QA/QC samples. No true field duplicate samples exist because sample start, stop, and elapsed times, sample flow rates, final air volumes, and the equipment used to collect each sample are inherently different. These factors will be controlled to provide samples that are as identical as is practicable, but samples designed to reflect field sampling reproducibility are more properly referred to as co-located.

Additionally, certain air matrix methods preclude certain types of field QA/QC samples because a certain QA/QC function is already accounted for in the laboratory procedure.

Air matrix QA/QC samples will be collected for each sample method as follows:

- Co-located samples will be collected so that at least 10% of samples per zone will be collected in duplicate or co-located. As samples are collected, collect at least one duplicate or co-located sample along with the first of every set of 10 normal samples collected (i.e., if you only collect 4 normal samples one duplicate will have been collected).

- Co-located un-spiked/spiked sample pairs will be collected during sampling activities for semi-volatiles using Method TO-13A, similar to Method 18. Media will be spiked at 10 times the method detection limit with the explosive residue compounds including 2,4 and 2,6 DNT, DBP, and DBA using commercially available certified standards of these explosive residues in method-compatible volatile solvents. Un-spiked/spiked pairs will be collected for each sample during the baseline sampling phase and monitoring phase. The data obtained from these samples will demonstrate analyte capture efficiency, stability, and recovery during preparation for the Method TO-13A sampling and Method 8270D analytical procedures.

- Field blanks will be prepared by installing sample media into the sampling apparatus, as though a sample run was about to be performed, but no air sample will be collected. The media will then be recovered, stored, labeled, and shipped according to the identical protocols as normal air matrix samples. These samples will be prepared to demonstrate that the equipment decontamination procedures for the sampling equipment were performed effectively. Field blanks will be prepared and submitted at a rate of 10% of samples collected. Field blanks are not required for Method TO-15A for VOCs, as sample canisters and flow regulators are screened for Baseline contamination prior to deployment by the laboratory.

- Media blanks will be retained and analyzed by the laboratory. For most air matrix methods, sample media blanks are analyzed prior to and during project sample analysis in order to ensure that media is free from trace levels of target analytes or other interferences.

- Lot blanks will be submitted per lot number of sample media for air analysis when applicable. For example, sorbent tube media and filter media will be supplied by the laboratory in ‘lots’. One sample media example will be removed from the media lot prior to exposure to site contaminants. This lot blank will be evaluated for the same parameters as the samples that will be collected using this lot of sample media. It will be denoted as a lot blank on the chain of custody and is considered field QC. Lot blanks will be submitted to the laboratory with each new lot of media, unless the laboratory is supplying media and has already retained a lot blank.

- Temperature blanks are not applicable to air matrix samples. Temperature data loggers (HOBO™ or equivalent) will be packaged in the shipping container along with any air matrix field samples that may be temperature sensitive. These loggers within a shipping container enable the laboratory to assess the temperature of the contents over the course of shipment without disturbing any of the field sample media, or introducing liquids or other potential contaminants. Temperature loggers will be employed as required by the method or laboratory SOP.

- Trip blanks will be submitted with each shipment containing samples for SVOC analysis. Trip blanks will consist of sample media that has been opened and then repackaged and labeled, but not deployed. Trip blanks are used to evaluate the potential cross-contamination that may occur during the shipment of samples. Trip blanks will be included in each sample container.

3.6.3 Field Quality Control for Continuous Air Monitoring

In order to ensure collection of high-quality data, field calibration of monitoring instruments will be performed during the initial installation and at any time that certain criteria are met as listed below. These calibrations will be conducted by the trained personnel. All calibration records will be examined by the project QA officer.

Instrument calibration checks will be required if any one of following criteria is met:

- At start-up;
- When any maintenance activity that may alter the response of any instrument is conducted;
- When the daily span of any of the continuous gas analyzers deviates by more than ±10 percent from the designated span value;
- When audit results of the continuous gas analyzers show that the difference between the audit standard and the instrument response exceeds ±10 percent;
- When a continuous gas analyzer has been shut-off for more than 2 days; and
- Prior to removal of an instrument from a station if it is still operational.
- Calibrations will be performed according to requirements of EPA regulatory guidelines and National Institute of Standards and Technology (NIST) traceability and documentation.

- Documentation of all site visits will be provided through several forms. A station log will be maintained at the site detailing inspection, calibration, or repair activities. Records of measurements taken during calibrations will be recorded on forms designed specifically for the instrument under calibration.

- Test equipment used for calibrations will be maintained and calibrated on a regular basis. Records that provide traceability to the NIST of all equipment used for adjusting monitoring systems are maintained by the air team.

- In order to ensure collection of high-quality data, field calibration of monitoring instruments and recorders will be performed. These calibrations will be conducted by the trained air team.

- Periodic multi-point calibrations and spans will be performed using standards documented traceable to NIST.

- Calibrations, zero checks, span checks, and precision checks will be done through the normal sampling trains (i.e., those scrubbers and filters normally employed during sampling).

- Zero/span checks will be performed daily but no automatic adjustment will occur, but the information will be used to detect sudden malfunctions or changes in calibration that may warrant unscheduled maintenance visits. The span-check concentration will be at 70 to 90 percent of instrument full-scale response.

- Level-I span (~90% full scale), zero and precision checks (~5% full scale) will be performed bi-monthly. Multi-point calibrations will be performed whenever the daily span exceeds ±15 percent of expected.

Accuracy checks are done by performing multi-point calibrations of the continuous gas analyzers consisting of challenging each instrument with known concentrations at approximately 5, 20, 40, and 90 percent of full scale. In addition to these points, a zero check will be performed on each analyzer. Gas phase titration (GPT) with ozone will be performed to assess NO2-to-NO converter efficiency in the NOx analyzer. Linearity over the range of each analyzer will be checked and adjustments made, as appropriate, to bring the analyzer response within the control limits.

The control limits for multi-point calibrations for the SO_2, NOx, CO, and CO_2 analyzers is ± 15 percent for span concentrations and ± 0.015 ppm for zero checks (± 1.5 ppm for CO and CO_2).

When performing calibrations, the entire sample train of the analyzer is connected to a certified dilution system output port via a glass manifold. Care is taken to introduce the audit span gas through as much of the normal sampling train (i.e., filters and scrubbers) as possible. The analyzers are challenged with specific concentrations of span gas as follows. These ranges may vary depending on the final selected operational range.

Nitric oxide (NO), sulfur dioxide (SO_2), carbon monoxide (CO), and carbon dioxide (CO_2) concentrations are generated using NIST traceable EPA Protocol No. 2 cylinders and gas dilution. Zero air is used to dilute the concentrations of cylinder span gas. The zero air is provided by a zero air generator. Zero air for the CO_2dilution is provided by a cylinder of CO_2 free air or by using a soda lime scrubber in conjunction with the zero air generator.

In addition to the accuracy checks, the nitrogen dioxide concentrations are introduced into a NO/ NO_2/NOx analyzer by gas-phase titration (GPT) of NO with O_3 (ozone). Nitric oxide reacts completely with ozone to produce nitrogen dioxide and oxygen to test the analyzer's converter efficiency. The analyzer converter efficiency is defined as the slope of the linear regression using the NO2 source versus the NO_2 converted x 100. The converter efficiency must be greater than or equal to 96 percent to pass the calibration check.

Lastly, independent audits will be performed periodically throughout the program with the frequency based on the final program expected duration. Audit procedures will be exactly as a multi-point calibration for each monitor with an additional GPT done to check the NOx converter efficiency. Independent audits will be performed by a technician not directly involved in the initial installation, operation, or calibrations of the monitors using a separate set of NIST calibration equipment and gases. The control limits for multi-point audits for the SO_2, NOx, CO, and CO_2 analyzers is ± 15 percent for span concentrations and ± 0.015 ppm for zero checks (± 1.5 ppm for CO and CO_2).

3.7 SAMPLE MANAGEMENT

Specific nomenclature that will be used will provide a consistent means of facilitating the sampling and overall data management for the project. Sample nomenclature will follow a general format regardless of the type or location of the sample collected. The general nomenclature consists of the following components:

- Geographic location (e.g., location within a school or park).
- Collection type (e.g., composite, grab, etc.).
- QA/QC type (e.g., normal, duplicate, etc.).
- Sequence - An additional parameter used to further differentiate samples.

Sample data management will be completed utilizing the EPA-provided SCRIBE software.

3.8 DECONTAMINATION

Non-disposable sampling equipment (hand trowels, stainless steel bowls, etc.) if used during the sample collection process will be thoroughly pre-cleaned before initial use, between use, and at the end of the field investigation. Disposal sampling equipment will be used where possible and disposed at the end of the project as IDW. Equipment decontamination will be completed in the following steps:

- High-pressure water spray or brush, if needed, to remove soil from the equipment.
- Non-phosphate detergent and potable water wash to clean the equipment.
- Final potable water rinse.
- Equipment air-dried.

Personnel decontamination procedures will be described in the site-specific HASP that will be prepared prior to implementation of activities at the site.

3.9 SAMPLE PRESERVATION, CONTAINERS, AND HOLD TIMES

Once collected, samples will be stored in coolers or other suitable shipping containers while at the site and until submitted for laboratory analysis. The samples will be sent by common carrier to the designated laboratory or driven by the field members.

4. ANALYTICAL APPROACH

Information regarding analytical methods and data validation is provided in the following subsections.

4.1 ANALYTICAL METHODS

The air and soil samples will be submitted for the analyses noted below. The laboratory analytical methods are also listed below. The method detection limits are defined in the *Code of Federal Regulations* (40 CFR 136 Appendix B). Laboratory reporting limits for air and soil analyses are included in Appendix C

Air Samples

- VOCs by TO-15
- SVOCs including explosive residues by TO-13A and SW-846 Method 8270D
- Dioxin/Furans (PCDD/PCDF) by TO-9A and SW-846 Method 8290A

Soil Samples

- VOCs by SW-846 Method 5035/8260
- SVOCs including explosive residues by SW-846 Method 8270C
- Dioxin/Furans (PCDD/PCDF) by SW-846 Method 8290A
- TCLP Metals by SW-846 Method 1311
- pH by SW-846 Method 9040

The PTL will indicate on the chain of custody that a Level IV data package is required. The proposed laboratories that will be used for this project include:

EPA Region 6 Environmental Services Branch (ESB) Laboratory

10625 Fallstone Road
Houston, TX 77099

Eurofins Air Toxics

180 Blue Ravine Road, Suite B
Folsom, California 95630

Chester Labnet

12242 SW Garden Place
Tigard, Oregon 97223

Deliverables will include preliminary data via email in PDF format and an electronic data deliverable (EDD) in Excel format. The final data deliverable will include a full Level IV data package in PDF format and a final EDD in excel format.

4.2 DATA VALIDATION

The data validation team will validate the analytical data immediately upon receipt from the laboratory. It is anticipated that data validation will take up two weeks following receipt of each data package received from the laboratory. A summary of the data validation and findings will be presented in Summary Reports as part of the final report. The data team will evaluate the following to verify that the analytical data are within acceptable QA/QC tolerances:

- The completeness of the Laboratory Reports, verifying that all required components of the report are present and that the samples indicated on the accompanying chain-of-custody are addressed in the report.
- The results of laboratory blank analyses.
- The results of laboratory control sample (LCS) analyses.
- Laboratory precision, through review of the results for blind field duplicates.

The analytical data generated by the designated laboratory will be validated using EPA-approved data validation procedures in accordance with the EPA CLP *National Functional Guidelines for Organic Superfund Data Review – August 2014 (*EPA-S40-R-014-002) *and National Functional Guidelines for Inorganic Superfund Data Review – August 2014* (EPA-S40-R-013-001). A summary of the data validation findings will be presented in Data Validation Summary Reports as part of the final report. The following will be evaluated to verify that the analytical data is within acceptable QA/QC tolerances:

- The completeness of the laboratory reports, verifying that required components of the report are present and that the samples indicated on the accompanying chain-of-custody are addressed in the report.
- The calibration and tuning records for the laboratory instruments used for the sample analyses.
- The results of internal standards analyses.
- The results of laboratory blank analyses.
- The results of laboratory control sample (LCS) analyses.
- The results of matrix spike/matrix spike duplicate (MS/MSD) analyses.
- The results of surrogate recovery analyses.
- Compound identification and quantification accuracy.
- Laboratory precision, by reviewing the results for blind field duplicates.
- Variances from the QA/QC objectives will be addressed as part of the Data Validation Summary Reports.

Table 4-1
Requirements for Containers, Preservation Techniques, Sample Volumes, and Holding Times

Name	Analytical Methods	Matrix	Container	Preservation	Minimum Volume or Weight	Maximum Holding Time
Volatile Organic Compounds (VOCs)	EPA Method 5035/8260	Soil	Encore Sampler	4°C/ Methanol	5 grams	48 hours to extract from date sampled
Semi-Volatile Organic Compounds (SVOCs)	EPA Method 8270C	Soil	8-ounce glass jar	4°C	30 grams	14 days to extract from date sampled
Dioxin/Furans	EPA Method 8290A	Soil	8-ounce glass jar	4°C	30 grams	14 days to extract from date sampled
TCLP	EPA Method 1311	Soil	8-ounce glass jar	4°C	30 grams	14 days to extract from date sampled
pH	EPA Method 9040	Soil	8-ounce glass jar	4°C	30 grams	Immediately upon laboratory receipt
VOCs	TO-15	Air	Summa Canister	None	6 Liter @ 11.5 mL/min + 10% for an 8 hour sample Collection	30 days from date sampled
SVOCs	TO-13A/8270D; TO-9A/8290A (PCDD/PCDF)	Air	PUF (PCDD/PCDF) or PUF/XAD cartridge	4°C, foil wrapped	200 to 1,000 m^3	None
Explosive Residues	TO-13A/8270D	Air	PUF/XAD Cartridge	4°C, foil wrapped	200 to 1,000 m^3	None
PM2.5 Mass	40 CFR 50 Appendix L	Air	Teflon filter in filter holder	< 25°C	24 m^3	30 days from retrieval @ controlled temperature, otherwise 10 days

5. QUALITY ASSURANCE

Quality Assurance (QA) will be conducted in accordance with EPA's quality management requirements (*EPA Requirements for Quality Assurance Project Plans (QA/R-5*) [EPA/240/B-01/003, dated March 2001]; and *EPA Guidance for Quality Assurance Project Plans* [EPA/240/R-02/009, dated December 2002]). Standard Operating Procedures (SOPs) for field sampling, analytical screening methods, and other field activities will be conducted following EPA ERT Standard Operating Procedures (various dates), as applicable.

A Quality Assurance (QA) officer will be assigned and will monitor work conducted throughout the entire project including reviewing interim report deliverables and field audits. The PTL will be responsible for QA/QC of the field investigation activities. The designated laboratory utilized during the investigation will be responsible for QA/QC related to the analytical work. The project chemist will verify that laboratory QA/QC is consistent with the required standards and provide data validation support once the laboratory data has been received.

5.1 SAMPLE CUSTODY PROCEDURES

Because of the evidentiary nature of sample collection, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. After sample collection and identification, samples will be maintained under the chain-of-custody procedures. If the sample collected is to be split (laboratory QC), the sample will be allocated into similar sample containers. Sample labels completed with the same information as that on the original sample container will be attached to each of the split samples. All personnel required to package and ship coolers containing potentially hazardous material will be trained accordingly.

Chain-of-custody forms will be prepared utilizing SCRIBE software. The chain-of-custody procedures are documented and will be made available to all personnel involved with the sampling. A typical chain-of-custody record will be completed each time a sample or group of samples is prepared for shipment to the laboratory. The record will repeat the information on each sample label and will serve as documentation of handling during shipment. A copy of this record will remain with the shipped samples at all times, and another copy will be retained by the member of the Sampling Team who originally relinquished the samples. At the completion of the project, the data manager will export the SCRIBE chain-of-custody documentation to the Analytic Service Tracking System (ANSETS) database.

Samples relinquished to the participating laboratories will be subject to the following procedures for transfer of custody and shipment:

- The COC record will accompany samples. When transferring possession of samples, the individuals relinquishing and receiving the samples will sign, date, and note the time of the sample transfer on the record. This custody record documents transfer of sample custody from the sampler to another person or to the laboratory.
- Samples will be properly packed for shipment and dispatched to the appropriate laboratory for analysis with separate, signed custody records enclosed in each sample box or cooler. Sample shipping containers will be custody-sealed for shipment to the laboratory. The preferred procedure includes use of a custody seal wrapped across filament tape that is wrapped around the package at least twice. The custody seal will then be folded over and stuck to the seal to ensure that the only access to the package is by cutting the filament tape or breaking the seal to unwrap the tape.
- If sent by common carrier, a bill of lading or airbill will be used. Bill of lading and airbill receipts will be retained in the project file as part of the permanent documentation of sample shipping and transfer.

5.2 PROJECT DOCUMENTATION

All documents will be completed legibly and in ink and by entry into field logbooks, Response Manager, and SCRIBE. SCRIBE allows users the ability to synchronize the field and allows analytical data managers and data validators access to data to perform reviews from anywhere with an Internet connection. The Analytical Module is designed to take the analytical data entered into EPA SCRIBE software and make it available for multiple users to access on one site. The field personnel will utilize SCRIBE for all data entry on-site and will upload to the Response Manager Analytical module.

Field Documentation

The following field documentation will be maintained as described below.

Field Logbook

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. All entries will be signed by the individuals making them. Entries should include, at a minimum, the following:

- Site name and project number.
- Names of personnel on-site.
- Dates and times of all entries.
- Description of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain-of-custody information.
- Records of photographs.
- Site sketches.
- Calibration results.

Sample Labels

Sample labels will be securely affixed to the sample container. The labels will clearly identify the particular sample and include the following information:

- Site name and project number.
- Date and time the sample was collected.
- Sample preservation method.
- Analysis requested.
- Sampling location.

Chain-of-Custody Record

A chain-of-custody will be maintained from the time of sample collection until final deposition. Every transfer of custody will be noted and signed for and a copy of the record will be kept by each individual who has signed it.

Custody Seal

Custody seals demonstrate that a sample container has not been tampered with or opened. The individual who has custody of the samples will sign and date the seal and affix it to the container in such a manner that it cannot be opened without breaking the seal.

Photographic Documentation

Photographs will be taken to document site conditions and activities as site work progresses. Initial conditions should be well documented by photographing features that define the site-related contamination or special working conditions. Representative photographs should be taken of each type of site activity. The photographs should show typical operations and operating conditions as well as special situations and conditions that may arise during site activities. Site final conditions should also be documented as a record of how the site appeared at completion of the work.

Photographs should be taken with either a film camera or digital camera capable of recording the date on the image. Each photograph will be recorded in the logbook and within Response Manager with the location of the photographer, direction the photograph was taken, the subject of the photograph, and its significance (i.e., why the picture was taken). Where appropriate, the photograph location, direction, and subject will also be shown on a site sketch and recorded within Response Manager.

Response Manager

The field team will utilize the Response Manager module located on the EPA Web Hub, to collect and organize the data collected from the field activities. The information to be included encompasses some or all of the following depending on the specific project needs:

- General Module – Site-specific data including location and type of site. It also includes an area for all key site locations including geo-spatial data associated with the key site locations.

- Daily Reports – provides standard templates for tracking daily site activities, daily site personnel, and daily site notes for reporting back to the EPA OSC in a POLREP.
- Data Files – data files can be uploaded in the photo-module section and be associated with individual records or with the site in general. The meta data associated with that data file can be filled in using the photo-log fields.

The data stored in the Response Manager database can be viewed and edited by any individual with access rights to those functions. At any time deemed necessary, POLREPs can be generated by exporting the data out of Response Manager into Microsoft Excel/Word. The database is stored on a secure server and backed up regularly.

Report Preparation

At the completion of the project, the PTL along with the data validator will review and validate all laboratory data and prepare a draft report of field activities and analytical results for EPA OSC review. Draft deliverable documents will be uploaded to the TeamLink website for EPA OSC review and comment.