STATEMENT OF BASIS

COMMONWEALTH OF VIRGINIA

EMERGENCY FUEL STORAGE FACILITY

YORK COUNTY, VIRGINIA

EPA Region III
841 Chestnut Street
Philadelphia, PA 19107

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I. INTRODUCTION

This Statement of Basis explains the proposed remedy to abate the contamination at the Virginia Emergency Fuel Storage Facility ("Facility"), located in York County, Virginia. On April 2, 1992, the United States Environmental Protection Agency ("EPA") and the Virginia Department of Emergency Services ("VDES") entered into an Inter-Agency Cleanup Agreement ("Agreement") which required VDES, under EPA's guidance, to:

- conduct a comprehensive investigation to characterize the site history, hydrogeology, and the nature and extent of contamination at the Facility;

- conduct an ecological assessment to characterize the site ecology and the impact of the contamination on the environment;

- evaluate corrective action alternatives and propose a remedy to abate the contamination at the Facility;

- implement an EPA-approved remedy.

VDES has completed the site investigation and ecological assessment. The findings are reported in the "Supplemental Site Characterization And Ecological Assessment (SSCEA)," dated June 1994. Additionally, VDES has completed an evaluation of the corrective action alternatives and has proposed a remedy. The proposed remedy and the corrective action alternatives are described in detail in the "Corrective Action Plan (CAP)" prepared by VDES, dated June 1994.

EPA reviewed the CAP and has determined that the proposed remedy set forth in the CAP is adequately protective of human health, safety, and the environment. EPA concludes that the CAP has fully met the corrective action requirements of the Underground Storage Tanks (UST) regulations as defined in 40 CFR Part 280.66. On that basis, EPA has tentatively approved the CAP as proposed. Pursuant to the public participation requirements of the Agreement, the CAP will be available for public comment. EPA will consider public comments regarding the remedy before making a final decision.

This document provides justification for EPA's approval of the proposed remedy set forth in the CAP. It also contains summaries of the site investigation, ecological assessment, EPA's human health risk assessment, and EPA's evaluation of the corrective action alternatives. Detailed workplans, reports, data and correspondence pertaining to this document can be found in the Administrative Record, which can be reviewed at locations indicated in Section IX. EPA encourages the public to review the Administrative Record to gain a comprehensive understanding of the site and the rationale for the proposed remedy. The public comment and participation process is described in Section X.

II. PROPOSED REMEDY

EPA and VDES propose the following remedy for the Facility:

A. Access Restrictions: Restrict access to the northern portion of the Facility by erecting perimeter fences and warning signs, and implement deed restrictions to limit future land use. Only the northern portion of the Facility is contaminated; the southern portion is uncontaminated except for the cosmoline dump which will be remediated. Deed restriction of the northern portion of the Facility will be implemented to restrict future residential land use, groundwater withdrawal, excavation and activities that may endanger human health and the environment. Currently, the Facility is partially fenced. An 8-foot chain link fence topped with barbed wire will be installed around the northern portion of the Facility to restrict access to the tanks, valve pits, contaminated soil and sediments. Signs will be posted along the fence and at visible locations near Hipps Pond and North and South Ravines (North and South Branches of Hipps Creek) to warn against potential hazard of the contaminated sediments. As part of the CAP, the cosmoline dump in the southern portion of the Facility will be removed. No land use restriction will be imposed on the southern portion of the Facility upon remediation of the cosmoline dump.

B. Dam Upgrade: Upgrade the Hipps Pond dam and install an emergency spillway to safeguard against catastrophic failure of the dam and subsequent release of contaminated sediments. Although the pond water is nearly free of contamination, the sediments are contaminated with petroleum. The dam is in need of maintenance and it lacks an emergency spillway to divert excess water during severe storm events. As a preventive measure, an emergency spillway will be installed and the dam will be upgraded structurally to withstand a 100-year, 24-hour design storm event. A dam safety inspection program will be implemented to monitor the reliability of the dam in containing the sediments. In addition to inspection by state personnel on routine site visits, inspection will be conducted by a professional engineer once every five years. The inspection frequency exceeds Virginia State inspection requirement for Class III[1] Impounding Structures.

C. Securing Man-Made Structures: Man-made structures (tanks, valve pits, manways and Oil Water Separator 2) may pose safety hazard to animals and trespassers due to accidental trapping or falling inside. All access points will be physically secured by locking hasps, and the keys will be held in VDES. Additionally, these structures will be inspected by state personnel on routine site visits to evaluate the conditions of the security measures.

D. Decommissioning Oil Water Separator 1: Oil Water Separator 1 was designed to treat oil-contaminated water collected from the bottoms of the tanks via the terra cotta drain lines. Now that the tanks have been emptied and cleaned, Oil Water Separator 1 is no longer needed. The oil, water and sludge residues in the separator will be removed and the drain lines will be isolated at or near Valve 18. The separator will be washed, demolished and removed.

E. Cosmoline Dump Remediation: Cosmoline is a non-toxic petroleum grease used by the Navy for corrosion protection and lubrication purposes. Cosmoline is chemically non-toxic, but it may pose hazards to small animals. A cosmoline dump covering about one acre was found near the southern border of the Facility. The cosmoline and cosmoline-contaminated soil in this dump will be excavated and transported offsite for disposal.

F. Sludge Pit 2 Remediation: Sludge Pit 2 will be remediated by excavation and removal. The removed contents will be disposed of offsite or treated onsite by ex-situ methods. Ex-situ bioremediation technologies (widrowing, bioventing, and enhanced bioremediation) will be evaluated for onsite treatment of sludge and contaminated soil. A final decision regarding disposal or treatment of removed contents will be made after additional samples are taken to characterize the sludge pit contents. A detailed data collection plan will be included in the corrective action implementation workplan.

G. Long-Term Monitoring: A long-term monitoring program will be implemented to monitor groundwater, surface water, sediment transport, and benthic macroinvertebrates. The purpose of this long-term monitoring is to verify the appropriateness of the

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1 *According to Virginia State Dam Safety Regulations, Class III Impounding Structures are located where failure may cause minimal property damage to others, and no loss of life is expected. Class III impounding structures require inspection by a professional engineer once every six years.*

selected remedy. Groundwater will be monitored annually in the five contaminated areas for TPH, pH, conductivity and dissolved oxygen. Four new wells and 22 existing wells will be used to monitor the groundwater contamination plumes near their discharge points to surface water. Five surface water sampling locations in North and South Ravines and Hipps Creek were selected to monitor the conditions above and below Hipps Pond and near the fuel seep areas. Surface water will be sampled quarterly for the first year and annually thereafter for TPH, pH, conductivity and temperature at all locations, and Virginia discharge permit (VPDES) parameters at two monitoring points. Two 24-hour composite surface water samples will be collected beneath Hipps Pond during two one-in-five year 24-hour storm events to quantify total suspended solids (sediment mass) and TPH. Annual macroinvertebrate sampling will be performed in all five surface water sampling locations and additional reference locations to evaluate long-term aquatic environmental conditions. Sampling will be performed in August and September during low flow high stress conditions. The monitoring protocol described here will continue for five years. After five years, the monitoring protocol will be evaluated and modified as appropriate based on data collected during that period.

III. FACILITY BACKGROUND

A. Site History: The Facility was formerly owned by the United States Navy and was a part of the Navy's Cheatham Annex complex. Between 1973 and 1980, the VDES leased the Facility from the Navy to store fuels during the expected energy crisis. In 1981, the Commonwealth of Virginia purchased the Facility from the Navy, but shut down its operation in September 1982. The underground storage tanks at the Facility have been known to store various petroleum products including Number 1, 2 and 6 fuel oils, gas oil, Navy special and jet fuels. There is no record that any gasoline was ever stored at the Facility. The Facility was contaminated by oil spills from various surface and subsurface origins during the operation periods. One major spill occurred in 1977 resulting in one quarter million gallons of Number 1 Fuel Oil released to Hipps Pond at Valve Pit 18. A second major spill occurred in 1988 resulting in over 44,000 gallons of Number 6 Fuel Oil released to Hipps Pond at Oil Water Separator 1.

B. Site Description: The 460-acre Facility is located in York County, Virginia, approximately three miles from the City of Williamsburg (Figure 1). The Facility is bordered in the north, east and south by Naval facilities and a national park. Homes and commercial buildings are scattered in low density west of the Facility. The southern portion of the Facility is generally undeveloped forested areas. The northern portion contains 23 two-million-gallon underground storage tanks, several miles of underground fuel lines, 19 valve pits, and several power and fuel handling structures (Figure 2). Five of the 23 storage tanks are steel tanks and the remainder are concrete tanks. The site is characterized by rolling terrain, hardwood and pine-hardwood forests in 70 percent of the land, grasslands in previously cleared areas, and marshes in low-lying areas adjacent to surface water bodies. Two heavily wooded ravines (North and South Ravines) cut across the site and discharge into Hipps Pond. Hipps Pond is a man-made pond covering approximately seven acres. The pond water is retained by a small dam and the water discharges into Hipps Creek through a gated culvert and riser. Hipps Creek enters King Creek (a tributary of York River) at the Facility boundary approximately one-half mile from the dam. The uppermost aquifer is the Cornwallis Cave Aquifer of the Yorktown Formation, which is impacted by the contamination. Groundwater movement in this aquifer generally follows the surface terrain, and all impacted groundwater discharges into surface water within the site boundary. No water supply wells open to the Cornwallis Cave Aquifer were identified within or downgradient of the Facility.

C. <u>Previous Investigations</u>: As early as 1986, the Virginia Department of Waste Management, the Virginia Department of Emergency Services, the University of Virginia, and the Army Corps of Engineers have conducted investigations at the Facility in support of the interim and expected remedial activities. These investigations provide preliminary information regarding the site history, geology, hydrology, and the nature and extent of contamination. Findings in previous investigations are included in the SSCEA report and detailed records are on files with VDES.

IV. SUMMARY OF SITE INVESTIGATION

Pursuant to the Agreement, VDES has conducted a comprehensive investigation to characterize the site hydrogeology and the nature and extent of the contamination. Major investigation activities include: (a) a hydropunch survey at 84 sampling points across the Facility to screen the extent of groundwater contamination; (b) addition of four deep and 26 shallow monitoring wells to 18 existing monitoring wells; together, they provide data to delineate the groundwater contamination plumes; (c) collection of over 100 soil samples to characterize the extent of soil contamination; (d) performance of pump tests at four locations to characterize the hydraulic parameters of the uppermost aquifer; (e) excavation of a test pit to allow inspection of a representative section of the fuel pipeline; and (f) collection of surface water and sediment samples to characterize the extent of surface water and sediment contamination. The findings from these and previous investigations are summarized below:

A. Groundwater Contamination: Groundwater contamination was found in the uppermost aquifer in five discrete areas, each covering between two to four acres in areal extent (Figure 3). Except for trace amounts of free product detected in one monitoring well and one hydropunch sampling point, no free product plume has been identified. None of the deep monitoring wells (installed to 70 feet) revealed contamination, indicating that only the upper part of the uppermost aquifer was impacted. The human health contaminants of concern are: Benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), and arsenic. Maximum concentrations in the five contaminated areas range from 5 to 570 parts per million (ppm) of TPH, 0.144 to 11.1 ppm of total BTEX, 0.044 to 53.4 ppm of PAHs, and 0.05 to 0.125 ppm of arsenic. Relatively low concentrations of BTEX were detected in groundwater, which is characteristic of the heavier fuel oils previously stored at the Facility. Arsenic is not a fuel-related constituent or additive. It is a naturally occurring mineral and is believed to be released from natural sources to groundwater in chemical association with iron[2]. Contaminated groundwater at this site is enriched with iron due to chemically reducing conditions created by natural biodegradation of hydrocarbons. The groundwater plumes discharge into surface water within the site boundary. But as groundwater approaches surface water, the levels of contamination were attenuated to nearly non-detectable levels. No BTEX were detected at the receiving surface water.

B. Surface Water Contamination: Hipps Pond acts as a collection basin of all contaminated surface water, groundwater and sediments. A Virginia Pollution Discharge Elimination System (VPDES) permit was issued to the Facility in October 1991 which designated three monitoring points: pond effluent at the dam outfall, pond influent from Oil Water Separator 1, and pond influent from the North and South Ravines. VPDES permit monitoring parameters include oil-and-grease, BTEX, aquatic toxicity tests, priority pollutant organics, priority pollutant metals and non-priority parameters. VPDES samples passed the permit limits and toxicity tests by a wide margin. Oil-and-

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[2] *The depletion of oxygen by petroleum-degrading bacteria creates a chemically reducing condition that increases the solubility of iron in groundwater. Arsenic is a common trace constituent of sedimentary iron ores. It is possible that arsenic, manganese, and other trace elements are released into solution due to dissolution of iron (ferric hydroxide) under reducing condition. (Proceedings of Petroleum Hydrocarbons and Organic Chemicals in Ground Water, November 1986, p. 249-269. "Iron Dissolution Resulting from Petroleum-Product contamination in Soil and Ground Water," Patrict Longmire.)*

grease of the pond effluent averaged 1.5 milligrams per liter (mg/l) over a three-year period, which is below the VPDES permit limit of 30 mg/l. Water samples were also collected from Hipps Pond and from the North and South Ravines near the fuel seep areas. The results show that surface water is nearly free of contamination. TPH concentrations in surface water ranged from 0.5 to 0.9 mg/l and none of the human health contaminants of concern (BTEX, PAHs and arsenic) were detected. It appears that natural attenuation--dilution, biodegradation, adsorption and volatilization--has effectively removed the contaminants as groundwater enters surface water. Below the fuel seep areas, the sediments in the ravines are stained with brown iron rust. Contaminated groundwater at this site is enriched with iron due to reducing conditions created by natural biodegradation of hydrocarbons. When contaminated groundwater enters surface water, iron is oxidized into brown ferric precipitates.

C. Soil Contamination: Petroleum-contaminated soils are found scattered across the site. Typically, surface and subsurface contaminated soils are found in sludge pits, around structures where oil spills previously occurred, and in all groundwater contamination areas. Not all groundwater beneath contaminated soil is impacted because the soil contaminants at the site contain low levels of soluble constituents. Surface-contaminated soil poses a particular concern because it is a potential exposure pathway to human and animal receptors. Surface-contaminated soils of significant areal extent are found in Sludge Pit 2, in the cosmoline dumps, and in the fuel seep areas by the ravines. TPH levels in shallow-contaminated soil vary substantially from sample to sample, but generally fall within the range of 50 milligrams per kilogram (mg/kg) to 1000 mg/kg. The human health contaminants of concern (PAHs, BTEX and arsenic) were found at levels below EPA's health-based limits (Table 3). Sludge Pit 1, which has been remediated under interim measures, was found to contain buried drums and sludges from previous tank cleaning operations. The buried drums were found to contain non-hazardous residues. Based on limited sampling, Sludge Pit 2 is believed to contain similar contents. Groundwater downgradient of Sludge Pits 1 and 2 was found to be only slightly contaminated, suggesting that the sludge contents are not very mobile in groundwater. A one-acre cosmoline dump was found in the southern portion of the facility, and a second smaller one was found in the pond dike area. Cosmoline is a petroleum grease used by the Navy for corrosion and lubrication purposes. Cosmoline is immobile in groundwater and chemically non-toxic, but it may pose physical risks to small animals. Groundwater beneath the cosmoline dumps has not been found to be impacted.

D. Sediment Contamination: There is widespread petroleum contamination in the pond and ravine sediments (Figure 4). TPH concentrations in sediments range from 60 mg/kg to 4,130 mg/kg with the highest concentrations found in Hipps Pond. The human health contaminants of concern (BTEX, PAHs), however, were found to be at trace or non-detectable levels. It appears that the toxic constituents of petroleum--also more soluble--have been depleted from the sediments. Although the contaminated sediments do not pose human health risks, the aquatic environment noticeably has been impacted across the site (See Section VI). Since the sediments in Hipps Creek downstream of the dam are only slightly contaminated (less than 60 mg/kg TPH), it appears that the pond has effectively contained and acted as a sink for contaminated sediments. However, the dam is in need of maintenance and it lacks an emergency spillway to divert excess water during severe storm events. Thus, there is a potential threat that the dam may fail catastrophically and release contaminated sediments downstream. The proposed remedy calls for a structural upgrade of the dam and installation of a spillway to provide one-in-100-year storm protection.

V. INTERIM MEASURES

VDES has completed several interim measures to expedite removal of the contamination sources. Detailed records of the interim measures are on file at VDES, and a summary is presented below.

A. PCB Transformers and Equipment Removal: In 1989 and 1991, nine transformers containing polychlorinated biphenyls (PCBs), and all PCB-contaminated equipment and materials were removed in accordance with EPA's protocols. Samples collected around the PCB-contaminated equipment confirmed that soil, concrete pads, floors and walls were cleaned up to EPA's standards.

B. Sludge Pit 1 Remediation: Sludge Pit 1, the larger of two sludge pits, was remediated and closed in October 1991. Sludge pit contents (drums, cans, sludge, contaminated soil and water) were removed and transported offsite for disposal. Samples collected from the walls and bottom of the pit confirmed that contaminated soil was removed to below 100 mg/kg TPH concentrations. Groundwater samples collected from Well MW-7 downgradient of the pit showed that TPH, BTEX and PAHs were below detection limits.

C. Drums and Cans Removal: In 1989 and 1992, scattered cans and drums at the Facility were removed for offsite disposal. Residues in these drums and cans were sampled to determine the hazardous nature of the contents. The results showed that these drums and cans contained non-hazardous water, petroleum and petroleum sludges.

D. Tank Cleaning And Pipeline Isolation: In 1993, all 23 two-million-gallon tanks, valve pits, machine rooms, and oil water separator 2 were cleaned. A quarter million gallons of oil, sludges and water residues were removed from the tanks and valve pits for offsite disposal. The interiors of the tanks and valve pits were pressure washed, and the waste water was treated prior to disposal. Additionally, fluid contents from product and steam lines were drained, asbestos insulations from exposed steam lines were removed, and the entire fuel distribution pipeline network was isolated.

VI. SUMMARY OF ECOLOGICAL ASSESSMENT

A. Methodology: Pursuant to the Agreement, VDES conducted an ecological assessment of the site. The assessment methodology includes: (a) a site reconnaissance of a one-mile zone from the site boundary to evaluate existing vegetation communities, common wildlife species and habitat types; (b) surveys of aquatic macroinvertebrate communities onsite and offsite; (c) interviews with local, state and federal natural resources specialists; and (d) review of existing environmental data and literature from state and federal sources. Field activities were performed in 1992 and 1993, and a follow-up macroinvertebrate survey was performed jointly with EPA's ecologists in January 1994 to evaluate offsite tidally-influenced creeks.

B. Findings: Based on site reconnaissance and literature review, no federal or state listed or proposed threatened or endangered species are known to permanently reside within the site boundaries. Except for some deformed herbaceous vegetation found in the ravine wetlands, there is no evidence of stress on terrestrial plants and wildlife caused by the petroleum contamination. The cause of the herbaceous plant deformity is unknown because deformed vegetation was also observed at locations not impacted by petroleum contamination. The onsite aquatic environment (North and South Ravines, Hipps Pond, and the upper reach of Hipps Creek) noticeably has been impacted as evidenced by low macroinvertebrate diversity and abundance. No fish were observed at and upstream of Hipps Pond, but small fish had been observed downstream. There is no evidence of offsite aquatic environmental impact. Macroinvertebrate survey of the offsite tidally-influenced creeks along King Creek did not reveal significant differences of the macroinvertebrate communities above and below Hipps Creek, or at the reference locations.

C. Contaminants of Concern: Iron and TPH are suspected to be the primary contaminants of concern, but other factors (oxygen, food sources, trace levels of certain metals and organics, etc.) cannot be ruled out because the ecological environment can be upset by minute changes of the pre-impact conditions. Iron concentrations in surface water range from 536 to 62,700 parts per billion (ppb) with the highest concentrations found in North

Ravine. The mean concentration (7,332 ppb) exceeds EPA's Water Quality Standard for iron (1,000 ppb) by seven times. TPH concentrations in sediments range from 60 to 4,130 mg/kg with the highest concentrations found in Hipps Pond. TPH concentrations in surface water samples are very low, ranging from 0.5 to 0.9 mg/l at the maximum. Studies have shown that oil can be physically harmful to fish and invertebrates by asphyxiation of benthic life and coating of their gills. Also, TPH is chemically toxic to aquatic life but the toxicity varies with the types of fuel oils. The heavier fuel oils found at the site is far less toxic than lighter fuel oils such as gasoline and kerosene.

D. Conclusions: Based on site reconnaissance, there is no evidence of any terrestrial environmental impact caused by the petroleum contamination. Macroinvertebrate survey of onsite creeks confirmed that the aquatic environment onsite has been impacted; however, the same survey conducted offsite failed to indicate any offsite aquatic environmental impact.

VII. SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

EPA has performed a human health risk assessment to evaluate, on a screening level, the risks posed by the site under current and future exposure scenarios. The screening level assessment represents a conservative approach by assuming the highest reported concentration for each contaminant in each medium in the risk quantification. Since the screening level results show that the Facility poses minimal risks under current exposure scenarios, a more refined assessment is not warranted. This assessment is described in detail in EPA's report "Screening Risk Assessment," dated November 1995. The report is available for review in the Administrative Record.

A. Contaminants Of Concern: The human health contaminants of concern are petroleum constituents (BTEX and PAHs), organic solvents (trace levels of TCE and PCE found in surface water) and arsenic. Arsenic is not a fuel-related constituent and there is no record of any arsenic used, stored or disposed of at the Facility. Petroleum contamination creates a chemically reducing condition that favors the release of arsenic from natural sources to groundwater. The maximum reported concentrations of the contaminants of concern are listed in Table 1.

EPA has not quantified the risk for cosmoline because toxicity data for cosmoline are limited. Cosmoline is a petroleum jelly best known as petrolatum. It is used in cosmetics, as a lubricant, as a corrosion protective coating, and is an approved additive to food as a lubricant, release agent and polishing agent. Based on its usage, cosmoline is unlikely to be chemically toxic, but it may pose hazards to small animals.

B. Exposure Scenarios: Two current exposure scenarios were evaluated: (1) adult exposure to surface water and sediments via inadvertent ingestion and dermal contact. This can only occur to unauthorized trespassers because the facility is currently unoccupied, and has been shut down and secured since 1992; and (2) adult occupational exposure to surface-contaminated soil via inadvertent ingestion, inhalation and direct contact. This can only occur to workers involved in remediation activities.

Two future exposure scenarios were evaluated: (1) adult residential exposures to hypothetical groundwater usage onsite via ingestion, inhalation and direct contact; and (2) juvenile residential exposures to hypothetical groundwater usage onsite via ingestion, inhalation and direct contact. The above scenarios can only occur to hypothetical--but highly improbable--future residents because the proposed remedy calls for deed restrictions to limit future groundwater use and residential development of the contaminated northern portion of the facility. Groundwater contamination is confined within the northern portion of the site boundary.

TABLE 1 - MAXIMUM CONCENTRATIONS

Contaminant of concern	Soil (mg/kg) (<10 ft deep)	Surface Water (ug/l)	Sediment (mg/kg)	Groundwater (ug/l)
Benzene	ND	ND	ND	200
Toluene	ND	ND	ND	2,600
Ethylbenzene	0.83	ND	ND	2,200
Xylene	1.59	ND	ND	6,300
Benz(a)-anthracene	ND	ND	0.35	ND
Benzo(k) fluoranthene	ND	ND	1.19	ND
Naphthalene	38.1	ND	ND	ND
Acenapthene	5	ND	ND	10
Fluorene	7.7	ND	ND	34
Anthracene	ND	ND	0.13	10
Pyrene	0.43	ND	0.4	ND
Trichloro-ethene (TCE)	ND	9	ND	ND
Tetrachloro-ethene (PCE)	ND	5	ND	ND
Arsenic	29	20	26	125

ND-not detected

C. <u>Risk Quantification</u>: Based on standard EPA assumptions[3], risks to human health were quantified. Numerical cancer and non-cancer risks are listed in Tables 2 and 3 by medium. Since the assumptions are conservative, the true risks are likely to be less than the numerical risks indicated, and possibly could be zero.

EPA expresses cancer risk in terms of the likelihood that a person might develop cancer from exposure to contaminants from a site. For example, a risk assessment might say that a receptor has an upper bound excess cancer risk of 1 in 10,000 (also written as 1 times 10^{-4}). This conveys several facts. First, the risk is an upper bound rather than an average estimate. The true risk is likely to be less, and may be zero.

Second, the numerical estimate means that if 10,000 people received this level of exposure averaged over a 70-year lifetime, no more than one would have a probability of developing cancer. Depending on site-specific factors, the EPA's threshold of acceptable cancer risk ranges from 1×10^{-6} to 1×10^{-4}, or from one in one million to one in ten thousand.

EPA expresses non-cancer health risk as a ratio, known as the Hazard Quotient (HQ), which is defined as the calculated exposure from a single contaminant in a single medium divided by a reference dose. The reference dose is the level of exposure that EPA believes will be without adverse effect in human populations, including sensitive individuals. When the exposure equals the reference dose, the HQ is 1.0, which is EPA's threshold of acceptable non-cancer risk. The Hazard Index for a site is calculated by adding the HQs for all contaminants of concern within a medium or across all media to which a person may reasonably be exposed to. Similar to cancer risk estimates, EPA's HQ values are upper bound estimates. Because the reference doses are conservative, HQ values slightly greater than one are unlikely to produce adverse effects.

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[3] *Standard conservative exposure factors were used to quantify human health risks in accordance with: (a)"Risk Assessment Guidance for Superfund" (EPA/540/1-89/002), (b)"Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors" (EPA OSWER Directive 9285.6-03), and (c)"Dermal Exposure Assessment: Principles and Applications" (EPA/600/8-91/011B). Contaminant-specific cancer slope factors or reference doses were obtained from EPA's Integrated Risk Information System data base (1995).*

D. <u>Conclusions</u>: Under current[4] exposure scenarios, a total cancer risk of 2×10^{-6} and a non-cancer Hazard Index of 0.0078 were estimated for trespassers; and a total cancer risk of 4×10^{-5} and a non-cancer Hazard Index of 0.19 were estimated for remediation workers. These risk levels are below EPA's thresholds[5] of acceptable risk. A substantial portion (between 80% to 99%) of the risks is attributable to the presence of arsenic in soil, sediments and surface water. Arsenic, a naturally occurring mineral, is believed to be released from natural sources to groundwater in chemical association with iron. Contaminated groundwater at this site is enriched with iron due to chemically reducing conditions created by natural biodegradation of hydrocarbons. The risks associated with fuel-related constituents (BTEX, PAHs) in soil, sediments and surface water are insignificant, and do not exceed EPA's thresholds[5] of acceptable risk.

Under future[6] exposure scenarios, a total cancer risk of 2×10^{-3} and a non-cancer Hazard Index of 15 were estimated for adults; and a total cancer risk of 1×10^{-3} and non-cancer hazard index of 37 were estimated for children. These risk levels exceed EPA's thresholds of acceptable risk. Similar to the case with current exposure, a substantial portion (between 72% to 95%) of the risks is attributable to the presence of arsenic in groundwater. But unlike the case with current exposure, the risks associated with fuel-related constituents in groundwater are significant, and exceed EPA's thresholds[5] of acceptable risk.

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[4] *Current exposure can only occur to unauthorized trespassers or remediation workers because the facility is currently unoccupied, and has been shut down and secured since 1982.*

[5] *EPA's threshold of acceptable cancer risk is between* 1×10^{-4} *to* 1×10^{-6} *(probability cancer risk of one in ten thousands to one in one million). EPA's threshold of acceptable non-cancer risk is a Hazard Index of less than or equal to one.*

[6] *Future exposure can only occur to hypothetical--but highly improbable--future residents because the proposed remedy calls for deed restrictions to limit future groundwater use and residential development.*

TABLE 2 - CANCER RISKS

	Onsite Soil (< 10 ft deep)	Surface Water	Sediment	Ground-water (Adult	Ground-water (Child)
Benzene	ND	ND	ND	1×10^{-4}	5×10^{-5}
Arsenic	4×10^{-5}	2×10^{-7}	2×10^{-6}	2×10^{-3}	1×10^{-3}
Benzo(k) fluoran-thene	ND	ND	1×10^{-9}	ND	ND
Benz(a) anthracene	ND	ND	3×10^{-9}	ND	ND
TCE	ND	2×10^{-8}	ND	ND	ND
PCE	ND	1×10^{-7}	ND	ND	ND
TOTAL	4×10^{-5}	2×10^{-6}		2×10^{-3}	1×10^{-3}

EPA's threshold of acceptable cancer risk is between 1×10^{-4} to 1×10^{-6}; ND-not detected

TABLE 3 - NON-CANCER HAZARD QUOTIENTS

	Onsite Soil (< 10 ft deep)	Surface Water	Sediment	Ground-water (Adult)	Ground-water (Child)
Toluene	ND	ND	ND	1.3	2.3
Ethyl-benzene	ND	ND	ND	2.3	4.0
Xylene	ND	ND	ND	0.17	2.9
Naphtha-lene	0.0005	ND	ND	0.51	0.91
Acenap-thene	4.1×10^{-5}	ND	ND	0.0064	0.012
Fluorene	9.4×10^{-5}	ND	ND	0.029	0.059
Anthracene	7×10^{-6}	ND	1.7×10^{-8}	0.0008	0.0016
Pyrene	7×10^{-6}	ND	5.2×10^{-7}	ND	ND
Arsenic	0.19	0.0028	0.0034	11	27
TCE	ND	0.0008	ND	ND	ND
PCE	ND	0.0008	ND	ND	ND
TOTAL	0.19	0.0078		15.3	37.2

EPA's threshold of acceptable non-cancer hazard quotients is less than or equal to one; *ND-not detected*

VIII. CORRECTIVE ACTION ALTERNATIVES

A. Description of corrective action alternatives

EPA has evaluated the following corrective action alternatives which are described below:

(1) Alternatives for Groundwater

GW-1 (No action) - The no action alternative maintains conditions as they currently exist. It is included for comparative purposes.

GW-2 (Institutional controls and monitoring) - Under this alternative, institutional controls and long-term monitoring will be implemented. A fence will be erected around the northern portion of the facility to restrict access, and deed restrictions will be implemented to limit future residential land use and groundwater development. These measures do not apply to the southern portion of the facility, which is uncontaminated except for the cosmoline dump. The cosmoline dump will be remediated under this plan. Groundwater within the five contaminated plumes will be sampled over time to monitor the progress of natural attenuation. Twenty-six monitoring wells located downgradient of the sources and oriented along the flow paths to surface water were selected as the points of compliance. Natural attenuation will be evidenced by stable or declining concentrations over time, suggesting that the plume is stable or shrinking. In a stable plume, the source may persist in residually- contaminated soils at the water table, but the natural attenuation rate approximately equals the contaminant mass loading rate to groundwater. In a shrinking plume, the natural attenuation rate exceeds the contaminant mass loading rate to groundwater. Groundwater will be sampled annually for five years, and the data will be evaluated. If the data indicate that natural attenuation is progressing as expected, the monitoring program will be terminated after five years. If the data are inconclusive or suggest an expanding plume, further monitoring will be required. If an expanding plume is confirmed, a contingency plan will be implemented.

GW-3 (Active Remediation) - Contaminated groundwater will be remediated by in-situ methods such as pump-and-treat and in-situ bioremediation. This alternative will require installation of groundwater collection/injection systems and on-site treatment systems at the five contaminated areas. The groundwater collection/injection system may include horizontal wells, vertical wells or interceptor trenches. The onsite treatment systems may include carbon adsorption, oil water separator, iron remover and other pretreatment units.

(2) <u>Alternatives For Surface Water</u>

SW-1 (No Action)- The no action alternative maintains conditions as they currently exist. It is included for comparative purposes.

SW-2 (Institutional controls and monitoring)- Under this alternative, a combination of three institutional control strategies was considered: installing a fence around the contaminated northern portion of the facility, installing signs along the perimeters of Hipps Pond and North and South Ravines to warn against recreational use of surface water, and implementing deed restrictions to restrict future residential use of the northern portion of the Facility. Water samples will be collected at the pond inflows and outflow, at North and South Ravines below the seeps, and at the outlet of Hipps Creek to King Creek to monitor changes in surface water quality and to comply with the VPDES permit requirements.

SW-3 (Active remediation) - This alternative will require installation and operation of surface water pump-and-treat systems to remove the contaminants of concern that impact the aquatic environment. It should be noted that human health contaminants of concern were non-detectable or below EPA's health-based limits. The treatment systems may include iron removal, carbon adsorption and other organic/metal filtration units. The treated water will be returned onsite to surface water.

(3) <u>Alternatives For Soil</u>

S-1 (No Action) - The no action alternative maintains conditions as they currently exist. It is included for comparative purposes.

S-2 (Institutional controls) - Under this alterative, a combination of two institutional control strategies was considered: (a) installing and maintaining a fence around the contaminated northern portion of the facility, and (b) implementing deed restrictions to restrict future residential use of the northern portion of the Facility.

S-3 (Capping) - Under this alternative, capping of surface-contaminated soil to reduce infiltration rate and eliminate direct contact pathways to receptors was evaluated. This alternative will require placing a clay barrier on top of contaminated soil, revegetating topsoil above the clay barrier, and constructing grading/diversion ditches to control surface runoff and erosion. This alternative will require long-term monitoring and maintenance to ensure the integrity of the engineered barriers.

S-4 (Removal for offsite disposal) - Under this alternative, contaminated soil will be excavated, removed and disposed of offsite. This alternative will require transporting contaminated soil to landfills or treatment facilities that accept petroleum-contaminated soil. This alternative is applicable to remediating contaminated soil at relatively shallow depth because it is economically impractical to excavate contaminated soil at great depth. This alternative is also applicable to remediation of the cosmoline dumps and Sludge Pit 2.

S-5 (Removal for onsite treatment) - This alternative will require excavation of contaminated soil prior to treatment onsite by ex-situ methods. Ex-situ methods under consideration include land treatment, bioventing and enhanced bioremediation. Oxygen, moisture or nutrients will be added to contaminated soil piles by tilling or operation of vent/leachate collection and treatment systems. This alternative is limited to remediating soil at a shallow depth because it is economically impractical to excavate soil at great depth.

S-6 (In-situ treatment) - This alternative will require treatment of contaminated soil in place by in-situ methods. In-situ methods under consideration include enhanced bioremediation and bioventing. This alternative will require installation and operation of well/vent systems to treat contaminated soil in place with the addition of oxygen, moisture or nutrients. This alternative is applicable to remediating soils at all depths.

(4) Alternatives For Sediments

SE-1 (No Action) - The no action alternative maintains conditions as they currently exist. It is included for comparative purposes.

SE-2 (Institutional controls and monitoring)- Under this alternative, a combination of three institutional control strategies was considered: installing a fence around the northern portion of the facility, installing warning signs along the perimeters of Hipps Pond and North and South Ravines, and implementing deed restrictions to restrict future use of the site. To monitor the effectiveness of the dam in containing the sediments, samples will be collected at the pond outlet and analyzed for sediment contents following storm events greater than or equal to once in five years.

SE-3 (Dam upgrade) - Under this alternative, the existing dam will be upgraded to withstand 100-year, 24-hour storm events. An emergency spillway will be constructed to divert water from overtopping the dam under severe storm events. The dam itself will be upgraded by clearing trees from the area, removing submarine netting from the banks, filling, compacting and revegetating the banks and surrounding areas. A dam safety inspection program will be implemented to monitor the reliability of the dam in containing the contaminated sediments. In addition to inspections by state personnel on routine site visits, inspection will be conducted by a professional engineer once every five years. The inspection frequency exceeds Virginia State inspection requirement for Class III Impounding Structures.

SE-4 (Active remediation) - Under this alternative, contaminated sediments will be removed from Hipps Pond and the ravines by dredging, pumping or excavation. The removal activities will agitate the sediments and measures will be required to control offsite transport of contaminated sediments. The removed sediments will be dewatered and disposed of offsite, or treated onsite by ex-situ methods similar to those described for Alternative S-5.

(5) <u>Alternatives For Physical Structures</u>

P-1 (No action) - Physical structures of concern include tanks, valve pits, manways and oil water separator 2. These underground structures may pose safety hazard to animals or trespassers due to accidental falling or trapping inside. The no action alternative maintains conditions as they currently exist. It is included for comparative purposes.

P-2 (Demolition) - Under this alternative, the underground structures will be demolished by explosives or by conventional construction equipment. The debris will be buried, piled up onsite or removed offsite. The demolished areas will be restored, stabilized and revegetated.

P-3 (Filling) - Under this alternative, the underground structures will be filled in with sand to eliminate underground openings. The amount of sand needed would be enormous because of the large capacity of the tanks.

P-4 (Physical security) - Under this alternative, the underground structures will be physically secured by locking hasps at all access points. The structures will be inspected periodically to assess the conditions of the security measures.

B. Remediation Standards

The remediation standards of six target contaminants and the maximum concentrations detected at the site are compared in Table 4 by medium. Contaminant concentrations that exceed the remediation standards are shown in bold.

TABLE 4
REMEDIATON STANDARDS

(1)Target Contaminant	(2)Shallow Soil (mg/kg)		(3)Surface Water (ug/l)		(4)Sediment (mg/kg)		(5)Groundwater (ug/l)	
	Max. Conc.	Stan-dard	Max. Conc.	Stan-dard	Max. Conc.	Stan-dard	Max. Conc.	Stan-dard
Benzene	ND	200	ND	53	ND	0.1	**200**	5
Toluene	ND	$4x10^5$	ND	175	ND	0.1	**2,600**	1,000
Ethylbenzene	0.83	$2x10^5$	ND	320	ND	0.01	**2,200**	700
Xylene	1.59	$1X10^6$	ND	74	ND	0.04	6,300	10,000
Naphthalene	38.1	$8X10^4$	ND	62	ND	0.16	ND	20
Arsenic	29	38	20	190	**26**	8.2	**125**	50

The basis of the remediation standards are explained below:

(1) Target Contaminants: The target contaminants are a subset of the contaminants of concern. They are selected on the basis that they represent the most toxic and commonly detected or expected contaminants at the site. Contaminants that were detected in only a limited number of samples and not commonly associated with petroleum contamination are excluded.

(2) Shallow Soil: The standards are based on EPA's Region III Risk-Based Concentration Table for industrial soils (July to September 1995). Shallow soil refers to contaminated soil within 10 feet from the ground surface. Though EPA's definition of shallow soil in exposure assessment refers typically to soil less than 2 feet deep, the lack of shallow soil samples necessitates EPA to use a more conservative assumption of including soil samples less than 10 feet deep.

(3) Surface Water: The standards are based on Virginia and EPA Water Quality Criteria for freshwater chronic effects on aquatic life (1995).

(4) Sediments: The standards are based on EPA Region III Biological Technical Assistance Group screening levels for sediments (1995) or soils if sediment levels are unavailable.

(5) Groundwater: The standards are based on EPA Drinking Water Regulations and Health Advisories limits or Maximum Contaminant Levels (1995).

C. Evaluation Of Proposed Remedy And Alternatives

The EPA Underground Storage Tank (UST) program emphasizes a risk-based decision making approach in corrective action. The UST regulations in 40 CFR Part 280.66(b) and the Agreement in Section III.B.(3) state that "The implementing agency will approve the corrective action plan only after ensuring that implementation of the plan will adequately protect human health, safety, and the environment." Thus, *the stated remediation objective is to ensure adequate protection of human health, safety, and the environment.*

In accordance with 40 CFR §280.66(b), EPA has considered the following factors to evaluate the alternatives: (a) The physical and chemical characteristics of the regulated substance, including its toxicity, persistence, and potential for migration; (b) The hydrogeologic characteristics of the facility and the surrounding area; (c) The proximity, quality, and current and future uses of nearby surface water and groundwater; (d) The potential effects of residual contamination on nearby surface water and ground water; (e) An exposure assessment; and (f) any other information assembled in compliance with this subpart. Other information EPA used to evaluate the alternatives include the technical effectiveness, cost effectiveness, practicality, and implementability factors of the alternatives.

Remediation alternatives were first evaluated for their ability to meet the stated remediation objective. Alternatives that fail to meet the remediation objective were eliminated from further consideration. Alternatives that can meet the remediation objective were further evaluated and compared in light of the evaluation factors described above. Alternatives that *best* meet the remediation objective were selected as the proposed remedy.

Based on that evaluation, EPA has selected a combination of Alternatives GW-2, SW-2, S-2, S-4, S-5, SE-2, SE-3 and P-4 as the proposed remedy. Justification of EPA's selection is provided below on a medium by medium basis:

(1) Proposed Alternative (GW-2) For Groundwater

EPA proposes *Alternative GW-2 (Institutional controls and monitoring)* for groundwater as the best alternative that will meet the remediation objective of adequate protection of human health, safety, and the environment. Five relatively small groundwater contamination plumes were delineated onsite. Hydraulically, all shallow groundwater must enter Hipps Pond before exiting the site. The pond effluent has already met the remediation standards and state NPDES limits. Groundwater data suggest that natural attenuation is in progress, and the plumes appear to be stable or shrinking. Petroleum (BTEX and PAHs) concentrations in the groundwater plumes were found to be naturally attenuated to nearly non-detectable levels at the seepage points to surface water, and completely non-detectable at the receiving water. Therefore, contaminated groundwater is being restored naturally to remediation standards as groundwater approaches surface water. If the present trends continue, contaminated groundwater in the five existing plumes will eventually be attenuated to remediation standards. The proposed "institutional controls and monitoring" alternative is technically effective and cost effective in meeting the remediation objective because: (a) as evidenced by the data trends, natural attenuation is as effective as active remediation in restoring groundwater to remediation standards; (b) monitoring will furnish data to track the progress of natural attenuation and to detect any adverse changes that may occur, and (c) institutional controls will provide safeguard against consumptive use of contaminated groundwater until such time as groundwater is naturally attenuated to remediation standards. Currently, there is no groundwater usage at or downgradient of the site.

EPA rejects Alternative GW-1 (no action) because it fails to meet the remediation objective of adequate protection of human health, safety, and the environment. Without restricting future land use, the "no action" alternative fails to prevent and protect future groundwater use until such time as groundwater is naturally restored to drinking water standards.

EPA rejects Alternative GW-3 (active remediation) because it fails the technical effectiveness and practicality criteria. Active remediation may initially speed up the rate of natural attenuation; however, the overall time to restore groundwater to drinking water standards may not be significantly reduced. Pump tests performed at the site indicate that the impacted aquifer can only sustain low recovery rates. This would limit the effectiveness of any in-situ treatment methods that rely on circulation of fluid in the aquifer. In this respect, there is no evidence that active remediation will be more effective than natural attenuation, but it will cost significantly more. Thus, Alternative GW-3 fails the technical and cost effectiveness criteria. Furthermore, groundwater contamination represents only a small part of total site contamination. Active remediation of groundwater will not significantly improve the overall environmental quality unless active remediation of widespread sediment contamination is pursued simultaneously. As discussed below in Section VIII.B(4), EPA recommends against active remediation of sediments because of the threat of potential adverse remediation effect. Thus, Alternative GW-3 also fails the practicality criterion.

(2) Proposed Alternative (SW-2) For Surface Water

EPA proposes *Alternative SW-2 (institutional controls and monitoring)* for surface water as the best alternative that will meet the remediation objective of adequate protection of human health, safety, and the environment. A perimeter fence will be installed to restrict access and deed restrictions will be implemented to limit future residential development in the northern portion of the Facility. Surface water samples collected at the site indicate that the human health contaminants of concern (BTEX, PAHs and arsenic) were below EPA's acceptable risk thresholds (see Tables 2 and 3). Additionally, VPDES monitoring data indicate that the influents and effluent from Hipps Pond have met VPDES permit limits by a large margin and passed all aquatic bioassay tests. Therefore, the site surface water has already met the remediation standards and no remediaton action is warranted. Although the surface water quality data suggest that the surface water is suitable for unrestricted uses, EPA is concerned with recreational uses of the site surface water. Recreational activities such as swimming and boating would likely agitate the contaminated sediments and transport them offsite, thereby impacting the downstream aquatic organisms. Therefore, EPA proposes the "institutional controls and monitoring" alternative to restrict such uses.

EPA rejects Alternative SW-1 (no action) because it fails to meet the remediation objective of adequate protection of human health, safety, and the environment. The "no action" alternative places no restriction on potential recreational use of the site surface water by trespassers or future residents. Recreational use of surface water can potentially agitate and transport the contaminated sediments offsite. Aquatic environment is sensitive to loading of petroleum-contaminated sediments.

EPA rejects Alternative SW-3 (active remediation) because it fails the technical effectiveness, practicality and implementability criteria. First, active remediation of surface water is not warranted from the risk-based perspective because the site surface water has already met the remediation standards. Second, active remediation of surface water will not be technically effective, practical nor implementable unless active remediation of contaminated sediments is pursued at the same time. As explained below in Section VIII.B.(4), EPA recommends against active remediation of the contaminated sediments because of the threat of potential adverse remediation effect.

(3) <u>Proposed alternatives (S-1, S-4 and S-5) for soil</u>

Cosmoline dump EPA proposes *Alternative S-4 (excavation and offsite disposal)* to remediate the cosmoline dump in the southern portion of the site. Cosmoline is a non-toxic petroleum grease that may pose physical risks to animals by physically trapping them. Removal of the cosmoline dump--the only contaminated area in the southern portion of Facility--allows unrestricted future land use of the area. EPA rejects Alternative S-1 (no action) because it fails to meet the remediation objective of adequate protection of human health, safety, and the environment. The "no action" alternative would leave the cosmoline dump in place which could pose physical hazards to small animals and future residents.

Sludge Pit 2 EPA proposes *Alternatives S-4 (excavation and offsite disposal) and S-5 (excavation and onsite treatment)* to remediate Sludge Pit 2. The choice between offsite disposal or onsite treatment depends on the contents uncovered from Sludge Pit 2. The contents in Sludge Pit 2 have not been fully characterized. Additional characterization of the sludge pit contents will be performed prior to and during excavation. EPA rejects Alternative S-1 (no action) because it fails to meet the remediation objective of adequate protection of human health, safety, and the environment. The "no action" alternative would leave Sludge Pit 2 in place which could pose risk to small animals.

Other surface-contaminated soils EPA proposes *Alternative S-1* (no action) for all other surface-contaminated soils. The amount of surface-contaminated soils remaining in the Facility (excluding Sludge Pit 2 and the cosmoline dumps) is limited and the levels of contamination are below EPA's acceptable risk thresholds (see Tables 2 and 3). EPA rejects Alternatives S-6 (active remediation) and S-3 (capping) on risk-based consideration because the levels of contamination are below EPA's acceptable risk thresholds, and the impact on air and groundwater from surface-contaminated soils is negligible. It appears that natural volatilization, flushing and biodegradation have already depleted all soluble and volatile constituents from surface-contaminated soils.

(4) <u>Proposed alternatives (SE-2 and SE-3) for sediments</u>

EPA proposes *Alternatives SE-2 (Institutional controls and monitoring) and SE-3 (dam upgrade)* as the best alternatives that will meet the remediation objective of adequate protection of human health, safety, and the environment. Recreational and consumptive use of the site surface water will be restricted by deed restrictions and installation of a perimeter fence in the northern portion of the Facility. As part of the monitoring program, storm event samples will be collected at the pond outlet to safeguard against excessive sediments transport offsite. Structural upgrade of the dam to 100-year storm protection and installation of an emergency spillway will safeguard against catastrophic failure of the dam. Additionally, inspection by state personnel on routine site visits and by a professional engineer once every five years will provide further guarantee of the integrity of the dam in permanently containing the contaminated sediments.

EPA rejects Alternative SE-1 (no action) because it fails to meet the remediation objective of adequate protection of human health, safety, and the environment. The "no action" alternative is not acceptable because recreational use of the site surface water can threaten the aquatic environment by agitating and transporting the contaminated sediments downstream. Also, the dam is in need of maintenance and upgrade to safeguard against catastrophic failure. A dam break will release a large quantity of contaminated sediments which can severely impact the downstream aquatic environment.

EPA rejects Alternative SE-4 (active remediation) because it fails to meet the remediation objective of adequate protection of human health, safety, and the environment. Active remediation will require removal of a large volume of sediments by dredging, pumping or excavation prior to treatment onsite or disposal offsite. The removal activities would disturb the clean sediments that have naturally capped the contaminated sediments. The disturbed sediments would migrate offsite through the dam outlet. Although control measures such as stilling basin or silt curtain can be installed to minimize offsite sediment migration, such measures will not be effective in controlling offsite migration of dissolved phase contaminants and extra fine sediments. Discharge of large quantity of fine sediments and dissolved phase contaminants can severely impact the downstream aquatic environment. EPA concludes that it is best to leave the contaminated sediments in place undisturbed and to allow natural capping to continue. EPA recommends against active remediation of the sediments because of the threat of potential adverse remediation effects.

(5) Proposed alternative (P-4) for physical structures

EPA proposes *Alternative P-4 (physical security)* as the best alternative that will meet the remediation objective of adequate protection of human health, safety, and the environment. Currently, the underground structures are partially secured. By installing locks to all underground entrances and performing routine inspection about once a month, the proposed alternative will provide maximum safety protection of animals and trespassers.

EPA rejects Alternative P-1 (no action) because it fails to meet the remediaton objective of adequate protection of human health, safety, and the environment. The "no action" alternative is unacceptable because unsecured structures pose safety hazards to human and animals, as evidenced by dead animals recovered from the underground storage tanks during the tank clean out operation.

EPA rejects Alternatives P-2 (demolition) because it fails the cost effectiveness criterion. The "demolition" alternative is cost prohibitive because of the extensive site work needed to demolish the tanks and restore/stabilize the demolished areas. The proposed "physical security" alternative can achieve the same objective without incurring enormous costs.

EPA rejects Alternative P-3 (filling) because it fails the cost effectiveness criterion. The "filling" alternative is cost prohibitive because of the extensive site work and the enormous amount of sand needed to fill in all 23 two-million-gallon tanks. The proposed "physical security" alternative can achieve the same objective without incurring enormous costs.

IX. ADMINISTRATIVE RECORD

A copy of the Agreement, the SSCEA, the CAP, EPA's Screening Risk Assessment, workplans and pertinent correspondence are available for review at two locations:

Williamsburg Regional Library
515 Scotland Street
Williamsburg, Virginia 23185
Contact: Patsy Hansel
804-220-9216

US EPA Region III
841 Chestnut Building
Philadelphia, PA 19107
Contact: Andrew Fan (3HW90)
215-566-3426

X. PUBLIC PARTICIPATION

EPA is issuing this Statement Of Basis pursuant to the Public Comment And Participation section of the Agreement. EPA will announce the public comment period by issuing a public notice in two local newspapers. After consideration of comments received during the public comment period, EPA will select a final remedy. All comments that are within the scope of this decision and supported by factual grounds will be considered by EPA in making its final decision.

EPA may modify the proposed remedy or select a different alternative based on new information and public comments. Therefore, the public is encouraged to review and comment on the proposed remedy described in the CAP and in this Statement Of Basis. Since an important function of the Statement Of Basis is to solicit public comment on all alternatives, alternatives not evaluated in the CAP may be proposed by the public at this time. The public may participate in the remedy selection process by reviewing the documents contained in the Administrative Record and submitting written comments to EPA during the public comment period. Written comments shall be submitted to EPA's project manager at the following address:

Mr. Andrew Fan (3HW90)
Project Manager
U.S. EPA Region III
841 Chestnut Building
Philadelphia, PA 19107

6/24/96
Date

Thomas C. Voltaggio, Director
Hazardous Waste Management Division