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EPA Superfund
Record of Decision:

Defense General Supply Center
(DLA) OU 4
Chesterfield County, VA
8/31/1999

FINAL
RECORD OF DECISION

FOR

OU 4 - FIRE TRAINING AREA SOURCE AREA
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

PREPARED FOR

DEFENSE LOGISTICS AGENCY

AND THE

U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE

PREPARED BY:

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

CONTRACT No. DACA87-94-D0016
JOB No. 10300-5-3109

JUNE 1999

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FINAL
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FOR
OU 4 – FIRE TRAINING AREA SOURCE AREA
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

Prepared for:

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CONTRACT NO. 87-94-D-0016; D.O.09

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LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DLA	Defense Logistics Agency
DSCR	Defense Supply Center Richmond
FFA	Federal Facility Agreement
FOS	Fuel Oil Storage
FTA	Fire Training Area
ISCP	Installation Spill Contingency Plan
MCL	Maximum Contaminant Level
mg/kg	milligram(s) per kilogram
µg/L	micrograms per liter
msl	mean sea level
NCP	National Contingency Plan
NPL	National Priorities List
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbon
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	remedial investigation
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
semi-volatiles	semi-volatile organic compounds
SF	Slope Factor
SPCC	Spill Prevention Control and Countermeasures
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit
volatiles	volatile organic compounds

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Fire Training Area Source Area - Operable Unit 4
Defense Supply Center Richmond (DSCR)
Richmond, Virginia

1.2 STATEMENT OF BASIS AND PURPOSE

1.2.0.1 This decision document presents a determination that no remedial action is necessary to protect human health and the environment at the Fire Training Area (FTA) Source Area, which has been designated as Operable Unit (OU) 4, at the Defense Supply Center Richmond (DSCR) in Richmond, Virginia. The selected remedial action (in this case, no action) was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA) and, to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This decision is based on the administrative record for this installation. The Commonwealth of Virginia concurs with the selected remedy.

1.3 DESCRIPTION OF THE SELECTED REMEDY

1.3.0.1 This operable unit is the fourth of thirteen operable units that are currently being addressed at DSCR. Operable Unit 4 addresses the contaminated soil at the FTA. The operable units and the portions of the site that they address are as follows:

- OU 1 - Open Storage Area
- OU 2 - Area 50 Source Area
- OU 3 - National Guard Source Area
- OU 4 - Fire Training Area Source Area
- OU 5 - Acid Neutralization Pits Source Area
- OU 6 - Area 50/Open Storage Area/National Guard Area Ground
- OU 7 - Fire Training Area Ground Water
- OU 8 - Acid Neutralization Pits Ground Water
- OU 9 - Interim Action for OU 6
- OU 10 - Building 68

- OU 11-Transitory Shelter 202
- OU 12-Building 112
- OU 13-Polycyclic Aromatic Hydrocarbon (PAH) Area

1.3.0.2 The "No Action Alternative" is the selected remedy for this site. The Remedial Investigation and the Risk Evaluation conducted for OU 4 support this decision. The concentrations of contaminants in the soil at the site do not pose unacceptable risks to ecological receptors or human health. The human receptors which were evaluated included current and potential future on-site receptors at OU 4, including workers, construction workers, recreational users and residents.

1.4 DECLARATION STATEMENT

1.4.0.1 The "No Action Alternative" for the contaminated soil at the Fire Training Source Area is protective of human health and the environment. Therefore, applicable or relevant and appropriate requirements have not been identified. Because this remedy will not leave hazardous substances onsite above health-based levels for residential receptors, the land use for the site will be unlimited and unrestricted. Therefore, the five-year review will not apply to this action.

[signature] 8/13/99

Jan B. Reitman
Staff Director, Environmental and Safety Policy
Defense Logistics Agency

Date

[signature] 8/31/99

Abraham Ferdas
Director, Hazardous Site Cleanup Division
Environmental Protection Agency, Region III

Date

2.0 DECISION SUMMARY

2.1 SITE NAME AND LOCATION

Fire Training Area Source Area - Operable Unit (OU) 4
Defense Supply Center Richmond (DSCR)
Richmond, Chesterfield County, Virginia

2.1.0.1 The DSCR is located in Chesterfield County, Virginia, approximately 11 miles south of the city of Richmond (Figure 2-1). The FTA is located in the southern section of DSCR. The southern boundary of DSCR is formed by Kingsland Creek, which is located approximately 600 feet south of the FTA. Operable Unit 4 consists of the contaminated soil at the FTA. Ground-water contamination at the FTA, which has been designated as OU 7, will be addressed by a separate Record of Decision (ROD).

2.1.0.2 The FTA was formerly used for fire training exercises, where waste chemicals were reportedly dumped in pits, ignited, and then extinguished. The area includes three former, unlined pits known to have been constructed in the FTA that were reportedly used for fire training purposes. Figure 2-2 shows the location of the three burn pits. Fire training exercises were conducted at the site from at least the late 1960s through 1979. Currently, the FTA, and the areas immediately surrounding the FTA, are used for storage of used construction materials, nonhazardous soils, and other miscellaneous, innocuous materials. An unpaved road that passes north and west of the FTA and then follows the northern side of Kingsland Creek is used as a jogging path.

2.1.0.3 The DSCR was originally constructed in 1941 as two separate facilities: the Richmond General Depot and Richmond Holding and Reconsignment Point. In 1962 the installation became designated as the Defense General Supply Center and in 1996, the facility name was changed to DSCR.

2.1.0.4 The Defense Logistics Agency (DLA), an agency of the Department of Defense, provides logistics support to the military services including procurement and supply support, contract administration, and other services. Since 1942, the DSCR's mission has been the managing and furnishing of military general supplies to the Armed Forces and several federal civilian agencies.

Today DSCR manages more than 300,000 general supply items at a facility valued at $100 million and encompassing 565 acres. The DSCR has more than 16 million square feet of covered storage space in 27 large brick warehouses and a million square feet of office space.

2.1.0.5 Land use in the vicinity of DSCR is primarily single family residential, intermixed with retail stores and light industry. The southern boundary of DSCR is formed by Kingsland Creek, which is located approximately 600 feet south of the FTA. The north creek bank is forested leading into a sparsely grassed area just south of the FTA. The area to the south of DSCR has been developed as predominantly single family residential housing. Based on available information, approximately 200 residential dwellings are located downgradient and within a 1-mile radius of the FTA. An additional 240 residences are located north and east of the site within a 1-mile radius. Office buildings and housing units at DSCR are located upgradient of the FTA and are not potentially impacted by the site. The estimated number of people living within 1 mile downgradient of the FTA in 1992 was 603. The total population living within a 1-mile radius of the site in 1992 was approximately 2,000.

2.1.0.6 DSCR received its drinking water from the Chesterfield County Water Supply from 1988 to 1993; since 1993, the water has been obtained from the City of Richmond water system. No water supply wells are located on DSCR's property. The off-base residential areas (primarily south and northeast of the FTA) have been served by the public water supply system since June 1987, but some of the homes also have private ground-water wells. A residential well survey conducted in October 1992 identified 19 ground-water wells located south of the FTA. Of these wells, 10 are used for the household's water supply needs. Four wells are used for outside purposes only (i.e., irrigation). The other five wells are reportedly not used. Of the 14 wells that are used, 4 are screened in the upper aquifer (less than 35 feet deep), and 4 are screened in the lower aquifer (greater than 35 feet deep). The depths are not known for the remaining six wells.

2.1.0.7 There is no surface-water storage or surface-water intake at the FTA. Kingsland Creek forms the southern boundary of the DSCR and ultimately discharges into the James River approximately 2.5 miles downstream of the DSCR. There are no surface-water intakes from the creek prior to its discharge to the James River.

2.1.0.8 The DSCR is located within the modified continental climatic zone, an area characterized by extreme variations in temperature and precipitation during the course of a year. Typically, the area experiences warm summers, relatively mild winters and normally adequate rainfall. The mean annual temperature is between 55 degrees Fahrenheit and 60 degrees Fahrenheit. The average annual precipitation is 44.2 inches. The mean annual pan evaporation rate for the area is between 48 and 64 inches. Precipitation and pan evaporation are generally greatest during July and August. Wind direction in the vicinity of the DSCR is variable most of the time, although the prevailing wind direction is southerly.

2.1.0.9 The land surface at the FTA has been extensively altered by grading and filling operations. The topography slopes gently (1 to 2 percent) towards the creek from the FTA. The maximum difference in the local topographic relief is approximately 15 feet. Elevations range from 100 feet above mean sea level (msl) in the northern portion of the facility to 85 feet above msl near Kingsland Creek.

2.1.0.10 Surface drainage in the FTA area is generally directed to the south, towards Kingsland Creek. A drainage divide about 1,300 feet north of the FTA limits the surface drainage to Kingsland Creek. Drainage ditches north of the FTA collect area run-off and feed into two storm sewer lines. These storm sewer lines transect the FTA, discharging approximately midway between the FTA and Kingsland Creek. One of these storm sewer lines is located beneath Pit 1 (eastern storm sewer line). Locations of the storm sewer lines are shown in Figure 2-2. The storm sewer line that runs adjacent to Pit 3 (western storm sewer line) is not currently functional. A concrete plug is present at the former discharge point, which has resulted in backflow of water into the drainage ditches that feed into the eastern storm sewer line.

2.1.0.11 The eastern storm sewer line is currently functional. The line discharges above ground into a surface drainage ditch that flows through a low wooded area south of the FTA. A culvert allows drainage from this area beneath a roadway to Kingsland Creek. In 1995, a supplemental investigation of the soils at the outlet of the eastern sewer line and the low wooded area was performed to determine whether surface run-off from the FTA collected by the storm sewer system and open drainage features (ditches) may have transported contaminants (PAHs, pesticides, volatiles, and metals) into the wooded area south of the FTA. Based on the data from this investigation, it was concluded that drainage waters were not contributing significantly to contamination in the low wooded area and Kingsland Creek.

2.1.0.12 The unconsolidated soils below the DSCR have been divided into four formations by the U.S. Geological Survey. The Eastover Formation is present immediately below the land surface and consists of up to 25 feet of interlayered beds of sand, silt and clay with occasional gravel. The predominantly gray clay and silt of the Calvert Formation underlies the Eastover throughout the area. The Calvert Formation averages approximately 11 feet in thickness. The Aquia Formation consists of approximately seven feet of gray sand, gravel and clay underlying the Calvert Formation. The Potomac Formation, which underlies the Aquia Formation, extends to the bedrock. The Potomac consists of approximately 40 feet of interbedded sand and gravel with occasional silty and clayey seams. Bedrock in the region consists of the Petersburg Granite. The Petersburg Granite is overlain with saprolite, a clay-rich, weathered component of parent bedrock, which retains the features of the granite.

2.1.0.13 An unconfined aquifer is present in the Eastover Formation. This aquifer is referred to in this report as the upper aquifer to distinguish it from a confined aquifer that exists in the Potomac Formation (the lower aquifer). The upper aquifer would be the first aquifer expected to be impacted by any surface releases of contaminants at the FTA.

2.1.0.14 Parker Pond and Bellwood Elk Preserve are the two areas of environmental significance near the FTA site in the DSCR. Parker Pond, located approximately 600 feet north (upgradient) of the FTA, is a recreational pond with fish and waterfowl, and is stocked with bluegill, largemouth bass, and catfish for recreational fishing. The Bellwood Elk Preserve, located 2,200 feet east of the FTA, is a 20-acre fenced area supporting a herd of 8 to 10 elk. The herd is maintained by DSCR personnel. It is unlikely that these areas would be impacted by the contaminants detected at the FTA due to their distance from the site and geographic location, which would preclude drainage or surface run-off from the FTA reaching these areas.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.0.1 Past industrial operations at the DSCR have included parachute manufacture and repair, mess kit and canteen repair, refrigerator repair, material handling, equipment overhaul, and engine rebuilding. Current industrial operations include the refurbishing of steel combat helmets and compressed gas cylinders using both wet (acid and caustic) and dry (ball blasting) processes, and tent and fabric repair.

2.2.0.2 The DSCR motor pool operations include minor vehicle repairs, fluid changes, and vehicle lubrication. These activities take place at the motor pool facility located in the southern portion of the DSCR. There are several underground gasoline and fuel storage tanks located throughout the installation.

2.2.0.3 Chemical operations at the DSCR have included storing and shipping flammable, toxic, corrosive and oxidizer chemicals for DLA. The majority of the chemicals are stored in warehouses at the DSCR. Chemicals stored at the DSCR have also included pesticides and herbicides for use at DSCR and as part of the chemical stock mission of the DSCR.

2.2.0.4 Operable Unit 4 consists of the source area or soil associated with activities at the FTA. Fire training exercises were conducted at the FTA from the mid 1960s until the late 1970s. The surface area of the site was used for the fire training exercises during which obsolete and unserviceable waste chemicals were burned. Three separate unlined pits are known to have been constructed in the FTA, and were probably used for the fire training exercises. The location of the three burn pits is provided in Figure 2-2. Flammable liquid chemicals and petroleum products were dumped into these pits, ignited, and then extinguished during the training exercises. Petroleum oils, lubricating oils, solvents, pesticides, and herbicides may have been burned at the site.

2.2.0.5 Pit 1, which was in use from approximately the mid 1970s through 1979, was a circular feature, with a diameter of approximately 50 feet and a depth of 3 feet. The pit was filled in with soil in 1983. The western edge of the pit is underlain by a storm sewer that runs north-south through the area and eventually discharges into Kingsland Creek southeast of the FTA (Figure 2-2).

2.2.0.6 Pit 2 was rectangular in shape, approximately 20 feet by 40 feet in dimension, with an unknown depth. The pit is reported to have been filled in with soil when it was replaced by Pit 1 in the early to mid 1970s. The pit was in operation from the late 1960s until its abandonment.

2.2.0.7 Pit 3 was identified in the area during previous investigations, but it is uncertain if it was used for fire training exercises. The pit was rectangular in shape and estimated to be 10 feet by 25 feet in dimension, with an unknown depth.

2.2.0.8 Several sampling and analysis programs have been performed for the soils, ground water, sediments and surface water associated with the FTA during the Remedial Investigation (RI) to evaluate the nature, magnitude and extent of contamination and evaluate the risks posed to human health and the environment by site-related contamination..

2.2.0.9 The primary contaminants detected in the soils at the FTA are polycyclic aromatic hydrocarbons (PAHs). Other contaminants detected in the FTA soil include pesticides, metals, and volatile organic compounds (volatiles). The presence of these compounds is related to the materials used during the fire training exercises.

2.2.0.10 Elevated concentrations of PAHs were detected in soil samples collected between the FTA and Kingsland Creek. This area of contamination is suspected to be related to a release of No. 4 fuel oil from a 300,000 gallon aboveground fuel oil storage (FOS) tank formerly located west of Pit 3. The tank was surrounded by an earthen containment berm that overlies the former location of Pit 3. In November 1978, a spill reportedly occurred from the tank, with an estimated 10,600 gallons of fuel oil released to the bermed area as a result of a cracked valve. Heavy rain at the time of the spill caused the oil to flow into the western line of the storm sewer system that traverses the FTA and eventually discharge in to a low-lying area south of the FTA now designated by DSCR as the Polycyclic Aromatic Hydrocarbon Area (PAH Area) (OU 13). The contamination associated with this spill is being addressed under OU 13.

2.2.0.11 Contamination of both the upper and lower aquifers is indicated at the FTA site. The primary contaminants in ground water are chlorinated volatiles, with petroleum-related contaminants (benzene, toluene, ethylbenzene and xylenes [BTEX]), metals, and semivolatile organic compounds (semi-volatiles) also detected in some wells. The contaminated ground water associated with the FTA is being addressed under OU 7.

2.2.0.12 Less than 20 micrograms per liter (μg/L) of chlorinated and aromatic volatiles were detected in the surface waters of Kingsland Creek. These contaminants are suspected to result from discharge of contaminated ground water into the creek.

2.2.0.13 The DSCR has implemented a Spill Prevention Control and Countermeasure Plan (SPCC) and an Installation Spill Contingency Plan (ISCP) to aid in the prevention, control, and remediation of spills at the DSCR. The SPCC plan identifies procedures and actions that are to be followed to prevent spills and/or control spills once they occur. The ISCP presents guidelines for spill response, including cleanup and disposal of chemicals and contaminated soils.

2.2.0.14 In 1984, the DSCR was recommended for placement on the CERCLA National Priorities List (NPL) and was promulgated to the NPL in 1987. This action resulted from a Hazard Ranking System scoring performed for the DSCR that was based on the conclusions of previous studies conducted at the facility by the U.S. Army Environmental Hygiene Agency. In August 1986, the United States Environmental Protection Agency (USEPA) issued a Corrective Action Permit to DSCR pursuant to the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq. As part of the RCRA activities conducted at DSCR, three RI documents were issued pertaining to sites investigated at DSCR from 1989 through 1995. In 1990, the DLA, DSCR, USEPA, and the Commonwealth of Virginia entered into a CERCLA Federal Facility Agreement (FFA) pursuant to Section 120 of CERCLA, 42 U.S.C. § 9620, which guides remediation activities. Since 1990, DSCR has been completing the RIs, and preparing feasibility studies for the 13 named operable units. The RI for OU 4 was completed in December 1996. Additional environmental investigations have been conducted at DSCR since 1990 pursuant to the FFA. RODs have been issued for OU 1, OU 3, OU 5 and OU 9. Feasibility Studies are currently being completed for OU 2, OU 6, OU 7, OU 8, OU 10, OU 11, OU 12, and OU 13.

2.3 SUMMARY OF COMMUNITY PARTICIPATION

2.3.0.1 On 23 February 1984, the DSCR organized an Interagency Task Force comprised of state regulatory agencies, USEPA, county agencies, Virginia National Guard, Rayon Park Representatives, and DSCR personnel. The purpose of this group was to ensure that actions carried out at the site were done with input and review from affected parties.

2.3.0.2 DSCR prepared a community relations plan in 1992. In 1994, the base held a public information session to provide additional information to the public. DSCR also sends out information to a predetermined mailing list on a regular basis. The community relations effort meets the requirements of CERCLA Section 117(a), as amended by SARA (1986).

2.3.0.3 The proposed plan and ROD for OU 4 were made available to the public on February 21, 1999. The proposed plan was made available to the public in the administrative record maintained at the central branch of the Chesterfield Public Library in Chesterfield, Virginia. The notice of availability for this document was published in the Richmond Times Dispatch, on February 21, 1999. The public comment period was held through April 7, 1999. In addition, a public meeting was held on March 17, 1999. At this meeting, representatives from USEPA, the Commonwealth of Virginia, and DSCR answered questions concerning the remedial alternatives evaluated for this site. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD. This decision document presents the selected remedial alternative for OU 4, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the NCP. The decision for OU 4 is based on the administrative record.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

2.4.0.1 The work at the DSCR has been organized into 13 operable units:

- OU 1 - Open Storage Area
- OU 2 - Area 50 Source Area
- OU 3 - National Guard Area Source Area
- OU 4 - Fire Training Source Area
- OU 5 - Acid Neutralization Pits Source Area
- OU 6 - Area 50/Open Storage Area/National Guard Area Ground Water
- OU 7 - Fire Training Area Ground Water
- OU 8 - Acid Neutralization Pits Ground Water
- OU 9 - Interim Action for OU 6
- OU 10 - Building 68
- OU 11 - Transitory Shelter 202
- OU 12 - Building 112
- OU 13 - PAH Area

2.4.0.2 The scope of this action addresses the fourth operable unit (OU 4) at DSCR, the source area (contaminated soil) at the Fire Training Area. Contaminated ground water at the FTA is being addressed under OU 7. The contaminated soils located south and southeast of the FTA were originally included under OU 4. However, the source of PAH contamination in the soils is not associated with activities at the FTA and this area, therefore, was identified as a separate operable unit (OU 13).

2.5 SUMMARY OF SITE CHARACTERISTICS

2.5.0.1 Site investigations at the FTA were initiated in 1982 with the installation of four ground-water monitoring wells. Several phases of soil sampling have been performed at the FTA. Soil samples were first obtained during the RI from 1982 to 1989 (Figure 2-3). Additional soil samples were collected in 1992 and 1993 (Figure 2-4). Soil samples were obtained from the aboveground fuel oil storage area, the PAH Area, and an area south of Kingsland Creek in 1992 (Figure 2-5). Additional soil and ground-water samples were collected in the FTA and PAH Area and sediment samples were collected from Kingsland Creek in September 1995 to supplement the RI for the FTA (Figure 2-6). More recently, additional soil samples were collected during installation of the monitoring wells for a dual-phase extraction pilot test performed adjacent to the FOS Area in 1997 as part of the feasibility study process for OU 7.

2.5.0.2 This ROD addresses the chemicals detected in surface and subsurface soil samples collected at depths of 1 to 10 feet below grade at the FTA. A summary of the sampling results of the chemical analysis of these soil samples is presented in Table 2-1. The background concentrations presented in Table 2-1 are based on the upper limits established during the Background Characterization Study performed at DSCR in 1997. Following discussions with the USEPA, the background value for arsenic was revised to include additional data. The revised background value for arsenic (84 milligrams per kilogram [mg/kg]) was presented and discussed during a meeting at USEPA's office on January 26, 1998. Documentation of the revised background value for arsenic is provided in the minutes for the meeting, which were transmitted via a letter from Law Engineering and Environmental Services, Inc. dated March 10, 1998. The background data set for arsenic appears to be acceptable for data comparison purposes. Based on a 2-sided Student's T-test at the 5 percent significance level, the OU 4 arsenic data do not appear to be significantly different from background.

2.5.0.3 The results of soil sampling at the FTA site indicate that metals, volatiles, semi-volatiles, and pesticide contamination exist in the soil within and between the former fire training pits. The highest contaminant concentrations are apparently restricted to the soils within the extent of the former pits, and in an area between Pits 1 and 2 (Figure 2-7). Of the 22 metals detected in soils from all 3 pits, 13 were detected at concentrations less than background concentrations established for the DSCR (Table 2-1). Metals that exceeded background concentrations include beryllium, cadmium, copper, manganese, mercury, nickel, potassium, selenium, and zinc. The majority of these exceedances are not considered high relative to the natural variation expected in background concentrations. In addition, the historical practices at the FTA do not suggest that there is any relationship between the metal detections and the former activities that took place in the three pits.

2.5.0.4 Twenty-seven semi-volatile organic compounds, mostly PAHs, were detected in soils of the FTA (Table 2-1). The PAHs detected occurred at levels above background levels established for the DSCR. Background values were not established for most of the other semi-volatiles. Of the detected semi-volatiles without associated background criteria, none exceeded available USEPA Region III Residential Risk-Based Concentrations. Five PAHs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, are carcinogenic in nature. The PAHs were detected at all three former fire training pits and the surrounding areas, but were limited primarily to surface soils. Chlorinated benzenes were detected at Pit 3.

2.5.0.5 Thirteen volatiles were detected in soils of the FTA. The highest concentrations of chlorinated volatiles (e.g., trichloroethene at 76 mg/kg) were detected in surface soils of Pit 1, although low levels (e.g., 0.001 mg/kg) were detected in soils throughout the site. Background concentrations are not available for volatiles because volatiles are not naturally present in the environment and past use of the site (prior to presence of DSCR) does not indicate an anthropogenic source for volatiles.

2.5.0.6 Eight pesticides and the polychlorinated biphenyl (PCB)-1260 were detected in soils at the FTA. The concentrations of 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; and dieldrin were greater than background values established for DSCR. The highest concentration of a pesticide (3.3 mg/kg of 4,4-DDD) was detected in the 1-foot below ground surface (bgs) sample from SSFTA-12 near Pit 1. PCB-1260 was detected in two out of 30 samples, both times at concentrations below the USEPA Region III Residential Risk-Based Concentrations for soil. Petroleum hydrocarbons were also detected in soils at the FTA, and diesel was detected at the former aboveground fuel oil storage tank location.

2.5.0.7 Volatiles, PAHs and pesticides were detected during the RI in the PAH Area (OU 13), which lies south of OU 4 between the FTA and Kingsland Creek. The presence of volatiles and PAHs in the soils located south and southeast of the FTA, in the vicinity of Kingsland Creek, is associated with the aboveground storage tank fuel oil spill that occurred in 1978 and has lead to the designation of OU 13 (the PAH Area) and further investigation. The presence of pesticides may be the result of surface run-off in the FTA. Remedial actions to be taken to address the contaminated soils at OU 13 and ground water at OU 7 will be addressed under separate RODs.

2.5.0.8 In September 1995, sampling of shallow soils (0 to 6-inch depth) was performed to evaluate the storm sewer system and drainage pathways at the FTA. Figure 2-6 notes the locations sampled. The objective of the sampling was to determine if surface run-off from the FTA through the sewer system and open drainage features (ditches) may have transported contaminants (PAHs, pesticides, volatiles, and metals) into the wooded area south of the FTA. This investigation focused upon the eastern storm sewer line and the length of a drainage ditch south of the FTA in a wooded area into which this line discharges. In addition, samples were collected from a drainage input location on the north side of a set of railroad tracks, and a ditch into which drainage occurs from beneath the railroad tracks. Volatiles are not indicated to be present at significant concentrations (1.2 J µg/kg to 23 J µg/kg) in the drainage pathways. Beryllium (0.68 mg/kg), arsenic (180 mg/kg), and three PAHs (benzo[a]anthracene – 2,200 J µg/kg, benzo[a]pyrene – 2,600 J µg/kg, and benzo[b]fluoranthene – 3,300 J µg/kg) were detected at concentrations that exceeded the USEPA Region III RBCs for residential exposure. The sediment collected in the drainage pathways will be addressed as part of OU 13 and are not further discussed in this ROD.

2.5.0.9 Surface-water samples collected from Kingsland Creek during various investigations indicate that low levels of chlorinated volatiles (1.1 µg/L to 4.4 µg/L) and BTEX (1.1 µg/L to 15 µg/L) compounds may have been introduced to Kingsland Creek. The FTA is a likely source of the volatiles and BTEX contamination observed in surface waters of Kingsland Creek. Migration of the contaminants from the site may be the result of surface run-off and/or discharge of ground water into the creek. Two storm sewer lines which run directly north to south through the FTA may also be acting as conduits along which contaminated ground water could be directed towards the creek. No volatiles or BTEX compounds were detected in the sediments of Kingsland Creek. The concentrations of metals in both the surface waters and sediments of Kingsland Creek, were similar in samples collected upstream and downstream of the FTA, and are not considered a consequence of site contamination. Sediment/surface-water toxicity tests conducted on samples from Kingsland

Creek show relatively small or no impacts for acute toxicity and growth rates in comparison to the control station on Kingsland Creek. Furthermore, a benthic macroinvertebrate survey was also performed along Kingsland Creek, with results indicating no significant impacts to either species diversity or abundance.

2.5.0.10 Semi-volatiles were detected in both the upper and lower aquifers at low concentrations (4.3 µg/L to 27 µg/L). Several metals were detected at elevated concentrations but could not be related to any known site activities. The elevated concentrations of some of these metals (i.e., arsenic, chromium, and iron) were considered the result of naturally occurring levels of metals in the soils. Chlorinated volatiles, primarily tetrachloroethene and trichloroethene, were detected in both the upper and lower aquifers at concentrations which exceed federal Maximum Containment Levels (MCLs) by several orders of magnitude. The ground-water contamination present beneath and downgradient from the FTA is being addressed under OU 7, the ground-water operable unit.

2.6 SUMMARY OF SITE RISKS

2.6.0.1 The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as the baseline indicating what risks could exist if no action were taken at the site. This section of the ROD reports the results of the baseline risk assessment conducted for this site.

2.6.0.2 A baseline risk assessment has been conducted for the FTA as documented in the RI Report and revised in the RI Report Addendum for the FTA (RI Addendum) and in the updated risk assessment calculations for OU 4 of September 28, 1998 (updated risk assessment calculations). The baseline risk assessment was updated in 1998 in order to re-evaluate the site-related risks based on new background concentrations developed for DSCR, updated toxicity values, and risk assessment procedures and guidance that have changed since the RI Addendum was prepared. The objective of a baseline risk assessment is to provide the framework for developing risk information necessary to assist in the risk management decision-making process at investigation sites. The baseline risk assessment evaluates the potential health impact of the contaminants detected in soil, ground water, surface water, and sediments on the exposed and potentially exposed populations if no action is taken to remedy conditions at the site. This summary of site risks, based on the updated risk assessment calculations, includes only the results pertinent to OU 4 (i.e., soil at the FTA).

2.6.1 Contaminants of Potential Concern

Table 2-1 presents a summary of information about contaminants of potential concern in soils at the FTA. Note that the number of contaminants of concern shown in this table is reduced from the total number of contaminants encountered at the FTA. This reduction is performed by considering the toxicity and frequency of occurrence of each contaminant and results in a focused list of contaminants of concern to be addressed further.

2.6.1.2 Arsenic and iron were not selected as contaminants of potential concern because the maximum detected concentrations of 81 mg/kg and 27,400 mg/kg, respectively, were slightly less than their respective upper tolerance limit (UTL). It is important to note that the background concentrations for arsenic and iron are elevated at DSCR. Exposure to the background concentrations of arsenic and iron may result in unacceptable risk levels.

2.6.2 Exposure Assessment

2.6.2.1 A complete exposure pathway consists of a source, a release mechanism, an environmental transport route leading to an exposure point, a receptor, and an exposure route. There are four potential exposure scenarios at the site. These are exposure to ground water, soils (including airborne particulates), surface water, and sediments under present site conditions or under anticipated future site use.

2.6.2.2 Under current conditions, the most likely exposure to soil at the FTA is for current on-site workers. Potential exposure routes are dermal contact with contaminants in the soil, incidental ingestion of soil through hand to mouth contact, and inhalation of contaminated dust particles or volatile contaminants. Recreational joggers using the path near the FTA also have the potential for exposure through inhalation of airborne dust. Access to DSCR is restricted, therefore, joggers are comprised of DSCR employees.

2.6.2.3 In the future, exposure to subsurface soils is possible if remediation and/or building occurs on site which results in disturbing subsurface soils. Potential future receptors include construction workers, on-site workers, recreational joggers, and if the land use at the FTA changes, residents. Future workers and residents may have contact with potentially contaminated surface and subsurface soils through incidental ingestion of soils through hand to mouth contact, inhalation of airborne dust particles, inhalation of volatiles, and dermal contact.

2.6.2.4 Currently, there is no potable water supplied on DSCR utilizing ground water (upper or lower aquifers). Potable water for DSCR is received through the city of Richmond water supply. Therefore, on-site exposure to ground water is not expected. Off-site residents have the potential to come into contact with potentially contaminated ground water through the use of private water wells for drinking water and other uses (bathing, irrigation of gardens or nurseries, etc.). Ground-water issues are being addressed under OU 7.

2.6.2.5 Potential exposure pathways may include off-site contact with stream sediments and surface water in Kingsland Creek. The FTA is actually separated from the creek by a chain link fence, and therefore worker contact is not anticipated. Kingsland Creek is a small stream, and use of the surface water as a potable water source by off-site residents is not expected. However, use of the surface water by a local nursery for irrigation water may occur. In addition, wading by children and adults is a possible scenario for residential exposure to Kingsland Creek sediments and/or surface water (even though the area around the creek is wooded). Exposure to surface water and sediments during wading is anticipated to be limited to dermal contact. Kingsland Creek is not large enough to support a viable recreational fishery.

2.6.2.6 Future exposures are anticipated to remain similar to current potential exposures, as DSCR property use is not likely to change in the foreseeable future. Although residential exposures are unlikely at the FTA, future residential exposures (adult and child) were included in the baseline risk assessment. Future land use in the areas adjacent to the base is expected to remain residential.

2.6.3 Toxicity Assessment

2.6.3.1 The toxicity assessment is an integral part of the risk evaluation process. Quantitative reference values describing the toxicity of the contaminants of concern are evaluated. Toxicity values such as the Reference Dose (RfD) and the Slope Factor (SF) are based primarily on human and animal studies with supportive evidence from pharmacokinetics, mutagenicity, and chemical structure studies.

2.6.3.2 Slope Factors have been developed by the USEPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminant(s) of concern. These excess lifetime cancer risks are those related to the site and not those associated with everyday exposures. The SFs, which are expressed in units of (milligram per kilogram per day)$^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in milligram per kilogram per day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope Factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

2.6.3.3 Reference doses have been developed by the USEPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. The RfDs, which are expressed in units of milligram per kilogram day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals that are not expected to be associated with adverse effects. Estimated intakes of contaminant(s) of concern from environmental media (e.g., the amount of a contaminant of concern ingested from contaminated soil) can be compared to the RfD. The RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

2.6.3.4 The toxicity values used for the risk assessment were obtained from the USEPA's Integrated Risk Information System (IRIS) data base. If toxicity values were not available from IRIS, they were obtained from the Health Effects Assessment Summary Tables (HEAST). When values were not available in IRIS or HEAST, values from the National Center for Environmental Assessment were used. The toxicity assessment is then used in conjunction with the exposure assessment to yield the risk characterization for the site.

2.6.4 Risk Characterization

2.6.4.1 Risks from potential carcinogens are estimated as probabilities of cancer as a result of exposure to chemicals from the site. The risks from each pathway (dermal contact, inhalation and ingestion) can be summed to estimate the combined (cumulative) risk for the receptor. A summary of the cancer risk estimates for both the current and future receptors is provided in Table 2-2. These risk estimates are compared to the USEPA's Target Risk Range of 10^{-6} to 10^{-4} to evaluate the need for remedial action. If risk levels are above the USEPA's Target Risk Range remedial action is generally required. If risk levels are below or within the USEPA's target Risk Range remedial action is typically not required. The total soil pathway cancer risk for the current occupational workers was calculated to be 2×10^{-5}, which is within the USEPA's Target Risk Range. For future occupational workers (and construction workers), the total soil pathway cancer risks were calculated to be 9×10^{-6} and 4×10^{-7}, respectively, which are within or below the USEPA's Target Risk Range. The estimated inhalation of fugitive dust cancer risk for current and future recreational joggers was 1×10^{-10}, which is below the USEPA's Target Risk Range. The combined risk for future residential exposure to soil at the FTA was estimated to be 5×10^{-5}, which is also within the USEPA's Target Risk Range. The combined risk for the recreational wader exposed to surface water and sediment was estimated to be 2×10^{-6}, which is within the USEPA's Target Risk Range. This information was originally presented in the Remedial Investigation and the Feasibility Study and revised in the updated risk assessment calculations.

2.6.4.2 Noncarcinogenic effects are characterized by comparing the estimated chemical intakes to the appropriate RfD value. The ratio of the chronic RfD to the chronic daily intake for a specific chemical is termed the hazard quotient. The sum of the individual chemical hazard quotients is the hazard index for that pathway. A hazard quotient greater than 1 indicates that the threshold for response for a specific chemical has been exceeded, a hazard index greater than 1 that the cumulative hazard for a given exposure pathway has been exceeded. A summary of the noncarcinogenic risk estimates for both current and future exposures to soil at the FTA is provided in Table 2-3. The hazard indices for current occupational workers, future occupational workers, future construction workers, and recreational joggers were all below the threshold value of 1 with values of 0.03, 0.02, 0.4, and 0.002, respectively. The hazard indices for future residential adults and children were also below the threshold value of 1, with values of 0.06 and 0.3, respectively. The hazard indices for recreational waders (adult and children) were below the threshold value of 1, with values of 0.007 and 0.06, respectively. This information was originally presented in the Remedial Investigation and the Feasibility Study and revised in the updated risk assessment calculations.

2.6.5 Ecological Risk Characterization

2.6.5.1 Ecological risks posed by the site to the environment were considered low. The terrestrial landscape of the site is highly industrialized, and offers little to no available habitat for terrestrial wildlife receptors. Terrestrial wildlife are not likely to find suitable forage or nesting habitat at this site. Terrestrial wildlife habitat is present along Kingsland Creek. The primary exposure pathways considered were exposure to soils, and Kingsland Creek surface waters and sediments. Burrowing species have the potential to be exposed to soils via incidental ingestion, inhalation of fugitive dust, and dermal contact. Nonburrowing species may have exposure to soils primarily via dermal contact and, to a lesser extent, inhalation and ingestion. Species utilizing the riparian habitat and Kingsland Creek have the potential to be exposed to surface water and sediments during normal foraging activities. Aquatic organisms living in the creek also have the potential for exposure to surface water and sediments. However, surface-water and sediment toxicity testing in Kingsland Creek did not indicate impact to the stream, and the benthic macroinvertebrates evaluated also indicated no significant impact to species diversity or abundance. No critical habitats or endangered species were identified that would be affected. Considering the limited impact to the creek and the limited contamination at the site, it was concluded that the site does not pose a significant ecological risk. It should also be noted that Parker Pond and the Bellwood Elk Preserve are not expected to be impacted by the FTA due to their geographic location and distance from the site.

2.7 DESCRIPTION OF THE "NO ACTION" ALTERNATIVE

2.7.0.1 Based on the results of the Revised Risk Assessment, no further action is recommended for OU 4. Based on the concentrations of analytes detected in the soil samples collected from the FTA and the risk posed to current and future on-site workers, future construction workers, and future residents, no further action is deemed necessary. It is important to note that this action is based on exposure scenarios considering direct contact with the soil. The FTA soil may require action under OU 7 to address the potential for migration of contaminants to ground water.

2.7.0.2 No significant changes in site conditions have occurred since the issuance of the Final RI Report. The "no action" alternative will consist of leaving the site intact. No additional sampling or monitoring will be necessary because no future potential threats to human health or the environment exist based on the current low levels of residual contamination, and the acceptable levels of risk to both human health and the environment. This remedial alternative will have no associated cost.

3.0 RESPONSIVENESS SUMMARY

3.0.0.1 The purpose of this responsiveness summary is to provide the public with a summary of citizen comments, concerns, and questions relating to the area of concern at the Defense Supply Center Richmond (DSCR) in Chesterfield County, Virginia. The area of concern specifically addressed by this responsiveness summary is:

- Operable Unit 4 (OU 4) – Fire Training Area Source Area

The responsiveness summary details the Defense Logistics Agency's (DLA) responses to these comments, concerns, and questions.

During the public comment period from February 21, 1999, through April 7, 1999, no comments or phone calls were received by DSCR concerning this operable unit. A public notice was published in the Richmond Times Dispatch, a newspaper of general circulation in the area, on February 21, 1999. In addition, a public meeting was held on March 17, 1999, at the DSCR Building 33. At this meeting, DSCR representatives presented slides outlining the proposed plan for OU 4 and the public was given an opportunity to comment on and ask questions concerning the plans.

3.0.0.2 The summary is divided into the following sections:

I. Letter and newspaper notice announcing date of the public comment period and location and time of the public meeting.

II. Copy of the certified minutes from the public meeting.

A copy of the Agency for Toxic Substances and Disease Registry's Public Health Assessment for DSCR was provided to Mr. and Mrs. Patton as requested at the public meeting. No public comments on the proposed plan were received. Thus, the decision to select "no further action" as the site remedy is unaffected.

DEFENSE LOGISTICS AGENCY
DEFENSE SUPPLY CENTER RICHMOND
8000 JEFFERSON DAVIS HIGHWAY
RICHMOND, VIRGINIA 23297-5100

MAR 0 4 1999

IN REPLY
REFER TO DSCR-WEP

Dear Neighbor,

I want to take this opportunity to bring you up-to-date on the progress of the Installation Restoration Program at the Defense Supply Center Richmond (DSCR). Although there were no public hearings during 1998, significant progress was made.

In September 1996, a major system located in the central portion of DSCR was implemented to clean up the ground water. Through the end of December 1998, 21,900,000 gallons of water were treated. In addition to cleaning the ground water, the system continues to "pull back" the contaminated ground water for treatment from Bellwood Properties. This successful operation is evidenced by the 96 percent reduction from contaminate levels found prior to starting up the system and a 9 percent reduction from the end of 1997.

Although the contaminates are still at detectable limits, none exceeded the safe drinking water standards published by the Environmental Protection Agency (EPA). The well, which was originally farthest away from DSCR's fence line until the installation of another well closer to Park Lee apartments in 1997, was 75 percent lower in contaminates in 1998 than in 1997. The ground water is also in compliance with the safe drinking water standards. Although the system has been successful in cleaning up a large quantity of water, the system currently being utilized is slow and could take up to twenty years to complete the clean up. New methods of ground water remediation are continually being developed and we are investigating methods to enhance the existing system which will in turn reduce the amount of time required to complete clean up.

In July 1998, we completed a one-year pilot study of ground water clean up which treats the ground water and the soils where contaminates are held after the ground water level is lowered due to pumping. This new technology was extremely successful and the estimated time to remediate the site was reduced by 75 percent. After evaluating the test results, we decided to continue operation of the system. Using this technology, we hope to enhance the aforementioned system. We are also pleased that EPA has reviewed our findings and plans to publish a paper utilizing a summary of our report as a case study. The paper will share our experiences and lessons learned with other people.

In December 1998, we started another pilot test utilizing developing technology to remove contaminates from the ground water without extracting the water from the aquifer. Results of this test are not yet available; however, we are optimistic that this technology will provide us with another option to clean up the ground water.

We have scheduled a public hearing on March 17, 1999 at 7:00 P.M. in the DSCR Center Theater in building 33-K Section. Building 33 is the first long building on the right after you enter DSCR's main gate. A map detailing the location is attached. The subject of this public hearing is the presentation of the proposed plan for the former fire training pit soils. The proposed plan presents a determination that no further remedial action is required. A copy of the proposal along with supporting documentation is located at the main Chesterfield county library located on Lori Road. To assist you in your review, we have attached a list of all documents directly relating to this proposed plan. We have also attached a copy of the public notice that was published in Richmond Times Dispatch on Sunday, February 21, 1999. The public comment period starts the day of publication and closes on April 7, 1999. We look forward to seeing you on March 17, 1999.

This should be a productive year in the Restoration Program at DSCR. In addition to presenting the proposed plan on March 17, 1999, we anticipate having another public meeting later this year to present four additional proposed plans. We anticipate presenting proposed plans for the area 50 landfill soils, building 68 soils, transitory shelter 202 soils, and the acid neutralization pit ground water.

The EPA maintains a web site for DSCR that contains information concerning the status of the site. The information can be accessed at **http://www.epa.gov/reg3hwmd/super/dgsc/fs.htm**. EPA also maintains a general web site at **http://www.epa.gov/**.

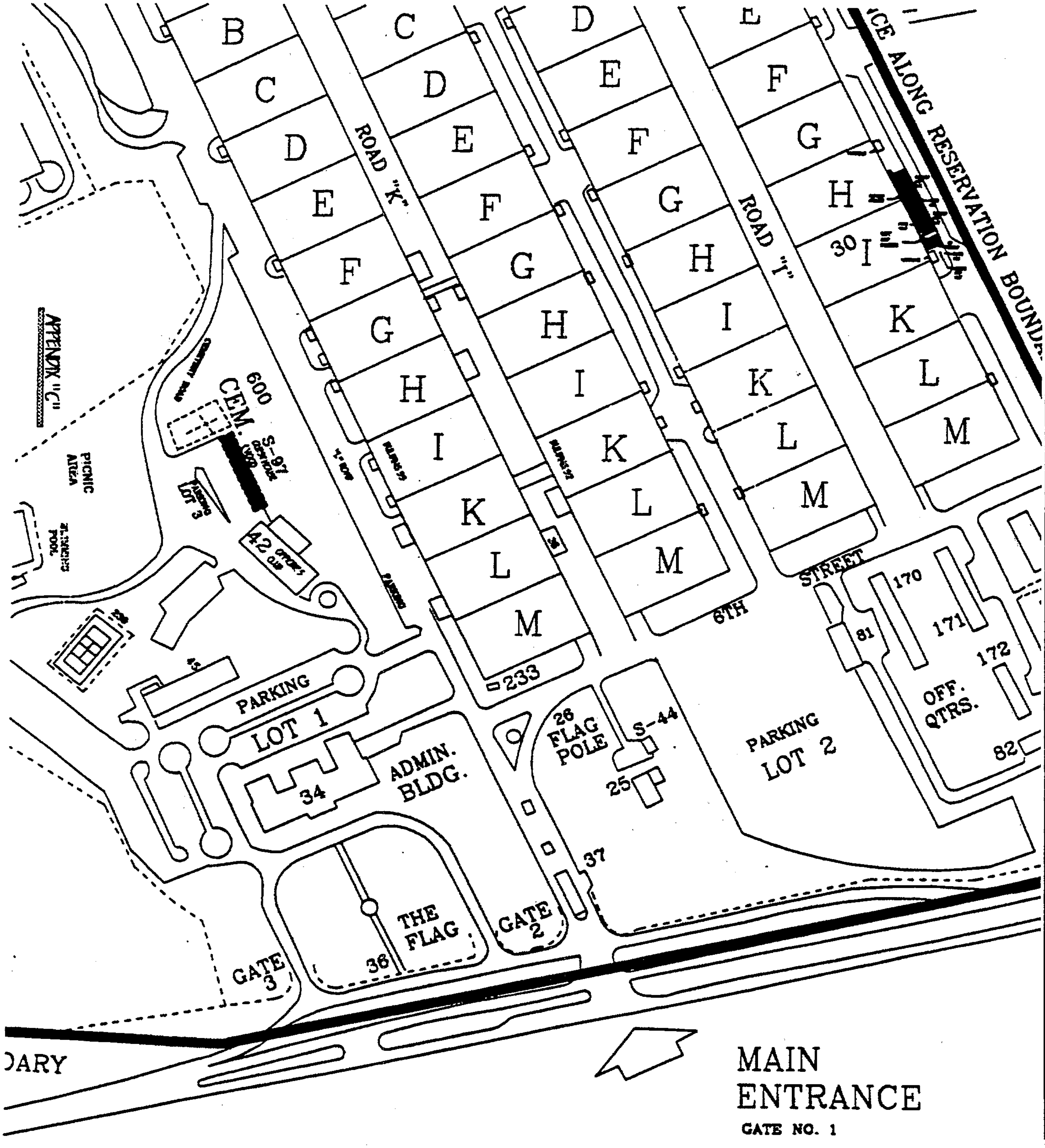
If additional information is required on any phase of our program, please contact the DSCR public affairs office at (804) 279-3209.

Sincerely,

GLENN J. PETRINA, P.E.
Director, Installation Services

Enclosures

Enter through the main entrance of the Defense Supply Center Richmond. Building 33 is the first long building on your right. Parking will be on your left. Please do not park in handicapped spots unless you are authorized. Please stop for pedestrians in the crosswalks. The public meeting will be in K bay.



RICHMOND TIMES DISPATCH
SUNDAY, FEBRUARY 21, 1999
METRO SECTION

PUBLIC NOTICE
PROPOSED REMEDIAL ACTION PLAN FOR THE DEFENSE SUPPLY CENTER RICHMOND

In accordance with the requirements of the Comprehensive Environmental Responsive, Compensation and Liability Act (CERCLA), the Defense Supply Center Richmond (DSCR), the U.S. Environmental Protection Agency (USEPA) and the Virginia Department of Environmental Quality (VDEQ) invite public comment for one of the 13 Superfund operable units: Contaminated Soils at the Former Fire Training Pits (Operable Unit (OU) 4). The public comment period will begin on February 21, 1999 and close on April 7, 1999.

A public meeting will be held to discuss the specifics of the proposed plan at 7 p.m., March 17, 1999, at the center theater, Building 33-K Bay, at the Defense Supply Center Richmond, 8000 Jefferson Davis Highway, Richmond, VA. This meeting will also provide an overview of the previous investigations and the risk assessment conducted for the site.

The proposed plan presents a determination that no further remedial action will be necessary to protect human health and the environment from contaminated soil at OU 4. The No Action decision for OU 4 is based on information presented in the Final Remedial Investigation Report Addendum for Fire Training Area (January 1996), the Updated Risk Assessment Calculations for OU 4-Fire Training Source Area (September 28, 1998), and amendments to the risk assessment calculations documented in a USEPA Memorandum from Jennifer Hubbard (Toxicologist) to Todd Richardson (Remedial Project Manager) dated December 30, 1998. These documents are available in the site's administrative record (see below). Based on the results of the risk assessment, direct contact with the soil does not pose unacceptable human health risks for current or potential future on-site receptors (including workers, construction workers, recreational users, and residents). Groundwater contamination associated with the Fire Training Area is being addressed under a separate operable unit (OU 7).

Although this is the preferred remedial option at this time, DSCR, in consultation with USEPA and VDEQ, may modify the preferred alternative or select another option based on the new information presented during the public comment period. Therefore, the public is encouraged to review the proposed plan for OU 4 and submit comments by April 7, 1999.

Citizens may review and photocopy the proposed plan and other documents relating to DSCR's Superfund studies and remedy selection located in the site's administrative file. The file is located at the Chesterfield County Public Library, 9501 Lori Road, Chesterfield, Virginia 23832. Library hours are 10 a.m. to 5:30 p.m., Friday and Saturday, and 10 a.m. to 9 p.m. Monday through Thursday. The library is closed on Sunday.

To submit written comments on the proposed plan; obtain more information regarding the site, the comment period; the upcoming public meeting; or to be added to the mailing list to receive updates on the program, interested parties should contact:

Mr. Thomas Owens
Public Affairs Officer
Defense Supply Center Richmond (DSCR-DB)
8000 Jefferson Davis Highway
Richmond, VA 23297-5000
(804) 279-3209

Written comments on the proposed plan may also be sent to:

Ms. Felicia Dailey
U.S. Environmental Protection Agency, Region III
Community Involvement Section (3H543)
1650 Arch Street
Philadelphia, PA 19103-2029

Document List
Fire Training Pit Soils
Operable Unit 4

VOLUME NUMBER	RECORD NUMBER	AD	TITLE OF RECORD	PREPARED BY	DATE	AREA OF CONCERN
2	27		Water Quality Engineering Consultant No. 32-24-384	USAEHA	Dec-20-84	FTP
6	65		Draft RI - Fire Training Pits	D&M	May-26-87	FTP
6	66		Draft RI - Fire Training Pits - Appendices	D&M	May-26-87	FTP
8	77		Work Plan - Fire Training Area	D&M	May-21-88	FTP
8	80		Revised Work Plan - Fire Training Area	D&M	Sep-21-88	FTP
9	83		Remedial Investigation - Fire Training Area	D&M	May-31-89	FTP
10	84		Remedial Investigation - Fire Training Area - Appendices	D&M	May-31-89	FTP
14	114		Proposed Preliminary ARARs for OU 4	Law	Sep-16-91	FTP
15	121		Draft RI Work Plan - Fire Training Area and Acid Pits	Law	Oct-11-91	FTP & ANP
15	124	A	Comments on Preliminary ARARs - OU 4	VDWM	Oct-30-91	FTP Soils
16	133		DGSC Review Comments - OU 4	EPA	Nov-19-91	FTP Soils
24	176		Draft Remedial Investigation Addendum	Law	May-4-93	FTP
25	180	A	Final Remedial Investigation Field Work - OU 4&7	Eng Sci	Feb-9-94	FTP
29	188		Draft Focused Feasibility Study - OU 4	Law	Jan-27-95	FTP Soils
31	196		Work Task Proposal - Analysis of Drainage Pathway	Law	Sep-20-95	FTP
31	198		Work Task Proposal Bedrock Monitoring Well	Law	Aug-10-95	FTP
32	204		Final Remedial Investigation Report Addendum - OUs 4 & 7	Law	Jan-24-96	FTP
34	213		Final Supplemental Report - OUs 4 & 7	Law	Dec-12-96	FTP
36	218		Final Focused Feasibility Report - OU 4	Law	Aug-22-97	FTP Soils
39	227		Updated Risk Assessment Calculations - OU 4	Law	Sep-28-98	FTP Soils
41	233		USEPA Risk Assessment Comments & Response	EPA/Law	Dec-30-98	FTP Soils
41	233		Final Proposed Plan - OU 4	Law	Feb-17-98	FTP Soils

SECTION II

OPERABLE UNIT FOUR

PROPOSED PLAN

COPY

PUBLIC MEETING

DEFENSE SUPPLY CENTER RICHMOND
Building 33
8000 Jefferson Davis Highway
Richmond, Virginia 23297-5000

March 18, 1999

7:00 p.m.

CAPITOL REPORTING, INC.
REGISTERED PROFESSIONAL REPORTERS
P.O. Box 959
Mechanicsville, Virginia 23111
Tel. No. (804) 788-4917

Thomas Owens, Defense Supply Center Richmond, Acting Public Affairs Officer

Katy Allen, Law Engineering and Environmental Services, Inc.

Bill Saddington, Defense Supply Center Richmond, Environmental Engineer

Adrianne D. Moore, DSCR-WEP

David Shui, Law Kennesaw

Stephen Mihalko, DEQ

Todd Richardson, EPA Region III

George Horvat, Dynamac Corporation

Sandy Olinger, Army Corps of Engineers

Lynne Clem, Law Engineering

Christian Knoche, Law Engineering

VISITORS

Sue & Paul Patton

Robert P. Avsec, Chesterfield Fire Department

INDEX

(Richmond, Virginia, March 17, 1999, 7:00 p.m.)

MR. OWENS: Good evening, ladies and gentlemen. My name is Tom Owens, and I'm the acting public affairs officer at the Defense General Supply Center, and I'd like to welcome you to tonight's public meeting to discuss several issues.

The first is to provide you all an update of the DSCR restoration program. We want to present the proposed plan for the former fire training pit soil, and finally we want to let you know of the primary documents that are being used for tonight's meeting. These documents are on file at the Chesterfield Country Library located at 9501 Lori Road in Chester, Virginia. We invite you to go and look at them.

We have a public comment period that extends from now until April 5th, and if you do have any comments regarding any of the proposals that we are presenting tonight, we invite you to send them in to me at my address at the Defense Supply Center Richmond, 8000 Jefferson Davis Highway in Richmond, Virginia.

After the public comment period we'll review all comments and we'll decide on a course of action for the remediation of the fire training pits. These are outlined as one, implement the current plan as is; two, modify the current plan, or select an alternative plan, and finally, issue a record of decision.

We have with us tonight the Defense Supply Center Richmond Environmental Engineer, Mr. Bill Saddington, who will take over this presentation from here to go into more detail on our plan. We also have a number of experts from different Federal, state, and offices as well as our contractors. And at this time I would like for them to introduce themselves before Bill comes up.

From Law Environmental our contractor who has been working with us throughout this, would you please stand now? We do have visitors and identify yourself and your job with your company, okay?

MS. ALLEN: My name is Katy Allen, I'm with Law Engineering and Environmental Services, and I'm the project manager for the remediation of this site.

MS. CLEM: I'm Lynne Clem with Law Engineering and Environmental Services, I'm a senior risk assessor.

MR. KNOCHE: I'm Chris Knoche with Law Engineering, I'm a sight manager and geologist.

MR. OWENS: Okay. We have an individual from the Environmental Protection Agency.

MR. RICHARDSON: My name is Todd Richardson, I'm with EPA Region III, I'm the remedial project manager.

MR. OWEN: Representative from Dynamac Corporation, one of the subcontractors.

MR. HORVAT: George Horvat, Dynamac Corporation, EPA Region III subcontractor.

MR. OWENS: Individuals from the Virginia Department of Environmental Quality.

MR. MIHALKO: My name is Stephen Mihalko, I'm a remedial project manager with the State, functioning to make sure the State requirements are met during cleanup.

MR. OWEN: Two individuals from our facilities engineering and installation services department, first in the back?

MS. MOORE: Hi, I'm Adrianne Moore and I'm the chief of the service center.

MR. OWEN: Now our environmental engineer as I was introducing one second ago is right here.

MR. SADDINGTON: Bill Saddington, I'm a remedial project manager working together with EPA and Environmental Quality.

MR. OWEN: And you walked in just after I introduced myself, I'm Tom Owens and I work in the public affairs office. If you'd like to move over to the center, it may be easier for you to see down here in this darker area. I think would be most beneficial.

Did I miss anyone?

MS. OLINGER: Yeah, you missed me. Sandy Olinger and I work for the Army Corps of Engineers, I'm the project manager who monitors the contracts to get the work done.

MR. OWENS: All right.

MR. SADDINGTON: Well, back up a minute. Since people came in late --

MR. OWENS: Okay. You want to cut it off and then pick up where Mr. Saddington comes in?

(Whereupon Mr. Owens reviewed the preliminary introduction.)

MR. SADDINGTON: I'd like to go into a little bit about the background on the center. It's 611 acres, it was a little larger a couple years ago, but we sold the reservoir to the county, or gave it to the county, so we lost about 29 acres in that transfer. Obviously 11 miles south of Richmond, 16 miles north of Petersburg, and has been a major supply facility for the Department of Defense since 1941.

It currently employs over 2,800 people, and it's one of the major elements of the defense logistics agency. What has happened over the last couple years I'm sure is many places have been closed and we've actually expanded our operation. We've been working this project, as Tom said, for at least ten years with agreement in place from EPA.

What we have is we have 13 operable units. Each operable unit has some remediation or studies that have to be done. This will be the fifth one where we have issued a record of decision.

The first one was Operable Unit 1, which was the open storage area. The record of decision for that one was issued in 1992. We had the five-year review and the selected remedy has been determined with EPA and the State agreement still be protective to the human health and the environment.

Operable Unit 2, this is the area that used to be a ravine back in the '60s where chemicals were disposed of. That was the accepted procedure in the '60s. There are a lot of problems gathered today throughout -- of course in the United States, not just here, we're getting close to a record of decision at least a proposed plan on it. We anticipate it will probably be late this year where we will have another meeting and present the proposed plan for our Operable Unit 2. We're looking in the December time frame.

The Operable Unit 3 is the National Guard area. This, again, was a soils area. Record of decision was issued in 1994, we had to remove some soils, haul them off-site, a little area, the rest of it was institutional controlled where we have to do some work if we're going to dig in the soils for construction or any intrusion of activities. We will be doing a five-year review to make sure the selected remedy is meeting the criteria of the health and human environment.

The one we want to talk about tonight is Operable Unit 4, the fire training pits. This was an area where fire training went on for a period of years down in the southern portion. If you live in the immediate area you've probably seen it. I mean, I imagine there was a black cloud of smoke.

OU-5, acid neutralization pit, this was actually the second rod we issued in 1992. The selected remedy was vapor vacuum extraction. The area was not as contaminated as we originally thought. We did the pilot test and we found out that the pilot test cleaned it up, so we did perform an explanation of significant differences which was presented, if I remember correctly, at our last meeting. And that area now has been closed out as being clean.

OU-6 and OU-9 -- I'm sorry, this should be OU-9 down here, these are the same areas. OU-6 is the final solution which we're doing a pilot test now to try to expedite the clean up. OU-9, same area, we've had a system in operation for a little over two years, and we have remediated or cleaned up somewhere in the order of two and a half million gallons of water. And we continue to pull it back towards the center. If you're familiar already with the area, Bellwood Properties, which is right beside the National Guard is where we're pulling the water back there to reduce contamination.

Again, the method we use used to be a state-of-the-art method. Now more work has been done, we have ended up coming out with new methods. The method we're using now is taking us as long as 20 years, and what we're looking at now is something to make it a little faster to expedite the clean up. Do as good or better job, but in a shorter period of time.

OU-7, the fire training pit ground water, again, this is the ground water contamination related to the fire training pits. We're looking for a way to expedite the clean up in this. We did a study on it and now we're looking at a different type of clean up method. We probably will implement two different methods. This is probably the toughest one we have right now to clean up.

OU-8, the acid neutralization pit, groundwater. The pilot study was extremely successful and we have kept it running, and we have cleaned up about a million gallons of water here. We are going to issue a record of decision, but since we've had such good success with this one, we're going to keep it running and probably have a rod issued based on what we know now. They did a very good job. It's one of the new technologies and probably will do the job in three or four years. And this is one of the things we're looking at for OU-6 to expedite the clean up.

The last four we have were not in the original ones, they've been added as we found a little more out. None of them are really significant. Building 68 - soils this year we'll issue a rod hopefully near the end of the year or hopefully early the next year.

Transitory shelter 202. We'll end up recommending an institutional control, and this will essentially mean that we can keep it as it is, but we cannot turn it over to residential areas. But I think anybody really familiar with this area does not foresee it in the future going to residential controls. It's too valuable warehouse space if anything happened to us.

Building 112 - soils. That was a pesticide facility and some of the old pesticides in the soils there like chlordane, I'm sure you all have heard of chlordane which was used for termites, also the DDT, we used to mix it there, take it around and use it in other places. And just probably over the years we've had some spills and there's a little higher concentration than you would want to find where you would use the area.

Finally, the last one, OU-13 that's the latest one we found, that was an accident, but this was a result of an oil spill. And when we did the original survey no one told us about it. So we were doing some other work in the area and we found this, and it didn't fit in anything we found before, so they are now working on that one again getting ready to hopefully have a rod sometime next year.

We hope by next year we'll have all the records of decision in place, all the meetings, and it would just be clean up from then on. We've studied it, we've done a lot of studying, and I think it has taken a long time, but we're getting to the point now where what we've learned and the new technology that's coming out, we will probably be ahead of the game in the long run. Clean it up quicker than we would if we went in with the technology of the late '80s.

This is the one we want to talk about today, is fire training area soil area, OU-4, Operable Unit 4. The proposed remedy tonight addresses only the contaminated soils in the area. The ground water contamination you saw earlier is being managed under another operable unit, Operable Unit 7, and that is the ground water. If you're familiar with this, this is the southern portion of the center, Kingsland Creek, and the fire training pits are right in this area here. And the three of them as far as we can figure we knew of two, and during the samplings in the late '80s, where we were doing the studying we found indications where there may have been a third one. But no one really remembered, so it may be some contamination from some other source, but it's got the same characteristics as the training pit. Again, it's in the south portion, and it's bounded by Kingsland Creek, which is the little creek that runs along the southern boundary.

This is a little schematic of the area. You can see the fire training pits, the approximate location, the west to east location, and the other lines are just storm sewer lines that run through the building. They actually drain a major area of the center. I would estimate in the order of 100 to 150 acres is drained through that particular area down there and along here.

There was actually three pits. One was used from mid '70s through '79, diameter was 50 feet, depth of three feet and was filled in with soil in 1983. Pit two from the late '60s to the early '70s, rectangular pit, 20 by 40 feet, and again, it was filled in with soil in early to mid 1970s.

And again, I mentioned the third pit was found during the investigation, and was actually found by a sampling of the ground water. It looked like there was a plume there that was emitting from a place we didn't know about.

Chemicals used in the fire training. Most of them were petroleum, pesticides, herbicides, of this nature, and I think the theory was back in those days, if they thought it would burn they would throw it in, something would just not burn. And, of course, flammable, liquid chemicals. From my experience in the military, these would throw off some pretty black smoke when they lit them off. A little history of it, 1982 was the first work that was done on it, the Hygene Agency out of Maryland installed four wells, and we've been sampling off and on from 1989 to 1997. And we looked at everything; we looked at soils, we looked at ground water, surface water, sediments, storm water drainage, and we did toxicity testing. But again, we're just taking soils tonight, but everything will be tied together with OU-7 to make sure the creek is protected and the ground water is cleaned up.

The soils, the primary contaminants of concern are polynuclear aromatics, the others we have are pesticides, dieldrin, metals, volatile organic compounds. You get the tetrachloroethane and trichloroethene you find all over, it's a common degreaser. Ground water contamination will be addressed in Operable Unit 7, but some of the other contaminants found in there particularly are volatile. And we found low levels of chlorinated and aromatic volatiles in Kingsland Creek.

I'll turn it over to Katy now, she's going to talk about the rest, and what we considered, why we got to the point to make the recommendation, Katy?

MS. ALLEN: Thank you, Bill. As Bill just noted, a number of samples were collected from various media at the fire training area. Based on the analytical results from those samples, we looked at the data and determined what the potential risks to human health or the environment might be posed by the soils of the fire training area. That's commonly called the baseline risk assessment, and that says they're evaluated for current and future risks to human health and environment from site contamination during the remedial test investigation.

The purpose of the risk assessment was two-fold. One was to look at the human exposure, risk potential from the site, in particular, from the contaminants identified in the site soil. We looked at three exposure pathways, one being ingestion of the soil, in other words if you were to actually touch the soil, get it on your hands, and then somehow get your hand to your mouth, and then that would ingest the soil and particulates contained in the site.

The second thing, inhalation of fugitive dusts. The fugitive dusts being dusts that are commonly carried into the air by the wind, which you would then breathe in the normal course of inhaling.

And the third being dermal or skin contact with the soil. In other words, when you touch the soil and it comes in contact with your skin some contaminants can actually be absorbed through your skin. So we looked at those three what we call pathways of exposure.

To address potential risk to the environment we looked at what we call ecological risks. The ecological risk being the site was considered to be low because as you can see from the photograph that Bill Saddington had shown earlier, the site is largely industrial, it's used for storage of a variety of military materials, there is extremely minimal vegetation, it's basically bare ground, no grass growing, really no suitable habitat for animals to live in. We wouldn't expect to see nesting or those types of activities by animals in this area.

We reviewed endangered species that might be either in transit through this area or actually residing in the vicinity of DSCR, and no endangered species were identified that can be potentially affected by contaminants at this site. We also sampled surface water from Kingsland Creek, we did toxicity testing of creatures that might live in the creek and determined that there was no significant impact from the soils at this site in Kingsland Creek. Particularly in looking at the discharge from the storm sewer system that drains this portion of the base.

This is a slightly more detailed description of the actual calculations that occurred as part of the risk assessment. We looked at current workers, in other words, people at DSCR who actually might be engaged in the course of their work activities and activities at the site. For example, the people who are storing material there, they were actually on-site, could potentially be exposed to soils at the site.

We looked at what a future worker, in other words, this is a person who is currently working there. We looked at what a future worker might encounter while working at the site, exposure to surface and subsurface soils. And a third we looked at was the construction worker who might actually be digging at the site, and someone who would come in contact with either the surface soils of the site or soils that are in depth at the site. In particular, a ten foot depth would be a typical construction type depth that might be exposed for construction activities.

We then used standard EPA protocols for performing risk assessments and evaluated what the carcinogenic or cancer risk was posed by the soils would be, and what the percentage outcome would be, and the carcinogenic compounds and the compounds that are not carcinogenic. We calculated what is called a hazard index, which is a threshold by which an adverse health affect might occur.

EPA has established in it's regulations what are called target risk range for carcinogens with a range ranging from 10 to the minus 6th excess cancer risk, 10 to the minus 4th, and as you can see from this calculation the excess cancer risk for these various scenarios range from 2 to the minus 5th, nine to the minus 6th, and four to the minus 7th.

The hazard index, the threshold for adverse affects is, one, in other words, the number above one would indicate that there was a potential adverse affect. And as you see here the hazard from the calculated numbers are well below one.

The third column indicates what chemicals that were present at the site are actually creating a risk. In other words, these are the chemicals that are predominantly resulting in the calculated numbers. They were predominantly poly aromatic hydrocarbons, which are compounds from auto emissions, burning material, completely burned poly aromatic hydrocarbons, which would be present. And the second compound is dieldrin, which is a pesticide normally used in agricultural use.

Another scenario that we looked at was if at some future point in time, although it's not foreseeable at this time, if and when use of this site should change from it's current industrial use as a portion of the center to residential use, in other words, perhaps the property would be sold and use of the site for building homes and people to reside at would be concentrated, we looked at the potential risk from that land use. Public future residential exposure scenario, and again, the list totals that we calculated are within the range considered acceptable by EPA. And the same chemicals were involved in producing that risk as were the industrial chemicals at the site.

MR. PATTON: Would you break that 5 times 10 to the minus 5th into layman's terms so that I could understand what's the risk? For person or what?

MS. ALLEN: Okay. This is considered an excess cancer risk, above that which normally would be observed statistically in a population. The increased risk could be 5 people per 100,000 might incur an incident of cancer. So it's above what's normally observed in the population.

And another scenario that we looked at was current recreation user of the site. There's a jogging path that traverses the site a little bit north, but doesn't actually cross the site, but there is a potential that recreational users of that jogging path could be exposed to fugitive dust that might be blown from the site while they're jogging. And again, the risk posed there is significantly low, 1 times 10 to the minus 10th, and a hazard of 0.002. This is a target risk which they consider to be acceptable.

The ecological risk characterizations, as I mentioned before, the site does not pose a significant ecological risk. One reason being the industrial nature of the site does not offer habitat for animals to either form or nest. And the second being the surface water and sediment toxicity testing which was performed in Kingsland Creek indicated no significant impact to the creek.

In conclusion, based on the risk characterization performed to human health risk and ecological risk assessment from the risk from the exposure to soils are either below or within the U.S. EPA target excess cancer risk range and below the hazard threshold for the current future worker scenario, evaluated the current recreational jogger, and the future residents, both adults and children. The ecological assessment indicated that the site does not pose a significant ecological risk. There are no critical habitants or endangered species affected, and there's no significant impact to Kingsland Creek.

This forms the basis for the recommendation at this site that conditions in the soils at Operable Unit 4, which is the fire training area soils, or also called the fire training area source area, are deemed to be protective of human health and the environment. And no action is recommended for the soils at the fire training area at this time.

MR. OWENS: That concludes the presentation. Do you have any questions that anyone in this group might be able to answer for you?

MR. PATTON: Probably not, I've been involved in it from day one and I didn't get answers to the questions then, and it's been years since then, and, you know, I didn't get successful answers to the questions that I had, and I was personally involved with the General here and his lieutenant.

I was kind of pushed back, put on raps of things that went on then, so, I mean, all that's past in the past, and I think, you know, and I like the way you're doing things, you know, and I'm pleased with it, you know, and I can't say that I was pleased then, but you know, you get so many things going on and so much cover, you know, going on, and it was a lot of cover up going on back in those days.

MR. OWENS: Was there?

MR. PATTON: Yes, sir. And I was personally involved with going with the General's aide picking up some of the stuff that I had showed him, contaminate, and there was no report come back that he ever cleaned them up, or that he ever took samples. And I personally went with him when I picked up the samples and did it, see. And, you know, that's back in then we just come to see the update of what's being done now. And the one question I do have are you going to open the ground at the National -- at the end of Alcot? The open pit area that's closed now, are they going to open that up and clean it out, or are they going to leave that closed in?

MR. SADDINGTON: I'm really a little lost on where you're talking. Oh, OU-2?

MR. PATTON: I think that's right at the end of Alcot Road where the National Guard is, to the right you go straight on in, you go over to the open field.

MR. SADDINGTON: The open field you're talking about?

MR. PATTON: Yes, the open pit. And General Quarters originally said we handled chemicals like chocolate pudding not knowing how much is under the pit.

MR. SADDINGTON: Yes, we're going to open it a little bit. We opened it a couple years ago, and I seem to remember you may have been at the meeting at the Holiday Inn?

MR. PATTON: Yes.

MR. SADDINGTON: We went ahead and the only thing we really found we did find some ora. It was floating, now, it appears we're trying to find it again. We're going to open it up is the plan right now, and again, there would be a public meeting to let everybody now. It looks like what we're going to do is we're going to get the soil that is contaminated with ora and dig that out and dispose of that properly, and then fill it in again, that's step one.

Step two then is we're looking at putting a clay cover on it so that the rainfall does not push through it, and then the chemicals will be trapped in there.

The other thing we found out, the ground water contamination coming out of that area which feeds OU-6 seems to be getting less in the volatile organic compound. It looks like there's been a flushing action, and again, we are catching it at the edge of the National Guard.

So the only other way we know to get to the chemicals to get out of there is a storm sewer to run north-south, and if you're familiar with the area you know what --

MR. PATTON: Yes.

MR. SADDINGTON: We're going to cut a line. We haven't really made up our mind whether we're going line the existing storm sewer and just drain the cover, or cap them off and go with new storm sewers. We did a TV study of those storm sewers. We ran a what I call a creepy-crawler down there and got a complete TV video of that. So our contractors here are evaluating now, and part of their recommendation for the whole clean up will be what do we do exactly with that storm sewer, replace it, cap it, or, you know, line it. So that's where we're going.

We think we have a good plan and like, again, I think I mentioned, we hope to have a public meeting like this probably November, December time frame. And, of course, as you know, we've been sending you people our mailing list and again, if you know anybody who wants to get on the mailing list, please let me know. But we send a letter at least once a year and make sure you're aware of the public meetings and we'd like to see you come and participate and I'm happy to hear you say you think we're doing better than we did 10 or 20 years ago. Does that answer your question?

MR. PATTON: Yes, it does. And my question -- I don't know who would answer, this is 5 per 100,000 people, cancer rate, where they're projecting it could be or whatever. I haven't done any research. I threatened to do it, but I just never done it because I didn't want to open a Pandora's box. Within 500 feet of my house there are three people that I personally know, have know them personally, died with cancer within 500 feet of my house. And that to me is quite high. And just simply knowing, you know, not to go investigate, one of them was my neighbor, next door neighbor, he died with cancer. Then I have another neighbor that lives two blocks down the street, he died with cancer and the pastor who lived across the street, he died with cancer, and all lived there for at least -- well, there was one more, that's four that within like I said all the same year.

MR. SADDINGTON: Could you handle that, Lynne?

MS. CLEM: The number we gave you, the 5 and 100,000, those are excess cancer above what the normal cancer is for, you know, being exposed to gasoline and other contaminates and things that you have in your everyday life. And I'm not sure what the actual average cancer rate is for a given area. It's different in every area. We've been here 30-some years and we have quite a small --

MR. PATTON: And I don't know what the rate would be in our small community. And I didn't like, like I said, I threatened to do it and threatened to do it and I just never did it. To look and do some leg work to find out who has actually died in this area from cancer.

MR. SADDINGTON: You know, it's just --

MS. OLINGER: There are so many factors, family history and smoking and your job. I have several friends who work industrial jobs and are exposed to all kinds of things.

MS. CLEM: This is such a small area, it does seem a little unusual as many of us know. Bill, do you have a risk assessment around?

MR. SADDINGTON: I have it, it's in the public record.

MS. CLEM: There's a public health assessment for the area.

MR. SADDINGTON: Let me try and bring out a little bit of information. Several years ago as part of the clean up STSDR, which is an agency for toxic substance and disease registry, they're a part of the communicable diseases in Atlanta, and they are part of the clean up of every superfund site. They're required by law to come in and do an assessment of our site. Let me check that and see and get it out and get back to you when I could find out. It's been four or five years since he did it, so I don't really remember what did.

But I think one of the things he would do would be look at the cancer risk.

MS. OLINGER: Yeah, they did look at the surrounding areas.

MR. OWEN: Because I know when the General Defense Supply area was built it was built higher than the area so all the run off comes off from us from the different centers. Because we're in a lower area we built those as up high and everything runs off of us. We had a problem with that for years until the run off.

MR. SADDINGTON: I remember when I first came here we had a gentlemen that was working with me was called Phil Butler who lived along Senate Avenue, and he was one of the guiding lights that had the water line put down Congress and down Senate long before the rest of the area had it because he had a contained --

MR. PATTON: Well because your all's drain ran straight to his well and he couldn't get it contained.

MR. SADDINGTON: So the county had to run him water, and that was the first water line I understand, and that was in the '70s, wasn't it?

MR. PATTON: Yes, we've been here since '66, haven't we?

MR. SADDINGTON: Okay. You're in county water now?

MR. PATTON: Yes, county water.

MR. SADDINGTON: Well, as long as I got your name I'll take the list home and we'll make a copy and I'll take a look and get back to you. It would probably be two weeks because I'm going to be on vacation for the next week to ten days.

MR. PATTON: Okay. One other question I had, too, that you said that I've read in here several different places where the water had been cleaned up 75 percent, 96 percent, and 9 percent, and then it would be another 20 years of cleaning up, you know, I don't understand all of that.

MR. SADDINGTON: Well, what essentially happens is it's very easy to get the first 90 percent. And what we're doing now is we're pulling it back, and when I say we cleaned up 96 percent, the one well we were monitoring from, it dropped down, we actually pulled the water table down 10 feet.

MR. PATTON: My well went dry last year. The water for my garden.

MR. SADDINGTON: We're sorry, we may have done that.

MR. PATTON: I've never had that problem before, of course, we just use the water to garden with so --

MR. SADDINGTON: Well, it would not affect you all because I think you have a shallow board well?

MR. PATTON: It's 48 feet.

MR. SADDINGTON: Okay. We may have done it.

MR. PATTON: It's in the lower -- 44 feet before it ever hit water.

MR. SADDINGTON: I'm sorry. I hope we didn't do anything to you.

MR. PATTON: That was no problem because I was just using it for water a couple hours a day.

MR. SADDINGTON: We had a fairly dry spring last year because this actually dropped ten feet two years ago, and it's been holding pretty steady. But what happened is the one well, which we'll call my point of compliance, which is the point that meets EPA guidelines. If we get to this point, we got a point where we know we're compliant. It dropped 96 percent over the life, I think was the figures, I quoted 80 percent?

MR. PATTON: Yes.

MR. SADDINGTON: 96. What's happened is we're pulling water back onto the center, so we're actually pulling clean water to replace it, reversing the ground water flow. The ground water flow in that area is like from a west to east. What we've done now by pumping down we're making it come east to west. So we're pulling cleaner water back. That's when you got the big job. But what happens is it drops off quick and it just approaches a point where you probably will never get to zero, but you get to the point where you can't find it, you can't analyze it. But that's where the 20 years comes in. And when I talk 20 years, I'm talking close in. This is probably 300 or 400 feet, it's right on the Park Lee property. See what I'm saying? That drops off quick.

Now, you have to go back and if I give you the results closer in they're not going to be as good as the point of compliance, but EPA has basically accepted the point of compliance at our fence line. So we're trying to get everything back and then we're looking for a way to implement or expedite the clean up, because the method we use, and this is a 20-year method, and that is why everybody is trying to get away from it. We're trying to do something that will continue to allow us to use what we have, the money we vested, but also clean it up by adding additional equipment. That's what we're looking at right now.

MR. PATTON: Well, one thing that really helped us along is when the government came in and put water in which showed us they are interested. I mean, up to that point they didn't show any interest at all. They cut off bringing any water into us, period. We had to go back to drinking well water. They said the water you have is contaminated and we were involved from day one, and I was involved there like in day one, and back in those days things was hot and nobody knew what was going on or the direction to go in. It was kind of jumping back and forth passing the buck one to the other.

MR. SADDINGTON: I got involved a couple months before the letter came around when water was available to everybody and I said what are you doing, do remember that? I said can you tell me whether the county owns water, that was like September '87 from what I remember. And that's when we quit doing the monitoring water for the people.

MR. PATTON: Well, like I said, I have been personally active in it with, you know, any way I could help. I took the General's personal aide, like I say, and showed him areas that I knew of that was contaminated, and that's one of the things that turned me off because he took samples of things going into No Name Creek is what they call it, No Name Creek, and I have dealt with those chemicals before, and I knew what they were. And I never got reports, they never got a sample of those reports, it kind of rubs me wrong because the General's aide, General Quarter's aide.

MS. OLINGER: We have samples now and that data is available.

MR. PATTON: But I never seen it.

MR. SADDINGTON: I don't think we have the data he'd be talking about.

MS. OLINGER: Not that data, but we have samples.

MR. PATTON: I took the guy's name is -- whatever information I could come back to him. As a General, when he had knowledge, we had to handle the chemicals like chocolate pudding. He got booted out, he was gone, you know, go around telling people that, especially the public.

MR. SADDINGTON: Well, I'm happy to report that we do have little fishing in No Name Creek though EPA didn't believe it until I showed it to them. You know, the creek's not that deep or anything like that but they are starting to come up. I don't know where they come from, but they're about that big, maybe an inch long.

MR. PATTON: Yeah, because he was telling me crawfish was in this and stuff like that.

MR. SADDINGTON: I've never seen any crawfish.

MR. PATTON: I never seen fish. I have looked down all of it and I could never find anything and he was telling me all these things in it. And I live here, I know there's nothing in it up to that point unless he put stuff in and took pictures of it, they never showed it to me. So I don't like to be deceived, be up front and get it out in the open and we can deal with it. I'm pleased, like I say, with what you're doing and happy to come and, like I say, see it updated and that you're all working at it.

MR. SADDINGTON: We anticipate we'll probably have at least one, maybe two more meetings this year and hopefully we're going to get another three records of decision.

MS. OLINGER: That's kind of pushing it with EPA lawyers, they're kind of limited up there.

MR. SADDINGTON: But that's what we're shooting for, and one of them is going to be the area, the big area.

MR. PATTON: Right. I understand. We were doing a lot of things wrong, but we have to pay the price for them now.

MS. OLINGER: Well, people didn't know things back then.

MR. PATTON: Right. They just didn't care. Same with Y2K.

MR. SADDINGTON: I knew about that 1971 when the mortgages started acting funny, you know, 30-year mortgages. Any other questions? I see someone from the fire department, the county fire department. Any questions back there?

MR. AVSEC: No, sir.

MR. OWENS: Okay. Well, with no further questions we'll conclude the evening. Thank you all for coming out and make sure everybody has signed in and we have the information we need, thank you.

(Whereupon the hearing was concluded at 7:45 p.m.)

STATE OF VIRGINIA)
)
CITY OF RICHMOND)

I, JULIE M. WINKEL, a Certified Shorthand Reporter, Registered Professional Reporter, and Notary Public for the Commonwealth of Virginia, residing in Virginia, certify:

That the public meeting was taken before me pursuant to notice at the time and place therein set forth.

That the speakers comments and all comments made by visitors had at the time of the hearing were recorded stenographically by me and were thereafter transcribed. I hereby certify that the foregoing transcript is a full, true, and correct record of my stenographic notes so taken.

I further certify that I am not related to any party to said action nor in anywise interested in the outcome thereof.

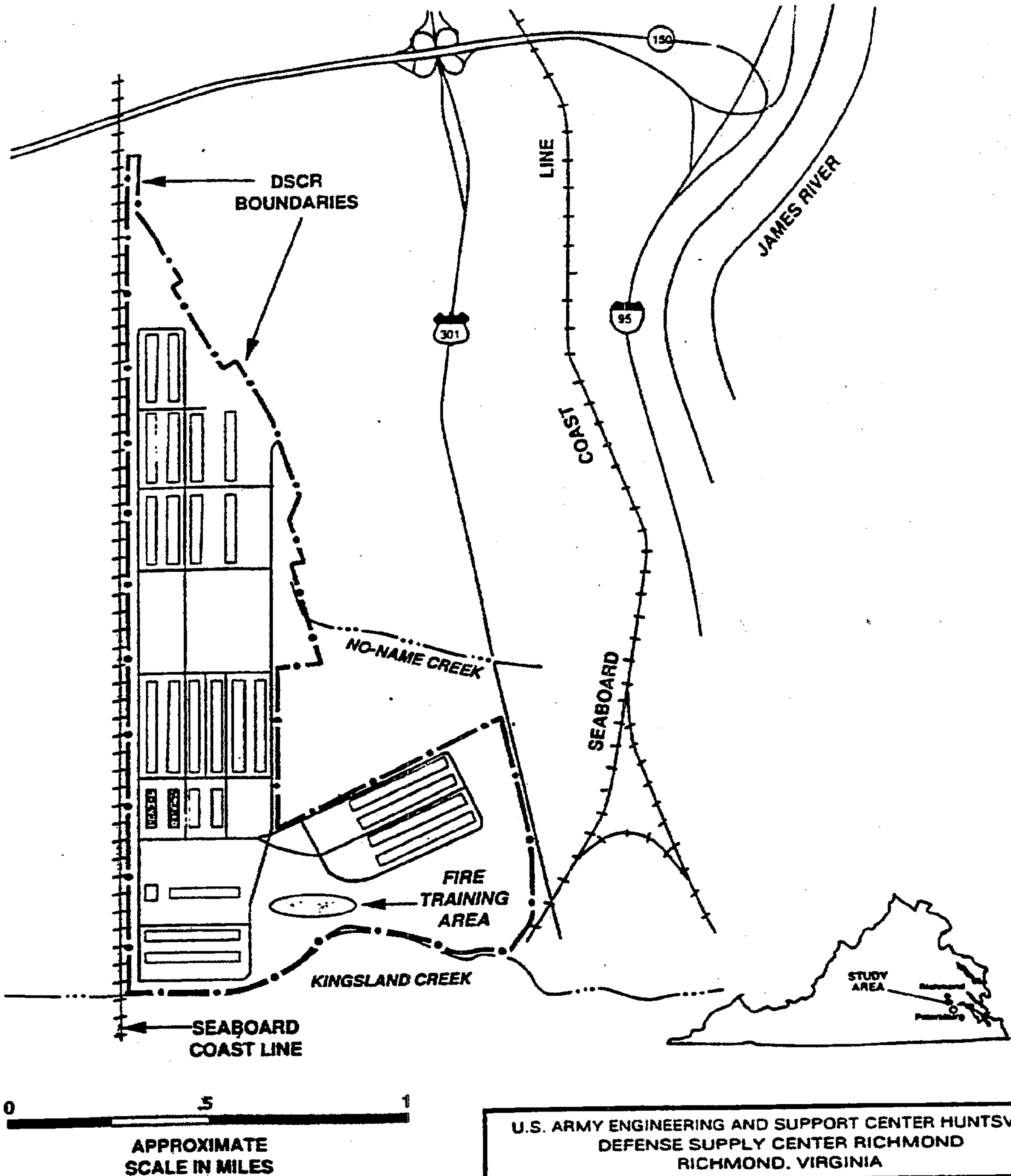
IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my official seal this 22nd day of March, 1999.

Julie M Winkel

JULIE M. WINKEL
Certified Shorthand Reporter
Registered Professional Reporter
and Notary Public in and for the
City of Richmond, Commonwealth of
Virginia.

My Commission Expires:
December 2, 2000

FIGURES



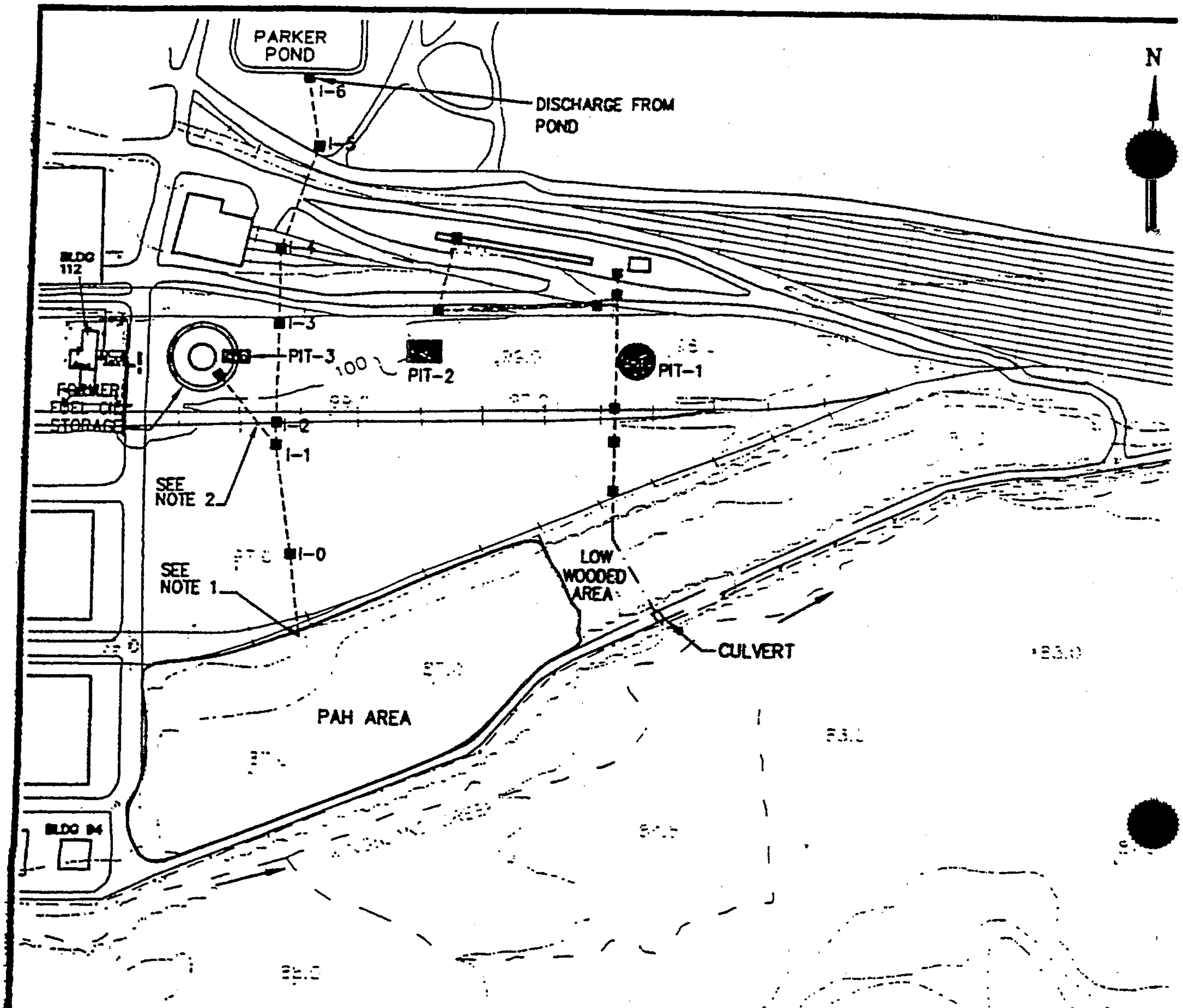
U.S. ARMY ENGINEERING AND SUPPORT CENTER HUNTSVILLE
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VIRGINIA

OU 4 RECORD OF DECISION

DEFENSE SUPPLY CENTER RICHMOND AND SURROUNDING AREA

RICHMOND, VIRGINIA

PREPARED/DATE:	DCS 7/1/96	FIGURE NUMBER:	FILE DATE:	01 JUL 96
CHECKED/DATE:	KLA 7/1/96	2-1	PLOT DATE:	10 DEC 97
PROJECT NO.:	11000-6-3119		FILE NAME:	00636-63119



LEGEND:

- SURVEYED GROUND ELEVATION (FEET)
- STREAM / CREEK (ARROWS INDICATE FLOW)
- FENCE
- RAILWAY TRACKS (INCLUDES ABANDONED LINES)
- TREE LINE
- CONTOUR LINE
- STORM SEWER LINE w/DROP INLET
- SURFACE DRAINAGE FEATURE

0 250 500
SCALE IN FEET

NOTES:
1. PIPE OUTLET REPORTEDLY CAPPED DURING FILLING ASSOCIATED WITH PAH AREA
2. LOCATION OF THIS LINE INFERRED FROM DRAWINGS AND DISCUSSIONS WITH SITE PERSONNEL

LAYER: SEWER FILE: /HOME/DGSC/SUPP-REP/ST-SEW

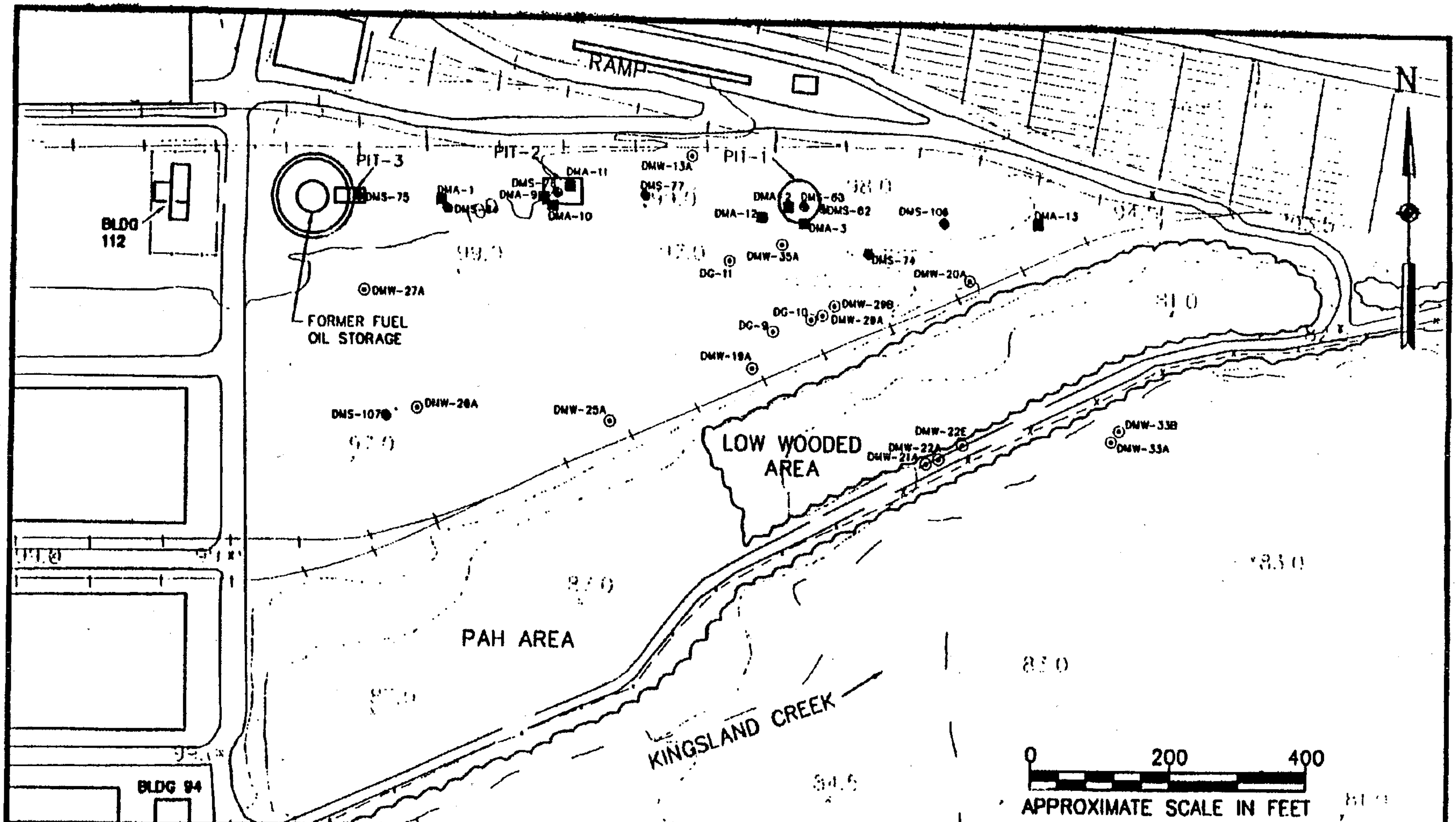
U.S. ARMY ENGINEERING AND SUPPORT CENTER
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VA

OU 4 RECORD OF DECISION

SITE MAP

FIRE TRAINING AREA

PREPARED BY/DATE:	DCS 2/14/97	FIGURE NUMBER:	FILE DATE:	27.DEC.9
CHECKED BY/DATE:	XCW 2/14/97	2-2	PLOT DATE:	02.OCT.97
APPROVED BY/DATE:	T1000-6-3119		FILE NAME:	HOME/DSCR/DON/SITEM



LEGEND:

- MONITORING WELL (DMW, DG)
- SOIL BORING (DMS)
- SHALLOW SOIL SAMPLE (DMA)
- TREE LINE
- TOPOGRAPHIC CONTOUR LINE
- STREAM/CREEK (ARROW INDICATES FLOW)
- FENCE

NOTE:

DMW, DMS AND DMA ARE
DAMES AND MOORE (1989)
DG WELLS ARE USAEHA (1982)

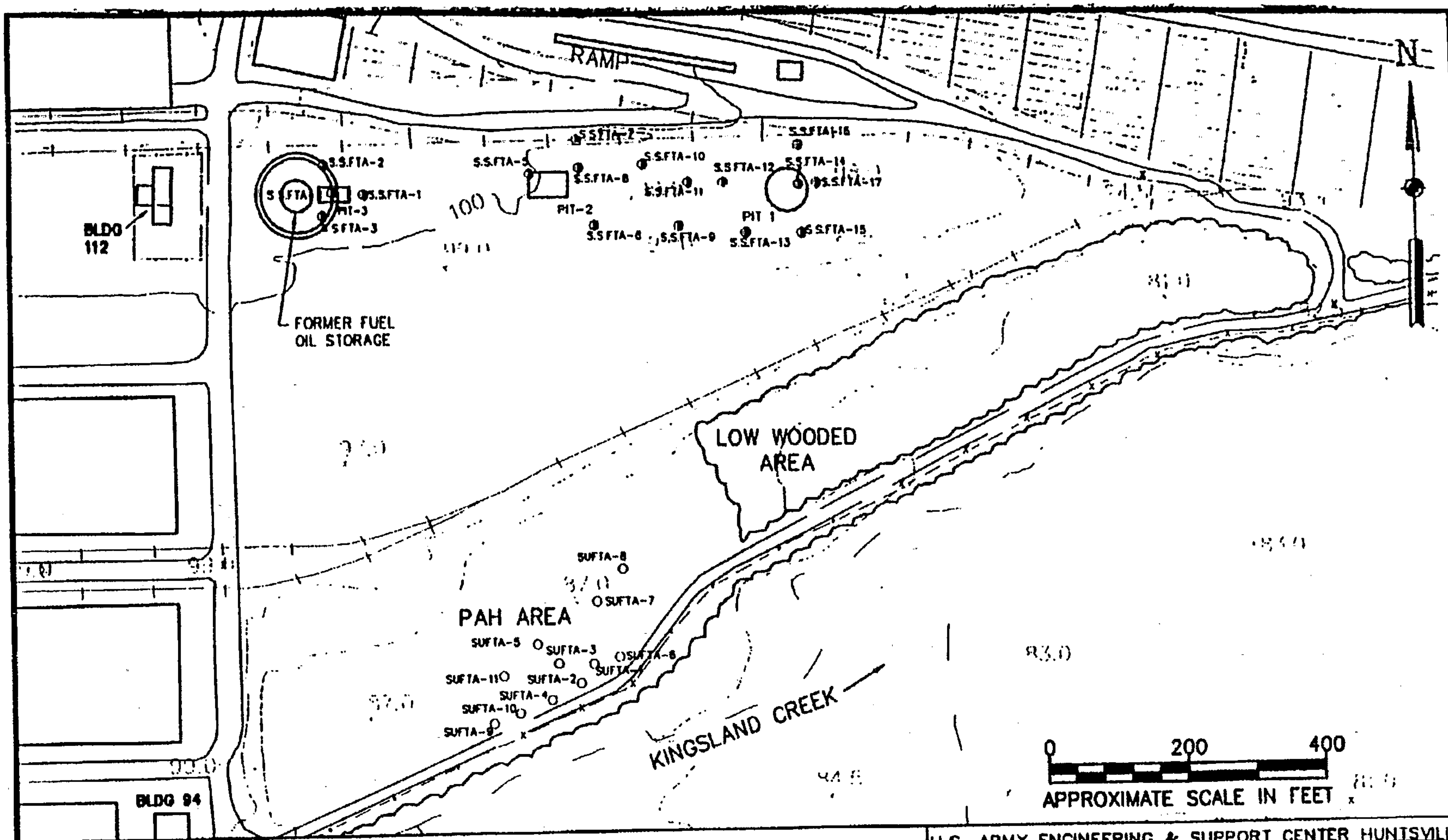
U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VA

OU 4 RECORD OF DECISION

SOIL SAMPLING LOCATIONS (1982–1989)

FIRE TRAINING AREA

PREPARED BY:	DCS 2/14/97	FIGURE NUMBER:	FILE DATE:	06 FEB 97
CHECKED BY:	XCW 2/14/97	2-3	PLOT DATE:	10 DEC 97



LEGEND:

- ◐ SOIL SAMPLING LOCATION (ES, 1992)
- ○ SOIL SAMPLING LOCATION (ES, 1994)
- TREE LINE
- TOPOGRAPHIC CONTOUR LINE
- —X—X— FENCE
- STREAM/CREEK (ARROW INDICATES FLOW)

U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE

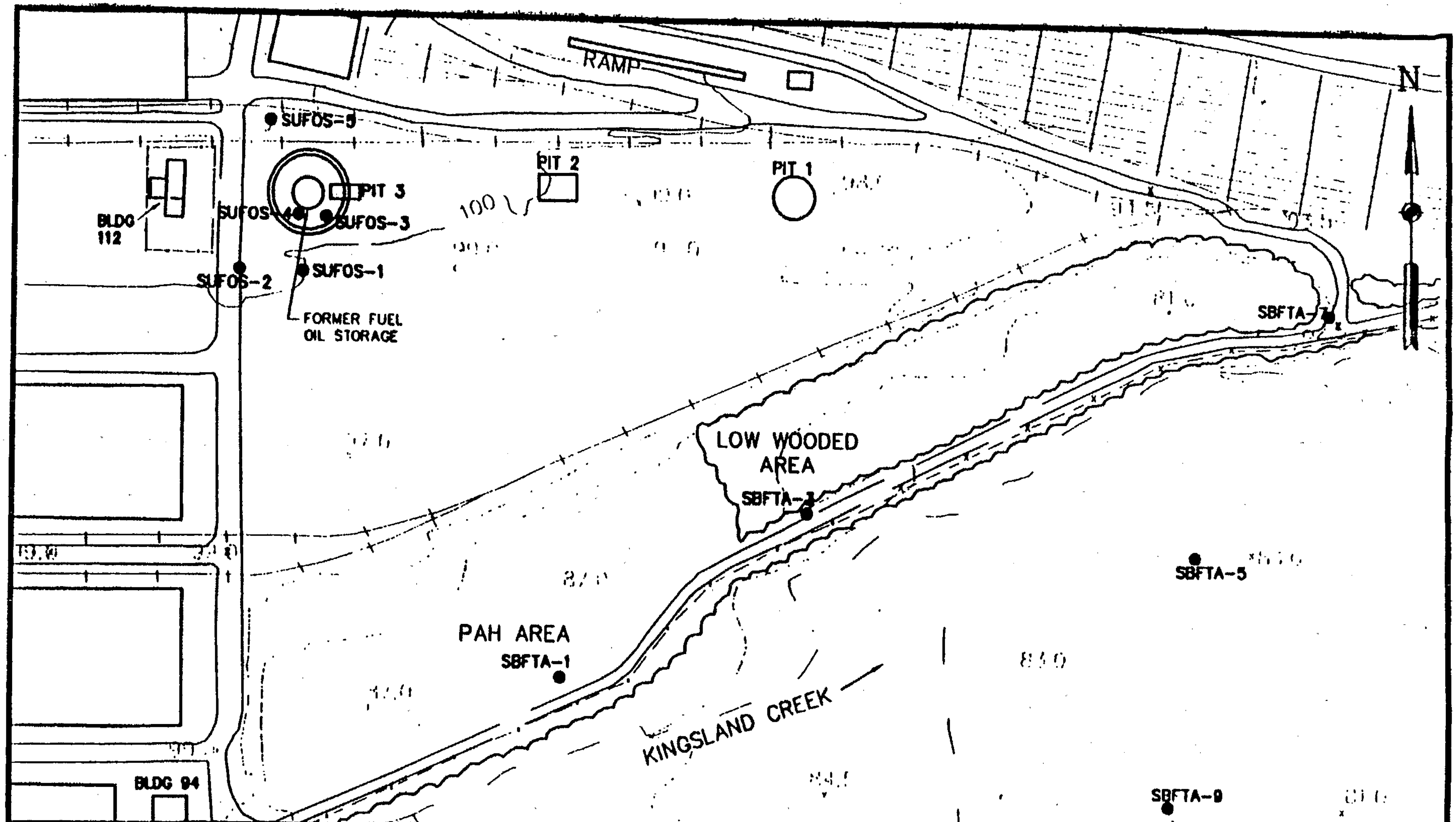
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VA

OU 4 RECORD OF DECISION

SOIL SAMPLING LOCATIONS (1992-1993)

FIRE TRAINING AREA

PREPARED BY: DCS 2/14/97	FIGURE NUMBER: 2-4	FILE DATE: 05 FEB 97
CHECKED BY: XCW 2/14/97		PLOT DATE: 10 DEC 97



0 200 400

SCALE IN FEET

LEGEND:

● SOIL SAMPLING LOCATION (LAW, 1992)

TREE LINE

TOPOGRAPHIC CONTOUR LINE

—X—X— FENCE

— — STREAM/CREEK (ARROW INDICATES FLOW)

U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE

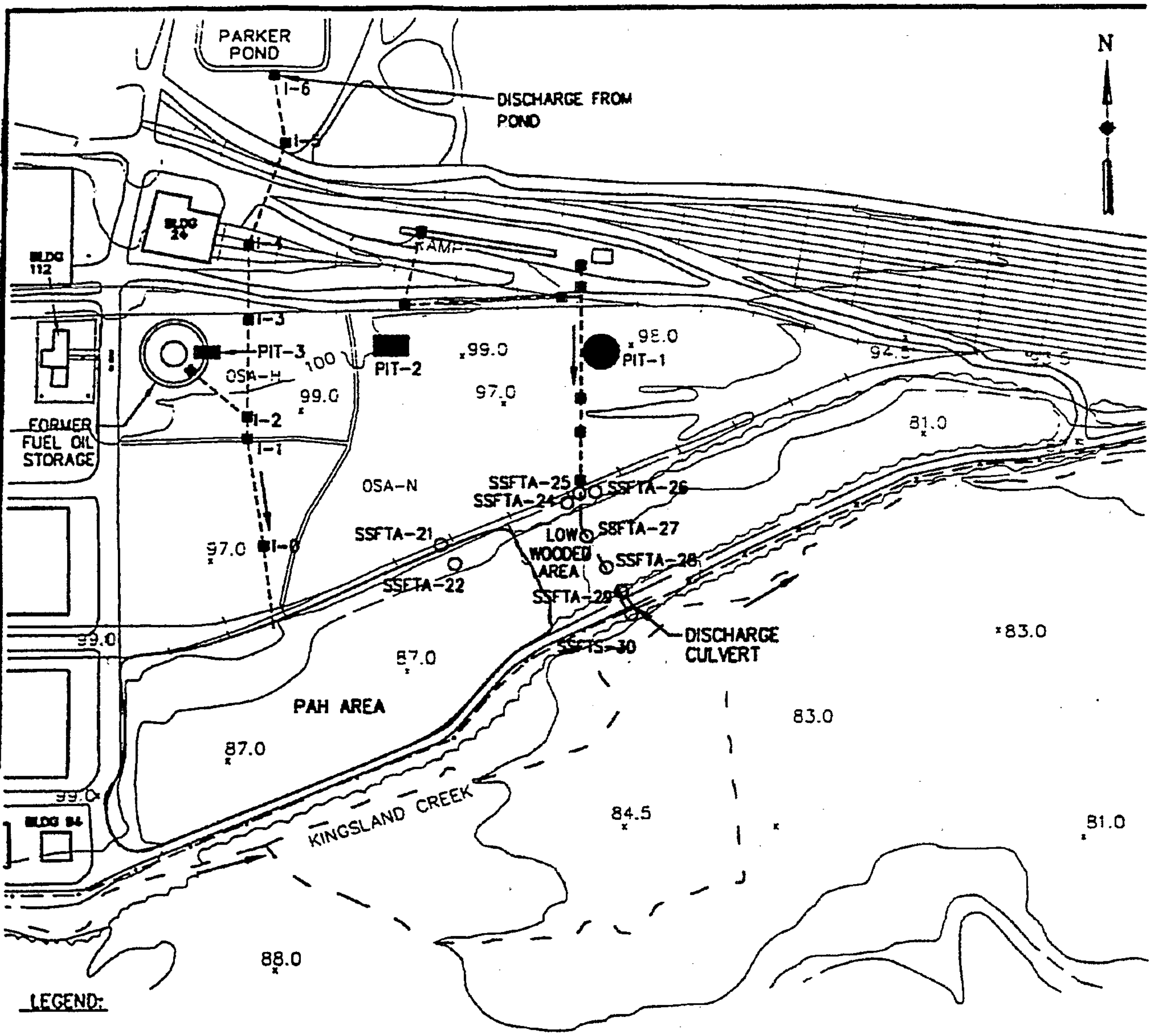
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VA

OU 4 RECORD OF DECISION

SOIL SAMPLING LOCATIONS (1992)

FIRE TRAINING AREA

PREPARED BY: DCS 2/14/97	FIGURE NUMBER:	FILE DATE:	06.FEB.97
CHECKED BY: XCW 2/14/97	2-5	PLOT DATE:	10.DEC.97



LEGEND:

- SHALLOW SOIL SAMPLE (0-6")
- 88.0x SURVEYED GROUND ELEVATION (FEET MSL)
- STREAM / CREEK (ARROWS INDICATE FLOW)
- FENCE
- RAILWAY TRACKS (INCLUDES ABANDONED LINES)
- TREE LINE
- CONTOUR LINE
- STORM SEWER LINE w/DROP INLET
- SURFACE DRAINAGE FEATURE
- UNPAVED ROAD

0 250 500
SCALE IN FEET

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. (A) DISCHARGE PIPE FROM INLET I-0 PLUGGED WITH CONCRETE PLUG.
3. DOWNSTREAM PIPE PRESENCE/ LOCATION INFERRED.

U.S. ARMY ENGINEERING AND SUPPORT CENTER
DEFENSE SUPPLY CENTER RICHMOND
RICHMOND, VA

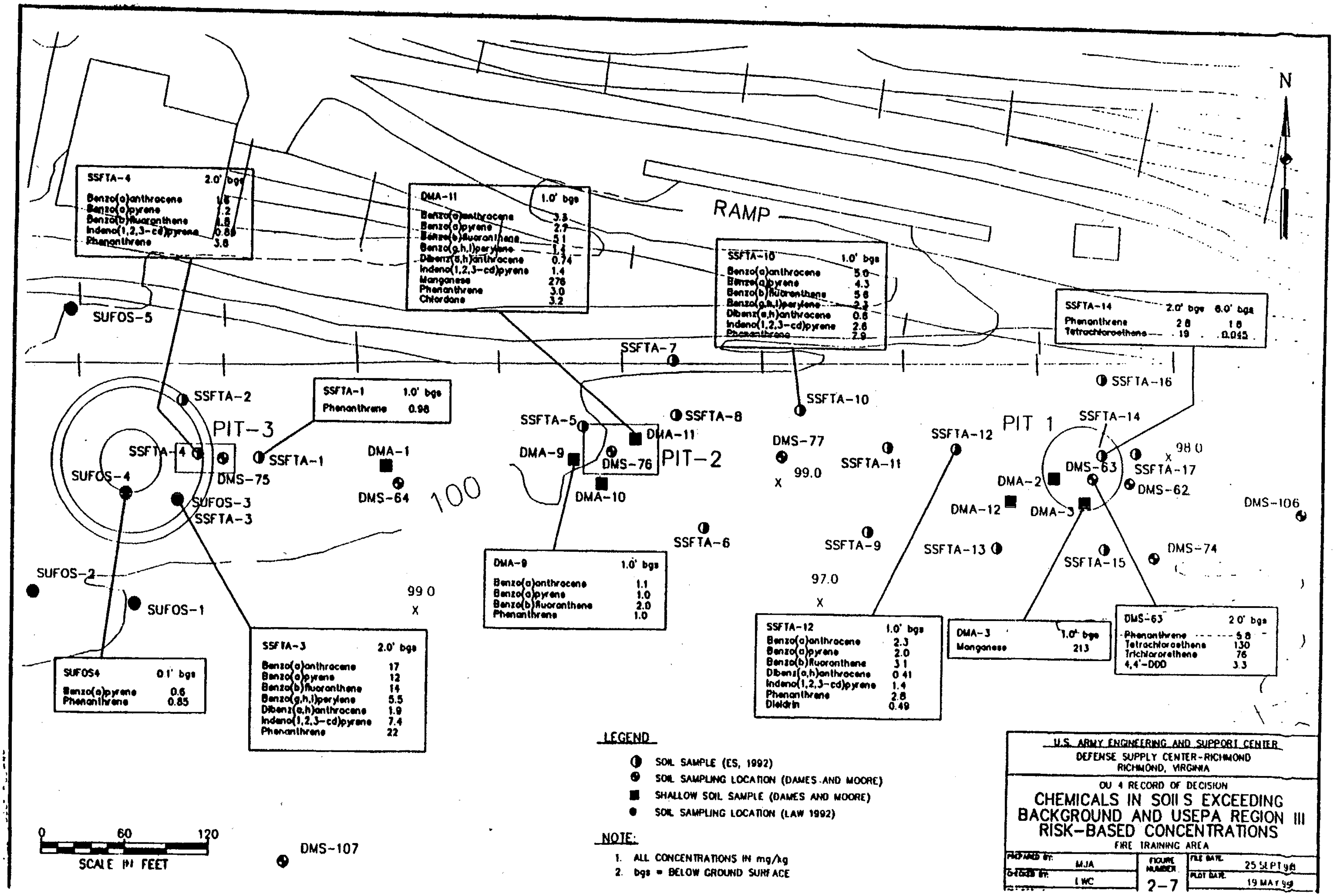
OU 4 RECORD OF DECISION

SOIL SAMPLING LOCATIONS (1995)

FIRE TRAINING AREA

PREPARED BY/DATE:	DCS 2/14/97	FIGURE NUMBER:	FILE DATE:	06.FEB.97
CHECKED BY/DATE:	XCW 2/14/97	2-6	PLOT DATE:	25.SEPT.98
APPROVED BY/DATE:	10300-5-3109		FILE NAME:	FTAMAP3.DWG

FILE: /DSCR/ROD-RPT/


N
RAMP
SSFTA-4 2.0' bgs
Benzo(a)anthracene 1.6
Benzo(a)pyrene 1.2
Benzo(b)fluoranthene 1.8
Indeno(1,2,3-cd)pyrene 0.89
Phenanthrene 3.8
DMA-11 1.0' bgs
Benzo(a)anthracene 3.3
Benzo(a)pyrene 2.7
Benzo(b)fluoranthene 5.1
Benzo(g,h,i)perylene 1.4
Dibenz(a,h)anthracene 0.74
Indeno(1,2,3-cd)pyrene 1.4
Manganese 276
Phenanthrene 3.0
Chlordane 3.2
SSFTA-10 1.0' bgs
Benzo(a)anthracene 5.0
Benzo(a)pyrene 4.3
Benzo(b)fluoranthene 5.6
Benzo(g,h,i)perylene 2.3
Dibenz(a,h)anthracene 0.6
Indeno(1,2,3-cd)pyrene 2.6
Phenanthrene 7.9
SSFTA-14 2.0' bgs 6.0' bgs
Phenanthrene 2.8 1.6
Tetrachloroethene 19 0.045
SUFOS-5
SSFTA-7
SSFTA-16
SSFTA-2
SSFTA-1 1.0' bgs
Phenanthrene 0.98
PIT-3
SSFTA-4
SSFTA-1
SUFOS-4
DMS-75
SUFOS-3
SSFTA-3
DMA-1
DMS-64
100
SSFTA-5
DMA-9
DMA-11
DMS-76
PIT-2
DMA-10
SSFTA-8
SSFTA-10
DMS-77
99.0
SSFTA-11
SSFTA-12
PIT 1
SSFTA-14
98.0
DMS-63
SSFTA-17
DMA-2
DMS-62
DMA-12
DMA-3
DMS-106
SSFTA-6
SSFTA-9
SSFTA-13
SSFTA-15
DMS-74
SUFOS-2
SUFOS-1
99.0
97.0
DMA-9 1.0' bgs
Benzo(a)anthracene 1.1
Benzo(a)pyrene 1.0
Benzo(b)fluoranthene 2.0
Phenanthrene 1.0
SUFOS4 0.1' bgs
Benzo(a)pyrene 0.6
Phenanthrene 0.85
SSFTA-3 2.0' bgs
Benzo(a)anthracene 17
Benzo(a)pyrene 12
Benzo(b)fluoranthene 14
Benzo(g,h,i)perylene 5.5
Dibenz(a,h)anthracene 1.9
Indeno(1,2,3-cd)pyrene 7.4
Phenanthrene 22
SSFTA-12 1.0' bgs
Benzo(a)anthracene 2.3
Benzo(a)pyrene 2.0
Benzo(b)fluoranthene 3.1
Dibenz(a,h)anthracene 0.41
Indeno(1,2,3-cd)pyrene 1.4
Phenanthrene 2.8
Dieldrin 0.49
DMA-3 1.0' bgs
Manganese 213
DMS-63 2.0' bgs
Phenanthrene 5.8
Tetrachloroethene 130
Trichloroethene 76
4,4'-DDD 3.3
LEGEND
SOIL SAMPLE (ES, 1992)
SOIL SAMPLING LOCATION (DAMES AND MOORE)
SHALLOW SOIL SAMPLE (DAMES AND MOORE)
SOIL SAMPLING LOCATION (LAW 1992)
NOTE:
1. ALL CONCENTRATIONS IN mg/kg
2. bgs = BELOW GROUND SURFACE
0 60 120
SCALE IN FEET
DMS-107
U.S. ARMY ENGINEERING AND SUPPORT CENTER
DEFENSE SUPPLY CENTER-RICHMOND
RICHMOND, VIRGINIA
OU 4 RECORD OF DECISION
CHEMICALS IN SOILS EXCEEDING BACKGROUND AND USEPA REGION III RISK-BASED CONCENTRATIONS
FIRE TRAINING AREA
PREPARED BY: MJA
CHECKED BY: LWC
FIGURE NUMBER 2-7
FILE DATE 25 SEPT 98
PLOT DATE 19 MAY 99

TABLES

TABLE 2-1

CHEMICALS DETECTED IN SURFACE AND SUBSURFACE SOILS
Fire Training Area Source Area - Operable Unit 4
Defense Supply Center Richmond
Richmond, Virginia

PARAMETER	FREQUENCY OF DETECTION (a)	RANGE OF REPORTED VALUES	MAXIMUM BACKGROUND CONCENTRATION (b)	USEPA REGION III RISK-BASED SCREENING CONCENTRATION (c)	FREQUENCY OF EXCEEDANCE (d)	COPC SELECTION CRITERIA
METALS, mg/kg:						
Aluminum	24/24	788-12,000	17,000	7,800	0/24	
Arsenic	22/24	0.53-81	84 (h)	0.43	0/24	
Barium	19/24	5.9-76	120	550	0/24	
Beryllium	10/24	0.2-1.2	0.50	16	0/24	
Cadmium	2/24	1-2	0.55	7.8	0/24	
Calcium	19/24	46-2,610	5,100	—	0/24	
Chromium	24/24	1.4-20	120	23	0/24	
Cobalt	17/24	1.5-54	180	470	0/24	
Copper	22/24	2.6-34	14	310	0/24	
Cyanide	1/8	1.75	—	160	0/8	
Iron	24/24	305-27,400	32,000	2,300	0/24	
Lead	24/24	1.8-102	200	—	0/24	
Magnesium	21/24	160-1,430	2,200	—	0/24	
* Manganese	24/24	2- 276	180	160	0/24	e
Mercury	11/24	0.11-0.4	0.18	2.3	0/24	
Nickel	6/24	3 4-12 N	10	160	0/24	
Potassium	19/24	183-2,890	1,100	—	0/24	
Selenium	4/24	0.2-2.6	1.9	39	0/24	
Silver	5/24	0.6-2.4 N	5.3	39	0/24	
Tin	2/8	5-243	—	4,700	0/8	
Vanadium	22/24	2.4-34	230	55	0/24	
Zinc	23/24	2-129	59	2,300	0/24	
SEMI-VOLATILES, mg/kg:						
Acenaphthene	9/58	0.082-3.3	0.37	470	0/58	
Anthracene	13.58	0.025-8.9	0.37	2,300	0/58	
* Benzo(a)anthracene	21/58	0.05 J- 17	0.51	0.87	6/58	e
* Benzo(a)pyrene	18/58	0.042 J - 12	0.53	0.087	7/58	e
* Benzo(b)fluoranthene	20/58	0.088 J- 14	0.86	0.87	6/58	e
* Benzo(g,h,i)perylene	10/58	0.067 J-5.5	0.47	—	3/58	f
Benzo(k)fluoranthene	12/58	0.088 J-5.2	0.37	8.7	0/58	
Bis(2-ethylhexyl) phthalate	16/58	0.064 J-0.71	0.95	46	0/58	
Carbazole	6/34	0.13 J-2.5 J	0.37	32	0/34	
Chrysene	23/58	0.057 J-14	0.77	87	0/58	
* Dibenz(a,h)anthracene	6/58	0.071-1.9 J	0.37	0.087	4/58	e
Dibenzofuran	7/58	0.052 J-2.2	—	31	0/58	
1,2-Dichlorobenzene	2/58	1.2-26 J	—	700	0/58	
1,3-Dichlorobenzene	1/39	1.4 J	—	7	0/39	
1,4-Dichlorobenzene	1/39	14 J	—	27	0/39	
3,3'-Dichlorobenzidine	1/39	0.42	—	1.4	0/39	
Diethyl phthalate	11/58	0.15 J-2.8	—	6,300	0/58	
Di-n-butyl phthalate	3/58	0.045 J-0.12	—	780	0/58	
Fluoranthene	29/58	0.053 J-23	1.6	310	0/58	
Fluorene	8/58	0.11 J-3.2 J	0.37	310	0/58	
* Indeno(1,2,3-cd)pyrene	12/58	0.08 J - 7.4	0.43	0.87	6/58	e
2-Methylnaphthalene	5/58	0.045 J-5.6	—	160	0/58	
4-Methylphenol	1/39	0.076 J	—	39	0/39	
Naphthalene	5/58	0.056 J-6.4	—	160	0/58	
N-Nitrosodiphenylamine	2/58	0.01-1.2 J	—	130	0/58	
* Phenanthrene	25/58	0.041 J-22	0.67	—	11/58	f
Pyrene	25/58	0.069 J-23	1.1	230	0/58	

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TABLE 2-1

CHEMICALS DETECTED IN SURFACE AND SUBSURFACE SOILS
Fire Training Area Source Area - Operable Unit 4
Defense Supply Center Richmond
Richmond, Virginia

PARAMETER	FREQUENCY OF DETECTION (a)	RANGE OF REPORTED VALUES	MAXIMUM BACKGROUND CONCENTRATION (b)	USEPA REGION III RISK-BASED SCREENING CONCENTRATION (c)	FREQUENCY OF EXCEEDANCE (d)	COPC SELECTION CRITERIA
VOLATILES, mg/kg:						
Acetone	16/58	0.003 J-0.066 J	---	780	0/58	
Chlorobenzene	1/39	0.63 J	---	160	0/39	
Chloroethane	3/39	0.003 J-0.013 J	---	220	0/39	
Chloroform	1/58	0.008 J	---	100	0/58	
total-1,2-Dichloroethene	8/42	0.001 J-0.16	---	70	0/42	
trans-1,2-Dichloroethene	1/16	0.061	---	160	0/16	
Ethylbenzene	2/58	0.025-0.47 J	---	780	0/58	
Methylene Chloride	7/58	0.004 J-0.038	---	85	0/58	
* Tetrachloroethene	12/58	0.001 J - 130	---	[12]	2/58	e
Toluene	6/58	0.001 J-1.5 J	---	1,600	0/58	
1,1,1-Trichloroethane	2/58	3.7-7.3	---	160	0/58	
* Trichloroethene	14/58	0.003 J - 76	---	[58]	1/58	e
Xylenes (total)	3/58	0.1-7.6	---	16,000	0/58	
PESTICIDES, mg/kg:						
* Chlordane (total)	4/46	0.0319 - 3.2	0.066 (g)	[1.8]	1/46	e
* 4,4-DDD	8/49	0.0046- 3.3	0.03	[2.7]	1/49	e
4,4-DDE	4/49	0.0039-0.36	0.2	1.9	0/49	
4,4-DDT	14/49	0.006-1.9	0.08	1.9	0/49	
* Dieldrin	4/30	0.0029 J - 0.49 J	0.016	[0.04]	1/30	e
Methoxychlor	1/30	0.0054 J	---	39	0/30	
PCB-1260	2/30	0.052-0.077	---	0.32	0/30	
2,4,5-T	2/17	0.11-0.25	---	78	0/17	
2,4,5-TP (Silvex)	1/17	0.085	---	63	0/17	
OTHER, mg/kg:						
Diesel	1/5	2.9	---	---	---	
Petroleum Hydrocarbons	6/22	560-2,400	---	---	---	

--- No background concentration established.
[ ] Indicates that levels in site samples exceed the boxed criterion level.
* Indicates compound selected as a contaminant of potential concern (COPC).
(a) Number of samples in which chemical was positively detected/ the number of samples available.
(b) Background concentration for DSCR based on the Revised Final Background Characterization Report (LAW, 1997).
(c) USEPA Region III Risk-Based Concentration (RBC) for Residential Soil, April 15, 1998.
(RBCs adjusted to represent a 0.1 hazard quotient, as appropriate)
(d) Number of samples in which chemical was detected at concentrations exceeding background and Region III Risk-Based concentrations/the number of samples available.
(e) Indicates contaminant exceeds Region III Risk-Based Concentration (RBC) for Residential Soil.
(f) Indicates contaminant concentration exceeds the background concentration and screening criteria not available.
(g) Value listed is the sum of alpha-chlordane and gamma-chlordane background concentrations.
(h) Derivation of arsenic background concentration documented in meeting minutes dated March 10, 1998.
BDL -Below Detection Limit
J -Estimated value
N -Spike sample recovery is not within control limits.
mg/kg -milligrams per kilogram, dry weight basis.

PREPARED BY/DATE: MJA 5/18/99
CHECKED BY/DATE: LWC 5/19/99

TABLE 2-2

SUMMARY OF CANCER RISK ESTIMATES
Fire Training Area Source Area - Operable Unit 4
Defense Supply Center Richmond
Richmond, Virginia

Population	Pathway	Estimated Excess Cancer Risk
CURRENT LAND USE	**OCCUPATIONAL ADULT**	
Occupational exposure to surface soils	- Incidental ingestion of soils	3E-06
	- Inhalation of fugitive dust	5E-10
	- Dermal contact with soils	2E-05
	Total Risk for Occupational Adult Worker:	**2E-05**
FUTURE LAND USE	**OCCUPATIONAL ADULT**	
Occupational exposure to surface and subsurface soils	- Incidental ingestion of soils	1E-06
	- Inhalation of fugitive dust	6E-11
	- Dermal contact with soils	8E-06
	Total Risk for Occupational Adult Worker:	**9E-06**
	CONSTRUCTION WORKER	
	- Incidental ingestion of soil	2E-07
	- Inhalation of fugitive dust	6E-12
	- Inhalation of volatiles	2E-09
	- Dermal contact with soils	2E-07
	Total Risk for Construction Worker:	**4E-07**
CURRENT/FUTURE LAND USE	**RECREATIONAL WADER**	
Recreational exposure to sediment and surface water	- Dermal contact with surface water	2E-06
	- Dermal contact with sediment	9E-08
	Total Risk for Recreational Wader:	**2E-06**
CURRENT/FUTURE LAND USE	**ON-BASE RECREATIONAL JOGGER**	
On-Base recreational exposure to surface soils	- Inhalation of fugitive dust	1E-10
	Total Risk for Recreational Jogger:	**1E-10**
FUTURE LAND USE (a)	**ON-SITE RESIDENTIAL ADULT**	
Residential exposure to surface and subsurface soils	- Incidental ingestion of soils	1E-05
	- Inhalation of fugitive dust	4E-10
	- Inhalation of volatiles	1E-07
	- Dermal contact with soils	4E-05
	Total Risk for Residential Adult:	**5E-05**

(a) Ground-water exposures are being addressed under Operable Unit 7.

53109.39

PREPARED BY/DATE: MJA 5/18/99
CHECKED BY/DATE: LWC 5/19/99

TABLE 2-3

SUMMARY OF HAZARD INDEX ESTIMATES

Fire Training Area Source Area - Operable Unit 4
Defense Supply Center Richmond
Richmond, Virginia

Population	Pathway	Estimated Hazard Index
CURRENT LAND USE	OCCUPATIONAL ADULT	
Occupational exposure to surface soils	- Incidental ingestion of soils	0.005
	- Inhalation of fugitive dust	0.007
	- Dermal contact with soils	0.02
	Total Hazard Index for Occupational Adult Worker:	**0.03**
FUTURE LAND USE	OCCUPATIONAL ADULT	
Occupational exposure to surface and subsurface soils	- Incidental ingestion of soils	0.005
	- Inhalation of fugitive dust	0.01
	- Dermal contact with soils	0.008
	Total Hazard Index for Occupational Adult Worker:	**0.02**
	CONSTRUCTION WORKER	
	- Incidental ingestion of soil	0.4
	- Inhalation of fugitive dust	0.02
	- Inhalation of volatiles	0.00008
	- Dermal contact with soil	0.003
	Total Hazard Index for Construction worker:	**0.4**
CURRENT/FUTURE LAND USE	ADULT RECREATIONAL WADER	
Recreational exposure to sediment and surface water	- Dermal contact with surface water	0.007
	- Dermal contact with sediment	0.0003
	Total Hazard Index for Recreational Adult:	**0.007**
	CHILD RECREATIONAL WADER	
	- Dermal contact with surface water	0.06
	- Dermal contact with sediment	0.002
	Total Hazard Index for Recreational Child:	**0.06**
CURRENT/FUTURE LAND USE	ON-BASE RECREATIONAL JOGGER	
On-Base recreational exposure to surface soils	- Inhalation of fugitive dust	0.002
	Total Hazard Index for Recreational Jogger:	**0.002**
FUTURE LAND USE (a)	RESIDENTIAL ADULT	
Residential exposure to surface and subsurface soils	- Incidental ingestion of soils	0.01
	- Inhalation of fugitive dust	0.04
	- Inhalation of volatiles	0.0001
	- Dermal contact with soils	0.01
	Total Hazard Index for Residential Adult:	**0.06**
	RESIDENTIAL CHILD	
	- Incidental ingestion of soils	0.1
	- Inhalation of fugitive dust	0.1
	- Inhalation of volatiles	0.0008
	- Dermal contact with soils	0.06
	Total Hazard Index for Residential Child:	**0.3**

(a) Ground-water exposures are being addressed under Operable Unit 7.

53109.39

PREPARED BY/DATE: MJA 5/18/99
CHECKED BY/DATE: LWC 5/19/99