EPA/ROD/R03-92/141
1992

EPA Superfund
Record of Decision:

DEFENSE GENERAL SUPPLY CENTER (DLA)
EPA ID: VA3971520751
OU 01
CHESTERFIELD COUNTY, VA
05/15/1992

FINAL RECORD OF DECISION FOR OU1-OPEN STORAGE AREA DEFENSE GENERAL SUPPLY CENTER RICHMOND, VIRGINIA

PREPARED FOR

DEFENSE LOGISTICS AGENCY
AND THE

U.S. ARMY CORPS OF ENGINEERS
HUNTSVILLE DIVISION

PREPARED BY:

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CONTRACT No. DACW87-90-D0023

JOB No. 11-1519

APRIL 1992

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Defense General Supply Center (DGSC)
Chesterfield County, Virginia

1.2 STATEMENT OF BASIS AND PURPOSE

1.2.0.1 This decision document presents the selected interim remedial action for the Open Storage Area source area (OSA source area), Operable Unit (OU1) at the Defense General Supply Center (DGSC) in Richmond, Virginia, which was chosen in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. SS9601 et seq., and to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) 40 C.F.R. Part 300. This decision is based on the administrative record for this site. This interim remedy was chosen by the Defense Logistics Agency (DLA) in consultation with the United States Environmental Protection Agency, Region III (EPA). Both the EPA and the Commonwealth of Virginia concur with the selected remedy.

1.3 ASSESSMENT OF THE SITE

1.3.0.1 Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

1.4.0.1 This operable unit is the first of eight operable units that are currently proposed for the DGSC site. Operable Unit 1 addresses the contaminated soils at the Open Storage Area (OSA). The other Operable Units, and the portions of the site that they address are as follows:

- OU2 - Area 50 Source Area
- OU3 - National Guard Area Source Area
- OU4 - Fire Training Source Area
- OU5 - Acid Neutralization Pits Source Area
- OU6 - Open Storage Area/Area 50/National Guard Area Ground Water
- OU7 - Fire Training Area Ground Water
- OU8 - Acid Neutralization Pits Ground Water

1.4.0.2 This action addresses the contaminated soils at the Open Storage Area source area by establishing physical and institutional controls to limit access to the soils.

1.4.0.3 The major components of the selected remedy include:

- Continued operation of the site as a restricted area in which access to the site is controlled by a dual system of fences and gates. Security personnel also restrict access to the fenced area.
- Institutional Controls including deed restrictions to restrict future development of the area. Restrictions which will limit future development include limitations on the transfer of the property, maintenance protocol, and which require environmental sampling prior to the start of any construction at the area, and ambient air testing and personnel monitoring during the construction phase.

1.5 STATUTORY DETERMINATIONS

1.5.0.1 The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is

cost effective. However, because treatment was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

1.5.0.2 Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action in accordance with CERCLA Section 121 (c), 42 U.S.C. S9621 (c) to ensure that the remedy continues to provide adequate protection of human health and the environment.

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION AND DESCRIPTION

Open Storage Area (OSA) Source Area - Operable Unit 1, Contaminated Soils
Defense General Supply Center (DGSC)
Chesterfield County, Virginia

2.1.0.1 The DGSC is located in Chesterfield County, Virginia approximately 11 miles south of the City of Richmond (see Figure 2-1). The OSA is a 43-acre fenced area located along the western boundary in the central portion of the DGSC. The OSA is used for the storage of drummed and containerized chemicals. The majority of the chemicals stored at the OSA are petroleum, oil and lubricant (POL) products.

2.1.0.2 The DGSC was originally constructed in 1941 as two separate facilities: i.e, the Richmond General Depot and Richmond Holding and Reconsignment Point. In 1962 the installation became known as the DGSC.

2.1.0.3 The Defense Logistics Agency (DLA), an agency of the Department of Defense (DOD), provides logistics support to the military services including procurement and supply support, contract administration and other services. Since 1942, the DGSC's mission has been the managing and furnishing of military general supplies to the Armed Forces and several Federal Civilian Agencies. Today DGSC manages more than 300,000 general supply items at a facility valued at $100 million and encompassing 640 acres. The DGSC has more than 16 million square feet of covered storage space in 27 large brick warehouses and a million square feet of office space.

2.1.0.4 Land use in Chesterfield County in the vicinity of the DGSC is primarily single family residential, intermixed with retail stores and light industry.

2.1.0.5 The DGSC is the major industry in the area. The area to the northeast and east of the DGSC has been developed as both single family and multi-family housing. Area 50 and the National Guard Area (NGA) are located immediately downgradient of the OSA. A wooded area and apartment complex is located east of the NGA. Rayon Park, a sparsely populated housing subdivision consisting of 83 houses, is located east of the DGSC and south of the wooded area. Municipal water is supplied to the residents of the downgradient apartment complex and Rayon Park.

2.1.0.6 The DGSC 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 F and 60 F. 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 DGSC is variable most of the time, although the prevailing wind direction is southerly.

2.1.0.7 The land surface at the DGSC has been extensively altered by grading and filling operations. Generally, the topography is essentially flat with a slight slope towards the northeast. The maximum difference in the local topographic relief is approximately 30 feet. Elevations range from 135 feet above mean sea level (msl) at the southwest corner of the facility to 108 feet above msl near the northeastern portion. Surface drainage in the OSA area is presently directed towards a storm sewer system that drains northeastward and discharges into the unnamed creek at the northeast corner of NGA. The unnamed creek flows north-to-south along the eastern edge of the NGA, turns to the east, and ultimately discharges into the James River.

2.1.0.8 The unconsolidated soils below the DGSC 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 is typically 11 feet thick. The Aquia Formation, approximately 7 feet of gray sand, gravel and clay, underlies 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 silt and clay seams. Bedrock in the region consists of the Petersburg Granite.

2.1.0.9 Soils and geologic conditions at the OSA area were characterized during the Remedial Investigation (RI) at the site. An unconfined water table aquifer is present within the Eastover Formation. This aquifer, referred to in this document as the Upper Aquifer, would be the first water bearing unit to be impacted by any contamination originating from the OSA. Vertical migration of contaminants from the Upper Aquifer would be inhibited by the underlying Calvert and Aquia Formations. These two formations, which have lower permeabilities than the overlying and underlying formations, are referred to as the Confining Unit. The confined Lower Aquifer underlying these two formations is located in the Potomac Formation.

2.1.0.10 Ground-water flow in the Upper Aquifer is generally towards the north-northeast. The average depth to ground water varies with season but typically ranges from 13 to 16 feet below ground surface. The hydraulic gradient has been calculated to range from 0.05 percent to 0.12 percent. The low hydraulic gradient in the ground water indicates that the potentiometric surface and ground-water flow direction are susceptible to seasonal changes in recharge, discharge or precipitation. Flow direction of ground water within the Lower Aquifer is generally east to northeast.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.0.1 Past industrial operations at the DGSC 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 DGSC 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 DGSC. There are underground gasoline and fuel storage tanks located throughout the installation.

2.2.0.3 Chemical operations at the DGSC have included storing and shipping flammable, toxic, corrosive and oxidizer chemicals for DLA. The majority of the chemicals are stored in warehouses at the DGSC. Chemicals stored at the DGSC have also included pesticides and herbicides for use at DGSC and as part of the chemical stock mission of the DGSC. The open storage areas at the facility are utilized primarily for open storage of 55-gallon drums of petroleum, oils, and lubricants. 2.2.0.4 The Open Storage Area source area (OSA source area), Operable Unit 1, consists of Open Storage Areas 38 through 47 (see Figure 2-2). The OSA source area has been used for the storage of drummed and containerized chemicals since the opening of the facility in 1942. The OSA source area is not paved, and drums in storage are stored directly on the ground or on wooden skids. Pathways between the drums are paved. Spills and leaks have been reported to have occurred within this area.

2.2.0.5 The northern end of Storage Areas 39 and 40 was the site of former drum recoupment activities carried out between the early 1960s and the late 1970s. Recoupment activities involve transferring the contents of leaking or damaged containers into new or reclaimed drums. The soils in the vicinity of the former recoupment area are reportedly stained from past spills, as are the soils in other locations around the OSA source area. Three documented spills of malathion occurred at the OSA source area between 1977 and 1980, though no resulting ground-water contamination has been identified in the area. All three spills occurred from 55-gallon drums awaiting recoupment.

2.2.0.6 In 1984, the DGSC was recommended for placement on the CERCLA National Priority List (NPL), and was promulgated to the NPL in 1987. This action was a result of a Hazard Ranking System (HRS) scoring performed for the DGSC that was based on the conclusions of previous studies done at the site by the United States Army Environmental Hygiene Agency (USAEHA). The DGSC received a hazardous ranking score of 33.85, with 28.5 being the minimum necessary to be promulgated to the NPL. In August, 1986 the United States Environmental Protection Agency, Region III (EPA), issued a Corrective Action Permit to DGSC pursuant to the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. SS6901 et seq. As part of RCRA activities conducted at the site, Dames and Moore, a contractor of DGSC, submitted three Remedial Investigation Reports pertaining to sites investigated at DGSC in 1989. The three reports submitted by Dames and Moore, Bethesda, Maryland were as follows:

- Remedial Investigation for the Fire Training Area, May 1989;
- Remedial Investigation for the Acid Neutralization Pits Area, April 27, 1989; and
- Remedial Investigation for the Open Storage Area/Area 50/National Guard Area, July 1989.

In September, 1990, the DLA, DGSC, EPA, and the Commonwealth of Virginia entered into a CERCLA Interagency Agreement (IAG) pursuant to Section 120 of CERCLA, 42 U.S.C. S9620, which contains the requirements for the implementation of remediation activities.

2.3 SUMMARY OF COMMUNITY PARTICIPATION

2.3.0.1 On February 23, 1984, the DGSC organized an Interagency Task Force comprised of State regulatory agencies, EPA, County agencies, Virginia National Guard, Rayon Park Representatives, and DGSC 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. This group was active in the mid 1980s, but became less active after county water supply lines were installed to service residents located near DGSC boundaries.

2.3.0.2 The proposed plan for Operable Unit 1 - Open Storage Area was released to the public on January 20, 1992. This document was made available to the public in the administrative record maintained at the Chesterfield Public Library at the Chesterfield County Courthouse in Chesterfield, Virginia. The notice of availability for this document was published in the Richmond Times Dispatch on January 20, 1992. The public comment period was held through March 6, 1992. In addition, a public meeting was held on February 20,1992. At this meeting, representatives from the DLA, EPA, and Commonwealth of Virginia answered questions concerning the remedial alternatives evaluated for this site. The thirty day public comment period was extended until April 6, 1992 due to a request made by a member of the public. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for Operable Unit One - Open Storage Area at the DGSC in Chesterfield County, Virginia, chosen in accordance with CERCLA and to the extent practical, the National Contingency Plan.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

2.4.0.1 As with many Superfund sites, the problems at DGSC are complex. As a result, the work at the site has been organized into eight operable units. These are:

OU 1 - Open Storage Area Source Area

OU 2 - Area 50 Source Area

OU 3 - National Guard Area 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 Water

OU 7 - Fire Training Area Ground Water

OU 8 - Acid Neutralization Pits Ground Water

2.4.0.2 The scope of this action addresses the first operable unit (OU1) at the site, the OSA source area (see Figures 2-1 and 2-2). OU1 addresses the contaminated soils present at the OSA. The purpose of this action is to prevent current or future exposure to contaminated soils at the site by restricting access to the OSA source area and insuring that any onsite construction activities conform to DLA and DGSC policies regarding military construction. Ground water at the OSA source area has not been shown to be impacted by contaminants leaching from the soils at the OSA source area.

2.5 SUMMARY OF SITE CHARACTERISTICS

2.5.0.1 Contamination of the soil at the OSA source area results from the chemical handling and storage activities conducted between the late 1950s and the present. Based on a review of past activities, the types of contamination that are present includes petroleum products, chlorinated and nonchlorinated solvents, pesticides, and herbicides. Elevated levels of some metals may also be identified as a result of their potential presence in the POL products at the site.

2.5.0.2 Several sampling and analysis programs have been performed at the OSA in order to evaluate the magnitude and extent of contamination. The complete analysis results are detailed in the Draft Remedial Investigation Report, Area 50/OSA/NGA - Dames and Moore, Bethesda, Maryland, July 1989. The locations of the soil samples were selected to identify sources of contaminants, potential pathways of contaminant migration

as well as the magnitude and extent of contamination.

2.5.0.3 The results of the chemical analysis on the soil samples are presented in Table 2-1. The soil samples were analyzed for the full Target Compound List (TCL) and Target Analyte List (TAL) constituents. Table 2-1 provides a summary of those constituents which were detected in at least one sample at concentrations above background. As shown in Table 2-1, the most frequently detected constituents in the soils at the OSA were semi-volatile organics including primarily polycyclic aromatic hydrocarbons (PAHs). Other constituents detected in soils from this site included four metals (antimony, arsenic, cadmium, chromium (VI)), volatile organics and pesticides. Constituents present in the soils in the OSA were primarily limited to the surface soils. The highest concentrations of PAHs and pesticides were found in samples from 0 to 4 feet deep. The only constituents detected at depth were antimony, arsenic, acetone, carbon disulfide, toluene, and xylene.

2.5.0.4 The primary constituents detected in the surficial (upper) aquifer ground water at OSA were volatile organics, phthalates, and inorganics (Table 2-2).

2.5.0.5 As shown in Table 2-2, two inorganic constituents and six volatile organics were present in the shallow ground water at concentrations greater than MCLs. A comparison to Table 2-1 shows that none of the constituents detected in the Upper Aquifer were detected in soil samples from the OSA. Therefore, there appears to be no correlation between the constituents detected in the soils at the OSA source area and in the Upper Aquifer at this site. In addition, a separate operable unit - OU6 (Area 50/OSA/NG Area ground water) will address contaminated ground water in the vicinity of the OSA and other adjacent sites.

2.5.0.6 The only compounds detected in more than one sample in the Lower Aquifer at the OSA source area during the Remedial Investigation were methylene chloride, acetone, and bis(2-Ethylhexyl)phthalate. These compounds were determined to be laboratory contaminants. No correlation was established between compounds detected in the Lower Aquifer and compounds in the soils at the OSA.

2.5.0.7 As there are no promulgated chemical-specific ARARs for constituents in soils, risk-based soil action levels were derived for the constituents in soils at the OSA source area. The risk-based soil action levels are presented in Table 2-3. Risk-based action levels or maximum background levelsfor antimony and arsenic were exceeded in only one sample each from depths greater than 5 feet. There was no standard available to use for a background level for antimony. It was determined in the Draft Remedial Investigation Report, Area 50/Open Storage Area/National Guard Area, Dames and Moore, Bethesda, MD, July, 1989, that the maximum background level for arsenic was 73.0 ppm.

2.5.0.8 Risk-based soil action levels were developed in accordance with EPA guidelines to be protective of workers at the facility who may be exposed to contaminated soils, via incidental ingestion, dermal contact, and inhalation of fugitive dusts during excavation activities. The risk-based soil action levels for carcinogenic constituents are based on a total risk, via all pathways of 1 x 10[-6]. The action levels for noncarcinogenic constituents are based on a total hazard index, via all pathways of less than 1.

2.6 SUMMARY OF SITE RISKS

2.6.0.1 A baseline risk assessment was conducted for the OSA source area as documented in the Draft Remedial Investigation Report, Area 50/Open Storage Area/National Guard Area, Dames and Moore, Bethesda, MD, July, 1989. The purpose of the assessment was to evaluate the potential human health and environmental risks posed by soil and ground-water contamination detected at the OSA. This risk assessment did not distinguish between source area and ground-water based risks. The results of the baseline risk assessment as they pertain to the OSA source area (i.e., contaminated soils) are summarized briefly below.

2.6.0.2 The potential exposure pathways which were considered in the baseline risk assessment included the following:

- Ingestion and dermal contact with ground water
- Ingestion and dermal contact with contaminated soils
- Inhalation of vapors and dusts
- Ingestion and dermal contact with surface water
- Ingestion of fish and game
- Ingestion of crops and other plants

2.6.0.3 Each of these pathways were evaluated for both on-site and off-site receptors, under both current and future conditions. On-site workers could be exposed during both current and proposed (future) warehouse construction. A complete exposure pathway includes a source, release mechanism, environmental transport route, receptor, and exposure route. Of the 44 exposure pathways considered in the baseline risk assessment, only 20 were considered to be complete.

2.6.0.4 The potential current exposure pathways considered to be complete at this site are summarized below:

- Current ingestion of soils, inhalation of dust and dermal contact with soils during excavation activities by on-site workers.

- Current inhalation of vapors and particulates by on-site workers.

- Current ingestion and dermal contact with surface water by off-site residents.

2.6.0.5 The potential future exposure pathways which were considered to be complete are summarized below:

- Future inhalation of dust and dermal contact with soils during construction and excavation activities by on-site workers.

- Future ingestion and dermal contact with ground water by off-site residents.

- Future inhalation of dust, ingestion of soil and dermal contact with soils from construction and excavation activities by offsite residents.

- Future ingestion and dermal contact with surface water recharged by contaminated ground water by off-site residents.

2.6.0.6 Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10[-6] or 1E6). An excess lifetime cancer risk of 1 x 10[-6] indicates that, as a plausible upper bound, an individual has one in a million additional chance of developing cancer as a result of site- related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

2.6.0.7 The potential carcinogenic risks from all current and future on-site exposures to soils were calculated to be 4 x 10[-8]. This is less than the standard risk range EPA uses for evaluating carcinogenic risks which is 1 x 10[-4] to 1 x 10[-6]. Because on-site risks were less than 10[-6], potential carcinogenic risks from current and future off-site exposures to soils were not calculated, but were assumed to be less than 4 x 10[-8].

2.6.0.8 Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the Hqs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

2.6.0.9 The potential non-carcinogenic hazard index from all current and future onsite exposure to soils was estimated to be 1 x 10[-6]. This value is far below the threshold value of 1.0 which represents a potentially unacceptable risk to human health from systemic toxicants (non-carcinogenic effects).

2.6.0.10 The potential risks involved from ground water at the site will be addressed in a separate operable unit (OU6) for ground water at the DGSC. This operable unit addresses the entire ground-water contaminant "plume" encompassing the Area 50/OSA/NG Area, as well as any other affected area.

2.6.0.11 Risks posed by the site to the environment were considered very slight during the RI. This was mainly because of the low levels of contaminants present. The primary exposure pathway which was considered in the environmental pathway was surface run-off to the stream near the site. Also, in assessing the environmental transport routes present at the site, no critical habitats or endangered species were identified that would be affected.

2.6.0.12 The primary contaminants addressed by remedial alternatives are semi-volatile organics. Although some metals are present, their concentration and extent are very limited. Minimal risk is associated through exposure to these metals as they are at a depth greater than 5 feet, and would not be disturbed by any excavation activities.

2.6.0.13 Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

2.7 DESCRIPTION OF ALTERNATIVES

2.7.0.1 CERCLA requires that each selected remedy be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (ARARs), utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and be cost effective. 2.7.0.2 During the Focused Feasibility Study for the OSA source area site (Focused Feasibility Study Report - OU1 Open Storage Area, Law Environmental, Kennesaw, GA, November, 1991), six remedial action alternatives were initially identified. As a result of screening process, four out of six remedial action alternatives were selected for detailed analysis. The four alternatives that were retained were:

- Alternative 1 - Surface Contaminant/Capping
- Alternative 3 - Excavation and Soil Washing
- Alternative 5 - Institutional Controls
- Alternative 6 - No Action Alternative

2.7.0.3 These four alternatives are described in the following paragraphs. For reference, the same alternative numbers as in the Feasibility Study Report are assigned to these alternatives.

Alternative 1 (Surface Containment/Capping)

Capital Cost:	$576,105
Annual O&M Costs:	$ 20,000
Present Worth Cost:	$825,300
Months to Implement:	6 to 9 months

2.7.0.4 Surface Containment/Capping: The proposed design is for a multi-layer cap that includes an asphaltic concrete upper surface underlain by a layer of gravel with a bitumen-saturated non-woven geotextile fabric sandwiched between the asphalt layers. Cap surface area would be approximately 31,218 sq. yd. Existing drainage structures would be utilized. The site soils are generally well compacted and settlement under the cap should not be a problem.

2.7.0.5 We have assumed that approximately 15% of the total OSA source area would need to be capped. The cap would extend to suitable distances beyond the areas with detectable contamination.

Alternative 3 (Excavation and Soil Washing)

Capital Cost:	$6,067,578
Annual O&M Costs:	$ 0
Present Worth Cost:	$6,067,578
Months to Implement:	12 to 18 months

2.7.0.6 The use of soil washing has been found to be effective in reducing the mass of both organic and inorganic contaminants in contaminated soils. However, every site is unique in both soil and contamination, therefore the process must be designed and tested for each site prior to its approval and application. For costing purposes, we have assumed a volume comprising 10% of the soils in the OSA source area to a depth of four feet.

- Soil Testing: Additional soil testing would be required to provide better delineation of areas requiring treatment. A considerable number of samples could be required. The cost of analysis could be reduced considerably by using a field screening method backed up with laboratory results. The cost of additional soil testing has not been considered in this detailed analysis.
- Site Preparation/Mobilization: Surface preparation prior to excavation would require the relocation of the numerous drums stored at the site. The site will need to be segregated into zones and

staging areas prior to mobilization or construction of the treatment equipment. Site zones will include the exclusion zone, support zone, and decontamination zone as well as a staging area for temporary storage of excavated soil prior to treatment. Another staging area will be required for temporary storage of treated soil for curing prior to re-emplacement. Staging requirements will depend on the allowable throughput rates of treatment equipment relative to excavation, estimated contact times, and re-emplacement rates. The general work area including all zones and staging areas will be fenced to delineate boundaries and prevent uncontrolled access.

- Equipment Testing: Prior to adoption of this alternative, bench-scale treatability tests may be necessary to ensure that remedial goals will be achieved. Testing will also be necessary at the site, just after the treatment units have been erected and prior to full implementation of remedial activity, to provide for air emissions permitting requirements and to verify on-site performance of the equipment.

- Excavation: Excavation will be accomplished using frontend loaders where site conditions permit. For the shallow (4 feet) excavation depth at the OSA source area, this will not present a problem.

Alternative 5 (Institutional Controls)

Capital Cost:	$ 15,000
Annual O&M Costs:	$ 0
Present Worth Cost:	$ 15,000
Months to Implement:	2 to 6 months

2.7.0.7 The Institutional Controls alternative involves instituting various access restrictions and institutional controls to prevent current and future human exposure to contaminated media at the site. No measures are taken which address or constitute remediation of the site.

- Access Restrictions: These generally consist of fencing, warning signs, and sometimes, active security measures such as guards and patrols. Since the DGSC is a secure federal facility, site access is already restricted and further access restrictions would not be required. Access control to the OSA source area itself is provided by a separate security system in addition to that of the main post. Therefore, a dual security system is in effect and will continue to be provided at the OSA site.

- Long-Term Institutional Controls: Institutional controls will include deed restrictions which will limit future development as follows:

1. Transfer of Property:

- The transfer of the property known as the Defense General Supply Center shall be in accordance with Section 120(h) of CERCLA, 42 U.S.C. S9620 (h) and any regulations promulgated pursuant to Section 120 (h); (see 40 C.F.R. S373 [1990]). See Attachment A.

2. Maintenance and Construction within the physical boundaries of the Open Storage Area:

- Maintenance: The DGSC's regulation, DGSCR 4150.1, shall be modified to require an environmental review in section III which is a statement of policy. The ROD shall be incorporated in the section I, which is a list of the references. See Attachment B.

- Military Construction Projects: An environmental site assessment shall be performed in accordance with the guidance provided in the DLA-W Policy Memorandum dated 27 December 1989 (see Attachment C), and shall be completed prior to project design within the OSA; and

3. Monitoring

. Any monitoring that is required as a result of the environmental site assessment described above will include soil gas sampling prior to the start of the project, and soil analysis, ambient air testing, and personnel monitoring during the construction phase of the project.

2.7.0.8 No further site restrictions (such as fences or signs) are required because the site is already operated as a restricted area. No measures are taken which constitute remediation of the site. If activities include new construction regrading or reworking of soils, measures will be taken to insure that workers and the public are adequately protected during site activities. These measures will include environmental sampling and personnel monitoring. Should hazardous waste be encountered during any construction or excavation activities, a prearranged plan, which shall be approved by the EPA and Commonwealth of Virginia, will be available and will be invoked. This alternative would require a five-year review in accordance with Section 121 (c) of CERCLA, 42 U.S.C. S9621 (c).

Alternative 6 (No Action Alternative)

Capital Cost:	$	0
Annual O&M Costs:	$	0
Present Worth Cost:	$	0
Months to Implement:	N/A	

2.7.0.9 The No Action alternative, as its name implies, involves absolutely no action at the site. The site is left in its present condition. The risks to human health and the environment remain at the levels established in the baseline risk assessment.

2.7.0.10 The No Action alternative is carried through the screening process are required by the NCP. It is used as a baseline for comparison with the other alternatives that are developed.

2.8 COMPARATIVE ANALYSIS SUMMARY

2.8.0.1 For the comparative analysis presented below, the alternatives from the detailed analysis were evaluated utilizing the EPA's nine evaluation criteria as laid forth in the EPA's document, "Guidance on Preparing Superfund Decision Documents, July 1989". These nine criteria are as follows:

1. Overall protection of Human Health and the Environment addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for the invocation of a waiver.

3. Long-Term Effectiveness and Permanence refers to the magnitude of residual risk and ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment refers to the objective of the treatment technologies that may be employed to remedy site concerns.

5. Short-Term Effectiveness refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment as a result of the construction and implementation activities.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

7. Cost includes capital and operation and maintenance costs.

8. State/Support Agency Acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the State and/or the Support Agency concurs with, opposes, or has no comment to the preferred alternative.

9. Community Acceptance will be assessed in the Record of Decision following a review of the public comments received on the RI/FS report and the Proposed Plan.

2.8.0.2 Overall protection of human health and the environment:

- Alternative 3 (Excavation and Soil Washing). This alternative is effective at protecting human health and the environment as it employs treatment as the principal remediation effort at the site. This alternative would be effective at removing the semivolatile and volatile organic compounds from the soils. Metals in the soils would not be affected by the treatment.

- Alternative 1 (Capping). This alternative does not reduce the toxicity or volume of the contaminants in the soil, but reduces their mobility. As the risk posed by the site is low and primarily associated with excavation, this alternative is effective at protecting human health and the environment.

- Alternative 5 (Institutional Controls). This alternative restricts access to the site to reduce the principal threat of exposure through ingestion or dermal contact with the contaminated soils, therefore it is protective of human health and the environment.

- Alternative 6 (No Action). Nothing is done to affect the current situation at the site. This alternative is not protective of human health and the environment.

2.8.0.3 Compliance with ARARs:

- ARARs and To Be Considered (TBC) requirements for the OSA source area are identified in Table 2-4. Chemical specific ARARs were not identified for the OSA soils. Thus, compliance with chemical specific ARARs are not an issue at the OSA. Risk-based soil action levels were determined as To Be Considered (TBC) requirements. However, these action levels or background levels were not exceeded except for single concentration of arsenic and antimony. Because these concentrations occurred at a depth of greater than 5 feet, they were not considered significant. This alternative will comply with the chemical-specific TBCs identified on Table 2-4 (risk-based soil action levels), with the exception of the single concentrations of arsenic and antimony discussed above. No location specific ARARs or TBCs wereidentified. Action specific ARARs and TBCs are discussed below.

- Alternative 3 (Excavation and Soil Washing) will not satisfy Virginia Solid Waste or Hazardous Waste Management Regulations for replacement of treated soil, and therefore is not being considered further.

- Alternative 1 (Capping) would satisfy the RCRA Closure Requirements.

- Alternative 5 (Institutional Controls) would satisfy appropriate OSHA and American Conference of Government Industrial Hygienists (ACGIH) requirements. In addition, Alternative 5 will meet the chemical-specific TBCs identified on Table 2-4 (riskbased soil action levels).

- Alternative 6 (No Action). There are no ARARs for a No Action Alternative.

2.8.0.4 Long-Term Effectiveness and Permanence:

- Alternative 1 (Capping) is assumed to be generally effective for as long as the cap material maintains its integrity. Assuming that the area that is capped is not heavily trafficked, and that periodic maintenance is performed to maintain and repair the cap materials, this type of cap can be expected to last anywhere from 20 to 50 years before requiring a complete reinstallation. Effectiveness of Alternative 1 also relies heavily on the assumption that the limiting of infiltration through the contaminated media will also limit continued contaminant migration.

- Alternative 5 (Institutional Controls) is only effective in preventing surface exposure at the site.

- Alternative 6 (No Action) leaves the site as it is and, like Alternative 5, is effective only if contaminant substances are already immobile or are significantly degraded by natural attenuation.

2.8.0.5 Reduction of Mobility, Toxicity, and Volume Through Treatment:

- Alternative 1 (Capping) is primarily aimed at reducing the mobility of contaminants and does nothing to decrease their toxicity and/or volume.

- Alternative 5 (Institutional Controls) seeks to limit exposure at the site. Alternative 5 does not affect contaminant mobility, toxicity, or volume.

- Alternative 6 (No Action) also does nothing to reduce contaminant mobility, toxicity, or volume.

2.8.0.6 Short-Term Effectiveness:

- Both Alternative 5 (Institutional Controls) and Alternative 6 (No Action) offer relatively equivalent short-term exposure potential since neither alternative involves disturbance of site materials, and since there was no excess risk from exposure to surface materials as determined in the baseline risk assessment.

- Alternative 1 (Capping) has a potential for short-term exposure to contaminated materials since grading of the site prior to installation of the surface cap may be required.

2.8.0.7 Implementability:

- Alternatives 5 (Institutional Controls) and 6 (No Action) are the easiest to implement in that no direct physical actions are to take place at the site as part of alternative implementation.

- Alternative 1 (Capping) is relatively moderately difficult to implement in that the site must be prepared and graded, and the cap must be carefully constructed under stringent quality control guidelines and supervision to maintain that the cap will perform as designed and intended. Both Alternatives 1 and 3 could significantly impact operations at the OSA.

2.8.0.8 Cost: The cost comparison among the alternatives is based both on the initial capital construction costs and the annual operation and maintenance costs. Based on the relative present worth costs, the alternatives are ranked as follows:

Approach	Present Worth Cost	Ranking
Alternative 6 (No Action)	$ 0	1
Alternative 5 (Institutional Controls	$ 15,000	2
Alternative 1 (Capping)	$825,300	3

2.8.0.9 State Acceptance: The Commonwealth of Virginia, upon review of the Proposed Plan, concurs with the preferred alternative.

2.8.0.10 Community Acceptance: Community acceptance of the preferred alternative was evaluated after the public comment period on the Proposed Plan for OU1. The community acceptance is described in the Responsiveness Summary of this ROD.

2.9 SELECTED REMEDY

2.9.0.1 Based on the preceding analyses of alternatives, the DLA has determined that Alternative 5 (Institutional Controls) is the most appropriate option at the site.

2.9.0.2 Although risk-based soil action levels (TBC requirements) or background concentrations for arsenic and antimony were exceeded in one sample each, none of the constituents found in the soils at the OSA are present in the ground water at concentrations greater than MCLs. Additionally, the samples containing arsenic and antimony concentrations greater than the risk-based action or background levels were collected at depths greater than 5 feet. Therefore, exposure to these constituents would not be expected to occur unless excavation activities take place at this site. Therefore, with respect to the soils at the OSA site, the institutional control approach has been determined to be the most effective and appropriate option.

2.9.0.3 The institutional control at the OSA site should include continued operation of the site as a restricted area. Specific deed restrictions are detailed in Section 2.7.0.7 of this ROD document. Future development of the OSA site, including excavation and other site grading, are not precluded by the site contamination or by the institutional controls recommended in this Record of Decision. As construction and excavation will be required as part of the site development by the base (construction is currently taking place, and additional construction is planned), formal safety measures will be instituted to protect both workers and the public. A soil sampling, analysis and remedial action plan will be done with concurrence from the regulatory agencies and instituted during excavation activities at the site. Although the site soils do not represent a significant threat to the ground water, continued monitoring of ground-water quality will be carried out as part of the ground-water operable unit (OU6) for the OSA and adjacent areas.

2.9.0.4 The estimated cost of the system is estimated to be approximately $15,000. The majority of the controls are already in place at the site, thereby negating many of the costs that could be associated with this alternative.

2.10 STATUTORY DETERMINATIONS

2.10.0.1 To meet the statutory requirements of CERCLA Section 121, the selected remedy must:

- Be protective of human health and the environment;
- Comply with ARARs (or justify an ARAR waiver);
- Be cost effective;
- Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and
- Satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element, or provide an explanation as to why this preference is not satisfied.

2.10.0.2 How the selected remedy complies with each of these requirements is summarized below.

2.10.1 Protection of Human Health and Environment

2.10.1.1 The institutional controls alternative is primarily aimed at reducing or eliminating human contact and preventing the inappropriate future usage of the site or contaminated soil. Ground-water monitoring would be conducted at this area as part of the ground-water operable unit (OU6). Due to the low levels of contamination present at OU1 and the existing restrictive access, this alternative is effective at protecting human health and the environment.

2.10.2 Compliance with ARARs

2.10.2.1 No ARARs were identified for this alternative. This alternative will comply with the chemical-specific TBC requirements (risk-based soil action levels) identified in Table 2-4, with the exception of single concentrations of arsenic and antimony which were encountered at a depth of greater than 5 feet. By requiring formal Health and Safety Plans and environmental and personnel monitoring for all future excavation and construction activities at the site, this alternative will also comply with the action-specific TBC requirements.

2.10.3 Cost-Effectiveness:

2.10.3.1 The alternative is cost effective. The cost for this alternative primarily involves costs that already are assumed as part of the DGSC operations. Additional cost of $15,000 is estimated for legal and other miscellaneous costs required for deed restrictions and establishing institutional arrangements and

procedures.

2.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies:

2.10.4.1 This alternative does not treat the soils at the OSA, but does have the potential for treatment if necessary during excavation activities at the site. The alternative does not therefore satisfy the preference for treatment technologies that reduce contaminant toxicity, mobility, or volume.

2.10.4.2 However, as the risk posed by the contaminants at the site is low, and due to their nature and extent, the DLA has determined that the selected alternative (Institutional Controls) represents the most effective option for OU1 at the DGSC.

2.10.5 Documentation of Significant Changes

The Proposed Plan for OU1-Open Storage Area Source Soils was released to the public on January 20, 1992. The Proposed Plan identified Alternative 5, Institutional Controls as the preferred alternative. The DLA reviewed all written and verbal comments submitted during the public comment period. Upon review of the comments, it was determined that no significant changes to the alternative, as it was originally identified in the Proposed Plan, were necessary.

2.10.6 Responsiveness Summary

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

- Operable Unit One (OU1) - Open Storage Area Source Soils
  The responsiveness summary details the DLA's responses to these comments, concerns and questions.

During the public comment period from January 20 through March 6, 1992, both written comments and phone calls were received by DGSC concerning the two operable units. In addition, for OU1, the comment period was extended from March 9, 1992, to April 6, 1992. Comments and calls received during these public comment periods are addressed as part of this responsiveness summary. As part of its efforts to inform the public of environmental activities at DGSC, the DLA held a public meeting on February 20, 1992, at the Chesterfield Elementary School. At this meeting, the Proposed Plans for OU1 and OU5 were presented, and the public was given an opportunity to comment on and ask questions concerning the plans. Several technical questions pertaining to OU1 and OU5 were answered during the public meeting. The responsiveness summary for OU1 is divided into the following sections:

I. Summary of questions and replies

II. Public meeting attendance roster.

III. Panel of experts.

IV. Selected newspaper notices announcing dates of the public comment period and location and time of public meeting.

All comments and concerns summarized in this document have been considered by the DLA in making a decision regarding the selection of the Institutional Controls Alternative for OU1 - Open Storage Area Source Soils as the chosen alternative. Those questions that do not pertain to OU1 are preceded by an asterisk (*).

I. SUMMARY OF MAJOR QUESTIONS AND COMMENTS

* 1. Comment: A resident sent a letter comment to DGSC stating that he agreed with vapor vacuum extraction for the Acid Neutralization Pit Soils (OU5) as long as institutional controls were included as part of the final solution.

DLA Response: With the preferred alternative being utilized, the main threat at the ANP area (chlorinated solvents) in the soils are being remediated. The single elevated occurrence of arsenic was encountered at significant depth (15 feet) and is considered unlikely to be encountered by reasonably anticipated site activities. Therefore, the DLA feels that institutional controls will not be necessary if chemical sampling of soils confirms that the chlorinated solvents have been removed after treatment.

2. Comment: A resident sent a letter comment to DGSC requesting that the public comment period for OU1 be started over as one of the referenced documents in the OU1 Proposed Plan was not available in the administrative record. He also questioned whether concerned citizens could get Technical Assistance Grant (TAG) money to help them with the process of understanding the remedial actions taking place at the site.

DLA Response: An additional time period is being allowed for public comment on OU1 as the missing reference document is now present in the administrative record. The EPA is willing to work with any group of citizens that is interested in obtaining TAG money to help their review of past and ongoing remedial activities at DGSC.

* 3. Comment: A former resident of the area sent a letter comment to DGSC asking that documentation relating to remedial work and laboratory testing of water be sent to her or kept available for viewing. She also requested that documentation as to whether or not her mother's property has contamination present be sent to her as they plan to sell the property.

DLA Response: The former resident was contacted to let her know that all of the administrative record would remain available for review at the Chesterfield Public Library, and that this administrative record contained information on all of the remedial work done at the site. DGSC representatives will also send any information pertaining to water well or other sampling done at her mother's address to help determine whether any contamination is present at the property.

The following comments were received during the public meeting on February 20, 1992.

4. Comment: A resident asked that the public comment period for OU1 be started over as the administrative record was missing a memorandum referenced in the OU1 Proposed Plan.

DLA Response: Refer to Comment #2 response.

* 5. Comment: A resident stated that he felt that institutional controls should be applied to the ANP area after treatment is complete.

DLA Response: Refer to Comment #1 response.

* 6. Comment: A resident asked that in the area of ground-water contamination whether everyone was hooked up to the county water supply system.

DLA Response: DGSC will look into the situation with anyone who leaves their name and phone number, and the location of the property in question, after the meeting.

* 7. Comment: A resident asked whether the DLA was aware that not all properties had county water run to them.

DLA Response: Refer to Comment #6 response.

* 8. Comment: A resident questioned whether anyone present was aware of a site not currently under investigation that the resident had pointed out to a general's aide a number of years earlier.

DLA Response: The DGSC will send out a representative with the resident to investigate the site, and will also forward any testing results concerning the site that they may have to the resident.

* 9. Comment: A resident questioned why some of the area residents were not on the committee.

DLA Response: The reason that public meeting is being held is to bring all of the concerned residents up to date on clean-up activities for OU1 & OU5.

* 10. Comment: A resident requested that additional people be put on DGSC's informational mailing list for remedial activities at the site.

DLA Response: Everyone who signed in to the register tonight will be put on the mailing list, unless they request otherwise. Also, residents can contact George Dellinger (DGSC Public Relations Officer) to be put on the mailing list also.

* 11. Comment: A resident asked for clarification as to who was and who wasn't hooked up to the county water system years earlier.

DLA Response: DGSC will look into the situation and respond to the resident.

* 12. Comment: A resident that lives along Kingsland Creek asked if the slime that she had on her well filter was normal.

DLA Response: The DGSC will have someone come to the resident's property to see about testing the water.

* 13. Comment: A county supervisor asked if material that went into the sanitary sewer at the ANP area eventually went into the county sewer system, and whether downstream hazards had been assessed.

DLA Response: The DGSC will look into what possible impact ANP activities may have had on the county sanitary sewer system.

* 14. Comment: The county supervisor asked that a reply also be sent to the county administrator.

DLA Response: A response will also be sent to the county administrator.

15. Comment: A resident asked if either OU1 or OU5 drain into Kingsland Creek. DLA Response: Neither OU1 or OU5 drain into Kingsland Creek.

* 16. Comment: A resident asked if any other sites drain into Kingsland Creek.

DLA Response: There are other sites that drain into Kingsland Creek, but they are not being addressed tonight, as only OU1 and OU5 are being discussed.

* 17. Comment: A resident asked when the other sites will be addressed.

DLA Response: Updates as to progress at the other sites will be provided as they become available.

* 18. Comment: A resident asked how long it would be until results would be available from studies being done on Kingsland Creek.

DLA Response: As Kingsland Creek is addressed as part of other operable units not being addressed at this meeting, there are no specific dates that can be given to the resident.

* 19. Comment: A resident asked whether the DLA had a time frame for reporting on the other sites not being addressed tonight.

DLA Response: Updates as to progress at the other sites will be provided as they become available.

* 20. Comment: A resident asked whether proposed plans for the other sites would be provided when they are done.

DLA Response: Proposed plans for all of the sites will be made available as soon as they are done.

21. Comment: A resident questioned whether contamination that got into the ground water at DGSC could come out at the surface of a site away from DGSC if the site was lower in elevation than DGSC, and what the effects of that contamination would be.

DLA Response: During studies at the site, the various ways in which the contaminants could move offsite were investigated. The studieslooked at different ways that people away from the site could be affected, including the contaminants being moved in the ground water. The studies showed that if the recommended alternatives are used, human health and the environment would be sufficiently protected from contaminants at the sites.

* 22. Comment: A resident questioned whether excavation involved with the remediation would cause additional migration of the contaminants.

DLA Response: The DLA has recommended a remediation alternative that does not involve excavation. Rather, at OU5, the contaminants will essentially be "vacuumed" from the soils, and the contaminants will be captured in a carbon adsorption unit.

* 23. Comment: A resident questioned whether these contaminants would be put in the county sewer line after they are removed from the ground.

DLA Response: The contaminants would not be put in the county sewer line. Instead, the carbon adsorption unit would be sent away for proper disposal.

24. Comment: A resident asked whether the whole process could be started over so that some of the community groups can try for a EPA Tag (money grant).

DLA Response: Refer to Question #2 for the DLA response.

* 25. Comment: A resident asked how long it would take for a steel drum to rust through if it was buried in the ground.

DLA Response: Although the exact number of years it can take depends on the condition of the drum originally, and the type of soil it is buried in, a buried drum can rust through in approximately a decade.

* 26. Comment: A resident asked if vacuum extraction would work if there were buried drums.

DLA Response: At OU5, there is no record of buried drums being present, nor were any found during investigative work at OU5. * 27. Comment: A resident asked about possible contamination at his property, and whether metals in the ground water could affect his pipes as he is not hooked up to the county system.

DLA Response: As part of the investigative activities at the other sites, which are not being addressed tonight, work is being done to try to determine what types of metals and organics are present in the ground water. The remedies proposed at OU1 and OU5 are designed to be protective of ground water. The remedies for the ground water will deal specifically with contaminants and the problems they may pose in ground water itself. The remedies will also take into consideration the possible affect ground-water contamination could have on residents affected by the situation.

* 28. Comments: A resident asked whether old wells that had been filled up previously could cause the contaminants to bypass the closed wells and move on to open wells.

DLA Response: Due to the way ground-water flows, the closed wells would not have an effect on the way the contaminants move through the ground water.

II. PUBLIC MEETING ATTENDANCE ROSTER

III. PANEL OF EXPERTS

The following list represents the panel members who participated in the public meeting held on February 20, 1992.

Defense General Supply Center
Colonel John E. Dawley, Jr., U.S. Army
George Dellinger
William Saddington
Art Wells
Kent Baldwen
William Walker
Major Kerry L. Burke, U.S. Army

U.S. Environmental Protection Agency - Region III
Jack Potosnak
Hank Sokolowski
David Sternberg

Virginia Department of Waste Management
Steve Milhalko
Jamie Walters

U.S. Army Corps of Engineers
Roger Fitzpatrick
Roger Young
Suzanne Murdock

Law Environmental, Inc.

Thomas Richardson
Lynden Peters

IV. SELECTED NEWSPAPER NOTICES ANNOUNCING DATES OF PUBLIC COMMENT AND LOCATION OF PUBLIC MEETING

PUBLIC NOTICE
Proposed Remedial Action Plans
for the
Defense General Supply Center (DGSC) Superfund Site

In accordance with the requirements of the Comprehensive Response, Compensation and Liability Act (CERCLA), the Defense General Supply Center (DGSC), the U.S. Environmental Protection Agency (EPA), and the Virginia Department of Waste Management (VDWM) invite public comment on the Proposed Plans for two of the eight Superfund operable units: the Open Storage Area (OSA) and the Former Acid Neutralization Pits (ANP). The Superfund public comment period will begin on January 21, 1992 and close on March 2, 1992.

A public meeting will be held to discuss the specifics of the proposed cleanup actions at 7:30 PM on February 20, 1992 at the Bellwood Elementary School, 9536 Dawnshire Road, Chesterfield, Virginia.

A focused feasibility study (FFS) has been prepared by DGSC for the contaminated soils at the OSA. The FFS evaluated the following remedial action alternatives:

Alternative 1: Surface Containment/Capping
Alternative 2: Solidification/Stabilization
Alternative 3: Soil Washing
Alternative 4: Evacuation with Off Site Treatment/Disposal
Alternative 5: Institutional Controls
Alternative 6: No Action

Based on an evaluation of the alternatives, the preferred cleanup option for the OSA is Institutional Controls consisting of environmental reviews prior to performing maintenance, an environmental assessment for military construction projects in accordance with the Defense Logistics Agency policy memorandum dated 27 December 1989 and any deed restrictions required under Part 120 (H) of CERCLA.

A focused feasibility study (FFS) has been prepared by DGSC for the contaminated soils at the ANP. The FFS evaluated the following remedial action alternatives:

Alternative 1: Surface Containment/Capping
Alternative 2: Excavation with Solidification/Stabilization
Alternative 3: Excavation with Soil Washing
Alternative 4: Excavation with Solid Phase Biotreatment
Alternative 5: Excavation with Bulk Incineration
Alternative 6: Excavation with Off Site Treatment/Disposal
Alternative 7: Vacuum Vapor Extraction
Alternative 8: Institutional Controls
Alternative 9: No Action

Based on an evaluation of the alternatives, the preferred cleanup option for the ANP is Vacuum Vapor Extraction. Vacuum Vapor Extraction consists of drawing vapors from the soils using extraction wells connected to a manifold system. The system is connected to a blower to draw vapors from the soil. The venting of volatile organic compounds (VOCs) to the atmosphere will be controlled through an emissions control system using vapor phase activated carbon. Citizens can hear presentations on these proposed technologies, and ask questions, at the February 20, 1992 public meeting.

Although these are the preferred remedial options at this time, DGSC, in consultation with EPA and VDWM, may modify the preferred alternative or select another option based on new information presented during the public comment period; therefore the public is encouraged to review and comment on the Proposed Plan for site cleanup prior to the close of the comment period.

Citizens may review and photocopy documents pertaining to the DGSC Superfund site studies and remedy selections in the site Administrative File, located at the Chesterfield Public Library, 9501 Lori Road, Chesterfield, VA 23232. Library hours are 10:00 a.m. to 5:30 p.m., on Wednesday, Friday and Saturday; and 10:00 a.m. to 8:00 p.m. on Monday, Tuesday and Thursday. The library is closed on Sunday.

For more information on the site, the comment period, or the upcoming public meeting or to be added to the

mailing list to receive updates on the site, interested citizens may contact:

Mr. George Dellinger
Defense General Supply Center, DGSC-DB
Richmond, VA 23297-5000
(804) 275-3139

DGSC begins clean-up journey

By DAVID BREIDENBACH
Staff Writer

CHESTERFIELD - Two contaminated sites at the Defense General Supply Center have started a long road to being cleaned up.

About 26 area residents, and officials from the DGSC and the Environmental Protection Agency discussed the sites and clean-up plans at a public hearing Thursday night at Bellwood Elementary School.

The two contaminated sites addressed were an open storage area and an acid neutralization facility. The Virginia Department of Waste Management is also taking part in the cleanup operation.

Marked as a Superfund site, the DGSC cleanup is different than an typical cleanup, said Jack Potasnak of the EPA, which is overseeing the DGSC's cleanup operation, he said.

Usually, sites are abandoned before the EPA ever gets involved. In this case, DGSC is still a working operation.

The entire DGSC site - which has a total of eight contaminated areas - is considered a Superfund site, said David Sternberg, an EPA public affairs specialist. The contamination sites were broken down to smaller areas to make it easier to clean up, he said.

"Of the two tonight, neither are the most severe, but everything is reviewed and the projects should go ahead," he said.

Five of the sites are called source areas, or places where contamination is known to have occurred. The other three involve

See DGSC, page A6

DGSC: Has cleanup hearing

Continued from page A1

groundwater' contamination and are considered the more difficult to clean, he said.

Contamination at the DGSC sites occurred as a result of normal operating procedures at the DGSC over three decades, said George Dellinger, a DGSC spokesman.

"There were many practices in the '40s, '50s and '60s that were considered normal operating procedures. Nobody thought anything about the environment," he said.

The open storage area, a 43-acre fenced site in the middle of the DGSC is used to store petroleum products. Higher than normal levels of two metals, arsenic and antimony, were found in soil samples there. The contaminated soil is not considered to be a significant risk, said William Saddington of the DGSC.

Because the site poses little risk, Saddington said the preferred method of treatment is to control the area. A fence will be put up around the area and the DGSC will continue to monitor it.

The second site, an acid neutralization facility, poses a different problem, he said. Higher than normal levels of arsenic and an organic contaminant were found.

The arsenic level was no great concern, but the organic contaminant, terchlorethane, which is used in cleaning materials, is of concern, he said. The DGSC intends to vacuum the contaminant out of the ground, he said.

Most of the citizens who spoke at the meeting were concerned with the effects the site has on the groundwater.

In the mid-1980s, water was extended to a number of households in nearby Rayon Park subdivision. About five residents of the subdivision, who are not tied into the county water system, complained of water problems at the meeting.

DGSC representatives took names and addresses and promised to address the questions. A public comment period closes March 6, at which time a final decision will be made on how to clean up each of the two sites, said Sternberg.

It will probably take about four years for the two sites to be cleaned. The groundwater sites are even more difficult to fix, he said.

"The EPA wants this done in a fast and thorough manner. (But) the site is difficult; it is a long-time process," he said.

Federal officials plan cleanup amid ground-water fears

By Mitch Zemel
Staff writer

Federal officials have presented plans to clean up two of eight Superfund hazardous waste sites at the Defense General Supply Center in Chesterfield County, but surrounding residents are more concerned about groundwater contamination.

Representatives of the military, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers and the state Department of Waste Management conducted a public hearing last night to discuss proposals to handle two of the sites. Both contain soil contaminated with arsenic, and one also contains a hazardous organic compound.

But the approximately 30 residents who attended the hearing at Bellwood Elementary School repeatedly asked questions about two other sites of contaminated ground water.

The officials said studies of those two sites and four others are not complete and they declined to give the residents any information about them. Officials added that they did not know when those sites would be studied or discussed.

Several residents expressed concern that the contaminated groundwater sites had affected their wells. One woman said multiple water filters have failed to make her water drinkable. Another resident said her water pipes corrode rapidly.

After declining to discuss the ground water, the federal officials took the residents' names and addresses and said they would contact them later.

Officials from the Defense General Supply Center have stated that public safety and health are not threatened by the sites, but EPA officials said last night they weren't sure whether residents are being affected by the contaminated ground water.

Most residents in the supply center area were connected to county water lines in the mid-1980s and don't use well water.

EPA officials said the two sites discussed last night are not the most serious ones.

To remove the organic contaminant from the soil at one of the sites, a process called "vacuum vapor extraction" would be used to blow air through the soil. The hazardous compound would be picked up by the air, which then would be filtered to remove the contaminant. The process would take about four years.

To deal with the other site, officials plan simply to restrict access to the area.

The agencies involved will not make a final decision on the cleanup proposals until after the public comment period ends March 6.

EPA officials said there is no timetable for cleanup of the other sites, which were put on the Superfind list in 1987. Most of the contaminants are from petroleum products and were discovered in the early 1980s.

Answers on cleanup are few

Bellwood waste sites in question

By Randolph P. Smith
Staff writer

For 26 years, Jo Ann Cordle has carried water from a well 500 feet from her home because her own well water is "slimy" and "tastes bad."

Even two water filters can't tempt Mrs. Cordle to cook or drink the well water piped into her home.

She wonders if her well is drawing ground water contaminated by chemical leaks at the Defense General Supply Center, which borders her property.

Several of Mrs. Cordle's neighbors in the Bellwood area of Chesterfield County also are worried about contaminated ground water feeding their wells. Some wonder if the cancer death rate in the neighborhood is higher than normal.

But Mrs. Cordle and about 30 neighbors got few answers last night at a public hearing for the first phase of the cleanup of hazardous waste sites at DGSC.

Despite the presence of at least a dozen representatives from DGSC, the state and the Environmental Protection Agency, the most common answer to residents' questions was, "We'll get back to you."

Officials said they weren't prepared to talk about potential ground water contamination.

They generally wanted to restrict the discussion to the first two of eight cleanup projects on the 639-acre military installation, which is one of six major supply depots for U.S. troops around the world.

Both of the initial cleanup efforts focus on contaminated dirt.

One site, a 43-acre storage area where an estimated 80,000 drums now sit, won't even be cleaned up because it "does not present a significant risk," said William Saddington, a DGSC environmental engineer. Soil at the site, which has been a drum storage area since 1942, has been found to contain above-normal levels of two metals.

The second cleanup effort is at the site of two acid neutralization pits.

Chemicals used to clean metal flowed out of a warehouse and into two concrete settling pits, where it was neutralized before being piped into the county sewer system. The pits were used from 1955 to 1985, when they were filled in with clean soil, Saddington said.

Contamination was found in soil under one of the pits and the organic vapors will be vacuumed out of the ground - a process that could take up to four years.

The ground water under the acid pits is contaminated, officials acknowledged, but they didn't want to discuss that in detail last night.

Officials stress that neither the soil nor the ground water poses health threats to DGSC's 3,200 employees or to Bellwood residents.

But several years ago, the federal government paid to extend county water to most of the homes in the Bellwood area after concerns were raised about contaminated ground water flowing off the base.

ATTACHMENT A

EPA HAZARDOUS SUBSTANCES REPORTING REQUIREMENTS FOR SELLING OR TRANSFERRING FEDERAL REAL PROPERTY

(40 CFR 373; 55 FR 14212, April 16, 1990)

PART 373-REPORTING HAZARDOUS SUBSTANCE ACTIVITY WHEN SELLING OR TRANSFERRING FEDERAL REAL PROPERTY

Sec.
373.1 General requirement.
373.2 Applicability.
373.3 Content of notice.
373.4 Definitions.

Authority: Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended. 42 U.S.C. 9601 et seq.

S373.1 General requirement.

After the last day of the six month period beginning on April 16, 1990, whenever any department, agency, or instrumentality of the United States enters into any contract for the sale or other transfer of real property which is owned by the United States and at which, during the time the property was owned by the United States, any hazardous substance was stored for one year or more, known to have been released, or disposed of, the head of such department, agency, or instrumentality must include in such contract notice of the type and quantity of such hazardous substance and notice of the time at which such storage, release, or disposal took place, to the extent such information is available on the basis of a complete search of agency files.

S373.2 Applicability.

(a) Except as otherwise provided in this section, the notice required by 40 CFR 373.1 applies whenever the United States enters into any contract for the sale or other transfer of real property which is owned by the United States and on which any hazardous substance was stored for one year or more, known to have been released, or disposed of.

(b) The notice required by 40 CFR 373.1 for the storage for one year or more of hazardous substances applies only when hazardous substances are or have been stored in quantities greater than or equal to 1000 kilograms or the hazardous substance's CERCLA reportable quantity found at 40 CFR 302.4, whichever is greater. Hazardous substances that are also listed under 40 CFR 261.30 as acutely hazardous wastes, and that are stored for one year or more, are subject to the notice requirement when stored in quantities greater than or equal to one kilogram.

(c) The notice required by 40 CFR 373.1 for the known release of hazardous substances applies only when hazardous substances are or have been released in quantities greater than or equal to the substance's CERCLA reportable quantity found at 40 CFR 302.4.

S373.3 Content of notice.

The notice required by 40 CFR 373.1 must contain the following information:

(a) The name of the hazardous substance; the Chemical Abstracts Services Registry Number (CASRN) where applicable; the regulatory synonym for the hazardous substance, as listed in 40 CFR 302.4, where applicable; the RCRA hazardous waste number specified in 40 CFR 261.30, where applicable; the quantity in kilograms and pounds of the hazardous substance that has been stored for one year or more, or known to have been released, or disposed of, on the property, and the date(s) that such storage, release, or disposal took place.

(b) The following statement, prominently displayed: "The information contained in this notice is required under the authority of regulations promulgated under section 120(h) of the Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA or "Superfund") 42 U.S.C. section 9620(h)."

S373.4 Definitions.

For the purposes of implementing this regulation, the following definitions apply:

(a) Hazardous substances means that group of substances defined as hazardous under CERCLA 101(14), and that appear at 40 CFR 302.4.

(b) Storage means the holding of hazardous substances for a temporary period, at the end of which the hazardous substance is either used, neutralized, disposed of, or stored elsewhere.

(c) Release is defined as specified by CERCLA 101(22).

(d) Disposal means the discharge, deposit, injection, dumping, spilling, leaking or placing of any hazardous substance into or on any land or water so that such hazardous substance or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

ATTACHMENT B

DEFENSE SUPPLY AGENCY
DEFENSE GENERAL SUPPLY CENTER
RICHMOND, VIRGINIA 23297

31 Jan 77

DGSC REGULATION
NO. 4150.1

DGSC-W

MAINTENANCE AND REPAIR OF BUILDING AND GROUNDS

I. REFERENCES

A. AR 420-70, Repairs and Utilities Buildings and Structures.

B. AR 420-74, Repairs and Utilities Natural Resources - Land, Forest and Wildlife Management.

C. DSAR 4270.3, Maintenance and Repair of Real Property Facilities (Excepting Family Housing).

II. PURPOSE AND SCOPE. To define responsibilities and establish policies for the upkeep and maintenance of buildings and grounds. This regulation is applicable to all elements of the Defense General Supply Center (DGSC) and tenant activities.

III. POLICY

A. Construction of new buildings, alterations or additions to existing buildings will not be undertaken by any individual without the prior approval of the Chief, Facilities Engineering Division, Dir/Installation Services (D/IS).

B. The Chief, Facilities Engineering Division, D/IS, is authorized to approve all requests within available operation and maintenance (O&M) funds, for work classified as maintenance (excepting Family Housing).

C. The Chief, Facilities Engineering Division, D/IS, is authorized to approve all requests for repair within available operation and maintenance (O&M) funds at a funded cost of $5,000 or less, except when the cost is more than 50 percent of the facility replacement cost, for work classified as repair (excepting Family Housing). The Director of Installation Services is authorized to approve all requests within available operating and maintenance (O&M) funds at a funded cost of $5,000 to $100,000, except when the cost is more than 50 percent of the facility replacement cost, for work classified as repair (excepting Family Housing).

D. No painting will be undertaken by any individual without prior approval of the Chief, Facilities Engineering Division.

E. Items showing indications of abuse or damage, other than that due to fair wear and tear, will be called to the attention of the responsible office and an explanation will be required. Unwarranted damage or abuse together with an estimate of the cost of repairs, will be brought to the attention of the Deputy Commander by the Director of Installation Services for appropriate action.

F. Cutting of trees on the Center will not be accomplished without approval of Chief, Facilities Engineering Division.

G. Cigarettes, empty cups, paper bags, etc. will not be scattered about the Center. Building occupants are responsible for the police of the area surrounding their building. Drink cans containing steel will be placed in trash receptacles provided unless they are aluminum drink cans, which will be placed in recycling container.

H. Care will be exercised by each person using the restrooms to ensure that papers, cigarettes, and ashes are not thrown on the floor, in the lavatories, or in the washstands.

I. Only emergency type work will be performed in the Family Housing areas without prior approval of the Family Housing Officer.

IV. RESPONSIBILITIES

A. The Chief, Facilities Engineering Division is responsible for the budgeting of adequate funds to provide for the maintenance and repair for all facilities located on the Defense General Supply Center.

B. The Chief, Facilities Engineering Division (Center Engineer), Dir/Installation Services will upkeep and maintain all building and grounds.

C. Directors/Major Office Chiefs will ensure proper policing and control abuse or damage to buildings, structures, facilities, or portions thereof, occupied or used by their activities.

D. The Director of Installation Services will maintain this regulation in a current status and review it annually.

V. PROCEDURES

A. The Chief, Facilities Engineering Division will monitor all activities located on the Defense General Supply Center for compliance with policies stated in paragraph III, violations will be reported to the Director of Installation Services.

B. All requests for construction or alterations to buildings will be processed IAW DGSCR 4150.1, Maintenance and Repair of Buildings and Grounds.

C. All requests for work in the Family Housing Area, other than trouble calls, will be approved by the Family Housing Officer on DA Form 2701 prior to accomplishment.

D. Trouble calls received from Family Housing will be accomplished on a monthly work order approved by the Family Housing Officer.

E. All requests for maintenance and repair, except trouble calls, will be requested on DA Form 2701.

F. All trouble calls will be received by phone by the Facilities Engineering Division on extension 3560.

BY ORDER OF THE COMMANDER

A. J. POLUBINSKI
Ch, Admin Services Division
Dir/Installation Services

DISTRIBUTION: E & S
S - 50 cys DGSC-WO

MAINTENANCE AND REPAIR OF BUILDINGS AND GROUNDS

I. REFERENCES: (See current DGSCR 4150.1 for refs A thru C) D. Record of Decision - Operative Unit 1 - Date _____

II. PURPOSE AND SCOPE: (See current DGSCR 4150.1 for policy and scope - no change contemplated)

III. POLICY: (See current DGSCR 4150.1 for policy items A through I)

J. An environmental review shall be performed prior to any excavation below 6 inches in the Open Storage Area for routine maintenance. The review shall consist of evaluating the proposed area of excavation through an on site inspection of the area and evaluation of analytical results from the remedial investigation and any other results that have been collected.

IV. RESPONSIBILITIES: (See current DGSCR 4150.1 for items A through D

E. The Environmental section of the Facilities Engineering Section shall be responsible for conducting the on-site review in the Open Storage Area.

V. PROCEDURES: (See current DGSCR 4150.1 for procedures - no change contemplated)

ATTACHMENT C

DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6100

DLA-W/DEPO (Mr. Stumpf/(AV)284-7275/gk)

SUBJECT: Installation Characterization and Clearance

TO: SEE DISTRIBUTION

1. Enclosed for your information is a copy of the "Interim Guidance for Construction Site Clearance at U.S. Army Installations" prepared by the U.S. Army Toxic and Hazardous Materials Agency. Also enclosed is an excerpt from draft AR 415-15 which accompanied the guidance.

2. We are initiating our own project in FY 90 through the Huntsville Division of the U.S. Army Corps of Engineers (CoE) to characterize all DLA managed installations based on site contamination criteria. The purpose of the project is to evaluate each installation to ensure safe conditions for construction site personnel as well as for its occupants. This project will result in an installation map with all areas labeled as either Category I, II or III. Basically, a Category I area is one for which there is no reason to believe that contamination has occurred as a result of past or present operations in the area; construction may proceed without any environmental cleanup. A Category II area is one for which there is potential for the presence of contamination from past or present operations in or near the area; a more extensive survey, including field investigations, is required before the area can be characterized and before construction may proceed. A Category III area is one which is known to be contaminated; remediation of a Category III area may be prohibitively expensive for any construction project.

3. CoE personnel or their contractor must have your full cooperation to accomplish this project. Please insure that they have access to all pertinent administrative records, documents and personnel.

4. Each area characterization will be reviewed by the installation, and all installation comments will be considered before the installation map is completed. When the report is completed, it will become part of the installation's master plan. All construction projects will include the area designation on DD Form 1391 and will address any requirements for additional investigation or cleanup as needed.

5. Please provide us with a point of contact for this project by 15 January 1990. You will be notified by the CoE or its contractor to arrange a schedule for your installation's evaluation.

6. POC for this matter at DLA-W/DEPO is Mr. Harry Stumpf, AV 2847275.

FOR THE DIRECTOR:

2 Encl

DISTRIBUTION:
DGSC-W
DCSC-W
DESC-W
DPSC-W
DDMT-W
DDTC-W
DDOU-W
DFSC-F
DNSC-N
CoE, Huntsville
(CEHND-ED-PM (Boswell))

INTERIM GUIDANCE FOR CONSTRUCTION SITE CLEARANCE AT U. S. ARMY INSTALLATIONS

PREPARED BY: DARRYL D. BORRELLI

U. S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY (USATHAMA)

PURPOSE

The purpose of this interim document is to provide immediate guidance to Major Commands (MACOMS) and Engineering and Construction Project Managers responsible for Military Construction, Army (MCA), minor MCA, Army Family Housing (AFH) construction projects, and all other construction projects on Army installations, regarding proper techniques for preconstruction site investigation and clearance procedures. Information contained herein will improve the safety of such projects and decrease the risk of injury to military, civilian, and contractor personnel involved in their construction.

Final guidance which specifically details procedures presented in this interim document is currently being developed and will be distributed upon its completion. Questions on the information provided in this interim guidance can be addressed to Mr. Darryl Borrelli, CETHA-IR-R, at (301) 6712828/3921.

AUTHORITY

The authority for this guidance is contained in memorandums from Major Generals Robertson and Offringa, Subject: Environmental Survey Guidance for Potential Construction Sites. These memorandums contain an excerpt from proposed Army Regulation 415-15 which specifically tasks USATHAMA to provide guidance concerning the clearance of sites proposed for MCA, Minor MCA, and AFH construction projects at Army installations worldwide.

CLEARANCE OF CATEGORY I SITES

Category I sites, by definition, are sites located in a traditionally nonhazardous location, such as an administrative, recreation, or housing area. The installation therefore has no reason to suspect that contamination has occurred through past installation operations in the area. It must be realized that clearance procedures for Category I sites entail only visual inspections, thereby inherently limiting their value. Prudent classification of sites into Category I must be practiced to ensure worker safety. If there is any potential for a site to contain contamination, or any doubt as to the site's historical usage, it must be upgraded to a Category II site, and investigated by the required procedures.

Procedures for sites classified as Category I are as follows:

1. Review of the installation historical records is required. Records regarding past construction at a site and its vicinity can normally be obtained from the Directorate of Engineering and Housing; while records regarding past installation activities in an area may be contained in the installation's library or museum. Emphasis should be placed not only on historical text, but also on archived photographs. Discussions with long-time installation personnel may prove beneficial for determining the historical usage of an area.

2. Review of the Initial Installation Assessment (IIA) and the update thereof, if one exists, is required. This document can usually be obtained from the Environmental Office of the Directorate of Engineering and Housing, and contains an assessment of environmental contamination that was potentially caused by past operations of the installation. Environmental personnel may be of help in interpreting the information contained in this document.

3. Installation Restoration Program documents, if any, should also be reviewed. Specifically these would be the Preliminary Assessment and Site Inspection report and any resulting reports. These reports can usually be obtained from the Environmental Office of the Directorate of Engineering and Housing.

4. Review of aerial photography contained in EPA's Environmental Photographic Interpretation Center (EPIC) report, and associated narrative is required. This report can also usually be found in the Environmental Office of the Directorate of Engineering and Housing. Photographs should be reviewed with environmental personnel or someone knowledgeable in discerning natural land disturbances from aerial photographs to ensure that the interpretation provided in the narrative is accurate. These photographs can provide some of the most conclusive information for the proper categorization of a site and its vicinity.

5. Surface reconnaissance or physical inspection of the surface of the proposed site and its vicinity to obtain evidence of potential contamination is required. This reconnaissance should be conducted under the supervision of environmental personnel who are experienced in field notation of factors which indicate

possible environmental damage, such as stressed vegetation, or other unnatural land features which may be related to anthropogenic sources. The surface of the proposed site should be walked by personnel spaced no further than twenty feet apart. Care should be taken to ensure that all areas of the proposed sites are covered.

Unnatural surface features and man-made structures or debris should be marked in the field by flags. Locations should be recorded on a site map. Features which are indicative of prior hazardous or industrial usage of the site and its vicinity will elevate the site to Category II, requiring further investigation. The clearance program for Category I sites should entail no longer than 2 weeks.

CLEARANCE OF CATEGORY II SITES

Category II sites are sites for which some degree of doubt exists as to the historical usage of the site and its vicinity, and therefore there is a potential for the presence of contamination. If doubt exists, a more extensive survey than that performed for a Category I site must be performed prior to construction to ensure worker safety. This will involve all of the procedures recommended for a Category I site as well as the use of several nonintrusive subsurface field investigative techniques. Specifically, the use of geophysical and soil vapor extraction techniques are required. A lead time of approximately 4 to 8 weeks, depending on a site size, will be required to accomplish field work and review of results for a Category II site. USATHAMA will be available to assist the installation commander in interpreting results of the geophysical/soil gas studies.

The five procedures outlined for Category I sites should be conducted prior to planning the ensuing nonintrusive field procedures. Review of the historical documents and a reconnaissance of the site surface will aid in the proper placement of field sampling devices.

1. GEOPHYSICAL TECHNIQUES

Surface geophysical investigation of the proposed site and its vicinity should occur next. Geophysical tools use natural physical properties of the earth to provide a "picture" of subsurface conditions. Geophysics can be used for an assessment of natural hydrogeologic conditions, an assessment of contaminants within the natural system, and most importantly, for the detection of buried wastes or unexploded ordnance (UXO).

A number of surface geophysical methods are available, including, ground penetrating radar (GPR), electromagnetics (EM), resistivity, seismic refraction, seismic reflection, gravity, and magnetometry. Most successful and cost effective for use in characterizing construction site conditions are magnetic, electromagnetic, and GPR techniques. These methods offer the benefit of continuous measurements along a profile line, thereby providing real time results which can be interpreted in the field. Choice of the proper methods will be site specific, and will require some knowledge of the geologic and hydrogeologic conditions at the site and its vicinity.

Final guidance on this subject will address the strengths and weaknesses of each available geophysical method, and will provide direction for choosing the proper method based on site conditions; however, for the purpose of this interim guidance, a general overview of the three most applicable methods will be provided.

a. GROUND PENETRATING RADAR (GPR)

Ground penetrating radar uses high frequency radio waves to elicit radar wave reflections from interfaces of material having different electrical properties. This technique is highly effective for the evaluation of natural soil and rock conditions, and for the delineation of subsurface burial pits and trenches. It can also be used for the location of buried pipes and tanks.

Depth of penetration for GPR is highly specific and varies according to properties of the soil and rock. Better overall penetration is achieved in dry, sand or rocky areas; poorer results are obtained in moist, clayey or conductive soils. Penetration from one to 10 meters is common.

Advantages offered by GPR are its acquisition of continuous data, providing highly detailed readouts, and the picture-like quality of results. Because of the high speed of data acquisition, site coverage with GPR is economically attractive. As with all geophysical techniques, experienced personnel are required for the correct interpretation of radar data.

b. ELECTROMAGNETICS (EM)

Electromagnetics (EM) uses low frequency electromagnetic induction to measure electric conductivity of subsurface soil, rock, and groundwater. Electrical conductivity is a function of the type of soil and rock,

its porosity and permeability, and the fluids which fill the pore spaces. EM can be used for the assessment of natural geohydrologic conditions, delineation of trench boundaries, buried wastes, and utility lines, and potentially for the mapping of contaminant plumes.

Instruments and field procedures have been recently developed which make it possible to obtain continuous EM profiling data to a depth of 15 meters. Continuous profiling data can provide excellent lateral resolution for the mapping of even small electromagnetic anomalies. EM works well in a variety of geologic settings; however, surroundings with a high percentage of conducting fluids or high moisture content will provide the optimum EM results.

Advantages of EM are again the ability to provide continuous profiling results of high resolution, and cost effectiveness based on the ease and quickness of data collection. This techniques offers a good "second best" alternative at sites where GPR is not viable based on geologic conditions.

c. MAGNETOMETRY

A magnetometer measures the intensity of the earth's magnetic field, and detects changes in that field caused by the presence of ferrous metals. The magnetometer's response is proportional to the mass of the ferrous target. This quality makes magnetometry very useful for the detection of buried drums and unexploded ordnance (UXO) or ferrous utility conduits. Penetration depths for the magnetometer vary depending on the mass of the buried ferrous object. Detection of a single buried drum or UXO rarely exceeds 10 feet. Clearance of the site surface of any ferrous metallic debris is required prior to conducting the survey to eliminate the potential for its interference. Results may be adversely affected by soils containing higher percentages of ferrous minerals. Natural changes in the earth's magnetic field must also be taken into account by the field operating crew. Interpretation by experienced geophysical personnel is extremely important for data validation.

Magnetometry should be used in conjunction with either GPR or EM to provide a complete picture of the subsurface environment. Specifically, it can alert trained personnel to the possibility of the existence of UXO, a common hazard at military installations. Magnetometry, like GPR and EM, has the advantage of providing continuous real time results, which increases its applicability to construction site clearance while reducing cost.

d. GENERAL GEOPHYSICAL SURVEY GUIDANCE

The boundaries for the geophysical survey should entirely encompass the area proposed for construction, with a 20 to 30 foot overlap on all sides to negate edge effects. Areas proposed for the placement of underground utility lines should be included in the survey as well. Survey lines should be spaced at 10 foot intervals with alternating geophysical methods run at each spacing. For example, a magnetometer survey would be conducted at even interval spacings of 0, 20, 40, etc., feet; while electromagnetics would be conducted at the odd intervals of 10, 30, 50, etc., feet until the site and its vicinity was covered.

Use of an experienced geophysical contractor is extremely important for obtaining valid results. The installation Environmental Office may be of help in identifying reputable geophysical firms in your area.

Results can usually be interpreted at the construction site to alert personnel to areas of interest. Areas containing anomalous readings indicating buried metal (possibly UXO), buried utility lines, pits, trenches, or contaminant plumes, should be marked on the site map. At this point, a decision may be made to abandon the site based on these results; or the decision to further investigate the anomalous readings may be reached. It is not recommended to propose construction activities at any site that shows a past usage for the burial of hazardous waste materials.

Metallic debris, indicated by the geophysics, should be carefully excavated by personnel experienced at the retrieval of UXO. The Explosive Ordnance Disposal Unit may provide guidance for such field activity. After the clearance of metallic debris from the site, the field investigation may proceed to its second stage, placement of soil vapor extraction devices.

2. SOIL GAS SURVEY

Soil gas sampling is used to detect volatile organic vapors which may be present in the pore spaces of near surface or vadose zone soils, and which may be released during construction excavation. If released in quantity, these vapors could be harmful to the health of on-site workers.

Soil gas sampling techniques are of two varieties. The passive or integrative technique utilizes a static trapping device implanted in the ground for a period from 7 to 30 days at depths up to 2 feet. The sample

collector consists of a ferromagnetic wire coated with an activated adsorbent encased in a glass protective tube. Upon retrieval, the device is transported to the laboratory where it is analyzed by desorptive mass spectroscopy. While this technique allows for the identification of a broad range of organic compounds, its application to construction site clearance is limited by the relatively long period of time required for sample collection and analysis.

Of more use for site clearance is the real-time soil gas technique. This technique can provide instantaneous results in the field to allow the detection of potentially hazardous vapors. A sampling device consisting of a hollow metal tube is driven into the ground to depths up to 20 feet. A vacuum is then applied to the tube and a sample of the soil gas is extracted via a syringe. This sample is then injected immediately into an on-site gas chromatograph (GC), usually truck-mounted, equipped with a flame ionization and photo ionization detectors capable of identifying the compounds of interest. Results from the GC are instantaneous.

Placement and spacing of the sampling devices are critical. Areas identified in the prior phases of the clearance investigation as having a high likelihood for contamination, such as areas of stressed vegetation, low areas where contaminants would accumulate, areas of anomalous electromagnetic readings, etc., should be targeted for soil gas investigation. In the absence of such indications, and to guide the placement of devices in areas not suspected of contamination, the use of a grid pattern should be employed.

In areas where the construction of the proposed project will require the excavation of soils, sampling devices should be located on 20 foot centers, or; one probe should be placed in every 400 square feet of area proposed for excavation. This applies as well to areas proposed for excavation for the placement of underground utilities. For areas considered part of the construction site, but which will not be excavated, the coverage of sampling devices can be reduced to probes on 50 foot centers. This would require one probe for every 2,500 square feet of area. These guidelines can be used to estimate the total required number of sampling points which can be placed on a random grid, or targeted to areas of suspected contamination.

Use of a reputable soil gas survey firm is important. Personnel should have knowledge of health and safety requirements for hazardous wastesite operations. The Environmental Office at the installation should provide the names of reputable soil gas firms in your area.

3. POST SURVEY GUIDANCE

Based on the results of the soil gas survey in conjunction with the results of the geophysical survey, a decision to abandon the site or proceed with construction will be required. USATHAMA, with the help of medical personnel from AEHA, will be available to aid in reviewing and interpreting survey results; however, the decision to proceed or abandon a site will lie ultimately with the installation commander.

If it is decided that construction can safely proceed at the site, results of the geophysical survey, any clearance procedures performed, and soil gas survey results should be provided in the design/construction documents. This will ensure that proper protective equipment, if required, will be provided to on-site workers. In some cases, the services of an industrial hygienist may be required during excavation to assure proper personnel monitoring and protection.

CLEARANCE OF CATEGORY III SITES

Category III sites have been defined as those sites currently known or suspected of having been contaminated with hazardous substances by past or current installation operations. This will include sites in bombing ranges, landfills, burn sites, etc. Proposals for construction at these sites are to be avoided if at all feasible.

Guidance for clearance of a Category III site must be obtained from USATHAMA on a case-by-case basis. A formal request for such guidance from the major command will be required. Investigation and clearance of such sites may require extensive field surveys, to include, geophysics, soil sampling and analysis, groundwater sampling and analysis, and the associated requirements for coordination with federal and state environmental agencies. The remediation of Category III sites prior to construction will require compliance with all applicable federal and state environmental regulations. Lead times for the completion of the preconstruction survey and remediation of a Category III site and its vicinity could easily encompass a number of years. Investigations of this sort would most likely render the proposed project economically infeasible.

EXCERPT FROM DRAFT AR 415-15

a. All proposed sites will be evaluated for potential site contamination and categorized as one of the following:

(1) Category I. This site is located in a traditional nonhazardous location, such as in an administrative, recreation, or housing area. The installation has no reason to suspect contamination.

(2) Category II. Current and former industrial sites or other hazard-producing activity sites will fit into this category. This site category consists of a perceived clean location, which, due to former industrial or other activities within or near the site, have the potential for contamination. Site survey will be accomplished IAW USATHAMA guidance. Assistance may be requested from: CCR, USA Toxic and Hazardous Materials Agency, ATTN: CETHA-IR, Aberdeen Proving Ground, MD 21010-5401, commercial phone, 301-671-3921/2828, autovon 584-3921/2828.

(3) Category III. Sites located in areas currently known or suspected to be contaminated are included within this category. Contamination will vary; i.e., known disposal site as identified in previous studies; unexploded ordnance at former range, etc. Site survey will be accomplished IAW USATHAMA guidance.

b. Actions required for evaluation, mitigation, and verification of site contamination are below. The statement following each action will be inserted as a separate sub-paragraph in paragraph D9, Summary ofenvironmental consequences, in the DD Form 1391 Processor, to highlight this issue.

(1) Category I sites require surface and records survey as shown below. A physical inspection (walk of the site IAW USATHAMA guidance) will be conducted for evidence of possible contamination and the results will be recorded in Detailed Justification Paragraph D9. A review of the following documents will be conducted and the findings recorded in Block D9:

(a) Aerial photography from the Environmental Protection Agency, Environmental Photographic Interpretation Center (EPIC), P. O. Box 1587, Vint Hill Farms Station, Warrenton, VA 22186, Commercial phone 703-349-8970, FTS 557-3110.

(b) Initial Installation Assessment and any updates available prepared by USATHAMA.

(c) Installation historical records.

(d) If a Category I site investigation discovers contaminated conditions (or the possibility thereof) the site will be reclassified as Category II or III as appropriate and those procedures followed.

(2) Category II sites are to be reviewed by MACOMS/MSCs and installation safety and environmental offices to determine the nature of potential contamination. They will be surveyed IAW USATHAMA guidance. Site surveys determined to be necessary will be performed prior to project design, and funded with installation operating funds. When investigation of a Category II site reveals contamination (other than minor limited contamination which will be cleared prior to design using installation operating funds) the site will be reclassified as Category III and those procedures followed. If the site remains a Category II site, add the following statement to paragraph D9 of DD Form 1391 - "The proposed construction site is a current/former industrial/test/other-(state what) site that is perceived to be clean and free of contamination. Safety and environmental evaluations of the site and available data do not show any need for further site surveys."

(3) Category III sites are to be avoided if at all feasible. They also require a survey IAW USATHAMA guidance. Clean-up should be accomplished prior to construction using installation operating funds. MCA funds may be programmed for clean-up as part of the total project, however, it is not encouraged due to funding constraints that will adversely affect the project's competition for funding. Add the following statement to paragraph D1 of DD Form 1391 - "The proposed construction site is a current/former industrial/test/other-(state what) site, with a potential for contamination. Safety and environmental evaluations of the site and available data indicated a detailed site survey was advisable and such a survey has been accomplished. Add one of the following:

(a) No contamination was found and there is no reason to believe contamination will be encountered during construction;

(b) No contamination was found but there is some potential that contamination may be encountered during construction. Potential contamination is identified to the designer in SRP 4 of the DD Form 1391 and must be reflected in construction contract documents. A separate line item providing for potential clean-up actions is included under the primary facilities. Detailed back-up environmental documentation is included in paragraphs D9, Summary of Environmental Consequences, and in SRP-4."

(c) All contamination found has been cleared and there is no reason to expect further contamination will be encountered during construction or;

(d) All contamination found has been cleared. Additional contamination may be encountered during construction and a separate line item providing for potential clean-up actions is included in the primary facility. Detailed back-up environmental documentation is included in paragraphs D9, Summary of Environmental Consequences, and in SRP-4."

c. Contracting Officers will insure that construction contracts include a clause specifying the category of the construction site, the Government's analysis of the current site conditions and the contractual responsibilities of all parties in the event of encounter with contamination.