SUPERFUND PROGRAM
PROPOSED PLAN FOR
REMEDIAL ACTION
ABERDEEN PROVING GROUND
WESTERN BOUNDARY STUDY AREA
OPERABLE UNIT 1 – GROUNDWATER

Aberdeen Area, Aberdeen Proving Ground, Maryland
May 1999

INTRODUCTION AND PURPOSE

In accordance with Section 117(a) of the ***Comprehensive Environmental Response, Compensation and Liability Act*** **(CERCLA)**, this **Proposed Plan** summarizes information supporting the U.S. Department of the Army at Aberdeen Proving Ground's (APG) preferred alternative for treatment of **Operable Unit 1 (OU1) – groundwater**. OU1 is located in the southwestern portion of the Western Boundary Study Area (WBSA) near the Harford County Production (HCP) wells (Figures 1, 2). Drinking water from wells HCP-5 and HCP-6 is contaminated with organic compounds (Figure 3). This Proposed Plan discusses the decision on treatment of this water. The preferred alternative of groundwater treatment using liquid phase **carbon adsorption** was developed by APG, the site owner and lead agency for site cleanup activities, with support from the U.S. Environmental Protection Agency (EPA), the regulatory agency with jurisdiction for site cleanup activities, and the State of Maryland Department of the Environment (MDE).

The Army, in consultation with EPA and MDE, will select a final remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. The Army, in consultation with EPA and MDE, may modify the preferred alternative or select another response action presented in this Plan based on new information or public comment. Therefore, the public is encouraged to review and comment on all the alternatives presented in the Proposed Plan. The **Remedial Investigation Report** and **Focused Feasibility Study** should be consulted for more detailed information on these alternatives.

The Proposed Plan describes the alternatives analyzed for OU1, identifies the preferred alternative to reduce the risks posed by the areas, and provides justification for this initial recommendation. An Operable Unit is a discrete part of an entire response action. It can be defined as a certain geographic portion of the study area or, as in this case, as one environmental medium of a geographic portion of the study area. The Plan is intended to summarize, for public review, the conditions at OU1 and the comparative analysis of different methods for site remediation. It provides the public with information necessary to participate with APG and the regulatory agencies in selecting the most appropriate remedy for the WBSA's OU1. The proposal will be finalized in a **Record of Decision.**

The Army issues this Proposed Plan as part of its public participation responsibilities under CERCLA as amended by the **Superfund Amendments and Reauthorization Act (SARA)**, commonly known as the "Superfund Program" and the **National Environmental Policy Act of 1969 (NEPA).** This Proposed Plan summarizes information that can be found in greater detail in the Remedial

Investigation and Focused Feasibility Study reports and other documents contained in the **Administrative Record** file for this Site. The Army, EPA, and MDE encourage the public to review these documents to gain a more comprehensive understanding of the Site and the environmental activities that have been conducted at the Site. The Administrative Record file contains the information on which the selection of the response action will be based and is available for public review at the following locations:

Harford County Library – Aberdeen Branch
21 Franklin Street
Aberdeen, MD 21001
(410) 273-5608
Hours: Mon, Tue, Thurs: 10 a.m. – 8 p.m.
Wed: 1 p.m. – 8 p.m. Fri: 1 p.m. – 5 p.m.
Sat: 10 a.m. – 5 p.m.

Harford County Library – Edgewood Branch
2205 Hanson Road
Aberdeen, MD 21004
(410) 612- 1600
Hours: Mon, Tue, Thurs: 10 a.m. – 8 p.m.
Wed: 1 p.m. – 8 p.m. Fri: 1 p.m. – 5 p.m.
Sat: 10 a.m. – 2 p.m.

Kent County – Washington College
Miller Library
Chestertown, MD 21620
(410) 778-2800
Hours: Mon – Fri: 8:30 a.m. – 4:30 p.m.

A glossary of the bold-faced terms in the text appears at the end of this document.

DATES TO REMEMBER:
MARK YOUR CALENDAR

Public Comment Period:
June 9 to July 23, 1999
The Army will accept written comments on the Proposed Plan during the public comment period.

Public Meeting:
June 29, 1999
The Army, EPA, and MDE will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study and to answer any questions. Oral and written comments will also be accepted at the meeting. The meeting is scheduled for June 29, 1999 at 6:30 p.m. at the Aberdeen Senior Center in Aberdeen, Maryland.

SITE BACKGROUND

APG is located on the northwestern shore of the Chesapeake Bay, approximately 15 miles northeast of Baltimore, MD. The installation occupies nearly 72,000 acres in Baltimore and Harford Counties and is divided into two areas known as the Aberdeen Area and the Edgewood Area (Figure 1).

The WBSA is located along the northwestern boundary of the Aberdeen Area of APG, bounded on the south and southeast by Old Baltimore and Michaelsville Roads. Parts of the WBSA have been used as an airfield, a testing area for weapons and vehicles, a maintenance facility and storage area for vehicles, a landfill, and a housing area for troops. Because limited weapons testing has been performed in the WBSA in the past and is presently continuing, **unexploded ordnance (UXO)** can be found in some portions of the study area.

Based on potential receptors such as humans, flora and fauna, the WBSA was divided into three OUs. OU1 and OU2 are based on human consumption of drinking water. OU1 is the groundwater in the southwestern two-thirds of the WBSA near the Harford County well field. OU2 is the groundwater in the northeastern one-third of the WBSA near the City of Aberdeen well field. OU3 is concerned with the surface media for the evaluation of human health and ecological risks. This Proposed Plan only addresses OU1.

Several sites are located within the WBSA. These include the Aberdeen Fire Training Area (AFTA), Phillips Army Airfield (PAA), Phillips Army Airfield Landfill (PAALF), and the Palmer House area and the Test Range for Advanced Aerospace Vulnerability (TRAAV). These areas are briefly described below:

- Located just north of the PAA is the PAALF. Used as a sanitary landfill since 1950, the area has been limited to inert construction debris since 1971.
- The AFTA, located north of the airfield, was used as a housing area for troops during World War II. Fire training exercises took place from the early 1960s until March 1989.
- The PAA is in the central portion of the WBSA and is an active airfield. Testing has been conducted in this area on various airplane parts, experimental aircraft, and sighting equipment.
- Located southwest of the PAA, the Palmer House Area has been and is currently used as a maintenance facility for test vehicles.
- The TRAAV, also located southwest of the PAA, contains various aircraft and associated parts that are stockpiled on the ground. Assembly, disassembly, testing and firing into aircraft has occurred at the TRAAV.

The HCP wells are located approximately 1.5 miles southwest of the AFTA. The western border of the WBSA runs along the installation boundary where four of the HCP wells (HCP-5, -6, -8, and -9) are located. HCP-7 was never constructed. These wells currently pump water from OU1 and offpost areas. Four other wells (HCP-1, -2, -3, and -4) are located off the installation property west of the WBSA in Perryman, Maryland.

The present geologic interpretation of the Aberdeen Area consists of three distinct river terraces that trend from the northeast toward the southwest, roughly parallel to the Chesapeake Bay. These sediments are from fluvial or swampy areas of deposition. The contamination is generally found at intermediate depths between +20 and –80 feet relative to mean sea level.

Historically, the groundwater flow direction in the WBSA has been to the south, southwest and southeast where the shallow aquifer discharges into surface water bodies. However, pumping of the HCP wells altered the historic direction to have a flow component towards the Harford County Well Field from the AFTA.

IDENTIFICATION OF ENVIRONMENTAL CONTAMINATION

The WBSA has been the object of environmental investigation since the late 1980s. The investigation began in September 1987 as part of a **Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)** of various APG areas. Currently site remedial investigations are covered under CERCLA in accordance with a **Federal Facility Agreement** between the Environmental Protection Agency and the Department of the Army signed in 1990.

In February 1991, **trichloroethene (TCE)** was detected in Harford County Production well HCP-6 in the portion of the Perryman well field that is on-post approximately 1.5 miles southwest

of the AFTA. TCE was also detected in well HCP-5 at a later date. During the RCRA Facility Assessment, the AFTA was identified as a potential source for chemical contamination of several media and was thus targeted for a groundwater study as a potential source for the TCE.

Nature and Extent of Contamination

A **Remedial Investigation** was conducted from October 1993 to June 1998, to identify the types, quantities, and locations of contaminants. A summary of the Remedial Investigation results and a general chronology of environmental activities surrounding OU1 groundwater follow.

- Two environmental studies conducted by APG in 1990 and 1991 concluded that contaminants, such as **volatile organic compounds (VOC)** and metals, are present in the soil, surface water, and groundwater at and near the AFTA. These studies also highlighted the potential for contaminated groundwater to impact Harford County drinking water wells approximately 1.5 miles west of the AFTA at the APG boundary fence.
- In February 1991, Harford County discovered TCE contamination above drinking water standards or **maximum contaminant levels (MCLs)** of 5 µg/L (or parts per billion) in HCP-6. In 1992, TCE was found in HCP-5 in concentrations that exceeded MCLs.
- In December 1992, APG completed an investigation to further delineate the extent of VOC contamination in the area. Results from the study indicated the following: (1) groundwater in the AFTA area is moving towards the Harford County wells, and (2) several of the monitoring wells sampled showed TCE contamination. Two of these monitoring wells, approximately 300 feet from HCP-5 and HCP-6, contained TCE levels over 4 times the MCL of 5 µg/L.
- During 1993-94, a field investigation defined the extent of VOC contaminated groundwater between the AFTA and the HCP wells. This study detected VOC contamination (primarily TCE) in the upper aquifer that originated from the AFTA. The HCP wells are affected by this TCE contamination. While the 1992 investigation was being conducted, APG evaluated contingency options for the well field and elected to install a granular activated carbon (GAC) treatment plant to treat the groundwater from wells HCP-5 and HCP-6 as an interim measure. Because TCE continues to be detectable in HCP wells 5 and 6, APG is still treating the groundwater from those wells. The highest concentration of TCE detected in the HCP wells to date is 14 µg/L. Since its installment, the treatment plant has kept the treated groundwater below safe drinking water standards.
- Soils at the AFTA were remediated from October 1990 to June 1994 and a confirmation study was conducted in the winter of 1994-95.
- During groundwater sampling for the Remedial Investigation, four different VOCs (carbon tetrachloride, 1,1-dichloroethene, tetrachloroethene and TCE) were detected above MCLs in the WBSA **plume**. Five different dissolved metals were detected above MCLs. Ten different explosives were detected with RDX being the most common. RDX was detected above its RBC value of 0.61 µg/L in one on-post monitoring well. There are no MCLs for explosives and detections for all explosives were below 2 µg/L.

- The contaminant with the highest concentration within the WBSA plume is TCE. The highest concentration of TCE detected in monitoring wells during the most recent groundwater-sampling event (March 1998) was 95 µg/L, exceeding the 5 µg/L MCL for TCE in drinking water. The highest concentration of TCE detected during the Remedial Investigation was 130 µg/L.
- Currently, the major portion of TCE groundwater contamination in OU1 is captured by the HCP wells. No TCE contamination has been found in off-post monitoring wells.
- Trends in groundwater data from well 19C, the closest on-post monitoring well to HCP-4, may indicate that TCE contamination is moving deeper and closer to HCP-4. Water pumped by HCP wells HCP-5 and HCP-6 is currently treated by the existing GAC system. The system also has the capacity and connections to treat wells HCP-8 and HCP-9. Water from HCP-4 cannot be treated by the existing system because it is not connected to the plant.

A Focused Feasibility Study was initiated based on Remedial Investigation results. A Focused Feasibility Study identifies and evaluates potential remedial alternatives and concludes with a recommendation of the preferred remedial alternative(s). The selection was made based on several factors, including protection of human health and the environment; compliance with all **applicable or relevant and appropriate requirements (ARARs),** long-term effectiveness; reduction of toxicity; mobility; volume of chemicals through treatment; short-term effectiveness; implementability; and cost. These factors are summarized at the end of this document in the Evaluation of Alternatives section. The Focused Feasibility Study selected a preferred alternative of groundwater treatment based on the above criteria.

SUMMARY OF THE RISK ASSESSMENT

The Remedial Investigation included a **human health risk assessment** that addressed the potential current and future risks posed to human health associated with this site. An ecological risk assessment was not evaluated as part of OU1 because ecological receptors are not exposed to groundwater. Ecological risk for this site will be evaluated under OU3 of the WBSA.

Following EPA requirements, the risk assessment included estimates of the risk posed to human health through both the current and future residential land-use scenarios. The current land-use scenario estimates the level of risk posed to human health and the environment based on the Army's current use of the land. Under future land-use conditions, site worker and residential exposures were considered for evaluation. Future residential development of the WBSA was considered highly unlikely given the industrial designation of the site. However, because production wells that currently supply residences are located within OU1, risks associated with future child and adult residential exposures to groundwater were evaluated.

Health risks are defined based on a conservative estimate of the potential **carcinogenic risk** or potential to cause other health effects not related to cancer. Carcinogenic risks and noncarcinogenic risks were evaluated as part of this risk assessment. Cancer risks are expressed as a number reflecting the increased chance, beyond that which is normal in the human population, that a person will develop cancer if he/she is directly exposed to the contaminants found in the groundwater at a site for 30 years. For example, EPA's acceptable risk range for cancer is 1×10^{-4} to 1×10^{-6}, meaning that there is one additional chance in ten thousand (1×10^{-4}) to one additional chance in one million (1×10^{-6}) that a person will develop cancer if exposed to a hazardous waste site. The risks associated with developing other health effects

are expressed as a **hazard index**. A hazard index of one or less indicates the human population is unlikely to experience adverse health effects.

HUMAN HEALTH RISK ASSESSMENT

The baseline risk assessment estimated the current and future health effects of fifteen chemicals of potential concern (COPC). The groundwater data was divided into five groups based on hydrogeologic information, contaminant levels and groundwater usage: TCE Plume, the Explosives Area, PAA, TRAAV, and a Site Wide grouping. The data groupings did not include any Harford County Production wells or effects of the existing GAC treatment plant. The maximum concentration of chemicals detected in each of the data groups was compared to **EPA Region III Risk-based concentrations (RBCs).** All organic concentrations above the RBCs were selected as COPCs. Only those inorganics with maximum concentrations above both RBC's and reference levels were selected as COPC's.

Under future land-use conditions, a site worker's ingestion exposures to groundwater from three of the groundwater groupings (i.e. Site Wide, TCE Plume and Explosives Area) were evaluated. Also under future residential land-use conditions, a child's ingestion and dermal absorption exposures to groundwater, as well as an adult's ingestion, dermal absorption, and inhalation exposures to groundwater were evaluated.

The cumulative cancer risks associated with both child and adult residents for all data groupings were within the EPA **target risk range**. The cumulative hazard indices for the future residential scenarios equaled or slightly exceeded 1 for each data grouping. These calculations were made as if the current treatment facility was not in place. The compounds contributing to the risk calculations associated with exposure to groundwater were 1,1-dichloroethene, TCE and arsenic. While explosives were present, they were not predominant chemicals of concern because of their low levels. Because arsenic levels were consistent with natural background levels in the area and site-specific reference levels, the arsenic levels are not considered harmful. However, the cumulative lifetime hazard index value estimated for the combined noncarcinogenic effects of the COPCs equaled or exceeded 1 for each data grouping of the future residential scenarios. Thus there is the potential for adverse human health effects if future residents ingest or absorb untreated groundwater in the TCE plume area.

In conclusion, the preferred alternative insures that chlorinated solvent levels greater than MCLs do not reach the Harford County water distribution system. Pumpage of the predominant COCs from OU1 groundwater, if not addressed by the preferred alternative or one of the other measures considered, may present a potential threat to public health.

SCOPE AND ROLE OF THE REMEDIAL ACTION

The scope of this remedial action is to ensure that drinking water supply derived from the OU1 portion of the WBSA is safe for human consumption. The cleanup strategy for this site is designed to prevent current and/or future groundwater contamination in OU1 from reaching the Harford County public drinking water supply. As discussed above, risks to human health are possible if actions are not taken to treat contaminated OU1 groundwater. The Army has evaluated various remedial alternatives that would treat the groundwater and reduce or eliminate the potential adverse health affects. The remedy that will be selected will represent the best balance of required and desired features as defined by CERCLA guidance and the **National Contingency Plan.** The **Remedial Action Objectives** are focused towards treating OU1 groundwater and reducing the concentrations of TCE and 1,1-dichloroethene

entering the Harford County water distribution system to levels within MCLs. The Remedial Action Objectives are:

- Prevention of human exposure (via the ingestion, dermal absorption, and inhalation pathways) to water containing TCE concentrations exceeding the MCL of 5 µg/L.
- Prevention of human exposure (via the ingestion, dermal absorption, and inhalation pathways) to water containing 1,1-dichloroethene in concentrations exceeding the MCL of 7 µg/L.

The Remedial Action Objectives are subject to the groundwater usage of the affected area of OU1. From the Focused Feasibility Study for OU1, the current GAC system treats 1200 gallons per minute (gpm), or 1.7 million gallons per day (mgd), and has an existing capacity to treat an additional 650 gpm or 0.9 mgd. Only water from wells HCP-5 and HCP–6 is currently being treated by the plant; water from wells HCP-8 and HCP-9 could also be treated by the existing plant. Harford County wishes to upgrade the pumping capacity of the wells. The Focused Feasibility Study recommends that any future treatment systems be connected to all eight wells in the Harford County Well Field. The GAC treatment system will treat all eight drinking water wells for TCE and RDX.

SUMMARY OF THE REMEDIAL ALTERNATIVES FOR GROUNDWATER OU1

A Focused Feasibility Study lists and analyzes possible interim and final actions which were considered feasible. This section presents a description of the remedial alternatives that passed initial screening and follow the EPA guidance for presumptive remedies. Each of the options entails a CERCLA site review 5 years after the start of the remedial action. The two presumptive treatment remedies identified by EPA for halogenated VOCs are Air Stripping and Granular Activated Carbon Adsorption. The feasible alternatives for the TCE Plume in groundwater at the WBSA are:

- Alternative 1 – No Action
- Alternative 2 – Limited Action (continued operation of existing GAC adsorption treatment system)
- Alternative 3 – Plant Construction with GAC Adsorption
- Alternative 4 – Plant Construction with Air Stripping.

There are several federal and state specific regulations that are associated with each of the four alternatives. These regulations, or ARARs, fall into three categories termed chemical specific, location specific and action specific. For all of the alternatives listed the chemical, or contaminant, specific ARARs are the same and are listed below. The location and action specific ARARs are listed with each alternative.

Chemical Specific ARARs for these alternatives are:

- 40 CFR 141, National Primary Drinking Water Regulations
- 40 CFR 143, National Secondary Drinking Water Regulations
- COMAR 26.04.01.06.08, Quality of Drinking Water in Maryland
- EPA Surface Water Quality Criteria
- COMAR 26.08.02.03 Maryland Drinking Water Regulations.

ALTERNATIVE 1: NO ACTION

Capital Cost	$118,384
Annual **O&M** Cost	$80,080

Present Net Worth (30 years) $904,173

Location Specific ARARs: None

Action Specific ARARs: None

CERCLA, as amended, and the National Contingency Plan require that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Remedial action is not included as part of the "no action" scenario; however, long term monitoring and dismantling of the current GAC system will be included as part of this alternative.

ALTERNATIVE 2: LIMITED ACTION

Capital Cost	$6,000
Annual O&M Cost	$273,384
Present Net Worth (30 years)	$2,614,050

Location Specific ARARs: None

Action Specific ARARs:

- 40 CFR 260 RCRA (Handling and Disposal and permitting of carbon)

Groundwater from two of the HCP production wells is being treated by the existing GAC system. This system involves groundwater being pumped through a vessel containing activated carbon to which the dissolved TCE contamination is adsorbed. Though TCE is the primary contaminant of concern, the GAC unit is capable of treating both halogenated VOCs and explosives. If after a period of treatment, concentrations of contaminants are detected in the effluent, the carbon can be removed and replaced by fresh carbon. The "old" carbon is commonly regenerated at an offsite facility. The limited action alternative involves operation of the current plant with no existing upgrades or modifications. Thus, the system will continue to treat the groundwater from the two production wells, HCP-5 and HCP-6 with the capacity to treat wells HCP-8 and HCP-9. The system does not have the connections or treatment capacity to treat groundwater pumped from the other four wells. Additionally, this alternative includes development of a groundwater monitoring plan and continued yearly monitoring of the Harford County Well Field to identify changes in the plume or groundwater flow.

ALTERNATIVE 3: PLANT CONSTRUCTION WITH GAC ADSORPTION

Capital Cost	$1,675,621
Annual O&M Cost	$270,928
Present Net Worth (30 years)	$4,260,520

Location Specific ARARs: None

Action Specific ARARs:

- 40 CFR 260 RCRA (Handling and Disposal and permitting of carbon)

- COMAR 26.09 – Maryland Erosion and Sediment Control Regulations.

This alternative involves enlarging and relocating the existing treatment facility to Harford County's Perryman facility and connecting the system to all eight of the HCP wells. The plant would have a capacity of 5.2 mgd. The treatment system will continue to be a fixed bed GAC system. As in Alternative 2, the GAC unit is a presumptive remedy, a proven solution, and is capable of handling explosives as well as the halogenated VOCs. Additionally, this alternative includes development of a groundwater monitoring plan and continued yearly monitoring of the Harford County Well Field to identify changes in the plume or groundwater flow.

ALTERNATIVE 4: AIR STRIPPING

Capital Cost	$1,104,947
Annual O&M Cost	$504,978
Present Net Worth (30 years)	$5,896,216

Location Specific ARARs: None

Action Specific ARARs:

- COMAR 26.09 – Maryland Erosion and Sediment Control Regulations
- COMAR 26.11.02 – Maryland Air Quality Permits, Approvals and Registration
- COMAR 26.11.15 – Maryland Air Quality Toxic Air Pollutants
- COMAR 26.11.06.06 – Maryland General Emission Standards, Prohibitions and restrictions – Volatile Organic Compounds.

Alternative 4 and Alternative 3 are essentially the same except the treatment system differs. With Alternative 4, groundwater would be extracted from the aquifer and treated using a tower air stripper. Air stripping is a presumptive remedy for the treatment of halogenated VOCs. The technique involves using a forced air blower through an aeration tank or a tower with stacked stripping trays that contain a flowing water stream. The upward airflow creates a "froth" inside the aeration tank or stripper tower. The air and water mix causes the volatile organic compounds to be driven from the water into the passing air. The air stream carries the VOCs out of the tower or tank where the air is treated (using a GAC device if necessary) before being released to the atmosphere. The designed system will require a new plant and will be capable of treating all eight HCP wells with a capacity of 5.2 mgd. The system can remove all of the VOCs of concern, but is ineffective for explosives and inorganic contaminants. Additionally, this alternative includes development of a groundwater monitoring plan and continued yearly monitoring of the Harford County Well Field to identify changes in the plume or groundwater flow.

EVALUATION OF ALTERNATIVES

The preferred alternative for treatment of water pumped from OU1 is Alternative 3: Plant Construction with GAC Adsorption.

This section compares the potential performance of each remedial alternative against the nine evaluation criteria listed in the National Contingency Plan and notes how each alternative compares to the other alternatives under consideration. The nine evaluation criteria are: (1) overall protection to human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume of contaminants through treatment; (5) short-term effectiveness; (6) implementability; (7) cost; (8) State/support agency acceptance; and (9) community acceptance. The first two criteria must be met before an alternative is eligible for selection. Criteria 3-7 are used to weigh major trade-offs among criteria, and the last two can only be considered after public participation. These nine evaluation criteria are discussed below. The "Detailed Analysis of Alternatives" can be found in the Focused Feasibility Study.

1. **Overall Protection of Human Health and the Environment** *determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.*

All of the alternatives except the "no action" alternative would provide adequate protection of human health and the environment in the short term. The "no action" alternative will allow contaminants exceeding the MCLs to enter the Harford County distribution system. The Limited Action alternative does not address the longer-term needs of additional drinking water supplied by all eight HCP wells. Alternative 2 is protective of human health only for groundwater pumped by HCP-5, –6, -7 and -8. Any

pollutants entering the additional four HCP wells, if pumped into the distribution system, may be dermally absorbed, ingested, and inhaled by citizens. Alternative 3 - Plant Construction with GAC Adsorption is a proven technology and would provide protection by treating the groundwater to levels at or below MCLs and will also remove any explosives that may reach the well field in the future. Alternative 4 – Air Stripping will remove all of the VOCs of concern and is protective of human health for all the COPC's identified in the Risk Assessment. However, the air stripping alternative will not sufficiently protect human health should explosives such as RDX reach the well field.

Because the "no action" alternative is not protective of human health and the environment, it has been eliminated from consideration under the remaining eight criteria.

2. **Compliance with ARARs** *evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the Site or whether a waiver is justified*.

Alternatives 3 and 4 would meet their respective ARARs in Federal and State laws. Alternative 2 – Limited Action may not be in compliance with federal and state MCLs if untreated contaminated groundwater from HCP-1, -2, -3 or –4 enters the distribution system. Otherwise, if only HCP-5, –6, -7 and -8 are used, all respective ARARs will be met.

3. **Long-term Effectiveness and Permanence** *considers the ability of an alternative to maintain protection of human health and the environment over time*.

Alternative 2 has, in the past, exhibited a high degree of reliability and protectiveness. However, there may be significant residual risk remaining from untreated water in the aquifer if contamination were to reach wells HCP-1, -2, -3 and –4.

Alternatives 3 and 4 will prevent public exposure to water exceeding MCLs or reference doses over the long term. Both GAC and air stripping systems are very reliable, though air stripping does generally require more maintenance than other systems. The adequacy and long term dependability for GAC and air stripping have been well proven for the predominant chemicals of concern.

4. **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** *evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.*

Alternatives 2, 3, and 4 treat the extracted groundwater, therefore reducing the toxicity of groundwater containing the predominant chemicals of concern and reducing the volume of the predominant chemicals of concern. However, none of these alternatives provides any reduction in groundwater mobility or volume. All of these treatment alternatives are nondestructive processes that merely transfer VOCs to another media, such as activated carbon, that will require off-site disposal by thermal destruction or recycling.

5. **Short-term Effectiveness** *considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation*.

Alternative 2 (Limited Action) is currently effective in treating water entering the distribution system, as long as HCP wells –1, -2, -3, and -4 have no VOCs detected in them. The potential does exist for TCE to reach HCP-4. If untreated groundwater from HCP-4 enters the system, this alternative will not adequately protect human health and the environment. Alternatives 3 and 4 will be effective immediately

in treating water entering the distribution system. Time required to meet the remedial objectives is short, and because of current safety and health practices there should be no substantial short-term risks to the community, environment, or workers due to construction. The air stripping alternative will be effective immediately in treating water entering the Harford County distribution system. Minimal short-term risks to the community, environment, and workers are possible due to general construction work. Minimal time is required to meet the remedial objectives.

6. **Implementability** *considers the technical and administrative feasibility of implementing the alternative, such as relative availability of goods and services*.

All of the groundwater technologies and remedies are readily available and generally proven. Alternative 2 is already in place, and its implementation requires very little additional capital and no construction. As four of the HCP wells cannot be treated under alternative 2, coordination and approval from regulatory agencies may be difficult. Alternative 3 is easily implemented. The current GAC system already in place could readily be transported to the Harford County Perryman Plant and expansion of the system to accommodate the entire 5.2 mgd is relatively easy. Alternative 4 is not capital intensive, but operations and maintenance burdens can be fairly substantial. Implementation of this alternative does require significant construction to include a water reservoir and pumps to accommodate system pressure requirements.

7. **Cost** *includes estimated capital and annual operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's 1999 dollar value. Cost estimates are expected to be accurate within a range of +50 to –30 percent.*

The overall comparative analysis of costs yields Alternative 2 as the least costly and Alternative 4 as the most costly. The Annual Operations and Maintenance Costs of Alternative 4 are nearly double that of Alternative 3.

8. **State Regulatory Agency Acceptance** *considers whether the State agrees with the recommendations of the Remedial Investigation/Feasibility Study and the Proposed Plan.*

The Maryland Department of the Environment agrees with the selection of Alternative 3 as a remedial action for OU1 groundwater. However, final concurrence with the preferred alternative will be determined after public participation.

9. **Community Acceptance** *considers whether the local community agrees with U.S. EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.*

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The Preferred Alternative for treatment of pumped groundwater from OU1 of the WBSA is Alternative 3, Plant Construction with GAC Adsorption. The Preferred Alternative was selected over the others because it is expected to achieve substantial risk reduction through treatment of the water from all HCP wells and it provides protection from groundwater that may become contaminated in the future due to plume expansion. This action is designed as an actual treatment measure of the groundwater. This alternative also addresses the CERCLA alternative for treatment. Alternative 3, relative

to the other alternatives, ranks favorably in protectiveness, cost, and ARAR compliance, and is easily implementable. Therefore, the Preferred Alternative is believed to provide the best protection to human health and is the best balance of the comparison criteria discussed above. This remedy will result in hazardous substances remaining on-site above health-based levels. There will be annual groundwater monitoring and a review will be conducted within five years after commencement of remedial action to ensure that the selected remedy continues to provide adequate protection of human health.

The existing GAC plant would be moved to Harford County's Perryman facility. The Army would pay for the capital costs of construction and have oversight of plant construction. The Army and Harford County will determine responsibilities for payment of operations and maintenance costs.

COMMUNITY PARTICIPATION

Public participation is an important part of selecting the final remedy. APG, EPA, and MDE provide information regarding the site investigation and cleanup of the WBSA to the public through the Administrative Record file, public meetings, and announcements published in local newspapers. The primary documents to review for more detailed information are:

- Draft Remedial Investigation Report, and
- Draft Focused Feasibility Study for Operable Unit 1.

The Army, EPA, and MDE are soliciting input from the community on the proposed alternative and encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have occurred at the site.

The final remedy selection will be presented in the Record of Decision. Comments from the public and the associated responses will be included in the Responsiveness Summary section of the Record of Decision.

To send written comments or to obtain further information contact any one of the following representatives:

Mr. Kenneth P. Stachiw, Program Manager
U.S. Army Aberdeen Proving Ground
Directorate of Safety, Health and Environment
ATTN: STEAP-SH-ER
Aberdeen Proving Ground, MD 21010
(410) 436-3320

Mr. Steve Hirsh, RPM (3HS50)
U.S Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3352

Mr. John Fairbank
Maryland Department of the Environment
Waste Management Division
2500 Broening Highway
Baltimore, MD 21224
(410) 631-3497

Written comments must be postmarked no later than the last day of the public comment period, June 29, 1999. For your convenience, a comment sheet is attached at the end of this document.

The dates for the public comment period, the location, and time of the public meeting, and the location of the Administrative Record files are provided in the Introduction and Purpose section at the front of this Proposed Plan.

ACRONYMS

APG	Aberdeen Proving Ground
AFTA	Aberdeen Fire Training Area
ARAR	Applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
COMAR	Code of Maryland Regulations
COPC	Chemical of potential concern
EPA	U.S. Environmental Protection Agency
GAC	Granulated Activated Carbon
gpm	Gallons per minute
HCP	Harford County Production Wells
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
Mgd	Million gallons per day
NEPA	National Environmental Policy Act
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAA	Phillips Army Airfield
PAALF	Phillips Army Airfield Landfill
RBC	risk-based concentration
RFA	RCRA Facility Assessment

RI	remedial investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
TCE	Trichloroethene
TRAAV	Test Range for Advanced Aerospace Vulnerability
µg/L	micrograms per litre
UXO	unexploded ordnance
VOC	Volatile Organic Compounds
WBSA	Western Boundary Study Area

Glossary of Terms

Administrative record – This is a collection of documents that contain information and reports generated during the investigation of the site and remediation. It is available for public review.

Applicable or Relevant and Appropriate Requirements (ARARs) – These criteria are set forth by federal and state statutes and regulations and must be considered in the evaluation of remedial alternatives.

Capital Costs – The financial support necessary to implement an alternative.

Carbon adsorption – A process using activated carbon to remove primarily soluble organic from air and water. There are granular and powdered activated carbon based on the size of the carbon particles.

Carcinogen – A chemical capable or suspected of producing cancer as a result of exposure.

Carcinogenic Risk – A number reflecting the increased chance or odds that a person will develop cancer if they are exposed to a site for 30 years.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - This federal law was passed in 1980 and is commonly referred to as the Superfund Program. It provides for liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste disposal sites that endanger public health and safety or the environment.

EPA Region III Risk-Based Criteria – A concentration, calculated for each chemical, using toxicity criteria and the carcinogenic risk/hazard index to determine the level of chemical concentrations that are protective of human health and the environment.

Federal Facility Agreement – A legal document signed by the U.S. Environmental Protection Agency and the U.S. Department of the Army that sets the framework for RCRA corrective action requirements and the CERCLA remedial action requirements.

Focused Feasibility Study – A process, part of CERCLA, that involves the collection of sufficient information to support an informed risk management decision regarding which remedy appears to be most appropriate for given Operable Units.

Groundwater – Underground water that fills pores in soils or openings in rocks to the point of saturation.

Hazard Index – The ratio used to describe the likelihood of occurrence of an adverse health effect from a noncarcinogenic contaminant.

Glossary of Terms (continued)

Human Health Risk Assessment – An evaluation of the risk posed to human health should remedial activities not be implemented.

Maximum Contaminant Level (MCL) – Based on the Safe Drinking Water Act, MCLs are the maximum permissible of a contaminant in water that is delivered to any user of a public water system.

National Contingency Plan (NCP) – Officially the National Oil and Hazardous Substances Pollution Contingency Plan, these CERCLA regulations give the federal government the authority to respond to the problems of abandoned or uncontrolled hazardous waste disposal sites as well as to certain incidents involving hazardous wastes.

National Environmental Policy Act (NEPA) – An act enacted on January 1, 1970 stating that any federal branch or agency proposing a project that might have a significant effect on the environment must include in the report statements concerning potential impact.

National Priorities List – This list, developed by EPA, identified the uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.

Noncarcinogen – A substance that is not believed to cause cancer. Some "noncarcinogens" may cause other types of adverse health effects, such as liver or kidney damage.

Operable Unit (OU) – Discrete part of a response action

Operational and Maintenance Costs (O&M) – The financial support necessary for long term operation and upkeep of a facility.

Plume – A three-dimensional zone within the groundwater that contains contaminants and generally moves in the direction of, and with, groundwater flow.

Present Net Worth – The amount of money (in 1999 dollars) necessary to secure the promise of future payments, or series of payments, at an assumed interest rate of 10% for 30 years.

Proposed Plan – A plan that summarizes the preferred alternative for a remedial action.

Remedial Action Objectives – Media-specific goals for protecting human health and the environment.

RCRA Facility Assessment – A report that describes the source and nature of a release; the type, magnitude, and likelihood of threats to public health and welfare of the environment; and the need for removal, investigation, and remediation.

Glossary of Terms (continued)

Record of Decision – This legal record is signed by the Army and the EPA. It provides the cleanup action or remedy selected for a site, the basis for selecting that remedy, public comments on alternative remedies, responses to comments, and the cost of the remedy.

Remedial Investigation (RI) – An investigation under CERCLA that involves sampling environmental media such as air, soil, and water to determine the nature and extent of contamination at an abandoned waste site and human health and environmental risks that result from the contamination.

Resource Conservation and Recovery Act (RCRA) – The Federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final disposal. RCRA also provides for safe hazardous waste management practices and standards.

Responsiveness Summary – A part of the record of decision in which the Army documents and responds to written and oral comments received from the public about the Proposed Plan.

Superfund Amendments and Reauthorization Act (SARA) – A congressional act that modified CERCLA. SARA was enacted in 1986 and again in 1990 to authorize additional funding for the Superfund Program.

Target risk range – A range of probabilities of risks to human health (1×10^{-4} to 1×10^{-6}). If calculated risks fall within this range, risk managers must determine whether remedial action is warranted to reduce the risk. If the risks are smaller than 1×10^{-6} (less than 1 in 1 million), no remedial action is required. If the risks are larger than 1×10^{-4} (1 in 10 thousand), remedial action is generally warranted.

Trichloroethene (TCE) – A volatile organic compound commonly used as a solvent.

Unexploded Ordnance (UXO) – Unexploded military materiel, such as ammunition.

Volatile Organic Compounds – Carbon compounds, such as solvents, oils, and pesticides, that have a tendency to vaporize at room conditions.

COMMENT FORM

This form is one way you can provide your comments to APG on its proposed action. However, you can submit written comments in any format. Your input on the Proposed Plan for the WBSA Groundwater OU1 is important to the Army, EPA, and MDE. Comments provided by the public are valuable in helping the Army select a final cleanup remedy for the Site.

You may use the space below to write your comments and mail. Comments must be postmarked by July 23, 1999. If you have any questions about the comment period, please contact the APG Hotline at (800) APG-9998. Those with electronic communications capabilities may submit their comments to the Army via Internet at the following web site address: www.apg.army.mil (environmental cleanup section).

ALTERNATIVES

_____1: No action

_____2: Limited Action

_____3: Plant Construction with GAC Adsorption

_____4: Air Stripping

MAILING LIST

_____Add my name to mailing list.

COMMENTS:

_____

_____

_____

Name:_____

Address: _____

City: _____

State: _____ ZIP: _____

The APG Mailing Address is:

Mr. Kenneth P. Stachiw, Program Manager

U.S. Army Aberdeen Proving Ground

Directorate of Safety, Health and the Environment

Bld. E4430 STEAP-SH-ER

Edgewood, MD 21010