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EPA Superfund
Record of Decision:

SOUTHERN MARYLAND WOOD TREATING
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Text:

RECORD OF DECISION

SOUTHERN MARYLAND WOOD TREATING SITE

HOLLYWOOD, ST. MARY'S COUNTY, MARYLAND

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 3, PHILADELPHIA, PENNSYLVANIA
SEPTEMBER 1995

RECORD OF DECISION
SOUTHERN MARYLAND WOOD TREATING SITE

DECLARATION

Site Name and Location

Southern Maryland Wood Treating Site
Hollywood, St. Mary's County, Maryland

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Southern Maryland Wood Treating Site ("the Site"), in Hollywood, Maryland, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA") and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"). This decision document explains the factual and legal basis for selecting the remedy for this site. The information supporting this remedial action decision is contained in the Administrative Record for this site.

The Maryland Department of the Environment concurs with the selected remedy. However, because MDE believes that EPA has selected a remedy which effectively eliminates the Site contamination through treatment and offsite disposal, MDE does not believe extended or indefinite ground water monitoring beyond 5 years is warranted.

Assessment of the Site

Pursuant to duly delegated authority, I hereby determine, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that 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 threat to public health, welfare, or the environment.

Description of the Selected Remedy

This is the second and final phase of remedial action for the Site. The first phase involved the installation of a sheet pile barrier wall around the most highly contaminated area of the Site, the "containment area". This phase addresses soil and sediment contamination and non-aqueous phase liquids ("NAPLs") which are the principal threats remaining at the Site and are a source of contamination to the ground water and surface water. Because the soil and sediments will be treated to levels that are protective of human health and the environment before backfilling onsite, and the NAPLs will be disposed offsite, the Site will not require long-term management.

The major components of the selected remedy include the following:

- Dewatering of the containment area in preparation for the excavation of subsurface soil and dense non-aqueous phase liquids ("DNAPLs") below the water table followed by onsite treatment of water generated in the dewatering process and discharge of treated water to the west tributary;

- Excavation of approximately 97,000 cubic yards ("CY") of soil from within and outside of the sheet pile wall and dredging of sediments from the onsite pond and segments of the east and west tributaries that contain contaminants in excess of the established cleanup levels;

- Dewatering of saturated soils/sediments onsite in preparation

for treatment by thermal desorption, followed by onsite treatment of water generated in the dewatering process and discharge of treated water to the west tributary;

- Staging of excavated soil/sediments onsite in preparation for dewatering, following dewatering in preparation for treatment by thermal desorption, and following thermal desorption in preparation'for backfilling. Also, onsite staging of NAPLs collected during excavation and dewatering, water treatment residues, recondensed contaminants from the thermal desorption treatment process, and any grossly contaminated soil/sediment that is not amenable to treatment by thermal desorption prior to offsite shipment for treatment and disposal;

- Onsite treatment of excavated soils and sediments by a thermal desorption process;

- Offsite treatment and disposal of desorbed, recondensed contaminants from the thermal desorption treatment process, NAPLs collected during excavation and dewatering, water treatment residues, and any grossly contaminated soil/sediment that is not amenable to treatment by thermal desorption;

- Sampling of treated soils and sediments to ensure delisting levels have been achieved;

- Backfilling with clean fill below the water table in the containment area and with treated soil/sediments above the water table in the containment area and in all other excavated areas;

- Pumping and treating of surface water from the onsite pond until the sources of contamination to the surface water i.e., soil, sediment, ground water) are remediated. Treatment of surface water in onsite water treatment system followed by discharge to the west tributary;

- Ground water, stream and wetlands monitoring;

- Implementation of institutional controls temporarily restricting ground water use in the shallow aquifer;

- Building demolition and cutting off of the sheet pile wall following remediation, as determined necessary. Offsite disposal of building rubble and sheet piling; and

- Maintenance of perimeter fencing until access restrictions are no longer necessary.

Declaration of Statutory Determinations

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. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as a principal element.

Because the selected remedy may not allow for unlimited use of and unrestricted exposure to the Site within five years of initiation of the remedial action, a policy review of the Site will be conducted within five years of the completion of physical construction of the remedial action. Such review shall be conducted in accordance with EPA guidance set forth in Structure and Components of Five-Year Reviews, May 23, 1991, OSWER Directive 9355.7-02 and Supplemental Five-Year Review Guidance, OSWER 9355.7-02A, to ensure that the remedy continues to provide adequate protection to human health and the environment. Such policy reviews will be conducted no less than every five years thereafter until EPA determines that there are no hazardous substances remaining on the Site that prevent unlimited use of and unrestricted exposure to the Site.

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W. Michael McCabe Date
Regional Administrator
Region 3

TABLE OF CONTENTS

DECISION SUMMARY

1.0 SITE NAME, LOCATION AND DESCRIPTION

The Southern Maryland Wood Treating Site ("SMWT" or "Site"), approximately 25 acres in size, is located just west of Maryland Route 235 on a 96 acre parcel of land approximately one mile north of Hollywood, Maryland in St. Mary's County (Figure 1). The operation of a pressure treated wood preservation facility on the Site for many years resulted in contamination of soils, ground water, surface water and stream sediments with wood preserving chemicals. No wood treating activities are currently performed onsite.

Figure 2 shows the primary Site features. The Site is bounded by residential, agricultural, and wooded tracts of land. An onsite freshwater pond discharges to Old Tom's Run (also referred to as the "west tributary"), which eventually reaches Breton Bay and finally the Potomac River. Currently the only building structures left onsite that were once associated with the wood preservation business are a pole barn previously used for wood storage, and a small house in the upper site area formerly used as an office.

The original process building, which has since been demolished, housed the wood pressure treatment operations including two treatment vessels or retorts. Wood and chemical preservatives were introduced into the vessels which were subsequently pressurized in order to treat the wood. Several large vertical tanks previously located next to the process building contained the chemical preservatives pentachlorophenol ("PCP") and creosote, which were used in the wood treating process.

According to the 1990 census, the population of St. Mary's County is approximately 76,000. Because the county is located along 400 miles of shoreline on the Potomac and Patuxent Rivers and the Chesapeake Bay, the population increases substantially in the summer season. On a more local basis, there are several residential subdivisions and numerous houses within an approximate 2-mile radius of the Site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was owned by Herbert and Louie Giddings from 1964 until 1975 when ownership was transferred to the Southern Maryland Wood Treating Corporation ("SMWT Corp."). The wood treating facility was owned and operated by the SMWT Corp., and subsequently operated by L.A. Clarke and Son, Inc. ("L.A. Clarke"), from 1965 to 1978 as a pressure treated wood preservation business. Creosote and PCP were used as wood preservatives at the Site.

The six unlined lagoons depicted in Figure 2 were used for disposal of liquid waste from the process. As a result of such disposal, onsite soils and ground water beneath the lagoons became contaminated. Non-aqueous phase liquids ("NAPLs"), both light ("LNAPLs") and dense ("DNAPLs"), are also found in the subsurface beneath the lagoons and above the underlying clay layer. Additionally, due to ground water discharge to the pond from the lagoon area, surface water and sediment in the onsite pond and sediment in the west tributary became contaminated. Sediments in the east tributary are also contaminated, most likely due to surface water runoff from contaminated soils onsite. Storage of treated wood onsite resulted in surface soil contamination in the upper site and northeast tank areas.

In the early 1970's, the operators of the facility submitted an application to the local health department for the construction of a new onsite well. Upon inspection of the Site, the St. Mary's County Department of Environmental Hygiene found evidence of possible contamination and rejected the application. Recognizing that the Site constituted a potentially serious source of contamination, the County instituted a program of sampling and inspection.

The State of Maryland ("State") subsequently entered into negotiations with the operator, requesting that the Site be cleaned up. However, in 1978, L.A. Clarke and Son, Inc., which had become sole shareholder in the SMWT Corp. in 1975, filed for bankruptcy and ceased wood treating operations. To enforce a site clean-up, the Maryland Water Resources Administration instituted a legal action against L.A. Clarke and Sons, Inc. In November 1980, the St. Mary's County Court issued a Consent Decree requiring a complete restoration of the Site.

Pursuant to a petition for contempt filed by the State with the St. Mary's County Court, L.A. Clarke began an initial cleanup of the Site in 1982. Liquids from the lagoons were sprayed into the woods behind the Site ("spray irrigation area"). The sludge from the lagoons was excavated and mixed with wood chips, composted sewage sludge and top soil, then spread in a previously uncontaminated area on the southeastern section of the property in an attempt to bioremediate the contaminants. The excavated lagoons were backfilled and graded. This attempt at land treatment of the sludge was unsuccessful, and resulted in the contamination of several additional acres of the property, now referred to as the "land treatment area".

On March 14, 1985, EPA initiated its first response action at the Site. After the discovery of contaminated material seeding into the fresh water pond, EPA started a removal action. During this action, approximately 1,400 cubic yards ("CY") of contaminated sediment were excavated from the pond. This sediment was stabilized with cement kiln dust and encapsulated onsite in an impermeable synthetic liner to the east of the former lagoon area within what is now the containment area.

The Site was proposed for inclusion on the National Priorities List ("NPL") on October 1, 1984, and listed on the NPL on June 1, 1986.

In 1988, EPA concluded a Remedial Investigation (RI) and Feasibility Study (FS) at the Site. Based on the findings of these studies, EPA issued a Record of Decision (ROD) on June 29, 1988. The ROD called for construction of a subsurface barrier wall around the former lagoon area, which was found to contain a plume of contaminated ground water; excavation and onsite incineration of contaminated soil from the former lagoon area, the land treatment area, and other areas of the Site; onsite incineration of liquids and solids contained in tanks and retorts; demolition of buildings; and pumping and treatment of contaminated ground water. The Maryland Department of the Environment ("MDE") concurred with the ROD, provided that the cost of the remedy could be substantially reduced during design.

In order to expedite the start of cleanup work at the Site, the remedial action was broken down into two phases. The first phase was the installation of a sheet pile barrier wall around the former lagoon and process areas (see Figure 2). This area is now referred to as the "containment area". Construction of the sheet pile wall was completed in November of 1990. The second phase included the remaining components of the selected remedy. In May 1992, design of the incineration and ground water treatment components had reached the 95% stage. At that time, it was apparent that a substantial cost reduction could not be achieved, resulting in Maryland's inability to fund its required 10% share of site remediation costs. At the same time, local citizens and local government entities expressed opposition to an onsite incinerator. The design work was suspended and EPA proposed to conduct a Focused Feasibility Study ("FFS") to reevaluate the remedy for the Site.

On June 29, 1993, a second removal action was initiated to address certain immediate threats at the Site while the FFS was being conducted. This action included the demolition of several buildings that were in danger of collapse; the removal and offsite disposal of liquid and solid waste in numerous tanks and the retorts, and over 350 drums of investigation-derived waste; the re-covering of the pile of previously excavated sediment; the construction of an underflow dam to reduce the flow of floating and sinking material from the onsite pond to the west tributary; the construction of a trench upgradient of the pond to collect contaminated ground water and, if possible, DNAPL; and the construction of a water treatment facility to treat water from the pond and/or the trench prior to its discharge to the west tributary. The water treatment facility became fully operational in June 1995 and will be operated on a continual basis through the remedial action.

The FFS was conducted from May 1992 to February 1995, at which time the Final FFS Report was issued. This Record of Decision ("ROD") is based on the remedial alternatives developed and evaluated in the FFS, as well as other Site characterization information found in the Administrative Record file.

EPA conducted a potentially responsible party ("PRP") search from 1985 to 1987. The PRPs identified by this search included the following: (1) SMWT Corp.; (2) L.A. Clarke & Son, Inc., parent company of SMWT Corp.; (3) Ted Curtas, President of SMWT Corp. and manager of site operations; (4) Michael Clarke, former officer, director, and stockholder of the SMWT Corp.; and (5) Louie Giddings, former property owner who leased the property to SMWT Corp.

On June 6, 1988, EPA issued Special Notice Letters affording the PRPs the opportunity to implement the remedy selected in the 1988 ROD. As no good faith proposal to implement the remedy was received and EPA had determined that none of the PRPs was financially viable, EPA proceeded with the remedial design/remedial action ("RD/RA"). Due to the absence of viable PRPs, no legal action has been instituted regarding cleanup of the Site. However, EPA has issued a notice to the property owner that EPA intends to file a Superfund lien on the property in accordance with §107(1) of CERCLA.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

During the period that EPA was conducting the FFS for the Site, extensive community involvement was maintained. EPA generated several drafts of the FFS Report and a Post-Remediation Human Health Risk Assessment that were released to the public for comment. Public meetings were held periodically to keep the community informed of the progress of the FFS and to solicit input from the community. In addition, monthly telephone conference calls were conducted with EPA, MDE, local press, and community members to update the public on the progress of the project.

The Final FFS Report for the Site was released to the public on February 24, 1995, and the Proposed Remedial Action Plan ("PRAP#) was released to the public for comment on March 22, 1995. These documents were made available to the public in the Administrative Record file maintained at the EPA Region 3 office in Philadelphia, PA, and at the St. Mary's County Library in Leonardtown, MD. The notice of availability of these documents was published in The Enterprise newspaper on March 22 and 29, 1995. A public comment period on the documents was held from March 22, 1995 to April 21, 1995. In addition, EPA held a public meeting on March 30, 1995 at the Carter State office Building in Leonardtown, MD. At that meeting, representatives from EPA and MDE answered questions about conditions at the Site and the remedial alternatives under consideration. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is a part of this ROD.

This decision document presents the selected remedial action for the Southern Maryland Wood Treating Site, in Hollywood, Maryland, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300. The selection of the remedial action for this Site is based on the Administrative Record.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The removal actions discussed above in Section 2.0 addressed certain immediate threats at the Site and removed a large volume of waste contained in drums, retorts, tanks and buildings onsite. This remedy addresses the remaining sources of contamination (NAPLs in the subsurface in the containment area, lagoon sludge in the land treatment area, and contaminated soils and sediments in the containment, northeast tank, upper site, and land treatment areas, and the tributaries), as well as contaminated ground water and surface water. EPA considers the NAPLs and contaminated soil in the containment area and the lagoon sludge in the land treatment area to be principal threat wastes, meaning that the material includes or contains high concentrations of hazardous substances, pollutants, or contaminants and acts as a source of contamination to other media. Pursuant to the NCP at 40 CFR §300.430(a)(1)(iii), EPA expects to use treatment to address the principal threats posed by a site, wherever practicable.

This ROD presents a final remedial action that will address all contaminated media and all potential routes of exposure to human or environmental receptors. The goal of this cleanup action is to ensure that future residents and ecological receptors will not be exposed to an unacceptable risk posed by Site soil, and ground water. In addition, this action will prevent future risk to ecological receptors posed by exposure to contaminated surface water and sediment.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Hydrogeology Geology, Soils

Topography - Topographic relief across the Site is about 35 feet, with elevations ranging between 119 to 154 feet above mean sea level. The Site slopes steeply from the upper site/northeast tank/process/land treatment areas down to the pond. The Site lies on a drainage divide such that runoff from the site discharges to tributaries that straddle the Site to the east and west. Both of these tributaries discharge to the Potomac River via Brooks Run and Mcintosh Run. Regionally, the Site is located close to the drainage divide between the Potomac and Patuxent River Basins.

Geology - Geologically, the Site lies within the Atlantic Coastal Plain physiographic province which is composed of unconsolidated gravels, sands, silts, and clays. Soil borings indicate that the soils onsite are composed primarily of silty and clayey sand which extends to a maximum depth of about 40 feet below ground surface ("BGS"). These are known as the "Upland Deposits," the uppermost water-bearing zone in the area of the Site. It is likely that a large portion of the surface and near-surface soils at the Site have been disturbed and reworked by past disposal operations (i.e., lagoons and land treatment) and remedial activities (i.e., excavation and backfilling).

The Upland Deposits are separated from the next sandy geological unit, the Chesapeake Group, by a low permeability dense blue clay which is approximately 20 feet thick in the area of the Site. While there are some domestic wells in the vicinity of the Site that obtain water form the Upland Deposits, drinking water supplies in the area are primarily obtained from the confined Aquia and Piney Point-Nanjemoy aquifers. These water-bearing units are located approximately 285 to 600 feet BGS and are separated from the Upland Deposits by several layers of alternating sands and clays. Table 1 includes a summary of a drilling log for an onsite production well that describes the layers found beneath the Site.

According to the May 1988 Remedial Investigation Report, a survey of available well logs in the area of the Site was conducted. six ground water supply wells, including the onsite production well which has since been abandoned, were found to be screened in the Aquia and Piney Point-Nanjemoy aquifers. Two residences were found to utilize shallow water table wells for their water supply. These wells are located approximately 200 yards northwest and 400 yards north of the Site, respectively. With regard to ground water flow in the water table aquifer, this would be considered upgradient from the Site.

Hydrogeology - The ground water flow pattern in the shallow water table aquifer (Upland Deposits) above the first blue clay encountered beneath the Site, has been altered to some degree by the installation of the sheet pile wall in 1990. Figures 3 and 4 show the ground water elevation contours and flow directions from February 1988 (pre-sheet pile wall) and May 1991 (post-sheet pile wall), respectively. These figures illustrate that the pond and the stream flowing from the pond (west tributary) are the main hydrogeologic controls in the containment area. The shallow ground water flow in this local area is towards the pond and stream indicating that they act as ground water discharge points.

Ground water elevations in most wells within the containment area have significantly decreased since the installation of the sheet pile wall. The decline in ground water elevations and changes in the flow patterns indicate that the installation of the wall has decreased the ground water flow from outside the containment area into the containment area. In the eastern portion of the containment area where the ground water divide was previously identified, ground water infiltrating into this zone appears to be trapped by the sheet pile wall thus resulting in a rise in the ground water level. Although there has been some modification in the ground water flow outside of the containment area, the flow direction remains essentially unchanged (i.e., east and south).

Ground water elevation and contours in the deeper sand bearing stratum below the blue clay are depicted in Figure 5. Ground water flow in this stratum is to the southeast.

5.2 Nature and Extent of Contamination

The SMWT facility used the typical wood treating preservatives, creosote and PCP. Creosote is an oily brown to black liquid which is either used full strength or diluted with petroleum oil or coal tar. Practically insoluble, it is denser than water and is made up of a complex mixture of organic compounds. A typical creosote composition includes 85% polynuclear aromatic hydrocarbons (PAHs), 10% phenolic compounds, and 5% nitrogen-, sulfur-, or oxygen-containing heterocycles. Technical grade PCP used to treat wood contains

85-90% PCP, other chlorophenolic compounds, and chlorinated dibenzo-dioxins and furans (0.1%). PCP and several of the PAHs are classified as probable human carcinogens. Table 2 lists the chemicals detected in ground water, soils, and sediments at the Site, including various creosote and PCP compounds.

At the SMWT Site, the wood treating process, which used these oil-based preservatives, produced sludge water and significant quantities of process wastewater that were discharged in several unlined onsite lagoons. In addition to the former lagoon area, Table 3 lists the various areas of the Site shown in Figure 2 and the probable causes of contamination in each area that resulted from the operation of the wood treatment business. A more detailed description of the contamination found in each area is presented below. This information is summarized from data gathered during the remedial investigation completed in 1988, a pre-design study conducted in 1991-1992, and a FFS conducted in 1992-1994. Soil boring locations from the pre-design investigation and monitoring wells installed during the RI and pre-design are shown in Figure 6. Additional soil borings and monitoring wells installed during the FFS are shown in Figure 7.

5.2.1 Soils in Land Treatment Area and Other Areas Outside Containment Area

The stratigraphy of the land treatment area shows approximately 1.5 feet of sandy soil, followed by 6 to 8 inches of composted lagoon sludge left from the attempt at land treatment, and then contaminated soils to a maximum depth of about 5 to 7 feet BGS. Contaminants consist primarily of PAHs in the thousands of parts per million ("ppm") range in the upper two feet BGS and to a lesser extent PCP at concentrations as high as 180 ppm. At the 5 to 7 foot depth, the maximum PAH concentration was only 77 ppm. These soils are considered a principal threat because they are highly contaminated with wood treating wastes. Below the 5 to 7 foot depth, soils are not contaminated.

Surface soils at a depth of approximately 0 to 2 feet are also contaminated with PAHs in portions of the upper site, process, and northeast tank areas of the Site. In the upper site area, PAHs are found in two locations (SO-7 and SO-4) in the surface soils at a few parts per million and at a few other locations in the hundreds of parts per billion ("ppb") range. Similarly, in the northeast tank area, a few shallow samples show PAH concentrations in the hundreds of parts per billion. At SO-15 total PAHs ("TPAHs") are found at approximately 15 ppm in the surface soil. Carcinogenic PAHs ("CPAHs") make up about 7 ppm of the contaminants at that location. At MW-23 TPAHS are at 28 ppm (11 ppm CPAHs) in the surface soil.

In the spray irrigation area TPAH concentrations of 3 ppm (1.5ppm CPAHs) are found at SO-26 in the surface soil. In a few other locations TPAHs occur in the hundreds of parts per billion range. Beyond the fence line, contamination is found only at SO-31 at less than 1 ppm in surface soil.

5.2.2 Ground Water Outside the Containment Area

Ground water in the land treatment area is not significantly impacted and shows very low levels of contamination, a few parts per billion base-neutral and acid extractable compounds ("BNAs"), which include the PAHs and various phenolic compounds. Volatile organic compounds ("VOCs") have not been detected in the ground water in this area.

In the upper site and northeast tank areas, concentrations of BNAs are not found above 11 ppb and no VOCs are present. At MW-23 BNA concentrations are at 121 ppb (mostly naphthalene) and VOCs at 9 ppb. The spray irrigation area showed 1 ppm BNAs at MW-12 and 155 ppb petroleum hydrocarbons, including benzene, toluene, ethylbenzene, and xylene ("BTEX"). MW-27 showed 1 ppb naphthalene in a sample collected in early 1995.

There are four wells, MW19-22, screened in the sand unit just below the blue clay beneath the Site. During the Pre-design study, no contamination was detected in these wells. Beginning in March 1994, these wells have been sampled on a regular basis to monitor whether contamination is moving through the clay into deeper aquifers.

During the March 1994 sampling event, several PARs and phthalates were detected in these wells at individual concentrations ranging from less than 1 ppb to approximately 10 ppb. This may be due to cross-contamination of the samples from air borne contamination resulting from excavation activities conducted simultaneously

with that sampling event. In all subsequent sampling events, no PAHs have been detected. Only one phthalate has been detected at a maximum of 33 ppb. This compound is frequently introduced during sampling and laboratory analysis and its presence is believed to be the result of sample handling and not site-related. These data results indicate that the clay layer is an effective confining unit and prevents contaminants in the shallow aquifer above the clay from migrating into the sand unit below the clay.

5.2.3 Soils within the Containment Area

Soil within the containment area is heavily contaminated with PARs at depths ranging from 0 to 2 feet BGS to the top of the clay layer underlying the Site, particularly in the area where the lagoons were located. The depth to clay varies in the containment area from about 8 to 40 feet due to the change in surface topography from the upper portion of the Site down to the pond. PAR concentrations range from the tens to thousands of parts per million. PCP at 29 ppm was found only at MW-28 in a surface soil sample. The pond sediments excavated during the first removal action in 1985 remain covered with plastic in the containment area. These sediments are contaminated with PARs at concentrations greater than 1000 ppm. No PCP has been detected in these sediments.

The soils within the containment area are considered a principal threat because they are highly contaminated with wood treating wastes and may act as a continuing source of contamination to ground water and surface water.

5.2.4 Ground Water and NAPLS Within the Containment Area

Ground water within the containment area is heavily contaminated with BNAs and VOCs. Figure 8 shows the area of shallow ground water contamination delineated during the RI. The location of the sheet pile wall is based on that delineation and is constructed such that almost the entire contaminated area is contained within the wall. All monitoring wells show high concentrations of VOCs except MW-09 where no VOCs are found. VOCs ranged from 355 - 2990 ppb. BNAs range from 0.065 - 270 ppm. TPARS ranged from 4-31 ppm with CPAHS ranging from non-detect to 1700 ppb.

Both LNAPLs and DNAPLs are found in monitoring wells within the containment area in the area where the waste water lagoons were once located. DNAPL levels range from about 1 to 4 feet in monitoring wells MW-28, MW-30, and MW-31. The LNAPL is most likely associated with the carrier oil in the creosote and PCP formulations used at the Site and tends to float on top of the water table. The NAPLs within the containment area are considered a principal threat because they are highly contaminated with wood treating wastes and act as a continuing source of contamination to ground water and surface water.

Because DNAPL is more dense than water, its movement in the subsurface is largely dependent on gravity and pressure gradients rather than on hydrodynamic factors. Thus, due to gravity, the DNAPL at the SMWT site has migrated through the subsurface from the original source, the waste water lagoons, and come to rest on the blue clay layer beneath the Site. The clay layer acts as a low permeability barrier to vertical migration of ground water and DNAPL. It ranges in thickness from 19 to 23 feet, is laterally extensive in the vicinity of the wells, borings and sheet piling of the containment area, and has a very low vertical permeability of 10-7 - 10-8 cm/sec. The DNAPL will not move from this position unless the pressure gradient of any pool or potentially mobile (continuous) fraction is disturbed in some way. In addition, because the density of the DNAPL is only slightly greater than water, several meters of DNAPL would have to be sitting on the clay to be able to displace the water in the clay pore spaces to allow the DNAPL to move into the clay. At this site, a maximum of only a few feet of DNAPL has been found in wells underlying the original source areas in the containment area.

5.2.5 Surface Water and Sediments

Surface water samples from the onsite pond show higher levels of contamination (> 1 ppm PAHs) in the upper reaches of the onsite pond than in the lower section of the pond (< 40 ppb PARs). The upper section of the pond receives contamination from ground water discharge from the containment area. The lower section of the pond is separated from the upper section by an earthen dam. Surface water samples collected from the west tributary in September 1994 show that, under normal weather conditions, very little contamination is flowing

from the pond via surface water due to the underflow dam installed during the most recent removal action. VOC concentrations were only 11 ppb in a sample collected just outside the sheet pile wall. When compared to ground water and surface water within the sheet pile wall, these levels are very low. Further downstream, contaminant concentrations were even lower. Surface water from the pond is currently pumped and treated in the onsite water treatment system before being discharged to the west tributary.

During the RI, stream sediment samples collected along the west tributary were found to be contaminated with total PAHs at concentrations in the range of tens of parts per million (ppm) at a distance of up to 1,900 feet downstream of the onsite pond. Along the east tributary, contaminant concentrations in sediments ranged from non-detectable to approximately 2 ppm in a sample collected near the confluence of the east and west tributaries. Contaminants detected in sediments were similar to those detected in onsite surface soils.

Both the eastern and western tributaries were resampled during the Pre-Design Study; the most recent round of sampling was conducted in February 1992. Concentrations of total PAHs of up to 266 ppm and CPAHs up to 218 ppm were detected approximately 1,500 feet from the Site in the west tributary. CPAHs were only as high as 6 ppm in a gully that leads from the northeast tank area to the east tributary. Samples collected in Old Tom's Run beyond the confluence of the west and east tributaries contained no BNAs.

5.2.6 Dioxin and Furan Contamination

During the RI, various media at the site were analyzed for chlorinated dibenzodioxins ("dioxins") and dibenzofurans ("furans"). These contaminants form in technical grade PCP during the PCP manufacturing process. Analytical results were reported in 2,3,7,8-tetrachlorodibenzodioxin ("TCDD") equivalent factors ("TEF") as follows:

Ground water	2,3,7,8-TCDD TEF	<0.6 ng/l
Background soil		<0.01 ug/l
Subsurface soil		<1.0 ug/l
Surface soil		<1.0 ug/l
Surface water/sediments		<0.01 ug/l

The dioxin/furan congeners found in all media were generally the more highly chlorinated (hepta- and octa-) and less toxic forms. Only a relatively small percentage of the congeners detected were of the more highly toxic forms (tetra-, penta-, hexa-). The data are consistent with areas where concentrated waste was disposed (i.e., the land treatment, northeast tank, process, and lagoon areas). Dioxins/furans were found at relatively high concentrations in the wastes in several of the tanks, but these tanks were removed from the Site during the most recent removal action and no longer present a threat.

5.3 Volume of Contaminated Soil and Sediment

Based on the various investigations conducted at the Site as summarized above, it is estimated that there are approximately 78,000 CY of in place soil and sediment containing contaminants in concentrations exceeding the cleanup levels established for this Site as set forth in Section 7.0, below. As a result of excavation, the density of the soil (Tons/CY) decreases, thus increasing the volume. When a swell factor of 1.25 is applied, this volume increases to approximately 97,000 CY of soil and sediment that will require treatment. This swell factor of 1.25 was used by the U.S. Army Corps of Engineers ("Army Corps") in determining the cost estimates for the excavation alternatives in the FFS. Table 4 lists the various areas of the Site and the estimated volume of soil/sediment which will be excavated and treated during the remedial action.

6.0 SUMMARY OF SITE RISKS

A baseline Risk Assessment was prepared in order to identify and define possible existing and future health risks and potential environmental impacts associated with exposure to the chemicals present in the various environmental media at the Site if no action were taken. The baseline Risk Assessment provides the basis for

taking action and indicates the exposure pathways that need to be addressed by the remedial action. The Baseline Risk Assessment can be found in Section 5.0 of the RI Report (May 1988) prepared by CDM Federal Programs Corporation. In this case the risk assessment is referred to as the "Public Health Assessment". It was used as one of the bases for the 1988 ROD for the Site and has not been changed.

6.1 Contaminants of Concern

During the RI at the Site, 40 organic and 22 inorganic chemicals were detected in the surface water, sediments, soils, and ground water. To simplify the risk assessment, these chemicals were screened so that only those chemicals most likely to contribute to the risk were evaluated in detail. Table 2 lists chemicals detected in all Site media with the exception of the chlorinated dioxins/furans. Table 5 lists the chemicals of concern ("COCs") selected for the Site. Because the inorganic chemicals do not appear to be present above the background levels and inorganic chemicals are not associated with the wood treating activities at the Site, no inorganics were selected as COCs.

Dioxins/furans were dropped from consideration as COCs most likely because concentrations in Site media did not exceed the action levels that would have triggered a concern for these compounds at the Site (1 ug/kg TEF for residential soil, and 0.01 ug/l TEF for ground water)A Furthermore, they would not have contributed significantly to the risk relative to the other contaminants at the Site because of their low concentrations.

The Site is currently vacant and is completely fenced. No wood treating activities are conducted onsite and no one uses it as a residence. Some drinking water supply wells in the area use the shallow aquifer as their water source. However, no drinking water wells are located onsite presently and the major contaminant plume is contained within the sheet pile wall. The cleanup levels established for this Site were developed assuming that the Site would be used for residential purposes, including use of ground water in the shallow aquifer, following remediation.

6.2 Human Health Risk Assessment

6.2.1 Exposure Assessment

The objective of the exposure assessment is to estimate the type and magnitude of exposures to the COCs that are present at or migrating from a site and the amount of each chemical of potential concern at a site that is actually taken into the body (i.e., the intake level or dose). The results of the exposure assessment are combined with chemical-specific toxicity information to characterize potential risks.

6.2.1.1 Exposure Pathways

A complete exposure pathway consists of the following elements: (1) a chemical source or a mechanism for contaminants to be released into the environment; (2) a medium through which contaminants may be transported, such as water, soil, air; (3) a point of actual or potential contact with contaminants (exposure point); and (4) a route or mechanism of exposure, such as ingestion, inhalation, or dermal contact, at the exposure point.

Exposure scenarios for both current-use and future-use conditions were considered for soil, sediment, ground water, surface water, and air. A summary of exposure pathways that were evaluated in detail is as follows:

- Current-use - direct contact with and ingestion of sediment and soils by trespassers and ingestion of contaminated fish from the off-site pond

- Future-use - Direct contact with and ingestion of soil by construction workers and future residents and ingestion of contaminated ground water from the shallow and deep aquifers by future residents.

Current-use scenarios were not evaluated for residents since no one currently lives onsite. Carcinogenic chemicals of concern, expected to drive the risk levels, though not detected in surface water, were evaluated for bio-uptake in fish using a surface water exposure model. Air contamination was not considered an exposure route because no contaminants were detected during air sampling during the RI and the chemicals in the Site soils are of low volatility. Future-use scenarios for sediments were not included because it was assumed that during development of the Site the pond sediments would be mixed with area soils during excavation and remediation operations.

Based on the assumptions made in the risk assessment that the Site might be developed for residential use in the future, the future-use scenarios included direct contact with contaminated soil and use of ground water as a potable water supply. Utilizing shallow ground water for drinking water, while unlikely, is considered a possibility since local residents use the shallow ground water upgradient from the Site. It is more probable that the deep aquifer will be used for a drinking water source. The deep ground water scenario assumed that contaminants present in the shallow aquifer will migrate to the deep ground water aquifer used as a potable water supply.

6.2.1.2 Estimation of Exposure Point Concentrations

In order to assess risk, concentrations of COCs in various media were estimated. Estimating exposure point concentrations was accomplished in two ways; (1) by using the RI data to calculate direct exposure, and (2) by utilizing a transport model to predict the potential migration of contaminants and subsequent concentration at the exposure points. Table 6 lists site media and corresponding concentrations of COCs (from the RI) used in the risk assessment.

The current and future exposure scenarios examined for the Site, involving direct contact with soils and sediments and future use of onsite ground water, used the data from the RI directly.

Modeling was used to develop exposure point concentrations for the following exposure scenarios:

- Human health risk through ingestion of aquatic life.
- Potential adverse effects on aquatic life in nearby surface water bodies.
- Potential future human health risks through ingestion of ground water contaminated by infiltration of contaminated soil.
- Potential future human health risk through ingestion of ground water contaminated by permeation of the clay barrier between the shallow and deep aquifers.

SURFACE WATER EXPOSURE MODEL - The purpose of the surface water exposure model was to predict an annual average concentration of COCs in the pond approximately one mile downstream of the Site. This prediction was then used to assess the potential impact on aquatic life and the potential risk of ingesting fish caught from the pond. At the SMWT Site, surface runoff and ground water discharge contribute to the dissolved concentrations of contaminants in the stream. Soil erosion contributes to the suspended portion of the surface water concentrations.

The model calculated loading rates that describe the mass of surface runoff, ground water recharge, and soil mass eroding from the Site. The loading rates were then multiplied by the concentrations of contaminants detected in soil and ground water to estimate the proportion of contaminants in the loading. The model relates soil concentrations to surface water concentrations.

Because exposure modeling involves a number of uncertainties, it was appropriate to use a range of concentrations for the risk assessment. The geometric mean concentrations of COCs detected in soil and ground water were used to develop the average case value, and the maximum values detected were used to develop the plausible maximum case. Table 7 lists the estimated annual surface water concentrations for the offsite pond.

GROUND WATER CONTAMINANT TRANSPORT MODEL - INFILTRATION - RI data showed contamination of surface and subsurface soil at the SMWT Site. Over time, a portion of the soil contaminants may become dissolved during infiltration and contaminate the shallow aquifer as the contaminated leachate infiltrates to ground water. In order to determine future contaminant concentrations due to this leaching, a two-part transport model was derived. In part one, the contaminant concentration in the infiltrate was determined by assuming an equilibrium partitioning between the soil and water. In part two, a dilution equation was used to estimate the mixing of the infiltrate with the water table aquifer beneath the Site. The model does not account for biodegradation and therefore provides a conservative estimate of contaminant concentrations. Table 7 lists the average and maximum plausible groundwater concentrations predicted by the model.

GROUND WATER CONTAMINANT TRANSPORT MODEL - PERMEATION - During the RI, ground water from the deeper aquifer did not reveal contamination. To assess potential future migration of chemicals through the clay layer, a one dimensional, vertical, downward transport model was used to predict concentrations over time from 1 to 100 years. Average and maximum values of contaminants detected in the shallow aquifer were used to provide initial source concentrations for average and plausible maximum case estimates. The model assumes uniform, steady, vertical, downward flow and first order decay, and linear, equilibrium adsorption of the contaminants in the aquifer. The model does not account for biodegradation and may result in an overestimation of the concentrations of the contaminants. For the COCs at the SMWT Site, the concentrations predicted by the model for up to 100 years were below detection due to the integrity of the clay layer. Thus, CPAHs and benzene are unlikely to contaminate the deep aquifer through permeation of the clay layer in any detectable concentration within any reasonable time period (i.e., at least the next 100 years).

6.2.1.3 Populations at Risk and Exposure Estimates

This step of the risk assessment involved examining the exposed or potentially exposed populations (e.g., current trespassers, future residents or construction workers) and determining their potential levels of exposure. This involved making assumptions about their behavior that might determine the amount of contamination to which they would be exposed.

Two cases for the intake of contamination were considered for exposed populations, an average case and a plausible maximum case. The average case assumes average estimates of exposure parameters (e.g., average frequency and duration of exposure) and uses the geometric mean concentration of contaminants found in each media. The plausible maximum case assumes the highest estimates of the exposure parameters and uses the maximum concentrations of contaminants found in each media.

Exposure of Trespassers to Contaminated Soil and Sediments - Under this scenario it is assumed that trespassers will enter the property and come into contact with contaminated soil. Contaminants will then be absorbed through the skin or ingested by eating or smoking with dirty hands. Trespassers are assumed to be between 13 and 18 years of age and have an average lifetime body weight of 60 kg. Additional assumptions used to estimate exposure are listed in Table 9. The same assumptions were used for exposure to sediments.

Exposure of Future Construction Workers to Contaminated Soil - Future construction workers on the Site would likely contact contaminated soil and absorb contaminants through the skin or by ingestion from the hands. Construction workers are assumed to be adults who weigh 70 kg and work 5 days a week and work 3-6 months onsite. Table 10 lists additional assumptions used to estimate exposure.

Exposure of Future Residents to Contaminated Soils - Under this scenario, if residential development took place onsite, future residents might be exposed to contaminated soils. Several different age groups, as well as residents living onsite for the average lifetime of 70 years, were evaluated using different assumptions about how each would be exposed to contaminants in site soils. Children were considered the most likely to be at risk because their daily intake of soil is quite high relative to older age groups. Table 11 lists the assumptions used to estimate exposure for each age group.

Besides soil ingestion, residents might become exposed to contaminants through dermal absorption by direct contact with soils. The surface area of exposed skin for children was assumed to be hands, lower arms, lower

legs, and for adults, hands and forearms only. To calculate the exposure parameters for a lifetime resident, the values for the different age groups were averaged taking into consideration the length of time the person spends in that group.

Exposure of Future Residents to Contaminated Ground Water - The Site could be used for residential purposes in the future with the possibility of residents using ground water in the vicinity of the Site as a drinking water supply. The assumptions used for this scenario were that a 60 kg individual would ingest two liters of contaminated water per day for 70 years.

6.2.2 Toxicity Assessment

A toxicity evaluation of the contaminants present at the Site was conducted in order to identify carcinogenic potency factors and chronic reference doses against which daily intake levels could be compared. Table 8 lists these health effects criteria used for evaluating the risks associated with exposure to the COCs at the Site.

Cancer potency factors ("CPFs") have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)-1, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses ("RfDs") have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that are likely to be without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Among the many contaminants found at the Site in the various media, the PAHs were found in the highest concentrations and with the most frequency. PAHs are a complex class of chemicals consisting of two or more fused aromatic rings with widely varying toxic potencies. Though carcinogenicity is the toxic effect of greatest public health concern, PAHs have also been shown to cause cytotoxicity in rapidly proliferating cells throughout the body, immunosuppresive effects, and dermal toxicity.

For practical purposes, the PAHs are often separated into two categories, the carcinogenic PAHs and the noncarcinogenic PAHs. The approach adopted by the risk assessment for the SMWT Site was to apply the carcinogenic potency factor (11.5 (mg/kg/day)-1) calculated from assays on benzo(a)pyrene ("BAP") to the entire subclass of CPAHs. This assumes that all CPAHS have the same potency as BAP. BAP is classified as a Group B2 Probable Human Carcinogen based on inadequate evidence of carcinogenicity in human studies and adequate evidence in animal studies. This is likely to result in overestimates of risk for two reasons: first, BAP is considered to be one of the most potent carcinogenic PAHs; and second, BAP constitutes only a small fraction of the total PAHs present at the Site. PAHs have demonstrated carcinogenic effects through the oral, inhalation, and dermal pathways.

In assessing the effects of the noncarcinogenic PAHs, the reference dose for naphthalene (0.41 mg/kg/day) was applied to the noncarcinogenic PAHs because the toxicity data appeared to be the most adequate and available for this class of compounds.

6.2.3 Risk Characterization

In the risk characterization step, the toxicity and exposure assessments are summarized and integrated into quantitative and qualitative expressions of risk. There are several differences between the approach used to describe risk for carcinogens and noncarcinogens. Both approaches are summarized below.

6.2.3.1 Carcinogenic Risk

For carcinogens, risks are estimated as the upper bound of the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogens. Excess lifetime cancer risks are determined by multiplying the dose or chronic daily intake ("CDI") with the cancer potency factor. CDIs are calculated using the concentrations of contaminants present in Site media and the exposure assumptions discussed in Section 6.2.1, above.

Carcinogenic risk estimates for each chemical and each exposure pathway may be added together to determine the aggregate risk associated with exposure to multiple contaminants in multiple media. These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10-6 or 1E-6). An excess lifetime cancer risk of 1 x 10-6 indicates that, as a plausible upper bound, an individual has a one in one million 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. EPA's target carcinogenic risk range is 1 x 10-6 to 1 x 10-4 (i.e., one in one million to one in ten thousand).

The carcinogens evaluated for the SMWT Site included the CPAHs and benzene because these are the carcinogens that contribute the majority of the risk. The carcinogenic risks calculated for each potentially exposed population for each medium are presented in Table 12.

Average and maximum upper bound excess lifetime cancer risks of 5 x 10-9 and 6 x 10-5 associated with the exposure of trespassers to the CPAHs in site soils were calculated. Cancer risks of 3.4 x 10-9 and 6.6 x 10-7 were calculated for exposure to sediments under the average and plausible maximum exposure conditions, respectively. For future construction workers, average and plausible maximum cancer risks were 3 x 10-8 and 3 x 10-4, respectively, due to exposure to both surface and subsurface soil. The maximum case risks for construction workers exceeded the upper end of EPA's target risk range. All risks calculated for trespassers were within the target risk range.

Future onsite residents are likely to be exposed mainly to surface soil. Cancer risks are greatest for children 1-6 years of age (2 x 10-6 average case and 2 x 10-2 plausible maximum case) and residents who live in the area for a lifetime (2 x 10-6 average case and 2 x 10-2 plausible maximum case); however, significant risks are also associated with all ages under the plausible maximum exposure scenario. Risks are in the range of 1 x 10-2 to 2 x 10-2 and exceed the upper bound of the target risk range.

Risks from ingestion of ground water for future onsite residents were calculated using actual current ground water data and the infiltration model discussed previously. Both are presented in Table 12. Risks calculated using actual current ground water data for CPAHs were 3 x 10-2 and 0.95, respectively, for the average and maximum exposure cases. Predicted ground water risks in the shallow aquifer from the modeling data were 3.5 x 10-6 and 2 x 10-3, respectively, for the average and maximum exposure cases. The assessment of risk from ground water did not include exposure to contaminated ground water by routes other than ingestion. Nevertheless, risks from ingestion alone associated with exposure to contaminated ground water exceed the upper bound of the target risk range.

6.2.3.2 Noncarcinogenic Risks

Potential concern for noncarcinogenic 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. HI values less than or equal to 1.0 indicate that lifetime exposure has limited potential for causing an adverse effect in sensitive populations. HI values greater than 1.0 show that acceptable levels of intake

have been exceeded.

Contaminants that were included in the noncarcinogenic risk calculations included the non-CPAHs, PCP, BTEX compounds, and several other phenolic compounds. Table 13 presents the noncarcinogenic risks associated with the various populations and exposure pathways developed for the Site.

Noncarcinogenic risks with HI values well below 1.0 were calculated for trespassers (soil and sediments), construction workers (soils) and residents exposed to soils under both average and plausible maximum cases. The HI value for noncarcinogenic risk to residents from ground water under the average case scenario was 1 x 10-1. The only exceedence of the HI value of 1.0 was seen in the plausible maximum residential ground water exposure scenario where the HI value was 50.

6.3 Environmental Risks

A formal quantitative ecological risk assessment was not generated for the SMWT Site during the RI; however, EPA requested that the U.S. Fish and Wildlife Service ("FWS") conduct an investigation to document impacts of the Site on aquatic biota. The results of the investigation are summarized below and can be found in the report Biota Investiqation of Freshwater Streams Possibly Affected by Southern Maryland Woodtreatinq Superfund Site (U.S. FWS, April 1990).

At the eight locations depicted in Figure 9, water quality parameters and physical conditions were recorded and fish populations were observed by electroshocking. Benthic invertebrates were collected, identified, and results were analyzed using EPA Rapid Bioassessment Protocols. A total of 2.39 acres of wetlands were delineated within the SMWT property boundary and are shown in Figure 10.

6.3.1 Contaminants of Concern

The contaminants of concern established by the FWS were PAHs, PCP and other organic compounds. PCP was detected well above water quality criteria for the protection of aquatic resources in the onsite pond and the upper reaches of the west tributary closest to the pond. PCP found in the sediments may result in a biota exposure problem. Further downstream, PCP was not detected.

The two and three-ring PAHs were not considered to be especially problematic because they are fairly mobile and photodegrade rapidly in water. The larger four to seven-ring PAHs, however, tend to associate with sediment where they degrade slowly and can be bioaccumulated by invertebrates. As no wildlife protection criteria exist for PAHs, the drinking water criteria were used for comparison to Site contaminant levels. Concentrations of PAHs in the onsite pond and upper reaches of the west tributary were found to be well above the drinking water criteria. FWS stated that the toxicity of the larger PAH molecules was likely to be chronic and persistent until contaminated sediment was buried or otherwise made unavailable to biota.

6.3.2 Terrestrial Routes of Exposure

Terrestrial animals would most likely be exposed to contaminants from soil, surface water, or through the food chain. The perimeter fence should keep large animals offsite but evidence of deer onsite was observed due to breaks in the fence that were present at the time. Smaller animals such as rabbits likely use the Site. Animals that live close to the ground, such as mice, and snakes would likely be exposed to soil contamination. Terrestrial animals may also be exposed to contaminants from the surface water and the pond which creates an attractive nuisance for wildlife.

6.3.3 Aquatic Routes of Exposure

Aquatic animals may be exposed to waterborne contaminants through dermal exposure, respiration (gills), or through the food chain. Rainwater runoff, as well as ground water discharge, may introduce contaminants into surface water. Exposure is likely to be chronic as contaminants have likely been entering the west tributary for years and are likely to continue until remediation of the Site is completed.

6.3.4 Effects On Stream Ecosystems

Aquatic biota were impacted in the west tributary relative to reference sites, but the presence of frogs and the diversity and relatively high density of benthie invertebrates indicate that negative effects of Site contamination are somewhat limited. Benthic invertebrate populations were slightly to moderately impacted, mainly due to the absence of pollution intolerant groups. No fish were observed in the upper reaches of the tributary adjacent to the Site. This may or may not be a result of Site contamination. Fish populations upstream and downstream of the confluence with the west tributary did not indicate impacts from the Site to Brooks Run or McIntosh Run.

6.4 Conclusion

Based on the baseline risk assessment discussed above, EPA concluded that actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in the 1988 ROD, might present an imminent and substantial endangerment to public health, welfare, or the environment.

When EPA commenced the FFS in 1992, essentially all the contamination that had been onsite when the baseline risk assessment was conducted remained onsite; hence, EPA concluded that it was not necessary to recalculate the risk posed by the Site if it were not remediated. It was assumed that the Site still required action to address the contaminants in various media. Because onsite tanks, drums, and several buildings and their contents have since been removed from the Site, any risk formerly posed by these sources has been mitigated. However, the long term risk posed by NAPLs, soil, ground water, surface water and sediment contamination remains to be addressed.

EPA performed a Focused Post-Remediation Risk Assessment ("FRA") that evaluated the human health risks during and post-remediationfor each of the nine alternatives developed in the FFS. See Focused Human Health Risk Assessment, Risks After Remediation for Nine Remedial Alternatives for the Southern Maryland Wood Treatment Site, Roy L. Smith, Ph.D, US EPA, November 17, 1994. Section 8.0, below, discusses the FRA in more detail.

7.0 REMEDIAL OBJECTIVES AND CLEANUP LEVELS

In order to address the unacceptable risks discussed in Section 6.0, above, and to protect human health and the environment, the following remedial action objectives and associated cleanup levels have been established:

(1) to prevent ingestion/direct contact with surface soils that contain in excess of 0.1 ppm benzo(a)pyrene (B(a)P) equivalence1;

(2) to protect ground water as a current or potential drinking water supply, by containing or treating subsurface soil that contains in excess of 1.0 ppm B(a)P equivalence2;

1 The contaminants that present the greatest risk at the Site are the CPAHs. The cleanup Levels set forth in this ROD were therefore based on addressing these contaminants. EPA believes that the distribution of different PAH compounds assumed in the Focused Risk Assesssent is statistically valid, and that individual lots of soil srs unlikely to differ greatly from the everage proportions observed. However, the Agency acknowledges that it is at Least theoretically possible that significant deviations could occur, and that some more highly toxic compounds Like benzo[a]pyrene might be present at proportions higher than expected. To avoid this problem, EPA has set cleanup standards in terms of benzo[a]pyrene (8[a]P) equivalence. This approach involves converting all CPAH concentrations to (B[a]P) equivalence, using a set of factors which are based on the relative carcinogenic potency of each compound (See Table 17). B[a]P equivalence for all CPAHs is then summed for comparison with the cleanup standard.

EPA believes that setting a cleanup level (i.e., to determine both limits of excavation and acceptable CPAH concentrations in treated soil) based on 8[a]P equivalence is reasonable for the Southern Maryland site. EPA emphasizes that although ppm of CPAH can be converted to and expressed in terms of some lower number of ppm 8[a]P equivalence, the actual risks posed by the contaminants are exactly the same.

Carcinogenic PAHs included in calculations to determine the cleanup levels include benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benz(s)anthracene, carbazole, and chrysene. Any additional CPAHs that might be encountered during remediation, such as indeno(1,2,3-cd)pyrene or dibenzo(a,h)anthracene, can be converted to B(a)P equivalence and factored into the total 8(a)P equivalence to assure that cleanup levels have been achieved.

2 The 1.0 ppm B(a)P equivalence cleanup level was developed from the 10 ppm CPAH cleanup level. The 10 ppm CPAH cleanup level for subaarface soil was originally selected at the start of the FFS as a screening level to evaluate renedial technologies. On an engineering basis, EPA believed that the list of technologies developed for evaluation in the FFS Work Plan could more reasonably achieve a cleanup level of 10 ppm CPAHs than the 1 ppm CPAHs cleanup level selected in the original Record of Decision (ROD), that this level could be implemented at a reasonable cost, and that it would result in an acceptable post-remedial risk. The Focused Risk Assessment then confirmed that on a risk basis this assumption was correct; therefore, the 10 ppm CPAH was determined to be an acceptable subsurface soil cleanup number.

In order to calculate the risks to ground water in the Focused Risk Assessment, EPA conducted a modeling exercise which is documented in Soil Cleanup Goals Modeling Using Multimedia Exposure Assessment (MULTIMED) Model Version 1.01 (Analytical) & Version 2.0 (Analytical & Numerical), David M. Kargbo, Ph.D., U.S. EPA Region 30 October 1994. MULTIMED was used to calculate the dilution attenuation factors (DAF) for each contaminant (MULTIMED Report, Table 6). The DAFs were then used to calculate the ground Water concentrationsthat would result from leaving 10 ppm CPAHs in the onsite soil (Focused Risk Assessment, Appendix 2, Table 1).

(3) to prevent future ground water contamination through the recovery and/or management of NAPL; and

(4) to protect surface water quality and to restore sediments in the pond and tributaries to acceptable levels for the protection of aquatic life. Sediment cleanup levels have been set at 3.2 ppm low molecular weight PAHs, and at 9.6 ppm high molecular weight PAHs3 and 0.4 ppm PCP4. All sediment cleanup levels are on a dry weight basis.

Further, upon achievement of the cleanup levels as defined herein, the Site will be available for residential use.

8.0 DESCRIPTION OF ALTERNATIVES

The FFS evaluated nine remedial alternatives to address the risks posed by current and potential future exposure to contaminants at the SMWT Site. The alternatives include:

1) No Further Action
2) Limited Action and monitoring
3) Capping and containment
4) Excavation, capping and containment
5) Excavation and offsite disposal
6) Excavation and onsite thermal treatment (incineration)
7) Excavation and onsite thermal desorption
8) Excavation and onsite solid-phase bioremediation
9) Excavation and onsite slurry-phase bioremediation

COMMON ELEMENTS:

Monitoring: All alternatives include ground water, surface water and sediment monitoring, although the duration of the monitoring program varies from alternative to alternative. For alternatives that leave a significant portion of the contaminated material onsite (Alternatives 1-4), the monitoring period would continue

The resulting ground water concentrations were then used to calculate the risks to ground water which are

presented in the Focused Risk Assessment in Tables 50 and 51 and in this ROD in Tables 14 and 15.

3 For sediment cleanup levels, low molecular weight PAHs include, but are not limited to, acenaphthene, acenaphthytene, anthracene, fluorene, 2-methyl naphthalene, naphthalene, and phenanthrene. High molecular weight PAHs include, but are not limited to, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, pyrene. Sediment cleanup levels are based on sediment screening guidelines found in the document National Status and Trends Program Approach. In: Sediment Classification Methods Compendium. Long, E.R. D.D. Mac Donald, 1992, EPA 823-R-92-006. EPA Office of Water (WH-556). Washingten, D.C.

4 The PCP cleanup level provided by the FWS is based on Sediment Quality Values Refinement: Volume I, 1988 Update and Evaluation of Puget Sound AET, U.S. EPA, September 1988.

for thirty years. For alternatives that include the treatment or offsite disposal of contaminated material (Alternatives 5-9), the monitoring period would include the time required for the remedial action to take place and a short period thereafter. Following soil and sediment remediation, monitoring would continue until EPA, in consultation with MDE, confirmed that Resource Conservation and Recovery Act ("RCRA") clean closure requirements have been met, MCLs or other risk-based chemical-specific ARARs had been met in the ground water and that surface water quality criteria had been met in the surface water. During this post-remediation monitoring period in Alternatives 5-9, institutional controls temporarily restricting ground water use in the shallow aquifer would be implemented and maintained.

DNAPL: The DNAPL is addressed differently by the various alternatives. The No Further Action and limited Action alternatives (Alternatives 1 and 2) do not address the DNAPL. In Alternatives 3 and 4, the possible recovery of the DNAPL would be evaluated during the remedial design. Recovery might be accomplished by operation of the existing trench, an enhancement of the system, or by installation of extraction wells. Alternatives 5 through 9 address DNAPL through active collection during the excavation of contaminated soil in the containment area and soil dewatering where it will be separated from the ground water. In all alternatives that address DNAPL, all collected DNAPL would be shipped offsite for treatment and disposal.

Ground water: Ground water within the containment area would be collected and treated in the onsite water treatment system under all but the No Further Action and limited Action alternatives. In the capping alternatives, if it were determined during the remedial design that DNAPL recovery is possible, ground water might be collected in the trench or recovery wells and would also be treated in the onsite water treatment system. For Alternatives 5-9, ground water within the containment area would be collected during soil excavation and dewatering, treated in the onsite water treatment system, and discharged to the west tributary.

Surface Water: Surface water in the onsite pond would be pumped and treated in the limited action alternative (Alternative 2) on a long-term basis (30 years) to prevent contaminated surface water from leaving the Site via the west tributary. In Alternatives 3-9, surface water in the onsite pond and tributaries would be addressed through the treatment or containment of contaminated soils, sediments, and ground water. In Alternatives 3-9 the pumping and treating of surface water from the pond that was initiated as a component of the most recent removal action would continue until the remedial action made it no longer necessary (i.e., until the soils/sediments and ground water that provide a source of contamination to the surface water were contained or excavated and treated). It is possible that the onsite pond will be eliminated during the implementation of Alternatives 3-9.

Sheet Pile Wall: The sheet pile wall would remain intact below ground surface in all alternatives. Following remediation in Alternatives 5 through 9, the sheet piling would be cut off below ground surface but would not be completely removed to depth.

Perimeter Fencing: In all but the no further action alternative, the perimeter fencing with locking gates that currently surrounds the Site, would be maintained in a manner sufficient to prevent unauthorized access to the Site. In Alternatives 2-4, the fence would be maintained for 30 years. In Alternatives 5-9 the fence

would be maintained until such time as EPA determined that all soil cleanup levels had been achieved and that exposure to Site media would not result in unacceptable risk to human health or the environment.

Building Demolition: In Alternatives 3-9, any onsite buildings that are not necessary for remedial action or operation and maintenance activities and that are contaminated with hazardous substances above health-based levels, would either be decontaminated or demolished and the rubble shipped offsite for treatment and disposal.

In addition to the Common Elements described above, the following is a brief description of the alternatives which were evaluated for remediation of the Site. All costs and implementation time frames are estimates and should be used for comparative purposes only. Cost figures include capital costs, annual operation and maintenance (O&M) costs, and present worth costs for each alternative. The present worth cost analysis was performed for annual O&M costs for each alternative using a seven percent discount rate.

Alternative 1 - No Further Action

Estimated Capital Costs: $0
Estimated Annual O&M Costs: $270,000
Estimated Present-Worth Costs: $3,400,000

The NCP requires that EPA consider a no action alternative for every site to establish a baseline for comparison to alternatives that do require action. No further remedial measures would be implemented under this alternative. Operation of the existing water treatment facility would cease. Ground water would continue to flow through contaminated soil. Contaminated ground water and NAPLs would enter the onsite pond and contaminated surface water would eventually discharge to the west tributary. Contaminated surface soils would remain onsite, allowing for possible human and wildlife exposure to contaminants. Ground water, surface water and sediments would be sampled periodically to monitor the potential for offsite migration of contamination. There are no applicable or relevant and appropriate requirements (ARARs) associated with the no further action alternative because by definition, ARARs only apply to remedial actions selected by EPA (CERCLA Section 121(d) (2)).

Alternative 2 - Limited Action and Monitoring

Estimated Capital Costs: $47,000
Estimated Annual O&M Costs: $320,000
Estimated Present-Worth Costs: $4,047,000

In this alternative no remedial actions would be performed except for the continued pumping and treating of surface water initiated during the most recent removal action to prevent offsite migration of contaminants from the onsite pond. Treated water would be discharged to the west tributary. Existing fence security on the Site would be upgraded, and ground water, surface water and sediment would be monitored. Well housings around existing monitoring wells would be installed to limit access.

Access to the Site would be restricted by the Site fence, and institutional controls would be implemented to limit future use of the Site. This could be accomplished by recording in the property deed information regarding the locations and quantities of hazardous materials disposed of on the property. Since subsurface contamination is of significant concern, such access restrictions would preclude any intrusive activities, such as boring or excavating, that would disturb the subsurface soil, or facilitate the migration of contaminants to new areas.

See "ARARS Common Among Alternatives," below, for further discussion of ARARs relating to this alternative.

Alternative 3 - Capping and Containment

Estimated Capital Costs: $13,000,000
Estimated Annual O&M Costs: $320,000

Estimated Present-Worth Costs: $17,000,000

To prevent human and wildlife contact with contaminated soil, Alternative 3 involves the construction of a RCRA cap over all areas of soil within the existing Site fence contaminated above the cleanup level of 0.1 ppm B(a)P equivalents. The cap would also prevent or minimize future ground water contamination or movement of existing ground water contamination by minimizing the infiltration of rain water into the soil. The process of capping the entire Site, approximately 23 acres, would take an estimated 18 months.

In addition, Alternative 3 includes dredging of any sediments in the tributaries and excavating any soil located outside the Site fence that are above the cleanup level. These soils and sediments would be consolidated under the cap within the Site fence. Excavated areas would then be backfilled with clean fill and regraded. Institutional controls would be implemented to ensure the integrity of the cap and monitoring structures and to prevent ground water use in the shallow aquifer.

The clay layer underlying the shallow aquifer would prevent the downward migration of contaminated ground water and DNAPL. During the remedial design, the possible recovery of the DNAPL would be evaluated. This might be accomplished by continued operation of the existing trench, an enhancement of this system, or possibly by installation of extraction wells. Any DNAPL collected would be stored onsite temporarily in preparation for shipment offsite for treatment and disposal. Any ground water collected in the process of DNAPL recovery would be treated onsite and discharged to the west tributary.

See "ARARs Common Among Alternatives," below, for a discussion of ARARs relating to this alternative.

Alternative 4 - Excavation, Capping and Containment

Estimated Capital Costs: $5,000,000
Estimated Annual O&M Costs: $320,000
Estimated Present-Worth Costs: $9,000,000

This alternative is essentially the same as Alternative 3, except that it involves the excavation of soil and sediment that is above the cleanup levels from outside the existing containment wall, the consolidation of this material within the wall, and the placement of a RCRA multi-layer cap over the containment area only. The excavation activities would take approximately two months and the capping of the containment area, approximately 4 acres, would take approximately six months.

See "ARARs Common Among Alternatives," below, for a discussion of ARARs relating to this alternative.

Alternative 5 - Excavation and Offsite Disposal

Estimated Capital Costs: $178,000,000
Estimated Annual O&M Costs: $320,000
Estimated Present-Worth Costs: $179,300,000

Offsite disposal involves the excavation of approximately 97,000 CY of soils and sediment contaminated above the cleanup levels and transportation of the material to an approved treatment and disposal facility. The most extensive excavation would take place within the containment area, where, in some areas, the soil would have to be excavated to the clay layer. The excavation process would take about four months. The time frame necessary for the offsite shipment of the soils would be dependent on the availability of an appropriate treatment facility.

Because this alternative would require excavation below the existing water table within the containment area, this area would have to be dewatered prior to or during excavation. The collected water would be treated onsite in the existing water treatment facility. NAPL collected during the excavation and dewatering processes and any treatment residues would be sent offsite for treatment and disposal. Treated water would be discharged to the west tributary. Residual NAPL (NAPL in the soil pore spaces) would be excavated and managed with the subsurface soil. Excavated areas would be backfilled with clean fill.

See "ARARs Common Among Alternatives," below, for a discussion of ARARs relating to this alternative.

Alternative 6 - Excavation and Onsite Thermal Treatment (Incineration)

Estimated Capital Costs: $57,000,000
Estimated Annual O&M Costs: $320,000
Estimated Present-Worth Costs: $58,300,000

Under this alternative, all surface soil, subsurface soil, and sediment containing contamination in excess of the cleanup levels (approximately 97,000 CY) would be excavated and treated onsite using a mobile thermal treatment unit (i.e., an incinerator) that would be transported to the Site. The incineration process would permanently destroy the contaminants. Clean fill would be backfilled below the water table in the containment area and treated soil would be backfilled above the water table. Excavation would take approximately four months and the treatment process itself would take about two years, based on the capacity of the treatment units expected to be available for use.

Because this would require excavation below the existing water table within the containment area, this area would have to be dewatered prior to or during excavation. The collected water would be treated onsite in the existing water treatment facility. NAPL collected during the excavation and dewatering processes and any treatment residues would be sent offsite for treatment and disposal. Treated water would be discharged to the west tributary. Residual NAPL (NAPL in the soil pore spaces) would be excavated and treated with the subsurface soil.

The operation of the thermal treatment unit would be in compliance with the RCRA regulations for owners and operators of hazardous waste treatment, storage and disposal facilities, specifically those associated with operation of an incinerator (Code of Maryland ("COMAR") 26.13.05.15)5. A permit would not be required; only substantive portions of the regulations would have to be met. Air emissions would be in compliance with Maryland regulations governing air pollutants and air quality for VOCs, visible emissions, particulates and nuisances (COMAR 26.11.15, 26.11.06.06, and 26.11.06.02,.03,.08), and with federal air emissions standards for process vents (40 C.F.R. Part 264, Subpart AA) and equipment leaks (40 C.F.R. Part 264, Subpart BB). See "ARARs Common Among Alternatives," below, for a further discussion of ARARs relating to this alternative.

Alternative 7 - Excavation and Thermal Desorption

Estimated Capital Costs: $31,000,000
Estimated Annual O&M Costs: $320,000
Estimated Present Worth Costs: $32,300,000

Under this alternative, all Site surface soil, subsurface soil, and sediments containing contamination in excess of the cleanup levels, approximately 97,000 CY, would be excavated and treated onsite using thermal desorption. Rather than destroying the contaminants as in Alternative 6, the thermal desorption process would separate volatile and semi-volatile contaminants from the excavated soil and sediments by heating them to the point where the contaminants vaporize. The separated (vaporized) contaminants would then be recondensed. The recondensed contaminants, the NAPL collected during the excavation and dewatering of soil, and any grossly contaminated soil/sediments that are not amenable to treatment by thermal desorption (i.e., media saturated with DNAPL in excess of the treatment capability of the thermal desorption unit), would be stored temporarily onsite then shipped offsite for treatment and disposal. Clean fill would be backfilled below the water table in the containment area and treated soil and sediments would be backfilled above the water table within and outside the containment area.

Because this would require excavation below the existing water table within the containment area, this area would have to be dewatered prior to or during excavation. The collected water would be treated onsite in the existing water treatment facility. Water treatment residues would be sent offsite for treatment and disposal. Treated water would be discharged to the west tributary. Residual NAPL (NAPL in the soil pore spaces) would be excavated and treated with the subsurface soil.

The operation of the thermal desorption unit would be in compliance with RCRA regulations for owners and operator; of

5 References to Maryland's authorized RCRA program regulations are included in the ARARs chart at Table 18 but have not been included in the body of the ROD.

hazardous waste treatment, storage and disposal facilities, specifically those associated with operation of a thermal treatment device defined as a miscellaneous unit (COMAR 26.13.05.16-1 and 40 CFR Subpart X, Part 264.600-.603). A permit would not be required; only substantive portions of the regulations would have to be met. Air emissions would be in compliance with Maryland regulations governing air pollutants and air quality for VOCs, visible emissions, particulates and nuisances (COMAR 26.11.15, 26.11.06.06, and 26.11.06.02,.03,.08), and with federal air emissions standards for process vents (40 C.F.R. Part 264, Subpart AA) and equipment leaks (40 C.F.R. Part 264, Subpart BB). See "ARARs Common Among Alternatives," below for a further discussion of ARARs relating to this alternative.

Alternative 8 - Onsite Solid-Phase Bioremediatton

Estimated Capital Cost (5 years/batch): $31,000,000
Estimated Capital Cost (10 years/batch): $42,000,000
Estimated capital Cost (15 Years/batch): $44,000,000

Estimated Annual O&M Costs (5, 10, 15 years): $320,000

Estimated Present Worth Costs (5 Years/batch): $32,300,000
Estimated Present Worth Costs (10 Years/batch): $43,300,000
Estimated Present Worth Costs (15 Years/batch): $45,300,000

In Alternative 8, contaminated soils and sediments, approximately 97,000 CY, would be excavated and treated onsite by solid-phase bioremediation, the process of using microorganisms to degrade hazardous organic contaminants into non-hazardous products. This alternative would include the construction of an onsite land treatment or composting area in which the treatment would be performed. Management of the treatment process would include watering, tilling and amending as necessary. Clean fill would be backfilled below the water table in the containment area and treated soil would be backfilled above the water table. It may be necessary to cover backfilled soil that contains contaminants in excess of the surface soil cleanup level with two feet of clean fill.

Due to the limited space available at the Site to carry out the composting/land treatment process, the excavated soils would need to be treated in a batch process. The solid-phase bioremediation treatment process is predicted to take between 5 and 10 years per batch to reach the established cleanup levels. Assuming that the volume of soil and sediment to be treated would be excavated in eight batches, the total time for remediation would range from 40 to 80 years.

Because this alternative would require excavation below the existing water table within the containment area, the soil within this area would have to be dewatered prior to or during excavation. The collected water would be treated onsite in the existing water treatment facility. NAPL collected during the excavation and dewatering processes, any treatment residues, and any grossly contaminated soil/sediment not amendable to treatment by bioremediation would be sent offsite for treatment and disposal. Treated water would be discharged to the west tributary. Residual NAPL (NAPL in the soil pore spaces) would be excavated and treated with the subsurface soil.

The operation of the solid-phase bioremediation treatment process would be in compliance with RCRA regulations for owners and operators of hazardous waste treatment, storage and disposal facilities, specifically those associated with land treatment units (COMAR 26.13.05.13). A permit would not be required; only substantive portions of the regulations would have to be met. Air emissions would be in compliance with Maryland regulations governing air pollutants and air quality for VOCs, visible emissions, particulates and nuisances (COMAR 26.11.15, 26.11.06.06, and 26.11.06.02,.03,.08). See "ARARs Common Among Alternatives," below, for a further discussion of ARARs relating to this alternative.

Alternative 9: Onsite Slurry-Phase Bioremediation

Estimated capital Costs (15 day retention time): $26,000,000
Estimated Capital Costs (35 day retention time): $33,000,000

Estimated Annual O&M Costs: $320,000

Estimated Present Worth Costs (15 day retention): $27,300,000
Estimated Present Worth Costs (35 day retention): $34,300,000

This alternative is like the other treatment alternatives in that it calls for the excavation and onsite treatment of soil and sediment contaminated above the established cleanup levels, approximately 97,000 CY. Alternative 9 is most similar to alternative 8, except that the biological treatment would occur in a slurry-phase, rather than a solid-phase.

Contaminated soil and sediment would be excavated and washed onsite. The washed soil, composed of the large particle-size soil fraction, would be backfilled onsite above the water table. Clean fill would be backfilled below the water table in the containment area. The slurry or liquid wash water containing the fine particle-size soil fraction and containing the bulk of the contaminants, would be treated in a bioreactor(s) located onsite. Following treatment, the slurry would be dewatered and the soil backfilled onsite. If necessary, the treated soil would be covered with two feet of clean fill if the contaminants were in excess of the surface soil cleanup level. Any water generated in the process would be treated in the onsite water treatment system.

The cost estimates for this alternative were calculated for two slurry retention times (15 days and 35 days). These periods refer to the time the slurry would be treated in the reactor in order to reach the appropriate cleanup level. Given 15 day and 35 day retention times, and the use of 155,000 and 434,000 gallon reactors, respectively, the time required for remediation is estimated to be 15 years.

The operation of the slurry-phase bioremediation treatment process would be in compliance with RCRA regulations for owners and operators of hazardous waste treatment, storage and disposal facilities, specifically those associated with storage in containers and treatment in tanks (COMAR 26.13.05.09, .10). A permit would not be required; only substantive portions of the regulations would have to be met. Air emissions would be in compliance with Maryland regulations governing air pollutants and air quality for VOCs, visible emissions, particulates and nuisances (COMAR 26.11.15, 26.11.06.06, and 26.11.06.02,.03,.08). See "ARARs Common Among Alternatives," below, for a further discussion of ARARs relating to this alternative.

ARARS Common Among Alternatives

Table 18 includes a complete listing of ARARs pertaining to all alternatives described above. For any onsite activities, the implementation of any of the alternatives would comply with only substantive requirements of the regulations.

&lternatives 2 through 9 - To determine whether soils, sediments and treatment residuals are hazardous wastes, regulations that define RCRA characteristic and listed wastes would be used (COMAR 26.13.02.01-.14, and .16-.19 and 40 CFR §261.24 (toxicity characteristic) and §261.31 (F wastes)).

The water treatment plant would be operated in accordance with Maryland water quality certification regulations (COMAR 26.08.02.10). Clean Water Act National Pollutant Discharge Elimination System (NPDES) requirements and Maryland Discharge limitations (COMAR 26.08.01.02, COMAR 26.08.02.03, 33 U.S.C. §1342 and COMARS 26.08.03.01 and .07, 40 C.F.R. Parc 125 Subpart K, and 40 C.F.R. Part 136) pertaining to the discharge of treated water to the west tributary would be met. Permits are not required for these onsite CERCLA actions. Any NAPLs collected, any water treatment residuals and any building demolition rubble determined to be contaminated with hazardous wastes would be staged and managed onsite prior to offsite shipment for treatment and disposal in accordance with RCRA regulations under Subtitle C.

Installation of monitoring wells would be conducted in compliance with Maryland regulations for well

construction (COMAR 26.04.04). Wells shall be installed by persons certified by the Board of Well Drillers pursuant to COMAR 26.05.01.

These alternatives would comply with applicable statutory and regulatory requirements under RCRA Subtitle C relating to Corrective Action of solid waste management units, including 40 C.F.R. Part 264, Subparts F and S.

Any remedial actions would be implemented in a manner that would not adversely impact any identified endangered species pursuant to the Endangered Species Act of 1978 (16 U.S.C. §1531 et seq., 50 C.F.R. Part 402) or historic resources pursuant to the Archaeological and Historical Preservation Action of 1974 (16 U.S.C. §469) and the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470 et seq., 36 C.F.R. Part 800).

Alternatives 3 through 9 - Dewatering of excavated soil and sediments will be performed in a manner consistent with all applicable RCRA treatment and storage requirements in Subtitle C.

Monitoring would be conducted to ensure that groundwater contaminant concentrations do not exceed Safe Drinking Water Act Maximum Contaminant levels (MCLe) (40 CFR §141.11-.12 and 141.61 - .62), non-zero MCL Goals (40 CFR §141.50-.51), or other risk-based chemical-specific guidelines (e.g., information found in the Integrated Risk Information System developed by the EPA Office of Research and Development, EPA Health Advisories on Drinking Water developed by the EPA Office of Drinking Water, and Health Effects Assessments developed by the EPA Environmental Criteria and Assessment Office and the Ground Water Protection Strategy of 1984 EPA 440/6-84-002) and that surface water concentrations do not exceed surface water quality criteria for site-related contaminants (33 U.S.C. §1314 and COMAR 26.08.02.03).

EPA has designated the Site as an Area of Contamination ("AOC") therefore eliminating the need to comply with RCRA land Disposal Restriction ("LDR") requirements (40 C.F.R. Part 268) for onsite land-based remedial activities within the AOC.

Dredging of the sediments in the tributaries would be in compliance with the substantive requirements of Maryland wetlands regulations (COMAR 08.05.04), Clean Water Act dredge and fill requirements (33 U.S.C. §1344, 40 C.F.R. Part 230), Army Corps regulations (33 CFR Parts 320-330) and the "Procedures for Implementing the Requirements of the Council on Environmental Quality" with regard to the protection of wetlands and floodplain management (40 C.F.R. Part 6, Appendix A).

Alternatives 3 and 4 - Cap construction, operation and maintenance, and closure and post-closure of the capped area would be performed in accordance with RCRA regulations applicable to landfills containing hazardous waste (COMAR 26.13.05.14 and COMAR 26.13.05.07). Excavation and cap construction would also be in compliance with Maryland regulations for the control of noise pollution (COMAR 26.02.03.02 A(2) and B(2) and COMAR 26.02.03.03 A), storm water management (COMAR 26.09.02), and erosion and sediment control (COMAR 26.09.01.11).

Alternatives 5 through 9 - Excavation and backfilling activities would be in compliance with the substantive requirements of Maryland regulations for the control of noise pollution (COMAR 26.02.03.02 A(2) and B(2) and COMAR 26.02.03.03 A), storm water management (COMAR 26.09.02), and erosion and sediment control (COMAR 26.09.01.11). In preparation for treatment (Alternatives 6-9) or offsite disposal (Alternative 5) and in preparation for backfilling after treatment (Alternatives 6-9), excavated soils and sediments would be staged and managed onsite in accordance with RCRA regulations under Subtitle C.

EPA and MDE anticipate that the implementation of Alternatives 5-9 would meet the RCRA clean closure requirements for the former landfill areas (i.e., the land treatment area and the containment area) (COMAR 26.13.05.07 and COMAR 26.13.05.14).

Alternatives 6 through 9 - Ground water appropriation for use in the treatment processes would be approved in accordance with COMAR 08.05.02. Any NAPLs collected during excavation and dewatering, any grossly contaminated soils or sediments that are not capable of being treated, and any treatment residuals determined to be contaminated with hazardous wastes would be managed prior to offsite shipment for treatment

and disposal in accordance with RCRA regulations Subtitle C.

Delisting of RCRA Hazardous Wastes

Alternatives 6 through 9 - The soils to be treated under these alternatives are contaminated with wood preserving waste identified and listed as K001 under both EPA's and Maryland's hazardous waste regulations, and F032 and F034 under EPA's hazardous waste regulations. Although the soil is contaminated with listed constituents, MDE and EPA do not view the soil itself as a hazardous waste. The soil is considered a natural media that must be managed as a hazardous waste due to the presence of the listed constituents. After treatment by the selected remedy has been completed, it must be demonstrated that the concentration of constituents remaining in the soil are reduced to the point that the soil no longer presents a threat to human health and the environment and, therefore, no longer requires management as a hazardous waste.

As more fully explained in the FFS (See Section 3.2.6.2', EPA determines when contaminated media no longer requires management as a hazardous waste pursuant to EPA's "contained-in" policy. However, Maryland has taken the position that EPA's contained-in policy does not apply to the Maryland hazardous waste program. Under Maryland's interpretation of its regulations, although soil and other media are not solid waste or hazardous waste in their own right, a listed hazardous waste mixed with such media must continue to be managed as a hazardous waste unless and until it is delisted. Maryland is not authorized to implement federal RCRA regulations establishing standards and procedures for delisting. Therefore, authority to delist hazardous waste under RCRA subtitle C rests exclusively with EPA.

Although EPA believes that a determination by the Region that the soils treated under these alternatives no longer contain hazardous waste under the contained-in policy is sufficient to permit these soils to be managed thereafter as non-RCRA regulated media, EPA also has determined, in accordance with the substantive standards of 40 C.F.R. Section 260.22, that if, after treatment, concentrations of hazardous constituents in Site soils and sediments are below the delisting levels as set forth in Table 16, the wastes contained in such soils and sediments are hereby dellsted. In addition to making its contained-in determination, EPA, in accordance with MDE's requirement, is utilizing the ROD to administratively delist those hazardous wastes which meet the substantive requirements cited above. Soils and sediments which meet such delisting criteria will be backfilled onsite.

During and Post-Ramediation Risk Assessment 8-nary

EPA performed a Focused Post-Remediation Risk Assessment (FRA) that evaluated the human health risks during and post-remediation for each of the nine alternatives described above. Tables 14 and 15 summarize the carcinogenic and non-carcinogenic risks to potential residents and workers who might be exposed to site media (i.e., soil, ground water, air emissions).

Risks associated with the air pathway include emissions from excavation in Alternatives 3-9, emissions from beneath the cap in Alternatives 3 and 4, and emissions from actual treatment processes in Alternatives 6-9. Generally, risks associated with the air pathway are well within acceptable levels in all cases for both carcinogenic and non-carcinogenic effects. The highest carcinogenic risks are associated with solid-phase bioremediation.

Alternatives 1 and 2 would not reduce contaminant levels in soils and therefore would not reduce the current unacceptable risks presented by the untreated soils. In Alternatives 3 and 4, soils would be capped and site access restricted so that no exposure to contaminated soils would occur. In Alternative 5, contaminated soils would be shipped offsite and replaced with clean fill, thus eliminating the possibility of exposure to contaminants. Assuming that the thermal treatment alternatives 6 and 7 would achieve the cleanup level of 0.1 ppm B(a)P equivalence for surface soil, the associated risks to residents and workers through direct contact exposure with contaminated soils would be very low and within acceptable levels for both carcinogenic and non-carcinogenic effects. The predicted post-remedial soil concentrations of contaminants for the bioremediation alternatives 8 and 9 are somewhat higher than for Alternatives 6 and 7 and result in risks to future site residents or workers that are higher than in Alternatives 6 and 7 but are still within the acceptable carcinogenic and non-carcinogenic risk range.

In Alternatives 6-9, risks associated with ground water exposure were calculated based on the predicted post-remedial soil concentrations of contaminants that could be achieved by each of the treatment technologies. For Alternatives 6 and 7, the carcinogenic risk associated with a subsurface soil cleanup level of 1 ppm B(a)P equivalence is within the acceptable risk range. The non-carcinogenic risk is slightly above the HI of one. These risks are actually associated with ground water contamination that would result from untreated soil left in the ground beyond the edge of the excavation which is expected to be a minimal volume of soil. EPA expects that the thermal treatment or thermal desorption processes which would treat the large volume of excavated soil would reduce the non-carcinogenic contaminant concentrations below the predicted levels because these compounds are relatively volatile and easily removed by these technologies. The associated non-carcinogenic risk to ground water would then be lower and below the HI of one. Additionally, institutional controls temporarily restricting the use of ground water from the shallow aquifer would be implemented and ground water monitoring would be conducted until EPA, in consultation with MDE, determined that MCLs or other risk-based chemical-specific ARARs had been achieved.

Carcinogenic risks from exposure to ground water following remediation in Alternative 8 are predicted to be just above the upper limit of the acceptable risk range for the 5 year/batch treatment time and an order of magnitude lower for the 10 year/batch treatment time. Non-carcinogenic risks to ground water for each of these is below the HI of one. Based on predicted soil concentrations resulting from treatment in Alternative 9, carcinogenic risk from exposure to ground water would be above the upper limit of the acceptable risk range and the non-carcinogenic risk would be well above the HI of one.

General Statement Reqarding Ecological Resources

While all remedial measures would be designed to minimize harmful impacts to ecological values of the pond and stream as well as the surrounding wetland and upland areas, some adverse effects would be unavoidable during implementation of Alternatives 3 through 9. These alternatives include such disruptive activities as dredging of the pond and tributaries, excavation of soils, cap construction, and construction of soil treatment process units for thermal and biological treatment. During the remedial design, EPA would determine the expected extent of the effects on ecological resources and would, in consultation with the FWS and NOAA, evaluate the necessity for restorative and/or mitigative measures to address such effects. Those measures would then be implemented during the Remedial Action.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The nine remedial alternatives described above were evaluated in detail to determine which would be the most effective in achieving the goals of CERCLA, and in particular, achieving the remedial action objectives for the Site identified in Section 7.0, above. EPA uses the nine criteria set forth in the NCP, 40 C.F.R. §300.430(e) (9) (iii) to evaluate remedial alternatives. These criteria are summarized in Table 19. The first two criteria (overall protection of human health and the environment and compliance with ARARs) are threshold criteria. The selected remedy must meet both of these threshold criteria (except when an ARAR waiver is invoked). The next five criteria (long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost) are the primary balancing criteria. The remaining two criteria (state and community acceptance) are referred to as modifying criteria and are taken into account after public comment is received on the Proposed Plan.

The following discussion summarizes the evaluation of the nine remedial alternatives developed for the SMWT Site against the nine evaluation criteria.

9.1 Overall Protection of Human Health and the Environment

Alternatives 5, 6 and 7 satisfy this criterion by removing contaminated soils and sediments and shipping them offsite (Alternative 5), thermally destroying contaminants onsite (Alternative 6), or thermally separating contaminated materials from Site soil for offsite disposal (Alternative 7). NAPLs and any grossly contaminated soils would also be removed and shipped offsite for treatment and disposal. All three alternatives also include treatment of surface water and ground water from the dewatering process during remediation, and monitoring and institutional controls temporarily restricting ground water use

following remediation to assure protective ground water and surface water levels have been achieved. Thus, all contaminated media would be addressed, and the Site would be protective of human health and the environment. This would allow for unlimited future use of the property once EPA, in consultation with MDE, had determined that ground water ARARs had been achieved. Risks to residents from air emissions during remediation are predicted to be acceptable. Risks from direct contact with treated soil and ingestion of ground water post-remediation are predicted to be acceptable for residents and workers.

Alternatives 8 and 9 would provide similar protection to human health and the environment provided they are able achieve the established cleanup levels. However, it is unlikely that either solid-phase or slurry-phase bioremediation would be able to achieve as great a reduction in contaminant concentrations as Alternatives 6 or 7. Higher post-remedial soil concentrations would result in higher residual risk, thus necessitating further treatment and/or more permanent land use restrictions. carcinogenic risks due to ground water ingestion associated with the predicted soil concentrations for Alternatives 8 and 9 are above the acceptable level of 1 x 10-4 and the non-carcinogenic risk for Alternative 9 is well above the acceptable HI of one.

Alternatives 3 and 4 are comparatively less protective than Alternatives 5 - 7 because contaminated media would remain onsite. Alternatives 3 and 4, both of which include capping of contaminated materials as an integral part of the alternative, would, in part, rely on land use restrictions to protect human health and the environment. Both alternatives rely upon capping to prevent or minimize future ground water contamination or movement of existing ground water contamination by minimizing infiltration of rain water into the soil. Both alternatives also rely on the sheet pile wall and clay layer beneath the Site to reduce the potential for offsite migration of contaminated ground water and DNAPL. The cap would also reduce the potential for future contact with contaminated soil as long as it remained intact.

Alternative 2 relies primarily upon institutional controls to prevent future human exposure to Site contaminants. While the Site would be fenced, there would be no other barrier to protect humans or wildlife from exposure to Site contaminants. Should future Site use be inconsistent with the institutional controls, human exposure to Site contaminants could result in a cancer risk in excess of 1 x 10-4. This is the same risk as would be expected under Alternative 1 which contains no provision for preventing exposure to contamination and is not protective of human health and the environment. As Alternatives 1 and 2 do not pass the threshold criterion of overall protection of human health and the environment, neither alternative will be evaluated further in the comparative analysis.

9.2 Compliance with ARARS

The summary of the alternatives in Section 8.0, above, presented an evaluation of the ability of each of the nine alternatives to comply with ARARs, including a review of chemical-specific, location-specific, and action-specific ARARs. All alternatives will meet all of their respective ARARs. Table 18 includes a complete list of ARARs pertaining to all of the alternatives.

In Alternatives 6 - 9, once treated site soils and sediments meet the standards for EPA's determination that the soils and sediments no longer contain hazardous waste and the criteria for delisting set forth in Table 16, such soils would not be considered hazardous waste or solid waste and would not need to be managed in accordance with either EPA's or Maryland's RCRA subtitle C (hazardous waste) or subtitle D (solid waste) requirements.

9.3 Long-Term Effectiveness and Permanence

Alternatives 5, 6 and 7 afford the highest degree of long-term effectiveness and permanence. All would permanently reduce the levels of onsite contaminants to levels that would allow for unrestricted use of the Site. Alternative 5 would do so by removing soil that would pose a threat through direct contact, ingestion or inhalation, as well as soil and DNAPL that would pose a threat to ground water. This material would be treated and disposed of offsite, and the Site would be backfilled with clean fill. Alternatives 6 and 7 would thermally treat Site soil, removing contaminants from the soil and either destroying them (Alternative 6) or recovering them and sending them offsite for recycling or further treatment and disposal (Alternative 7). As would alternative 5, these alternatives would remove soil that

would pose a threat through direct contact, ingestion or inhalation, and soil and DNAPL that would pose a threat to ground water sources.

Alternatives 8 and 9 would also result in a permanent reduction in levels of contaminants onsite, although it is not expected that the extent of the reduction achieved will equal that of Alternatives 5, 6 and 7. Alternatives 8 and 9 are more likely to result in higher post-remedial soil concentrations and more permanent restrictions on future use of the Site.

Alternatives 3 and 4 afford a comparatively lesser degree of long-term effectiveness than Alternatives 5-7 because they leave all contaminated material onsite and rely upon capping, subsurface barriers, and institutional controls to prevent future exposure to Site contaminants. Under both alternatives, capping would effectively prevent contact with contaminated soil, as long as the cap remained intact. The existing sheet pile barrier wall would prevent the offsite migration of contaminated shallow ground water; however, the long-term performance of sheet pile walls at Superfund sites has never been tested. In addition, these alternatives rely upon the integrity of the clay layer underlying the Site to prevent migration of contaminated ground water and DNAPL to deeper aquifers. EPA believes that the clay layer will serve as an effective barrier in preventing the downward migration of contaminants.

9.4 Reduction of Toxicity, Mobility or Volume through Treatment

Alternatives 5, 6, 7, 8 and 9 utilize treatment to permanently reduce the toxicity of contaminants. All of these alternatives involve the excavation and treatment (onsite or offsite) of approximately 97,000 CY of contaminated soil, including soil containing DNAPL. Under Alternative 5, the soil would be treated and disposed of offsite, and clean fill placed onsite. Under Alternatives 6 and 7, soil would be thermally treated onsite and backfilled onsite. This soil would not pose an unacceptable risk to human health or the environment. Under Alternatives 8 and 9, the treated soil would also be placed back onsite; however, this soil would likely contain higher residual levels of contaminants than would the thermally treated soil and thus would be less effective in reducing toxicity. Alternatives 5, 6, 7, 8 and 9 also include the treatment of contaminated ground water recovered during the excavation process, and the offsite treatment and disposal of DNAPL material separated from the recovered ground water. This would provide additional reduction in toxicity and volume of contaminants onsite. Because it includes the addition of amendments to the soil, Alternative 8 will result in an increase in the volume of treated soil.

Alternatives 3 and 4 include a provision for the possible collection of DNAPL from the containment area via the existing trench or some other extraction system. Any DNAPL recovered would be transported offsite for treatment and disposal. This would reduce the toxicity and volume of contamination at the Site to a small degree, but the large volume of contaminated soil and sediment would remain untreated.

9.5 Short-Term Effectiveness

The risk posed by excavation activities during the course of each alternative was evaluated in the Focused Risk Assessment. None of the alternatives under consideration are expected to pose an unacceptable risk to nearby residents during remediation. Risks due to the emissions from the treatment processes themselves were calculated for Alternatives 6 through 9. All were found to be acceptable.

For Alternatives 5 - 9, all of which include substantial excavation of contaminated soil, dust and sedimentation control measures would be required during the handling of contaminated material. Alternatives 3 and 4 would require these measures as well, although to a lesser degree as excavation would be less extensive.

The ecological system in the east and west tributaries and the pond would be impacted by dredging of sediments in Alternatives 3 through 9. Alternatives 3 and 4 would also affect terrestrial habitats during excavation although to a lesser extent than in Alternatives 5 through 9 which require extensive excavation.

Short-term effects during the remediation would be ongoing for less than 5 years for alternatives 3 through 7. The short-term effects associated with Alternative 8 may extend over several decades and those associated with Alternative 9 are estimated to occur over a 15 year period.

9.6 Implementability

Of the two capping/containment options, Alternative 4 (Partial Site Cap) would be easier to implement. This alternative involves the capping of a considerably smaller area of the Site than Alternative 3 (approximately 4 acres, as compared to 23 acres). While it requires some excavation, the soil to be excavated is generally shallow and would require no special excavation techniques. Alternative 3 would require the clearing, grading and capping of the entire Site. The equipment and materials required for both alternatives are readily available. Periodic maintenance of both the cap and the ground water treatment system would be required to ensure the continued performance of the remedial action.

Alternatives 5, 6, 7, 8 and 9 all involve the excavation of 97,000 CY of contaminated soil, some of which will be contaminated with NAPL. Excavation to depths of up to 40 feet will be required. Within the containment area, an engineered tie back system will be installed to provide stability during excavation. Because soil will be excavated from below the existing water table, it will be necessary to dewater the soil to the extent possible prior to excavation.

Alternative 5 would require the least amount of additional handling of the contaminated soil. Soil would be recontainerized and shipped offsite for treatment and disposal. This is a standard operation that should be simple to implement. The successful implementation of this alternative would, of course, be contingent upon the availability of permitted offsite treatment and disposal facilities which could handle this volume and type of waste.

Alternatives 6 and 7 include the construction and operation of transportable thermal treatment systems at the Site. These systems are existing units which are moved from site to site on a series of trucks, and then assembled. There are a significant number of vendors who have experience in operating a variety of different units that could be used at this Site. The handling of the material produced by the treatment process may vary, depending on exactly which unit is used. Generally, incinerators will produce ash that must be rehydrated prior to being backfilled. Based on treatability studies conducted using Site soil, the ash is not expected to exhibit a hazardous waste characteristic. Furthermore, it is expected that the listed hazardous constituents in the soil will be treated such that they no longer present a threat to human health and the environment and can therefore be delisted. It may be necessary to mix clean fill into the ash to lend the material structural stability and to promote vegetative growth. Thermal desorption units may produce a soil-like treatment product that can be handled as would the incinerator ash.

Alternative 8 involves a labor-intensive operation and would require a long time to implement. Due to limitations in available space, soil would have to be excavated in several lifts and treated in batches. This would require numerous mobilizations/demobilizations of excavation and hauling equipment, continuous treatment of ground water in the excavation area, and security control around the excavation and stockpiling areas for several decades. The biological treatment units would require continuous maintenance, including regular turning or tilling, irrigation, nutrient addition, and monitoring.

Alternative 9 would involve the greatest amount of material handling as it involves two separate treatment processes, soil washing followed by slurry-phase bioremediation. Available land space would determine whether soil washing and biological processes could be implemented simultaneously, and would determine the size of the reactors that could be used, thus determining the duration of treatment. A pilot scale treatability study would be required to determine the optimal retention time of the slurry in the reactor.

9.7 Cost

Capital costs for the capping alternatives (Alternatives 3 and 4) are relatively low but these alternatives would be less protective than the treatment alternatives (Alternatives 6 and 7). The costs for the offsite disposal alternative (Alternative 5) are very high but provide approximately the same protectiveness as Alternatives 6 and 7 which are considerably less expensive. For the two thermal treatment alternatives, capital costs for Alternative 6 are twice those of Alternative 7 but would result in approximately the same reduction in contaminant concentrations and risk. Capital costs for Alternatives 8 and 9 are similar to Alternative 7 but these alternatives are less certain to achieve a similar reduction in contaminant concentrations and risk. Annual operation and maintenance costs are similar for Alternatives

3-9. For Alternatives 3 and 4, it was assumed that O&M would continue for 30 years. For purposes of cost estimation for Alternatives 5 through 9, O&M is anticipated to occur for 5 years.

9.8 State Acceptance

MDE supports EPA's selection of Alternative 7 Thermal Desorption as the remedy for the Site. However, because MDE believes that EPA has selected a remedy which effectively eliminates the Site contamination through treatment and offsite disposal, MDE does not believe extended or indefinite ground water monitoring beyond 5 years is warranted.

9.9 Community Acceptance

Generally, the local community has expressed no opposition to the selected remedy. In written correspondence submitted to EPA, the St. Mary's County Commissioners have recommended that EPA select Alternative 7, Thermal Desorption, as the remedy for this Site. They have noted, however, that they do not believe that EPA evaluated the bioremediation alternatives adequately and that bioremediation may have been able to clean up the Site "in a more benign, less costly manner." The Commissioners have also stated that the thermal desorption system must be designed to recycle inert gases, must be heated externally, and must have proper emissions controls. Finally, the Commissioners want the site cleaned up to a level which will allow it to be used productively following remediation. The Commissioners are opposed to the capping alternatives. The Southern Maryland Environmental Awareness Coalition (EAC), a local citizens group, has expressed a position similar to that of the Commissioners. The EAC is endorsing thermal desorption but has health and safety concerns associated with the technology.

10.0 SELECTED REMEDY: DESCRIPTION AND PERFORMANCE STANDARDS

Following review and consideration of the information in the Administrative Record file, the requirements of CERCLA and the NCP, and public comment, EPA has selected Alternative 7 (Excavation and Thermal Desorption) as the remedy for the SMWT Site. Alternative 7 meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs, and provides the best balance of long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, shore-term effectiveness, implementability and cost.

The selected remedy consists of the following components:

- Dewatering of the containment area in preparation for the excavation of subsurface soil and DNAPLs below the water table followed by onsite treatment of water generated in the dewatering process and discharge of treated water to the west tributary;

- Excavation of approximately 97,000 CY of soil from within and outside of the sheet pile wall and dredging of sediments from the onsite pond and segments of the east and west tributaries that contain contaminants in excess of the established cleanup levels set forth in Section 7.0;

- Dewatering of saturated soils/sediments onsite in preparation for treatment by thermal desorption, followed by onsite treatment of water generated in the dewatering process and discharge of treated water to the west tributary;

- Staging of excavated soil/sediments onsite in preparation for dewatering, following dewatering in preparation for treatment by thermal desorption, and following thermal desorption in preparation for backfilling. Also, onsite staging of NAPLs collected during excavation and dewatering,

water treatment residues, recondensed contaminants from the thermal desorption treatment process, and any grossly contaminated soil/sediment that is not amenable to treatment by thermal desorption prior to offsite shipment for treatment and disposal;

- Onsite treatment of excavated soils and sediments by a thermal desorption process;

- Offsite treatment and disposal of desorbed, recondensed contaminants from the thermal desorption treatment process, NAPLs collected during excavation and dewatering, water treatment residues, and any grossly contaminated soil/sediment that is not amenable to treatment by thermal desorption;

- Sampling of treated soils and sediments to ensure delisting levels have been achieved;

- Backfilling with clean fill below the water table in the containment area and with treated soil/sediments above the water table in the containment area and in all other excavated areas;

- Pumping and treating of surface water from the onsite pond until the sources of contamination to the surface water (i.e., soil, sediment, ground water) are remediated. Treatment of surface water in onsite water treatment system followed by discharge to the west tributary;

- Ground water, stream and wetlands monitoring;

- Implementation of institutional controls temporarily restricting ground water use in the shallow aquifer;

- Building demolition and cutting off of the sheet pile wall following remediation, as determined necessary. Offsite disposal of building rubble and sheet piling; and

- Maintenance of perimeter fencing until access restrictions are no longer necessary.

The remedy and mandatory performance standards are described in detail below.

10.1 Excavation of Soils, Dredging of Sediments, and DNAPL Removal

Based on the cleanup levels set forth in Section 7.0, above, an estimated 97,000 CY of soils and sediments shall be excavated and/or dredged from the Site. This includes surface and subsurface soils from areas both within and outside of the sheet pile wall and sediments in the onsite pond and segments of the east and west tributaries. Within the sheet pile wall excavation must go as deep as the clay layer that underlies the Site in order to be able to reach and remove the DNAPL that is present in the subsurface. Because this will entail excavation below the current water table, the containment area must be dewatered prior to excavation. DNAPL collected during excavation and dewatering shall be staged onsite prior to transport offsite for treatment and disposal. Ground water generated from dewatering of the containment area shall be treated onsite in the existing water treatment system. Treated water shall be discharged to the west tributary.

Outside of the sheet pile wall, excavation is expected to extend only to an approximate depth of two feet, except in the land treatment area where it is expected to extend to an approximate depth of five to seven feet.
Soil and sediment samples shall be collected throughout the Site. Soil shall be analyzed for the PAH compounds and sediments for PAH compounds and PCP. The results shall be compared to the cleanup levels to determine the exact area and volume of soils/sediments requiring excavation. The number and location of samples and the analytical methods to be used shall be determined during the remedial design.

Performance Standards for the Excavation of Soils and Dredging of Sediments and DNAPL Removal:

1. The containment area shall be dewatered as necessary to allow excavation of contaminated soil and DNAPL that currently exists in the saturated zone below the top of the shallow water table.

2. All surface soils containing greater than 0.1 ppm B(a)P equivalents shall be excavated from all areas of the Site. Surface soils are defined as the upper two feet of soil in any given area. All subsurface soils containing greater than 1.0 ppm B(a)P equivalents shall be excavated from the land treatment area, the containment area and, if necessary, any other areas of the Site as determined by sampling during excavation.

3. All sediments in the onsite pond and the east and west tributaries containing greater than 3.2 ppm low molecular weight PAHs, 9.6 ppm high molecular weight PAHs, or 0.4 ppm PCP shall be dredged from these areas. Low molecular weight PAHs include, but are not limited to, acenaphthene, acenaphthylene, anthracene, fluorene, 2-methyl naphthalene, naphthalene, and phenanthrene. High molecular weight PARs include, but are not limited to, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, and pyrene.

4. Excavation activities shall be conducted in compliance with the substantive requirements of Maryland regulations for the control of noise pollution (COMAR 26.02.03.02 A(2) and B(2) and COMAR 26.02.03.03 A), storm water management (COMAR 26.09.02), and erosion and sediment control (COMAR 26.09.01.11). In preparation for treatment and following treatment in preparation for backfilling, excavated soils and sediments shall be staged and managed onsite in accordance with standards applicable to generators of hazardous waste (COMAR 26.13.03.02-.05) and standards applicable to treatment, storage, and disposal facilities (COMAR 26.13.05.09-.12)

5. Ground water generated from the dewatering process shall be treated onsite in the existing water treatment system to meet the substantive requirements of the NPDES program and Maryland Discharge limitations (COMAR 26.08.01.02, COMAR 26.08.02.03, COMAR 26.08.03.01 and .07, and 33 U.S.C. §1342, 40 CFR Part 125, Subpart K, and 40 CFR Part 136) before being discharged to the west tributary. The water treatment system shall be operated in accordance with Maryland water quality certification regulations (COMAR 26.08.02.10).

6. NAPL collected during excavation and dewatering, any grossly contaminated soil and sediment not amenable to treatment by thermal desorption, and any water treatment residuals determined to be hazardous wastes, either listed or characteristic (COMAR 26.13.02.01-.14, and .16-.19, 40 CFR §261.24 (toxicity characteristic) and 40 CFR §261.31 (F Wastes)), shall be disposed of offsite at a RCRA hazardous waste facility and shall be staged and managed onsite and prepared for offsite disposal in compliance with standards applicable to generators of hazardous waste (COMAR 26.13.03.02, .03, .04 and .05) and standards applicable to treatment, storage, and disposal facilities (COMAR 26.13.05.09-.12) and land disposal restrictions for waste analysis, treatment standards, and storage, respectively (40 C.F.R. 268.7, 268.9, and 268.50).

7. All excavation/dredging activities that will affect wetlands, floodplains, or waters of the United States shall be conducted in accordance with the substantive requirements of Maryland Wetlands Regulations (COMAR 08.05.04), the Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act (40 CFR part 6, Appendix A), and Clean Water Act Dredge and Fill Requirements (33 USC Section 1344, 40 CFR Part 230) and Army Corps regulations (33 CFR Parts 320-330).

10.2 Onsite Thermal Desorption of Excavated Boils and Dredged Sediments

All excavated soils and sediments containing concentrations of contaminants above the cleanup levels shall be treated onsite using a mobile thermal desorption system. A mobile thermal desorption unit shall be transported to and constructed onsite, then dismantled and removed from the Site following remediation. Contaminants in soils and sediments shall be desorbed (i.e., contaminants separated from the soil and sediments) by heating to the appropriate temperature to volatilize the organic contaminants. The appropriate temperature shall be determined during the remedial design. Desorbed contaminants shall then be recondensed, or collected by some other means, and disposed of offsite in a RCRA hazardous waste disposal facility. The actual type of desorber and the components of the system to collect treatment residuals shall be determined during the remedial design.

Performance Standards for Onsite Thermal Desorption of Excavated Soils and Sediments:

1. Excavated soils and sediments shall be treated by thermal desorption to achieve the following cleanup levels: soils/sediments to be backfilled as surface soils shall be treated to 0.1 ppm B(a)P equivalents; soils/sediments to be backfilled as subsurface soils shall be treated to 1.0 ppm B(a)P equivalents. Treated sediments shall not be placed back in the tributaries, but shall be backfilled in the containment area. For delisting purposes, all soils and sediments shall also be treated to the health-based delisting levels specified in Table 16.

2. The thermal desorber shall be operated in accordance with the substantive requirements of RCRA regulations for owners and operators of hazardous waste treatment, storage and disposal facilities, that treat hazardous waste in miscellaneous units (COMAR 26.13.05.16-1 and 40 CFR Subpart X, Part 264.600 - 264.603). If necessary, ground water

appropriation for use in the treatment process shall be approved in accordance with COMAR 08.05.02.

3 Air emissions from the thermal desorber shall be in compliance with substantive requirements of Maryland regulations governing air pollutants and air quality for VOCs (COMAR 26.11.06.06), visible emissions, particulates, and nuisances (COMAR 26.11.06.02, .03, .08) and with federal air emissions standards for process vents (40 CFR Part 264, Subpart AA) and equipment leaks (40 C.F.R. Part 264, Subpart BB).

4. Water generated in the treatment process that is not recycled in the process shall be treated in the onsite water treatment system prior to discharge to the west tributary. See Section 10.1, paragraph 5. for performance standards for the water treatment system.

5. Any other treatment residuals generated in the thermal desorption treatment process (e.g., recondensed organic contaminants) determined to be hazardous wastes either listed or characteristic (COMAR 26.13.02.01- .14, and .16-.19, 40 CFR §261.24 (toxicity characteristic), and 40 CFR §261.31 (F wastes)) shall be treated and/or disposed at a RCRA hazardous waste offsite facility and shall be managed onsite and prepared for disposal in compliance with standards applicable to generators of hazardous waste (COMAR 26.13.03.02, .03, .04, .05), standards applicable to treatment, storage, and disposal facilities (COMAR 26.13.05.09-.12) and land disposal restrictions for waste analysis, treatment standards, and storage, respectively (40 C.F.R. 268.7, 268.9, and 268.50).

10.3 Backfilling of Clean Fill and Treated Soils and Sediments

Following excavation in the containment area, clean fill shall be backfilled below the water table. Treated soil and sediment that has met the cleanup levels and delisting levels set forth in Section 10.2, above, shall be backfilled onsite. The Site shall then be graded and revegetated.

A statistical analysis of the treated soils and sediments shall be conducted before backfilling to ensure that the cleanup levels and delisting levels have been achieved. The frequency of sampling and the analytical methods to be employed shall be determined during the remedial design.

Performance Standards for Backfilling of Clean Fill and Treated Soils and Sediments:

1. Clean fill shall be backfilled below the water table in the containment area. Soil and sediment treated by thermal desorption that has achieved the subsurface soil cleanup level of 1 ppm B(a)P equivalents shall be backfilled in the subsurface above the clean fill and in other subsurface areas of the Site that have been excavated. Treated soil and sediment that has achieved the surface soil cleanup level of 0.1 ppm B(a)P equivalents shall be backfilled above the subsurface soil. Treated sediments shall not be placed back in the tributaries, but shall be backfilled in the containment area. Prior to backfilling, treated soils/sediments shall be sampled and analyzed to verify that cleanup

and delisting levels have been achieved.

2. For delisting purposes, no soils and sediments backfilled onsite shall contain contaminants above the delisting levels specified in Table 16. Additionally, the material to be backfilled must not exhibit any of the hazardous waste characteristics described in COMAR 26.13.02.11-.14 (i.e., ignitability, corrosivity, reactivity, or toxicity). To determine that the delisting levels have been met, the Toxicity Characteristic Leaching Procedure (TCLP), EPA Method 1311, shall be used.

3. The Site shall be graded appropriately to prevent subsidence and erosion. A vegetative cover shall be established to prevent soil erosion.

4. Backfilling activities shall be conducted in compllance with the substantive requirements of Maryland regulations for the control of noise pollution (COMAR 26.02.03.02 A(2) and B(2) and COMAR 26.02.03.03 A), storm water management (COMAR 26.09.02), and erosion and sediment control (COMAR 26.09.01.11).

5. All backfilling activities that will affect wetlands, floodplains, or waters of the United States shall be conducted in accordance with Maryland Wetlands Regulations (COMAR 08.05.04), the Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act (40 CFR part 6, Appendix A), and Clean Water Act Dredge and Fill Requirements (33 USC Section 1344, 40 CFR Part 230) and Army Corps regulations (33 CFR Parts 320-330).

10.4 Surface Water Pumping and Treating

Pursuant to the most recent removal action at the Site, surface water is currently pumped from the onsite pond, treated in the recently constructed onsite water treatment system, and discharged to the west tributary. This activity shall be continued pursuant to this ROD.

Performance Standard for Surface Water Pumping and Treating:

1. Surface water shall be pumped from the onsite pond in sufficient quantity to prevent untreated surface water from flowing to the west tributary. Pumping and treating shall continue until the sources of contamination to the surface water (i.e., soil, sediment, ground water) have been remediated.

2. See section 10.1, Performance Standards 5 and 6 for standards pertaining to operation of the water treatment system, discharge requirements, and treatment residue disposal.

10.5 Ground Water Monitoring

A ground water monitoring program shall be implemented during and after remediation to evaluate the effectiveness of the soil remediation. Ground water in the shallow aquifer shall be sampled before the start of remediation to establish a baseline of contaminant concentrations. Following remediation, ground water in the shallow aquifer shall be monitored to assure that the soil remediation sufficiently reduced

contaminants in the ground water to ensure protection of human health and the environment and to verify that clean closure requirements have been met.

Beginning in 1994, four wells screened in the deeper sand unit just below the blue clay layer beneath the site, have been sampled periodically to ensure that contaminants are not migrating through the clay. Monitoring of this sand unit shall continue throughout the design and implementation of the remedy and following remediation as a part of the Site monitoring program.

Performance Standards For Ground Water Monitoring:

1. New monitoring wells shall be installed in accordance with State requirements for well construction (COMAR 26.04.04). Wells shall be installed by persons certified by the Board of Well Drillers pursuant to COMAR 26.05.01.

2. Monitoring wells shall be located in the shallow aquifer in sufficient nnmher and location to determine the effectiveness of the soil remediation at the Site. Monitoring wells shall be located in the deep aquifer in sufficient number and location to verify that contamination is not migrating through the clay layer. The number and location of wells, existing or newly installed, to be included in the ground water monitoring network shall be determined during the remedial design. The frequency and duration of sampling and analytical parameters and methods to be used shall also be determined during the remedial design.

3. Post-remediation ground water results shall be evaluated to determine if RCRA clean closure requirements have been achieved and to ensure that contaminant concentrations do not exceed Safe Drinking Water Act Maximum Contaminant levels (40 CFR Sections 141.11 - .12, and 141.61 - .62), non-zero MCL Goals (40 CFR Section 141.5 -.51), or if no MCLs or MCLGs are available, other appropriate risk-based chemical-specific guidelines that are available at that time (e.g., information found in the Integrated Risk Information System (IRIS) developed by the EPA Office of Research and Development, EPA Health Advisories on Drinking Water developed by the EPA Office of Drinking Water, and Health Effects Assessments developed by the EPA Environmental Criteria and Assessment Office).

4. A statistical analysis of the ground water data shall be performed to determine that contaminant concentrations have stabilized at or below the MCLs or other chemical-specific ARARs. Such determination shall be made in consultation with MDE and shall be based on the policy reviews of the remedial action. The policy reviews shall be conducted no less often than every five years from completion of the construction of the remedial action in accordance with EPA guidance set forth in Structure and Components of Five-Year Reviews, May 23, 1991, OSWER Directive 9355.7-02 and Supplemental Five-Year Review Guidance, OSWER Directive 9355.7-02A. Policy reviews shall be conducted as long as

hazardous substances remain onsite and prevent unlimited use of and unrestricted exposure to the Site.

10.6 Stream and Wetland Monitoring

A fresh water pond is located onsite from which flows the west tributary (Old Tom's Run). The east tributary emanates from the eastern part of the Site and eventually converges with the west tributary. Approximately two to three acres of wetlands are located in these areas (Figure 10). While all remedial measures shall be designed to minimize harmful impacts to ecological values of the pond and stream, as well as the surrounding wetland and upland areas, some adverse effects will be unavoidable during implementation of the remedy. During the remedial design, EPA shall determine the expected extent of the effects on ecological resources and shall, in consultation with the FWS and NOAA, evaluate the necessity for restorative and/or mitigative measures to address such effects. Those measures shall then be implemented during the remedial action.

A stream and wetland monitoring program shall be implemented to evaluate Site impacts on these areas, to identify any changes in conditions in the stream or wetlands due to implementation of the selected remedy, and to assess the need for additional stream and wetland studies or additional remedial action.

During the remedial design phase, EPA shall determine the number and location of sampling points in the streams and wetlands and the analytical parameters and methods to be employed sufficient to perform the ecological evaluation for the Site and make the assessments described above.

Performance Standard for Stream and Wetland Monitoring:

1. The stream and wetland monitoring program shall be implemented to evaluate the tributaries and wetlands impacted by the Site, to identify any changes in conditions in the tributaries or wetlands due to implementation of the selected remedy, and to assess the need for additional stream and wetland studies or additional remedial action.

2. Ecological monitoring shall be conducted annually with the first round conducted prior to the start of the remedial action to establish baseline conditions. The study conducted by the U.S. FWS in 1990, as discussed in Section 6.3, documented the impacts of the Site on aquatic biota and delineated wetlands in the area of the Site. This document shall serve as a reference for the ecological evaluation of baseline conditions. The baseline study of the tributaries shall be performed in accordance with the modified Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, EPA/444/4-89-001, May 1989. Wetlands delineation shall be performed in accordance with COMAR 08.05.04 and 33 U.S.C. 1344, 40 CFR Part 230.

3. Monitoring shall continue for such time as EPA, in consultation with MDE, determines is necessary to assure protection of human health and the environment. This determination shall be based on the statutory reviews of the remedial action which shall be conducted no less often than every five years from completion of the construction of the remedial action in accordance with EPA guidance set forth in Structure and Components

of Five-Year Reviews, May 23, 1991, OSWER Directive 9355.7-02 and Supplemental Five-Year Review Guidance, OSWER Directive 9355.7-02A. Policy reviews shall be conducted as long as hazardous substances remain onsite and prevent unlimited use of and unrestricted exposure to the Site.

10.7 Institutional Controls

As soon as practicable, EPA shall ensure that institutional controls are in place to prevent installation of drinking water wells on the property in the shallow aquifer. Such institutional controls shall remain in effect until EPA determines that they are no longer required to protect human health and the environment.

Performance Standard for Institutional Controls:

The objective of the institutional controls is to limit the potential for exposure to contaminated ground water in the shallow aquifer and to minimize the extent to which the contaminant plume could be extended as a result of breaching of the clay layer beneath the Site. The institutional controls shall be maintained until EPA, in consultation with MDE, determines that MCLs or other risk-based chemical-specific ARARs have been achieved as specified in the performance standards for ground water monitoring in Section 10.5, above.

10.8 Building Demolition

Any buildings that are not necessary for remedial action or operation and maintenance activities and that are contaminated with hazardous substances shall either be decontaminated or demolished and the rubble and any decontamination wastes shipped offsite for treatment and disposal.

Performance Standards for Building Demolition:

All buildings that are not necessary for the remedial action or operation and maintenance activities shall be sampled to determine if they are contaminated with hazardous substances. If so, the building(s) shall either be decontaminated or demolished. The rubble and any decontamination wastes shall be handled onsite and prepared for shipment offsite in accordance with RCRA regulations for generators of hazardous wastes (COMAR 26.13.03.02-.05).

10.9 Sheet Pile Wall

Once EPA determines that the sheet pile wall, in its role as a containment structure, is no longer necessary to protect human health and the environment, the above-ground portion of the sheet piling shall be tested to determine if it is contaminated with hazardous substances. If it is found to be contaminated with hazardous substances, the sheet piling shall be handled in one of the following manners: (1) decontaminated in place; (2) cut off below the ground surface and prepared for offsite shipment to a hazardous waste disposal facility in accordance with RCRA regulations for generators of hazardous wastes (COMAR 26.13.03.02-.05); or, (3) cut off below the ground surface, decontaminated, and shipped offsite for recycling or disposal in a solid waste disposal facility.

10.10 Perimeter Fencing

The chain-link fence with locking gates that currently surrounds the Site shall be maintained in a manner sufficient to prevent unauthorized access to the Site until such time as EPA determines that all soil cleanup levels have been achieved and that exposure to Site media will not result in an unacceptable risk to human health or the environment.

10.11 Miscellaneous Performance Standards

All remedial activities shall be implemented in a manner that will not adversely impact any identified endangered species pursuant to the Endangered Species Act of 1978 (16 U.S.C. §1531 et seq., 50 C.F.R. Part

402) or historic resources pursuant to the Archaeological and Historical Preservation Action of 1974 (16 U.S.C. §469) and the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470 et seq., 36 C.F.R. Part 800).

This remedial action shall comply with applicable statutory and regulatory requirements under RCRA Subtitle C relating to Corrective Action of solid waste management units, including 40 C.F.R. Part 264, Subparts F and S.

The remedial action shall meet the RCRA clean closure requirements for the former landfill areas (i.e., the land treatment area and the containment area) (COMAR 26.13.05.07 and 26.13.05.14).

11.0 GROUND WATER CONTINGENCY

Based on the ground water concentrations that were predicted to occur in the modeling performed during the FFS, ground water in the shallow aquifer should be restored to drinking water conditions following remediation of the soils and sediments to the established cleanup levels. It may become apparent during implementation of the post-remediation ground water monitoring program that ground water concentrations are remaining at levels above what is considered to be protective of human health and the environment. In such case, EPA may require that any of the following measures be taken for an indefinite period of time:

1. cleanup levels may be modified and chemical-specific ARARs may be waived in accordance with CERCLA and the NCP;

2. institutional controls may be modified or extended in duration to restrict access to those portions of the aquifer where contamination is above safe levels; and

3. remedial technologies for further ground water restoration may be evaluated and implemented in accordance with CERCLA and the NCP.

The decision to invoke any or all of these measures may be made by EPA, in consultation with MDE, during reviews of the remedial action. Such policy reviews will be conducted at least every five years from completion of the construction of the remedial action in accordance with EPA guidance set forth in Structure and Components of Five-Year Reviews, May 23, 1991, OSWER Directive 9355.7-02 and Supplemental Five-Year Review Guidance, OSWER Directive 9355.7-02A. Policy reviews shall be conducted as long as hazardous substances remain onsite and prevent unlimited use of and unrestricted exposure to the Site. If necessary, EPA will issue an Explanation of Significant Differences, a ROD amendment, or a new ROD in accordance with CERCLA and the NCP to address the required change to the remedy.

12.0 STATUTORY DETERMINATIONS

EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA, 42 U.S.C. Section 9621, establishes several other statutory requirements and preferences. These requirements specify that when complete, the selected remedial action for each site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is invoked. The selected remedy also must be cost effective and utilize treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous substances. The following sections discuss how the selected remedy for this Site meets these statutory requirements.

12.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment by reducing contaminant concentrations in all Site media, by controlling exposure to contaminated soil, sediment, ground water and surface water and by reducing contaminant loading to ground water, surface water, and sediments.

Excavation and treatment of soils and sediments will reduce contaminant concentrations to a level where they will no longer present an unacceptable risk to human health and the environment through direct contact. Excavation and treatment of contaminated soils and sediments and removal of DNAPLs in the subsurface will also prevent further migration of contamination from the Site and effectively reduce contaminant levels in the ground water in the shallow aquifer and in the local surface water and sediments. Consequently, these measures will reduce the potential for exposure via direct contact or ingestion. Once the cleanup levels have been achieved, the carcinogenic risk associated with
exposure to soils and ground water is expected to be within EPA's target risk range of 1 x 10-6 to 1 x 10-4 and it is expected that there will be no significant potential for adverse noncarcinogenic health effects as a result of exposure to Site media.

Ground water monitoring will provide data for evaluating the effectiveness of the remedial action and will ensure that any unacceptable levels of contaminants in the ground water are addressed. Ground water use restrictions in the shallow aquifer will prevent future exposure to any remaining contaminated ground water by limiting the future installation of wells until EPA determines that ground water ARARs have been achieved to ensure protection of human health and the environment.

Dredging of the sediments in the pond and tributaries may impact ecological resources. Stream and wetland monitoring will provide a basis for additional remedial action, if it is determined to be necessary by EPA, in order to mitigate Site impacts on the stream or wetlands.

In the short-term, air emissions from the thermal desorption process will be reduced to acceptable regulatory levels by the installation of emission controls. Treated ground water and surface water which is discharged to the west tributary will meet all appropriate water quality standards and NPDES limitations in order to prevent any adverse environmental effects. Excavation activities will be conducted in accordance with regulations for noise pollution and sediment and erosion control.

Through treatment, institutional controls and monitoring, this remedy will be protective of human health and the environment during and upon completion of the remedial action.

12.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy shall attain all action-, location-, and chemical-specific applicable or relevant and appropriate requirements for the Site which are included in Section 10.

12.3 Cost-Effectiveness

The selected remedy, excavation and thermal desorption, is cost-effective in that it mitigates the risks posed by the contaminants associated with the Site, meets all requirements of CERCLA, and affords overall effectiveness proportionate to the cost. The estimated present worth cost for the selected remedy is $32,300,000. The costs associated with the capping alternatives, Alternatives 3 and 4, are comparatively lower ($17,000,000 and $9,000,000, respectively) but do not satisfy the statutory preference for treatment. Alternative 6, incineration, includes treatment and would provide effectiveness similar to the selected remedy but at almost twice the cost ($58,300,000). Alternative 5, offsite disposal is cost prohibitive with capital costs estimated at $179,300,000. The bioremediaton alternatives, Alternatives 8 and 9, have estimated capital costs in the same range as the selected remedy ($32,300,000 - $45,300,000 and $27,300,000 - 34,300,000, respectively) but are not likely to be as effective in achieving the cleanup levels established for this Site.

12.4 Utilization of Permanent Solutions And Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy for the Site utilizes permanent solutions and treatment technologies to the maximum extent practicable via the use of the thermal desorption technology. Of those alternatives that are protective of human health and the environment and that comply with ARARs, EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and

cost while also considering the statutory preference for treatment as a principal element and State and community acceptance. See Section 9.0 Summary of Comparative Analysis of Alternatives.

12.5 Preference for Treatment as a Principal Element

In keeping with the statutory preference for treatment as a principal element of the remedy, the selected remedy provides for the treatment of contaminated soils and sediments which constitute one of the principal threats known to exist at the Site. DNAPLs in the containment area, also a principal threat, will be excavated and disposed of offsite as the thermal desorption process would not be amenable to treating these wastes.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

Section 117(b) of CERCLA, 42 U.S.C. §9717 (b), requires an explanation of any significant changes in a ROD from the preferred alternative originally presented in the Proposed Plan. The selected remedy described in this ROD contains one significant change from EPA's preferred alternative in the Proposed Plan. The change described below was made in response to comments on the Proposed Plan.

A sediment cleanup level for PCP of 0.4 ppm (dry weight basis) has been added to the cleanup levels for the Site. This addition was necessary because the detection limits for PCP in sediment samples collected to date have been above 0.4 ppm; therefore, it is not currently known how extensive PCP contamination may be above this level. During the dredging operations, sediment samples shall be collected and analyzed using methods with appropriate detection limits to detect areas where this cleanup level has been exceeded and therefore requires excavation.

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<IMG SRC 0395197F>
<IMG SRC 0395197G>
<IMG SRC 0395197H>
<IMG SRC 0395197I>
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TABLE 1

Summary of Drilling Log for
On-Site Production Well (Abandoned)

Southern Maryland Woodtreating Site
Hollywood, MD
January, 1994

Description	Depth in Feet	Interpreted Geologic Unit
Yellow sand and clay	0-30	Pleistocene sediments
Blue clay	30-50	Chesapeake Group
Yellow sand	50-60	
Blue clay	60-90	
Green sand, shell, and rock	90-135	
Green clay	135-228	
Green sand, shell and clay	228-245	
Green clay	245-285	
Green sand, shell, and rock	285-325	Piney Point and Nanjemoy Formations
Black sandy clay	325-350	
Brown sand	350-370	
Black sand and clay	370-485	
White clay	485-493	Marlboro Clay
Pink clay	493-495	
Green sand	495-600	Aquia Formation

Source: State of Maryland Waste Management Administration records.

TABLE 2

CHEMICALS DETECTED IN ALL MEDIA
AT THE SOUTHERN MARYLAND SITE

2,4-DIMETHYLPHENOL	ALUMINUM
2-CHLOROPHENOL	ARSENIC
2-METHYLNAPHTHALENE	BARIUM
2-METHYLPHENOL	BERYLLIUM
3,3-DICHLOROBENZIDINE	CADMIUM
4-CHLOROANILINE	CALCIUM
4-METHYLPHENOL	CHROMIUM
ACENAPHTHENE	COBALT
ACENAPHTHYLENE	COPPER
ACETONE	IRON
ANTHRACENE	LEAD
BENZENE	MAGNESIUM
BENZOIC ACID	MANGANESE
BENZO(A)ANTHRACENE	MERCURY
BENZO(A)PYRENE	NICKEL
BENZO(B)FLUORANTHENE	POTASSIUM
BENZO(G,H,I)PERYLENE	SILVER
BENZO(K)FLUORANTHENE	SODIUM
BIS(2-ETHYLHEXYL)PHTHALATE	THALLIUM
BUTYLBENZYLPNTHALATE	VANADIUM
CARBON DISULFIDE	ZINC
CHRYSENE	CYANIDE
DIBENZOFURAN	
DIBENZO(A,H)ANTHRACENE	
DIETHYLPHTHALATE	
DI-N-BUTYLPHTHALATE	
DI-N-OCTYL PHTHALATE	
ETHYLBENZENE	
FLOURENE	
FLUORANTHENE	
INDENO(1,2,3-CD)PYRENE	
METHYLENE CHLORIDE	
NAPHTHALENE	
PENTACHLOROPHENOL	
PHENANTHRENE	
PHENOL	
PYRENE	
STYRENE	
TOLUENE	
TOTAL XYLENES	

TABLE 3

Area-By-Area Review of Possible
Causes of Contamination

Area	Possible Causes of Contamination
! Upper Site Area	! Drippage from treated wood during storage.
! Northeast Tank Area	! Drippage from treated wood during storage. ! Leakage from tanks.
! Process Area	! Retort waste disposal practices. ! Raw material spillage. ! Drippage from treated wood during transport. ! Inadequate housekeeping practices.
! Excavated Lagoons Area	! Waste disposal practices.
! Pond Area	! Surface drainage. ! Transport of contaminants from lagoons via groundwater.
! Spray Irrigation Area	! Spray irrigation of lagoon supernatants.
! Land Treatment Area	! Land application of lagoon sludges.
! West Tributary	! Run on from the on-site pond.

TABLE 4

Summury - Contaminated Soil Excavation Volume Estimates
Southern Maryland Woodtreating Site
Hollywood, Maryland

AREA	ESTIMATED VOLUMES (C.Y.)
A. CONTAINMENT AREA (1):	62,300
B. LAND TREATMENT AREA (2):	11,000
C. NORTHEAST TANK AREA (1):	1,700
D. UPPER SITE AREA (1):	300
E. WESTERN TRIBUTARY (1):	2,000
F. EASTERN TRIBUTARY (1):	200
TOTAL:	77,500 C.Y.

NOTE:

(1) Hazarclous Waste Remedial Action Predesign Report Vol. 1
Dames & Moore, June 1992

(2) EPA - ERT Analytical Report, August 1993

TABLE 5

CHEMICALS OF CONCERN SELECTED
FOR THE SOUTHERN MARYLAND SITE
RISK ASSESSMENT IN THE
REMEDIAL INVESTIGATION

GROUND WATER

Toluene
Benzene
Ethylbenzene
Styrene
Total Xylenes
Phenol
2-methylphenol
4-methylphenol
2,4-Dimethylphenol
Pentachlorophenol
ncPAHs
cPAHs

SEDIMENT

Toluene
Ethylbenzene
Total Xylenes
ncPAHs
cPAHs

SURFACE SOIL

Toluene
Ethylbenzene
Styrene
Total Xylenes
Pentachlorophenol
ncPAHs
cPAHs

COMBINED SOILS

Toluene
Ethylbenzene
Styrene
Total Xylenes
Pentachlorophenol
ncPAHs
cPAHs

NON-CARCINOGENIC PAHS

Naphthalene
2-methylnaphthalene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Fluoranthene
Pyrene
Benzo(g,h,i)perylene

CARCINOGENIC PAHS

Benzo(a)anthracene
Chrysene
Benzo(b) fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenzo(a,h)anthracene

TABLE 6

CONCENTRATIONS OF INDICATOR CHEMICALS
IN GROUND WATER
AT THE SOUTHERN MARYLAND SITE

CHEMICAL	UNITS	MAXIMUM CONCENTRATION	GEOMETRIC MEAN	FREQUENCY OF DETECTION
TOLUENE	ug/L	900	5.67	13 /44
BENZENE	ug/L	1500	6.38	14 /44
ETHYLBENZENE	ug/L	130	6.74	6 /44
STYEENE	ug/L	240	8.43	5 /44
TOTAL XYLENES	ug/L	610	7.20	11 /44
PHENOL	ug/L	12000	12.3	20 /47
2-METHYLPHENOL	ug/L	14000	22.7	14 /44
4-METHYLPHENOL	ug/L	16000	20.6	11 /44
2,4-DIMETHYLPHENOL	ug/L	8300	27.0	16 /44
PENTACHLOROPHENOL	ug/L	5000	54.3	12 /44
ncPNAs	ug/L	93340	142	106 /396
cPNAs	ug/L	7900	68	24 /308

CONCENTRATIONS OF INDICATOR CHEMICALS
IN SEDIMENT
AT THE SOUTHERN MARYLAND SITE

CHEMICAL	UNITS	GEOMETRIC MEAN	MAXIMUM CONCENTRATION	FREQUENCY OF DETECTION
TOLUENE	ug/kg	2.28	49	3 /17
ETHYLBENZENE	ug/kg	4.03	37	2 /17
TOTAL XYLENES	ug/kg	4.47	23	
ncPNAs	ug/kg	3593	78860	56 /153
cPNAs	ug/kg	2589	21545	29 /119

CONCENTRATIONS OF CHEMICALS OF CONCERN
IN SOILS
AT THE SOUTHERN MARYLAND SITE

		SURFACE DEPTHS (0.0.2.0 FT)			SUBSURFACE DEPTHS			COMBINED DEPTHS		
CHEMICAL	UNITS	GEOMETRIC MEAN	MAXIMUM CONCENTRATION	FREQUENCY OF DETECTION	GEOMETRIC MEAN	MAXIMUM CONCENTRATION	FEQUENCY OF DETECTION	GEOMETRIC MEAN	MAXIMUM CONCENTRATION	FREQUENCY OF DETECTION
TOLUENE	ug/kg	4.65	4600	8 /66	9.69	8100	1 /15	5.32	8100	9 /81
ETHYLBENZENE	ug/kg	8.17	8200	6 /66	16.0	10000	3 /15	9.25	10000	9 /81
STYRENE	ug/kg	8.18	12000	7 /66	14.5	7200	2 /15	9.10	12000	9 /81
TOTAL XYLENES	ug/kg	8.89	14000	7 /66	16.7	35000	2 /15	10.0	35000	9 /81
PENTACHLOROPHENOL	ug/kg	2071	90000	8 /59	1519	60000	4 /16	1923	90000	12 /75
ncPNAs	ug/kg	8377	154090000	132 /531	6151	4820000	34 /144	7776	15960000	166 /675
cPNAs	ug/kg	4295	1891500	78 /413	2496	392500	12 /112	3772	1891500	90 /525

TABLE 7

ESTIMATED ANNUAL AVERAGE SURFACE WATER CONCENTRATIONS
AT THE SOUTHERN MARYLAND SITE

(Concentrations in mg/l)

Chemicals of Concern	Average Case	Plausible Maximum Case
Benzene	1.0x10-3	0.18
Toluene	8.4x10-4	0.27
Ethylbenzene	9.1x10-4	0.11
Stryene	1.4x10-3	0.46
Xylene	1.3x10-3	0.69
Phenol	3.3x10-2	2.07
4-Methylphenol	1.6x10-2	1.98
2-methylphenol	2.8x10-3	1.72
2,4-Dimethylphenol	1.7x10-2	1.03
Pentachlorophenol	1.4x10-3	0.65
CPNAs	7.9x10-3	1.33
NCPNAs	3.1x10-2	26.98

CONCENTRATIONS OF GROUNDWATER BASED ON INFILTRATION MODEL
AT THE SOUTHERN MARYLAND SITE

CHEMICAL	Cgw (ppm) (a) AVG	MAX
TOLUENE		
ETHYLBENZENE		
STYRENE		
TOTAL XYLENES		
PENTACHLOROPHENOL		
cPNAs	9.0E-06	4.5E-03

(a) Calculated using Kd for cPNAs = 38,400

TABLE 8

HEALTH EFFECTS CRITERIA FOR CHEMICALS OF CONCERN
AT THE SOUTHERN MARYLAND SITE

CHEMICAL	Cancer Potency Factor (mg/kg/day)-1 (a) Oral	Weight of Evidence (b)	Reference Dose (RfD) (mg/kg/day) (c) Oral
TOLUENE			0.3
BENZENE	0.052	82	
ETHYLBENZENE			0.1
STYRENE			0.2
TOTAL XYLENES			2
PHENOL			0.04
2-METHYLPHENOL			0.05
4-METHYLPHENOL			0.05
2,4-DIMETHYLPHENOL			0.05
PENTACHLOROPHENOL			0.03
ncPNAs			0.41 (d)
cPNAs	11.5 (e)	82 (f)	

(a) Oral cancer potency factors (q1*) were deroved by EPA's Carcinogen Assessment Group (EPA 1986).

(b) Weight-of-Evidence classification for potential carcinogen. See text for description.

(c) RfD promulgated by the RfD Work Group (EPA 1986, 1987b,c).

(d) The reference dose for noncarcinogenic PNAs is currently under reanalysis (EPA 1987a). For the risk assessment, the most recently accepted value will be used. This reference dose is for naphthalene.

(e) The potency factor for carcinogenic PNAs is currently under reanalysis (EPA 1987a). For the risk assessment, the most recently accepted value will be used. This potency factor is for benzo(a)pyrene.

(f) The Weight-of-Evidence used for cPNAs is that of benzo(a)pyrene (EPA 1986).

TABLE 9

ASSUMPTIONS USED TO ESTIMATE EXPOSURE TO TREAPSSERS VIA DIRECT CONTACT WITH SOIL AND SEDIMENTS--CURRENT-USE SCENARIO AT THE SOUTHERN MARYLAND SITE

Parameter	Average Case	Plausible Maximum Case
Frequency of exposure	2 days/year	5 days/year
Period of exposure	5 years	5 years
Incidental ingestiona	50 mg/day	100 mg/day
Oral absorption factorb		
cPNAs	0.15	0.45
ncPNAs	0.50	1.00
other nc	1.00	1.00
Daily soil contact ratec	0.5 mg/cm2	1.5 mg/cm2
Area of exposed skind	1980 cm2	1980 cm2
Dermal absorption factore	0.01	0.04
Average body weight	60 kg	60 kg
Exposure point concentrationsf	geometric mean	maximum

a Based on the work of LaGoy 1987.
b This factor represents the percentage of contaminants absorbed from ingested soil.
c Based on the work of Schaum 1984.
d EPA 1985.
e This factor represents the percentage of contaminants absorbed through the skin.
f These concentrations are shown in Table 6.

TABLE 10

ASSUMPTIONS USED TO ESTIMATE EXPOSURE TO TREAPSSERS VIA DIRECT CONTACT WITH SOIL AND SEDIMENTS--CURRENT-USE SCENARIO AT THE SOUTHERN MARYLAND SITE

Parameter	Average Case	Plausible Maximum Case
Frequency of exposure	264 days/year	264 days/year
Period of exposure	0.25 years	0.5 years
Incidental ingestiona	50 mg/day	100 mg/day
Oral absorption factorb		
cPNAs	0.15	0.45
ncPNAs	0.50	1.00
other nc	1.00	1.00
Daily soil contact ratec	0.5 mg/cm2	1.5 mg/cm2
Area of exposed skind	1980 cm2	1980 cm2
Dermal absorption factore	0.01	0.04
Average body weight	70 kg	70 kg
Exposure point concentrationsf	geometric mean	maximum

a Based on the work of LaGoy 1987.
b This factor represents the percentage of contaminants absorbed from ingested soil.
c Based on the work of Schaum 1984.
d EPA 1985.
e This factor represents the percentage of contaminants absorbed through the skin.
f These concentrations are shown in Table 6.

TABLE 10

ASSUMPTIONS USED TO ESTIMATE EXPOSURE TO TREAPSSERS VIA DIRECT CONTACT WITH SOIL AND SEDIMENTS--CURRENT-USE SCENARIO AT THE SOUTHERN MARYLAND SITE

Parameter	Average Case	Plausible Maximum Case
Frequency of exposure		
Children (1-12 years)	125 days/year	250 days/year
Adults (12-70 years)	25 days/year	100 days/year
Lifetime (0-70 years)	50 days/year	125 days/year
Period of exposure		
Children aged 1-6 years	5 years	5 years
Children aged 6-12 years	6 years	6 years
Ages 12 and older	58 years	58 years
Lifetime (0-70 years)	70 years	70 years
Incidental ingestiona		
Children aged 1-6 years	100 mg/day	500 mg/day
Children aged 6-12 years	50 mg/day	250 mg/day
Ages 12 and older	25 mg/day	100 mg/day
Lifetime (0-70 years)	50 mg/day	140 mg/day
Oral absorption factorb		
cPNAs	0.15	0.45
ncPNAs	0.50	1.00
other nc	1.00	1.00
Daily soil contact ratec	0.5 mg/cm2	1.5 mg/cm2
Area of exposed skind		
Children aged 1-6 years	1730 cm2	1730 cm2
Children aged 6-12 years	2920 cm2	2920 cm2
Ages 12 and older	1980 cm2	1980 cm2
Lifetime (0-70 years)	2040 cm2	2040 cm2
Dermal absorption factore	0.01	0.04
Average body weight		
Children aged 1-6 years	15 kg	15 kg
Children aged 6-12 years	30 kg	30 kg
Ages 12 and older	70 kg	70 kg
Lifetime (0-70 years)	60 kg	60 kg
Exposure point concentrationsf	geometric mean	maximum

a Based on the work of laGoy 1987.
b This factor represents the percentage of contaminants absorbed from ingested soil.
c Based on the work of Schaum 1984.
d EPA 1985 Adult values were calculated based on the exposure of the hands and forearms. Children's values were calculated based on the exposure of the hands, lower legs and lower arms.
e This factor represents the percentage of contaminants absorbed through the skin.
f These concentrations are shown in Table 6.
g Lifetime values are weighted averages of values for different age groups

TABLE 12

CHRONIC DAILY INTAKE AND POTENTIAL CANCER RISKS TO TRESPASSERSa
AT THE SOUTHERN MARYLAND SITE

Media	Chronic Daily Intake		Excess Lifetime Cancer Risk	
	Average Case	Maximum Case	Average Case	Maximum Case
Soil	4-3x10-10	5.2x10-6	5.6x10-9	5.8x10-5
Sediment			3.4x10-9	6.6x10-7

a The assumptions made in developing the average and plausible maximum exposure cases are shown in Table 9.

Media	Chronic Daily Intake		Excess Lifetime Cancer Risk	
	Average Case	Maximum Case	Average Case	Maximum Case
Soil	2 6x10-9	2.6x10-5	2.8x10-8	2.6x10-4

a The assumptions made in developing the average and plausible maximum exposure cases are shown in Table 10.

TABLE 12

CHRONIC DAILY INTAKE AND POTENTIAL CANCER RISKS TO TRESPASSERSa
AT THE SOUTHERN MARYLAND SITE

Media	Chronic Daily Intake (mg/kg/day)		Excess Lifetime Cancer Risk	
	Average Case	Maximum Case	Average Case	Maximum Case
Soil				
Children 1-6 yrs	2 x 10-7	2 x 10-3	2 x 10-6	2 x 10-2
Children 7-12 yrs	1 x 10-7	1 x 10-3	1 x 10-6	1 x 10-2
Ages 13 yrs and older	5 x 10-8	1 x 10-3	6 x 10-7	1 x 10-2
Lifetime (0-70 years)	1.7x10-7	8.7x10-4	2.0x10-6	2 x 10-2
Groundwater				
Lifetime-Actual				
Benzene	3 x 10-4	5 x 10-2	1 x 10-5	3 x 10-3
CPNA	2 x 10-3	9 x 10-2	3 x 10-2	0.95
Lifetime-Infiltration model				
CPNA	3 x 10-7	2 x 10-4	3.5 X 10-6	2 x 10-5

a The assumptions made in developing the average and plausible maximum exposure cases are shown in Table 11.

TABLE 13

NONCARCINOGENIC RISKS

SOUTHERN MARYLAND WOOD TREATING

POPULATION	MEDIUM	AVERAGE CASE	MAXIMUM CASE	CASE
TRESPASSERS	SOIL	8 X 10-4	2 X 10-3	
	SEDIMENT	5 X 10-8	1 X 10-5	
CONSTRUCTION	SOIL	5 X 10-5	4 X 10-2	
RESIDENTS	SOIL	1 X 10-5	6 X 10-2	
	GROUND WATER	1 X 10-1	50	

TABLE 14

Southern Maryland Wood Treatment Site
Summary risk matrix: upper bound excess lifetime cancer risk

"--": Exposure route not assessed

Remedial Alternative	Air	Soil	Groundwater	Total
		Risk to Residents		
1,2: No action, limited action	2.01E-07	7.17E-04	-	-
3: Capping and containment	1.44E-07	-	-	-
4: Excavation, capping, and containment	7.00E-07	-	-	-
5: Excavation and off-site disposal	2.42E-07	-	-	-
6: Thermal treatment	1.99E-07	9.60E-07	8.77E-05	8.89E-05
7: Thermal desorption	2.20E-06	9.60E-07	8.77E-05	9.09E-05
8: ExcavaUon and on-site bioremediation (5 y)	1.33E-05	8.89E-05	1.42E-04	2.44E-04
8: Excavation and on-site bioremediation (10 y	1.33E-05	1.13E-05	1.30E-05	3.76E-05
9: Bio-slurry	3.81E-07	3.59E-05	3.26E-04	3.62E-04
		Risk to Workers		
1,2: No action, limited action	-	3.07E-05	-	
3: Capping and containment	-	-	-	
4: Excavation, capping, and containment	-	-	-	
5: ExcavalJon and off-site disposal	-	4.12E-07	-	
6: Thermal treatment	-	4.12E-07	-	
7: Thermal desorption	-	4.12E-07	-	
8: Excavation and on-site bioremediation (5 y)	-	3.81E-06	-	
8: Excavation and on-site bioremediation (10 y	-	4.86E-07	-	
9: Bio-slurry	-	1.54E-06	-	

Source: Focused Human Health Risk Assessment, Risks After Remediation for Nine Remedial Alternatives for the Southern Maryland Wood Treating Site, Roy L. Smith, Ph.D., U.S. EPA, November 17, 1994.

TABLE 14

Southern Maryland Wood Treatment Site
Summary risk matrix: upper bound excess lifetime cancer risk

"--": Exposure route not assessed

Remedial Alternative	Air	Soil	Groundwater	Total
		Risk to Residents		
1,2: No action, limited action	0.1472	1.2536	-	-
3: Capping and containment	0.1472	-	-	-
4: Excavation, capping, and containment	0.0447	-	-	-
5: Excavation and off-site disposal	0.0431	-	-	-
6: Thermal treatment	0.0429	0.0017	2.3846	2.4292
7: Thermal desorption	0.0429	0.0017	2.3846	2.4292
8: Excavation and on-site bioremediation (5 y)	0,0429	0.0516	0.9426	1.0371
8: Excavation and on-site bioremediation (10 y	0.0429	0.0065	0.1183	0.1678
9: Bio-slurry	0.0429	0.0626	8.7434	8.8489
		Risk to Workers		
1,2: No action, limited action	-	0.4605	-	
3: Capping and containment	-	-	-	
4: Excavation, capping, and containment	-	-	-	
5: Excavation and off-site disposal	-	0.0062	-	
6: Thermal treatment	-	0.0062	-	
7: Thermal desorption	-	0.0062	-	
8: Excavation and on-site bioremediation (5 y)	-	0.0189	-	
8: Excavation and on-site bioremediation (10 y	-	0.0024	-	
9: Bio-slurry	-	0.0230	-	

Source: Focused Human Health Risk Assessment, Risks After Remediation for Nine Remedial Alternatives for the Southern Maryland Wood Treating Site, Roy L. Smith, Ph.D., U.S. EPA, November 17, 1994.

TABLE 16
DELISTING LEVELS

CARCINOGENIC PAHs	DELISTING LEVEL (MG/L)
Benz(a)anthracene	2 X 10-4
Benzo(b)fluoranthene	6 X 10-3
Benzo(k)fluoranthene	2 X 10-1
Benzo(a)pyrene	1 X 10-2
Chrysene	6 X 10-2
Dibenz(a,h)anthracene	1 X 10-4
Indeno(1,2,3-cd)pyrene	6 X 10-3
NON-CARCINOGENIC PAHs	DELISTING LEVEL (MG/L)
Acenaphthene	1 X 102
Anthracene	6 X 102
Fluoranthene	6 X 101
Naphthalene	6 X 101
Phenanthrene	1 X 10-1 *
Pyrene	6 X 101

TABLE 16 (cont'd)

DELISTING LEVELS

SEMIVOLATILE AROMATIC HYDROCARBONS	DELISTING LEVEL (MG/L)
p-Chloro-m-cresol	1 X 101 *
2-Chlorophenol	1 X 101
2,4-Dimethylphenol	4 X 101
2,4-Dinitrophenol	4 X 100
Carbazole	2 X 10-1
Pentachlorophenol	6 X 10-2
Phenol	1 X 103
2,3,4,6-Tetrachlorophenol	6 X 101
2,4,5-Trichlorophenol	2 X 102
2,4,6-Trichlorophenol	5 X 10-1

TABLE 16 (cont'd)

DELISTING LEVELS

VOLATILE AROMATIC HYDROCARBONS	DELISTING LEVEL (MG/L)
Benzene	3 X 10-1
Ethylbenzene	4 X 101
Styrene	6 X 100
Xylene	6 X 102

* HBLs for these compounds obtained from information provided by the Office of Solid Waste, Health Assessment Section.

Treated soils will be analyzed using the EPA Method 1311 Toxicity Characteristic Leaching Procedure (TCLP). The concentrations in the resultant extract must meet the delisting levels in the table above. Provided these levels are achieved, the waste is delisted and the treated soils are no longer required to be managed as hazardous waste.

Delisting levels = HBL x DAF

HBL = health-based level in drinking water at a hypothetical downgradient well. The HBLs are found in Docket Report on Health-Based Levels and Solubilities Used in the Evaluation of Delisting Petitions Submitted Under 40 CFR §260.20 and §260.22, U.S. EPA, Office of Solid Waste, Waste Identification Branch, Delisting Section, December 1994.

DAF = dilution attenuation factor calculated using the EPA Composite Model for Landfills (CML) (See 56 FR 32993, July 18, 1991).

The exposure assumption that is used to assess the hazard of a petitioned waste is ingestion of contaminated ground water, leachate, or wastewater. The EPA CML models what happens when waste is placed in a landfill, leaching occurs, and contaminants are transported in ground water to a drinking water well.

TABLE 17

CALCULATION OF BENZO(A)PYRENE EQUIVALENCE
SOUTHERN MARYLAND WOOD TREATING SITE

Carcinogenic PAH	Toxicity equivalence factor	Concentration at 1 ppm total CPAHs1 (mg/kg)	Benzo(a)pyrene equivalence2 (mg/kg)	Concentration at 10 ppm CPAHs (mg/kg)	Benzo(a) pyrene equivalelece (mg/kg)
benzo (a) pyrene	1.0	0.06	0.06	0.60	0.60
benzo(b) fluoranthene	0.1	0.07	0.007	0.69	0.069
benzo(k) fluoranthene	0.01	0.07	0.0007	0.72	0.0072
benz(a) anthracene	0.1	0.14	0.014	1.4	0.14
carbazole	0. 003	0.46	0.0014	4.59	0.014
chrysene	0. 001	0.20	0.0002	2.00	0.002
TOTAL		1.00	0.0833	10.00	0.832
Rounding			0.1		1.0

1 Concentrations from Table 49 of the Focused Risk Assessment

2 Calculated by multiplying the concentration in mg/kg by the toxicity equivalence factor.

Table 18

Applicable or Releevant and Appropriate Requirements (ARARS)
and Guidance to Be Considered (TBCs)
for All Alternatives Evaluated
for the Southern Maryland Wood Treating Site

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
I. CHEMICAL SPECIFIC				
A. Water				
1. Safe Drinking Water Act	42 U.S.C. §§ 300f et seq.	Relevant and Appropriate	MCLs are enforceable standards for public drinking water supply systems which have at least 15 service connections or are used by at least 25 persons. These requirements are not directly applicable since	The NCP requires that remedial actions for ground water that is a current or potential source of drinking water shall meet the MCL for each site-related contaminant if the Maximum Contaminant Level Goal (MCLG) for that contaminants is set at a level of zero
a. Maximum Contaminant Levels (MCLs)	40 C.F.R. §§ 141.11-.12 and 141.61-.62		ground water at the Site may be used as a private drinking water supply. However, under the circumstances of this Site, MCLs are relevant and appropriate requirements.	and MCLs are relevant and appropriate under the circumstances of the site.
b. Maximum Contaminant Level Goals (MCLGs)	40 C.F.R § 141.50-.51	Relevant and Appropriate	MCLGs are non-enforceable health goals for public water supplies which have at least 15 service connections or are used by at least 25 persons. Under the circumstances of this Site, MCLGs are relevant and appropriate requirements.	The NCP requires that remedial actions for ground water that is a current or potential source of drinking water shall meet non-zero MCLGs for contaminants of concern for which they exist, where they are relevant and appropriate requirements.
2. Clean Water Act; Federal Ambient Water Quality Criteria for Protection of Aquatic Life	33 U.S.C. § 1314	Relevant and Appropriate	These are non-enforceable guidelines established pursuant to Section 304 of the Clean Water Act that set the concentrations of pollutants which are considered adequate to protect aquatic life. Federal ambient water quality criteria may be relevant and appropriate to CERCLA cleanups based on the uses of a receiving water	These criteria are relevant and appropriate because the State has designated the on-site stream for protection of aquatic life. Contaminant concentrations in treated ground water and surface water that will be discharged to the on-site stream shall not exceed the levels that will ensure compliance with these criteria.

Table 18

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
3. Maryland Surface Water Quality Criteria	COMARs 26.08.03 and COMAR 26.08.01.02	Applicable	These are criteria to maintain surface water quality for public water supplies, protection of aquatic life, recreational purposes, and other beneficial uses.	Contaminant concentrations in treated ground water and surface water that will be discharged to the on-site stream shall not exceed the lvels that will ensure compliance with these criteria.
4. Integrated Risk Information System (IRIS)	EPA Office of Research and Development	To Be Considered	IRIS is an EPA data base containing up-to-date health risk and EPA regulatory information for numerous chemicals. IRIS contains only those reference doses (FrDs) and cancer slope factors that have been verified by the RfD or Carcinogen Risk Assessment Verification Endeavor Workgroups, and is the preferred source of toxicity information.	These non-enforceable toxicity values shall be considered where remedial alternatives address risk-based criteria or when setting standards for cleanups.
5. EPA Health Advisories on Drinking Water	EPA Office of Drinking Water	To Be Considered	These advisories are non-enforceable guidelines for public water supply systems.	These advisories shall be considered for remedial actions involving ground water monitoring, recovery and treatment.
6. Health Effects Assessment	EPA Environmental Criteira and Assessment Office	To Be Considered	These are assessments of chemical-specific health effects that are based on non-enforceable toxicity data.	These assessments shall be considered where remedial alternatives address risk-based criteria or when setting standards for cleanups.
II. LOCATION SPECIFIC				
A. The Endangered Species Act of 1978	16 U.S.C § 1531 et seq. 50 C.F.R Part 402	Applicable	Act requires federal agencies to ensure that any action authorized by an agency is not likely to jeopardized the continued existence of any endangered or threatened species or adversely affect its critical habitat.	Potentially affected endangered species have not been identified. The remedial action shall be implemented so as not to adversely affect such resources should any be identified in the future.
B. The Archaeological and Historical Preservation Act of 1974	16 U.S.C. § 469	Applicable	Requires actions to avoid potential loss or destruction of significant scientific, historical, or archaeological data	Actions shall be taken to mitigate any adverse effects on identified historic resources that might result from implementation of the remedial action. No historic resources have been identified to date.

Table 18

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
C. Maryland Wetlands Regulations	COMAR 08.05.04	Applicable	Protects nontidal wetlands of the Site from dredging, filling, removal, or other alteration and requires State oversight and approval.	These regulations shall be applicable where excavation, backfilling, and construction of the cap or discharge to surface water affects wetlands.
D. Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Act	40 C.F.R Part 6 Appendix A	Applicable	This is EPA's policy for carrying out the provisions of Executive Orders 11990 (Protection of Wetlands) and 11988 (Flood plain Management) Requires Federal agencies to avoid or minimize adverse impacts of Federal actions upon wetlands and floodplains. If there is no other practicable alternative, impacts must be mitigated.	This shall be applicable where excavation of contaminated soils and sediments, construction of a cap, discharge of treated surface water or ground water to surface water, or backfilling of treated soils/sediments affects wetlands or a floodplain.
E. Clean Water Act Dredge and Fill Requirements	33 U.S.C. Section 1344 40 C.F.R. Part 230, 33 C.F.R. Parts 320-330 (Army Corps)	Applicable	Regulates the discharge of dredged or fill material to waters of the U.S. Activities must minimize adverse impacts and/or mitigate such impacts.	This shall be applicable where a cap is placed over any wetlands onsite and where any backfilling occurs in the pond or tributaries.
F. Ground Water Protection Strategy of 1984	EPA 440/6-84-002	To Be Considered	Identifies ground water quality to be achieved during remedial actions based on aquifer characteristics and use.	The EPA classification of the aquifer at the Site shall be taken into consideration during post-remediation ground water monitoring.
G. National Historic Preservation Act of 1966, as amended	16 U.S.C. §§470 et seq. 36 C.F.R. Part 800	Applicable	Requires remedial action to take into account effects on properties included in or eligible for the National Register of Historic Places and to minimize harm to National Historic Landmarks.	Actions shall be taken to mitigate any adverse effects on property eligible for or included on the National Register of Historic Places that could result from implementation of the remedial action.
III. ACTION SPECIFIC				
A. Control of Noise Pollution	COMARs 26.02.03.02 A(2) and B(2) and COMAR 26.02.03.03 a	Applicable	Provides limits on noise levels for the protection of human health and welfare.	Maximum Allowable Noise Levels shall not be exceeded at the site property boundaries during construction and operation of the remedy.
B. Water				
1. Clean Water Act National Pollutant Discharge Elimination	33 U.S.C. § 1342 and COMARs 26.08.03.01 and .07	Applicable	Establishes effluent limitations for discharges to waters of the State and controls discharge of toxic substances to surface waters.	These limitations shall be applicable to the discharge of treated ground water and surface water to the receiving stream. Actions must comply with only substantive portions of the regulations.

Table 18

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
2. Criteria and Standards for Best Management Practices	40 C.F.R. Part 125, Subpart K	Applicable	Requires a clear description of a best management practices (BMP) program to be submitted as part of the NPDES discharge permit application.	Discharge of treated ground water and surface water to the receiving stream shall be in accordance with a BMP program, although a permit is not required.
3. Guidelines Establishing Test Procedures for the Analysis of Pollutants	40 C.F.R. Part 136	Applicable	Establishes test procedures for analysis of effluent discharged under the NPDES program.	These guidelines shall be applicable to the discharge of treated ground water and surface water to the receiving stream.
4. Regulation of Water Supply, Sewage Disposal and Solid Waste	COMAR 26.04.04	Applicable	Establishes requirements for well construction and abandonment.	All wells shall be installed and/or abandoned and maintained in accordance with State requirements for construction and abandonment.
5. Stormwater Management	COMAR 26.09.02	Applicable	Requires development of a stormwater management plan and design and construction of systems necessary to control stormwater.	Stormwater shall be managed during and after construction to minimize stream channel erosion, pollution, sitation, sedimentation and local flooding.
6. Water Resources	COMAR 08.05.02	Applicable	Requires approval for water appropriation when volumes are such that they may affect water supply.	Thermal treatment, desorption and bioremediation will require large volumes of water.
7. Erosion and Sediment Control	COMARs 26.09.01.11	Applicable	Requires preparation of an erosion and sediment control plan for activities involving land clearing, grading and other earth disturbances and establishes erosion and sediment control criteria.	These regulations shall apply to clearing, grading, excavation backfilling, and capping activities at the Site.
8. Water Quality Certification	COMAR 26.08.02.10	Applicable	Establishes standards for certification that activities do not violate state water quality standards and limitations.	The water treatment system shall be operated in accordance with this regulation.
9. Board of Well Drillers	COMAR 26.05.01	Applicable	Identifies general regulations for well drillers in the State of Maryland	Well installation shall be performed by well drillers certified by the State of Maryland.
C. Air				
1. Air Emission Standards for Process Vents	40 C.F.R. Part 264, Subpart AA	Applicable	Establishes requirements for process vents associated with operations that manage hazardous wastes with organic concentrations of at least 10 parts per million weight.	These regulations shall apply to operation of the thermal treatment or thermal desorption units.

Table 18

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
2. Air Emissions Standards for Equipment Leaks	40 C.F.R. Part 264, Subpart BB	Applicable	Establishes standards for equipment design criteria, work practices, and specific emissions limits for TSD facilities that contain hazardous wastes with more than 10% by weight total organics.	These regulations shall apply to operation of the thermal treatment or thermal desorption
3. Maryland Regulations Governing Toxic Air Pollutants	COMAR 26.11.15	Applicable	Requires emissions of Toxic Air Pollutants (TAPs) from new and existing sources to be quantified; establishes ambient air quality standards and emission limitations for TAP emissions from new sources; requires best available control technology for toxics (T-BACT) for new sources of TAPs.	These regulations shall apply to operation of the thermal treatment, thermal desorption units, or bioremediation treatment units of upon testing of the unit, TAP emissions are detected.
4. Maryland Regulations Governing Air Quality (Volatile Organic Compounds)	COMAR 26.11.06.06	Applicable	Provides air quality standards, general emission standards and restrictions for air emissions of VOCs from vents and treatment devices that emit in excess of 20 lbs/day VOCs.	Emissions from thermal treatment, thermal desorption, or bioremediation units, shall meet emission limitations for VOCs.
5. Maryland Regulations Governing Air Quality (Visible Emissions, Particulates, Nuisance)	COMAR 26.11.06.02, .03, and .08	Applicable	Provide air quality standards, general emission standards and restrictions for visible emissions, particulates, and misances from vents and treatment devices.	These regulations shall apply to emissions from thermal treatment, thermal desorption, or bioremediation units.
D. Hazardous Waste				
1. Characteristics of Hazardous Waste (Toxicity, Ignitability, Corrosivity, Reactivity Characteristics) and Listed Wastes	COMARs 26.13.02.01-.14, and .16-.19 (COMARs 10.51.02.01-.13, and .15-.18 (1985) and 40 C.F.R. §261.24 and 261.31	Applicable	Establishes the criteria for determining if a solid waste exhibits the characteristics of toxicity, ignitability, corrosivity, or reactivity or is a listed waste.	These criteria shall be used in determining whether soils, sediments and treatment residuals are subject to RCRA hazardous waste regulations.
2. Standards Applicable to Generators of Hazardous Waste	COMARs 26.13.03.02, .03 .04, .05 (COMARs 10.51.03.02, .03, .04, .05 (1985))	Applicable	Establishes requirements for a generator who treats, stores or disposes of hazardous waste on-site, including packaging, labeling, manifesting, and recordkeeping requirements.	Treatment residuals or soils that contain listed hazardous wastes or exhibit a characteristic of a hazardous waste shall be managed onsite and prepared for offsite shipment according to these regulations.

Table 18

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
3. Standards for owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	COMAR 26.13.05 (COMAR 10.51.05)			
a. Miscellaneous Units	COMAR 26.13.05.16-1 (COMAR 10.51.01.16) and 40 CFR Subpart X, §264.600-.603	Applicable	Establishes performance standards for owners and operators of thermal treatment devices that do not thermally destroy hazardous wastes.	These regulations may apply to a thermal desorption unit depending on the design of the system.
b. Land Treatment	COMAR 26.13.05.13 (COMAR 10.51.05.13)	Applicable	Establishes standards for owners and operators of facilities that treat or dispose hazardous waste in land treatment units.	These criteria apply to the solid phase land treatment of contaminated soils onsite.
c. Incinerators	COMAR 26.13.05.15 (COMAR 10.51.05.15)	Applicable	Establishes regulations for hazardous waste incinerators including performance standards, operating requirements, monitoring and inspection, and closure.	These regulations apply to thermal treatment units defined as incinerators.
d. Closure and Post-closure	COMAR 26.13.05.07 (COMAR 10.51.05.07)	Applicable	Establishes regulations for closure and post-closure of hazardous waste treatment, storage, or disposal facilities.	Alternatives 3 and 4 would meet closure and post-closure requirements. Alternatives 5-9 would meet clean closure requirements.
e. Containers and Tank Systems	COMAR 26.13.05.09, .10 (COMAR 10.51.05.09, .10)	Applicable	Standards applicable to treatment, storage, disposal of hazardous wastes in containers and tanks, respectively	Contaminated soil and treatment residues will be stored in containers and/or tanks onsite prior to shipment offsite. Soil washing and slurry phase bioremediation would be conducted in onsite containers and/or tanks. Excavated soils and sediments may be placed in containers or tanks for purposes of dewatering prior to treatment and following treatment before backfilling.
f. Surface Impoundments and Waste Piles	COMAR 26.13.05.11, .12 (COMAR 10.51.05.11, .12)	Applicable	Standards applicable to treatment, storage, disposal of hazardous wastes in surface impoundments and waste piles, respectively	Excavated soils and sediments may be placed in a pile or surface impoundment for purposes of dewatering prior to treatment and following treatment before backfilling.

Table 18

ARAR or TBC	Legal Citation	Classification	Summary of Requirement	Applicability to Remedial Alternatives
g. Landfills	COMAR 26.13.05.14 (COMAR 10.50.05.14)	Applicable	Standards applicable to the construction, operation, closure and post-closure of landfills containing hazardous waste	Performance standards apply to the multi-layer cap, closure and post-closure in the capping alternatives, and closure of the landfills (i.e., land treatment area and containment area) for Alternatives 5-9.
h. Corrective Action for solid waste management units	40 C.F.R. Part 264 Subparts F and S	Applicable	Establishes standards for owners/operators to institute corrective action as necessary to protect human health and the environment for all releases of hazardous waste or constituents from any solid waste management unit	Corrective action would be instituted as necessary to protect human health and the environment from all releases of hazardous waste or consitituents from any solid waste management unit that might result from instituting any of the alternatives.
4. RCRA Land Disposal Restrictions	40 C.F.R Part 268.7 and 268.9 and 268.50	Applicable	Restrictions on land disposal of hazardous wastes that set concentration levels or methods of treatment that substantially diminish the toxicity of wastes or reduce the likelihood that hazardous constituents from wastes will migrate from the disposal site.	Contaminated media to be shipped offsite for treatment and disposal shall be temporarily stored onsite, analyzed, and treatment standards determined in preparation for shipment in accordance with these regulations.

TABLE 19

EPA CRITERIA FOR EVALUATING ALTERNATIVES

Threshold Criteria

Overall Protection of Human Health and the Environment: Describes how the alternative, as a whole, achieves and maintains protection each human health and the environment, and how risks posed through each pathway are eliminate, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs: Addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of Federal and State environmental laws an/or justifies invoking a Waiver.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence: Considers the ability of the remedy no maintain reliable protection of human health and the environment over time once clean-up goals have been met.

Reduction of Toxicity, Mobility, or Volume Through Treatment: Describes the anticipated performance of the treatment technologies that may be employed in a remedy.

Short-Term Effectiveness: Examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of the remedy, until the clean-up levels are achieved.

Implementability: Evaluates the technical and administrative feasibility of alternatives and the availability of required materials and services.

Cost: Considers the capital and operation and maintenance (O&M) costs of the alternatives.

Modifying Criteria

State Acceptance: Indicates whether the State agency, based on its review of the Proposed Plan, concurs with, opposed, or has no comment regarding the preferred alternative.

Community Acceptance: The community's general response to the alternatives will be assessed in the Record of Decision following a review of the public ccmments received on the Administrative Record and the Proposed Plan.

SOUTHERN MARYLAND WOOD TREATING SITE
HOLLYWOOD, ST. MARY'S COUNTY, MARYLAND

RESPONSIVENESS SUMMARY

This Responsiveness Summary documents public participation in the remedy selection process for the Southern Maryland Wood Treating Site ("the Site") and comments received by the U.S. Environmental Protection Agency ("EPA") during the public comment period on the Proposed Remedial Action Plan ("PRAP") for the Site. It also provides EPA's responses to those comments. The Responsiveness Summary is organized as follows:

1.0 OVERVIEW

On June 29, 1988, EPA issued a Record of Decision that established onsite incineration of contaminated materials as the selected remedy for the Site. Subsequently, community interest in the project grew and local citizens and environmental groups expressed strong opposition to the operation of an incinerator in their community. In 1992, due to escalating costs in the design of the remedy and the Maryland Department of the Environment's ("MDE") inability to fund its required cost share, EPA halted the design of the remedy selected in the 1988 ROD and agreed to reevaluate remedial alternatives for cleanup of the site in a Focused Feasibility Study ("FFS").

From approximately May 1992 to February 1995, EPA conducted the FFS where nine remedial alternatives were developed and evaluated for their ability to address the contamination at the Site. On March 21, 1995, EPA released the PRAP which presented EPA's preferred alternative for cleanup of the Site based on information from the FFS. The preferred alternative involved excavation of approximately 97,000 cubic yards of soils and sediments that are contaminated with wood treating wastes and onsite treatment using a thermal desorption technology.

EPA held a public meeting on March 30, 1995 to discuss the PRAP and to present its preferred alternative to the community. At this meeting, community members had an opportunity to ask questions and make comments regarding the results of the FFS, the risk assessment, and the cleanup alternatives listed in the PRAP. A 30-day public comment period was also held from March 22, 1995 to April 21, 1995. As no significant comments were submitted that would cause EPA to change its preferred alternative, EPA has selected thermal desorption as the remedy for this Site. A detailed description of the remedy is provided in Section 10 of this Record of Decision.

The two most vocal community groups throughout the FFS process, the Southern Maryland Wood Treatment Plant Task Force ("Task Force"), appointed by the St. Mary's County Commissioners, and the Environmental Awareness Coalition of Southern Maryland ("EAC"), a local citizens group, have submitted written correspondence endorsing the selected remedy, thermal desorption, for this Site. Both are opposed to no action, incineration, and capping alternatives that would leave wastes in place. Both groups have also expressed the opinion that EPA should have put more effort into evaluating bioremediation technologies which they believe might have been able to address the contamination at the Site with less impact to the community. MDE has also endorsed the selected remedy.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT

Community interest in what became the Southern Maryland Wood Treating Site existed even before the wood treating facility was built in 1965. Nearby residents informally protested the construction of an industrial facility on land which they had hoped would be used for residential purposes. Once the facility was in

operation, nearby residents complained to County officials of creosote-like odors coming from the Site.

EPA held its first public meetings on the Site in 1985 to explain short-term cleanup activities that were being conducted during the first removal action and to discuss planned long-term work to be performed in a Remedial Investigation and Feasibility Study ("RI/FS"). EPA conducted community interviews in 1986 and developed a Community Relations Plan that described issues of community interest and outlined EPA activities designed to facilitate citizen participation in the Superfund process during the RI/FS and beyond. When the RI/FS was completed, EPA released a PRAP presenting eight cleanup alternatives. An article in the local newspaper discussed the fact that EPA's preferred alternative involved onsite incineration of contaminated soil. EPA then held a public meeting to discuss the PRAP. This meeting was not widely attended. No opposition to the preferred alternative was expressed.

After EPA issued the Record of Decision on June 29, 1988, community interest in the Site grew. A new citizens group, the EAC, was formed and the St. Mary's County Commissioners became increasingly involved due to growing community concern with incineration and other aspects of the Site cleanup. The EAC applied for a Technical Assistance Grant in order to hire a technical consultant and collected 2000 signatures on petitions requesting that EPA reconsider the 1988 ROD. In July 1991, the County Commissioners sent a letter to EPA requesting that activities associated with incineration be suspended. The County Commissioners had previously appointed the citizen Task Force to assess the Site cleanup.

In response to the high level of community concern about incineration, EPA issued fact sheets to provide Site-specific information to the community and conducted further community interviews. EPA attended a County Commissioners meeting in April 1991 and conducted several workshops on incineration in September 1991 to provide further information and address community concerns. The local residents in attendance challenged EPA's assertion that mobile incineration was a safe and effective technology. At that time, EPA agreed to continue to evaluate emerging innovative treatment technologies for their potential applicability to the Site until the contract for the construction of the incinerator had been awarded. In the following several months, the EAC and the Potomac River Association, another citizens group, continued to voice their opposition to incineration, the Task Force met to discuss the remedy, and local media coverage of the Site continued.

EPA, acknowledging both community interest in alternatives to incineration and State concern regarding cost of the Site cleanup, asked EPA's Office of Research and Development ("ORD") to evaluate soil treatment technologies potentially applicable to the Site. ORD conducted this evaluation and summarized its results in a report dated February 3, 1992. This report, which was made available to the public, identified incineration as readily available, and bioremediation as potentially applicable to the Site. Finally, EPA announced in May 1992 that it would not move forward with the implementation of the 1988 ROD and agreed to conduct the FFS to formally reevaluate Site cleanup options.

Additional community relations work performed in the months that followed revealed the community's major concerns as the following: (1) community involvement in the decision making process; (2) assurance that EPA was considering and adequately evaluating all potentially applicable treatment technologies.

Throughout the FFS, EPA has maintained extensive community involvement in the process by offering regularly scheduled conference calls involving the EAC, the Task Force, local media, and other interested parties. MDE issued a series of written updates regarding the FFS and other Site activities. EPA has periodically issued additional Fact Sheets containing updated site information, has conducted further community interviews and Site tours for all interested parties, and has held numerous public meetings to update the community of progress on the FFS and to receive comments. To address specific concerns of the community on such topics as the integrity of the clay layer beneath the Site and the characterization of dense non-aqueous phase liquids ("DNAPLs"), EPA has held workshops where EPA experts on these topics have given presentations.

All documents, including drafts of the FFS Work Plan and the FFS report, were made available to the public in the information repository as they became available. Comments received from the public, primarily from the Task Force and the EAC and its TAG advisor, were taken into consideration as these documents were revised. In some cases, comments were addressed individually in separate documents. An entire remedial

alternative for slurry-phase bioremediation was developed and evaluated in the FFS at the specific request of the Task Force. EPA also performed an onsite treatability study for solid-phase bioremediation. Additionally, to assist EPA and the public in evaluating cleanup alternatives, EPA generated an innovative post-remediation risk assessment which predicted risks that would be posed by the Site during and following each of the alternatives evaluated in the FFS. This risk assessment was also submitted to the public for review and comment and discussed at a meeting with members of the Task Force and the EAC.

3.0 SUMMARY OF MAJOR COMMENTS RECEIVED DURING THE PUBlIC COMMENT PERIOD AND EPA'S RESPONSE

The responses to the comments received during the public comment period are divided into two categories, those received at the public meeting and those submitted in writing.

A. Comments Received at the Public Meeting

A transcript of the public meeting held March 30, 1995, is located in the Administrative Record file and is available for public review at the Site repositories at the St. Mary's County library and at EPA's regional office in Philadelphia.

Comment 1: Several commenters expressed the concern that the inclusion of the word "containment" in the titles of Alternatives 3 and 4, as described in the PRAP, is misleading. They do not believe that the natural clay layer beneath the Site can be relied upon to act as an effective containment mechanism to prevent DNAPLs from migrating vertically into deeper drinking water aquifers and that to truly be considered containment, these alternatives would have to include the installation of a RCRA-type liner as well as a cap.

With the current political climate of reducing government spending, the commenters' fear is that EPA may select thermal desorption as the remedy for the Site, but that at some time in the future the selected remedy might be changed to Alternative 3 or 4. This is because, in the commenter's opinion, the PRAP is written in such a way that these alternatives appear as protective of human health and the environment as thermal desorption, but are estimated to be significantly less expensive to implement.

EPA Response: It is EPA's position that the clay layer beneath the Site is an effective containment mechanism based on data collected from several investigations conducted in the last several years and on basic principles of DNAPL movement in the subsurface. Data collected from numerous soil borings installed throughout the Site indicates that the blue clay layer, which ranges from 19 to 23 feet thick, is continuous in the area of the Site and that it will effectively act as a containment mechanism to prevent vertical movement of contaminants in the ground water. The nature of the particular DNAPL material that is present at this Site, creosote, is such that in order to provide enough pressure to drive the DNAPL into the small capillary pores of the clay, much larger volumes of DNAPL would be required in the subsurface than have been found in several wells within the containment area. The vertical permeability of the clay has been determined to be very low, in the range of 10-7 to 10-8 cm/sec. Additionally, data collected from four wells screened in the sand unit beneath the clay have indicated that contaminants have not migrated through the clay. Based on ground water flow direction in that sand unit, the deep wells are located in the proper positions to detect contaminants if they were present. Data collected from these wells has not shown this to be the case. See EPA Response to Comment 12, below, for further details on data results from these wells.

Alternatives 3 and 4 do not call for the creation or operation of a landfill. They simply call for the closure of an existing hazardous waste landfill, including the consolidation of hazardous wastes within an area of contamination. Therefore, EPA's RCRA interim status closure requirements would apply, but not the minimum technology requirements ("MTRs") promulgated pursuant to the Hazardous and Solid Waste Amendments of 1984 ("HSWA") (RCRA § 3004(o)) to which the commenter is apparently referring. (MTRs apply to new landfills and replacement of or lateral expansions of existing landfills.) The state of Maryland also interprets its landfill closure regulations so that retrofitting the facility with new liners and leachate collection systems would not be required. However, the ground water monitoring program would be used to monitor potential releases from the unit. Both Alternatives 3 and 4 would meet EPA's and MDE's closure and post-closure requirements.

With regard to some outside force changing the remedy for a Site from what has been selected in a ROD, EPA

believes that this is unlikely to happen. Moreover, this scenario is not consistent with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") with respect to remedy selection. However, if such a situation did arise, it is unlikely that a decision would be made solely based on the titles of the alternatives presented in the ROD without reading the descriptions of the alternatives. The descriptions and the comparative analysis of alternatives provide a thorough explanation of the components of each alternative and an evaluation of the strengths and weaknesses of each. This includes the position that EPA finds the Capping and Containment alternatives to be protective but that, relative to thermal desorption, they are considered less protective and less desirable remedies for this Site. To make this distinction more clear, the text of the ROD has been modified somewhat from that which was found in the PRAP (See Section 9.0 of the ROD).

Comment 2: One commenter stated that the comparative analysis of alternatives in the PRAP did not clearly state that Alternatives 3 and 4 provide less protection than EPA's preferred alternative. One commenter expressed the opinion that the cost evaluation in the comparative analysis of alternatives should more clearly state that although Alternatives 3 and 4 are less expensive than Alternative 7, they don't provide the same level of protection. Another commenter suggested that the evaluation of the balancing criteria of long-term effectiveness and permanence and reduction of toxicity could more clearly show that Alternative 7 is the better choice despite the lower cost of Alternatives 3 and 4.

EPA Response: In Section 9.1 of the ROD, a statement has been added to the evaluation of overall protection of human health and the environment criterion to make it more clear that Alternatives 3 and 4 are considered comparatively less protective than Alternatives 5-7 because contaminated media would remain onsite and because they rely on institutional controls, in part, to provide protectiveness. The cost evaluation in Section 9.7 of the ROD has also been revised accordingly.

In the evaluation of the long-term effectiveness and permanence criterion in Section 9.3 of the ROD, the discussion clearly states that Alternatives 3 and 4 afford a comparatively lesser degree of long-term effectiveness than Alternatives 5 through 7 because they leave contaminated media onsite and rely on capping, subsurface barriers and institutional controls to prevent future exposure rather than removing or treating contaminated media.

Section 9.4 of the ROD, which evaluates the criterion of reduction of toxicity, mobility, or volume of contamination through treatment clearly states that Alternatives 3 and 4 include essentially no treatment of contaminated media compared to Alternatives 5 through 9.

Comment 3: One commenter expressed the opinion that DNAPLs at SMWT could have moved through the clay layer and that EPA has provided no detailed written analysis that could be peer reviewed to defend the position that the DNAPL has not and could not move through the clay layer.

EP& Response: Both EPA and MDE believe that the clay layer underlying the containment area prevents the vertical migration of the creosote DNAPL present at the SMWT site. This conclusion is supported by the following data collected in numerous Site investigations and documented in the Administrative Record file for the Site: (1) the lateral extent and thickness of the clay layer as evidenced by numerous soil borings conducted onsite; (2) the physical characteristics of the clay (e.g., very low vertical permeability of 10-7 to 10-8 cm/sec; (3) the depths of the DNAPL measured in the containment area (1 to 3 feet); (4) chemical and physical characteristics of the creosote DNAPL (e.g., specific gravity, chemical composition; and (5) basic principles governing downward DNAPL migration and capillary pressures (See DNAPL Site Evaluation, Robert M. Cohen and James W. Mercer, 1993, for a more detailed discussion).

To monitor whether site-related contaminants have migrated through the clay layer, EPA has installed four monitoring wells in the sand unit just below the clay layer. Based on data collected from these deep wells (see EPA Response to Comment 12, below, for a further discussion of data), EPA has determined that contaminants have not penetrated the clay. Quarterly monitoring of these wells is ongoing.

Comment 4: One commenter asked why EPA has established separate cleanup levels for soils and sediments.

EPA Response: The subsurface soil cleanup levels were developed for protection of human health from exposure

to ground water. The sediment cleanup levels were developed for the protection of aquatic life in the stream.

Comment 5: One commenter asked why the PRAP stated that the sediments "may" require remediation.

EP& Response: The ROD clearly states that sediments in the pond and tributaries with contamination above the established cleanup levels will be dredged and treated.

Comment 6: One commenter asked whether silt control measures will be implemented during excavation of the sediments.

EPA Response: State of Maryland erosion and sediment control regulations found in COMAR 26.09.01.04-.07 and .11 are listed as ARARs in Table 18 of the ROD. These regulations require preparation of an erosion and sediment control plan for activities involving such things as excavation and establish erosion and sediment control criteria. These regulations will be complied with during implementation of the remedial action.

Comment 7: Commenters asked why there are no ARARs associated with the no action alternative and asked whether it is possible for EPA to leave the Site as it currently exists if no further remedial action were taken to address contaminated media. Since EPA has already taken some actions at the Site, such as installing the sheet pile wall and installing monitoring wells, one commenter asked if EPA would have to perform such tasks as abandoning the wells and removing the sheet pile wall and consequently comply with any ARARs associated with these actions, even if a no-action remedy were selected. Another commenter asked why chemical-specific ARARs relating to ground water would be associated with Alternative 2 but not with Alternative 1 when the alternatives are so similar.

EPA Response: Section 300.430 (e) (6) of the NCP states that at every site "the no-action alternative, which may be no further action if some removal or remedial action has already occurred at the site, shall be developed" in the feasibility study along with other alternatives that include taking some remedial action. In this case, since several actions have already been taken at the Site, Alternative 1 should more correctly be titled No Further Action. This alternative is developed as a baseline to compare with the other alternatives developed in the feasibility study. According to the document "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," EPA/540/G-89/004, actions to reduce the potential for exposure (e.g., site fencing, institutional controls) are not to be included in this alternative, but monitoring may be included. Monitoring, the only component of the No Further Action alternative for thisSite, is not a remedial action (i.e., an action to reduce the potential for exposure). According to CERCLA §121(d) (2), ARARs have to be complied with only if a remedial action is selected for the Site. Since no selected remedial action is associated with the no action, or no further action alternative, there are no ARARs with which to comply.

If EPA selected no further action for this Site, any activities conducted onsite (e.g., monitoring well abandonment, dismantling of the water treatment system, or removal of the sheet pile wall) would be performed as closeout activities pursuant to previous decision documents or removal actions, not pursuant to the new ROD. Therefore, no ARARs would be associated with the no further action alternative because no new remedial actions would be conducted.

Because Alternative 2 includes no actions to remediate ground water, MCLs or other risk-based chemical specific ARARs related to ground water should not have been identified in the PRAP.

This correction has been included in the ROD in Section 8.0, Description of Alternatives and in the evaluation of compliance with ARARs in the comparative analysis of alternatives in Section 9.2 of the ROD. The PRAP stated that since Alternative 2 did not meet the threshold criterion of compliance with ARARs, it would not be evaluated further in the comparative analysis of alternatives. This statement has been removed. Further, in the evaluation of overall protection of human health and the environment (Section 9.1 of the ROD) Alternative 2 is now described as being not protective and is not evaluated further in the comparative analysis of alternatives for this reason.

Comment 8: One commenter questioned why no contingency is built into the remedy that would require a ground water remedial action should the monitoring show unacceptable concentrations of contaminants in the ground

water.

EPA Response: Section 11.0 of the ROD, Ground Water Contingency, includes provisions for further measures to be taken should the post-remedial ground water monitoring data show that contaminants remain at unacceptable levels in the ground water. Such measures might include modification of cleanup levels or institutional controls, ARARs waivers, and/or evaluation of remedial technologies for ground water restoration. The decision to invoke any or all of these measures may be made by EPA, in consultation with MDE, at any time, including during policy reviews of the remedial action which will be conducted at least every five years from completion of construction of the remedial action. Any such changes to the remedy described in the ROD will be made in accordance with procedures required by CERCLA and the NCP.

Comment 9: One commenter referred to the section in the PRAP on the nature and extent of contamination in surface water and sediment and asked for further explanation of the phrase "very little contamination is flowing from the pond via surface water due to the underflow dam installed during the most recent removal action". More specifically, the commenter asked what is meant by "very little", and on what data this determination was based.

EPA Response: The most recent surface water sample collected from the west tributary just outside the sheet pile wall in September 1994, contained only 0.011 ppm volatile organic contaminants. No semivolatile contaminants, which include the PAHs, were detected. These concentrations are very low relative to contaminant concentrations found in the ground water and surface water of the pond within the sheet pile wall. Contaminant concentrations in the upper reaches of the onsite pond are relatively high (> i ppm PAHs) and in the ground water are as high as 31 ppm PAHs.

Comment 10: One commenter asked why the water treatment system constructed during the 1994-95 removal action could not be operated even though final testing results had not been received which would determine whether the treated water meets the required discharge standards established by the State of Maryland.

EPA Response: In accordance with the NCP §300.415(h)(i), removal actions at Superfund sites are required to comply with ARARs to the maximum extent practicable given the exigencies of the situation. In order to discharge treated water to the west tributary, the treated water must be in compliance with the effluent limitations established by the state of Maryland pursuant to the Clean Water Act National Pollutant Discharge Elimination System (NPDES). At the time of the public meeting on March 30, 1995, EPA had not yet received the data which would prove that the treated water met these limitations; therefore, the water treatment system could not be operated. That data has since been reviewed and approved by the State and the system has commenced operation.

Comment 11: One commenter referred to the section in the PRAP on the nature and extent of contamination in several deep monitoring wells and asked if the statement "sampling events conducted during 1994-95 indicate that four monitoring wells outside of the sheet pile wall and screened in the sand unit just below the clay layer are free of site-related contamination" meant that contaminants were found in the wells but were not site-related or that no contaminants were found.

EPA Response: See response to comment 12, below.

Comment 12: Two commenters suggested when discussing the wells screened below the clay layer that language should be included in the ROD to indicate that contamination had been found in these wells during one of the quarterly rounds of ground water sampling, though subsequent sampling results show no contamination.

EPA Response: Section 5.2.2 of the ROD states that contamination (PAHs and phthalates) was found in the deep wells during the March 1994 sampling event but that this may be due to cross-contamination of the samples from airborne contamination resulting from excavation activities conducted onsite simultaneously with that sampling event. In all subsequent sampling events, no site-related contaminants have been detected. Only one phthalate compound, which is not site-related, has been detected. This compound, di-n-butylphthalate, is often introduced during sampling and laboratory analysis because it is a component of plastics and detergents.

Comment 13: One commenter asked whether EPA has identified the Site, including the area outside of the sheet pile wall, as an Area of Contamination (AOC) as this would affect the determination of ARARs for Alternative 4 where contaminated soil would be excavated and placed within the sheet pile wall.

EPA Response: The Preamble to the NCP 40 CFR Part 300 (Federal Register Vol. 55, No.46, pp. 8758-8760, March 8, 1990) equates an Area of Contamination (AOC), consisting of continuous contamination of varying amounts and types at a CERCLA site, to a single RCRA land disposal unit, and states that movement within a unit does not constitute placement. Without placement, RCRA land disposal restrictions (LDRs) would not apply. As stated in Section 8.0 of the ROD, EPA has designated the Site as an AOC. Therefore, any movement or consolidation of materials conducted onsite pursuant to these alternatives would not trigger these RCRA regulations and, as a result, they were not identified as ARARs for such activities.

comment 14: One commenter referred to the PRAP discussion of ARARs for Alternative 7, thermal desorption, and asked for an explanation of the statement "The operation of the thermal desorption unit would be in compliance with RCRA regulations for owners and operators of hazardous waste treatment, storage and disposal facilities, specifically those associated with operation of a thermal treatment device other than an enclosed type that uses controlled flame combustion."

EPA Response: For clarity, the ROD includes revised text which states that the operation of the thermal desorption unit will be in compliance with regulations that apply to thermal treatment units that are defined as miscellaneous units (COMAR 26.13.05.16-1 and 40 CFR Subpart X, §264.600-.603).

Comment 15: One commenter referred to the process of delisting wastes and asked for an explanation of the process EPA used to determine which contaminants would be included in the delisting and the process EPA used to establish the delisting levels (i.e., the concentrations of contaminants which will have to be met through the treatment process).

EPA Response: A March 21, 1995, memorandum from David M. Friedman, EPA RCRA Program, to Stephanie Dehnhard, EPA Remedial Project Manager, which was added to the Administrative Record file for the Site during the public comment period, documents EPA's process for determining the contaminants which will be delisted and their corresponding delisting levels. A copy of this memorandum was also submitted to the commenter during the public comment period.

Comment 16: One commenter asked if land use restrictions are included in any of the alternatives and whether they will be imposed on the Site following completion of the selected remedy.

EPA Response: In the description of alternatives in the ROD, land use restrictions are included in Alternative 2 to preclude access to the Site, and in Alternatives 3 and 4 to protect the integrity of the cap. Alternative 5 does not include land use restrictions since all wastes would be removed from the Site. Alternatives 6 through 9 do not include permanent land use restrictions since these alternatives include remediation of contaminated media. However, temporary land use restrictions would be imposed to prohibit ground water use until it was demonstrated that MCLS or other risk-based chemical specific ARARs had been achieved. The cleanup levels are based on protection of human health and the environment; therefore, no permanent land use restrictions would be needed. Provided the cleanup levels are achieved through implementation of the selected remedy (Alternative 7), no permanent land use restrictions will be necessary.

Comment 17: One commenter pointed out that the PRAP states that the Hazard Index ("HI") associated with ground water that was predicted in the post-remedial risk assessment for Alternatives 6 and 7, is slightly above 1 based on a subsurface soil cleanup level of 1 ppm benzo(a) pyrene ("BAP") equivalents. The commenter questioned why EPA would not excavate and treat this soil since the risk is above the HI of 1, the threshold above which EPA would normally take an action. Another commenter pointed out that the HI was actually 2.4, which in his opinion was more than slightly above 1.

EPA Response: The Hazard Index of 2.4 is the predicted risk from exposure to ground water that might result from soil containing concentrations at the established subsurface cleanup level, not from soil exposure. The Hazard Indices associated with exposure to soil with concentrations of contaminants at the established

cleanup levels were well below 1 for all alternatives.

When developing the cleanup levels for the Site and performing the post-remediation risk assessment, EPA evaluated the concentrations of contaminants in the Site soil that could reasonably be expected to be achieved by the technologies evaluated in the FFS. EPA then used a model, the Multimed model, to predict the ground water concentrations that would result from the predicted soil concentrations. The risk assessment then used those concentrations to predict the risk associated with exposure to ground water.

The HI of 2.4 is actually associated with exposure to the highest ground water concentrations that could conceivably result from untreated soil left in the ground beyond the edge of the excavation area, an amount that is expected to be a minimal volume of soil. EPA expects that the thermal desorption process which will treat the much larger volume of excavated soil will reduce the non-carcinogenic contaminant concentrations below the predicted levels because these compounds are relatively volatile and easily removed by thermal treatment. lower soil concentrations would then translate into lower ground water concentrations based on the reduction in constituents leaching into the ground water from the soil. This, in turn, leads to lower risk associated with ground water exposure.

EPA has discretion in determining when it is appropriate to take remedial action at a site. Generally, the threshold for non-carcinogenic risk is a Hazard Index above 1. In this case, though the ground water HI was greater than 1, EPA determined that it was not necessary to lower the subsurface soil cleanup level for the following reasons: (1) the ground water concentrations are predicted values based on a very conservative model, not on actual data which will not be available until after the soil is remediated and the ground water is sampled and analyzed; (2) the thermal desorption treatment process is expected to reduce non-carcinogenic contaminants in the soil well below those predicted in the model, thus, reducing ground water concentrations and associated risk: and (3) the difference between a HI of 1 and HI of 2.4 is actually very small because the reference dose for a non-carcinogen can incorporate several orders of magnitude of safety. The reference dose is the concentration of a chemical that is considered a safe dose. To calculate risk, the assumed dose is compared with the reference dose.

Finally, the selected remedy includes ground water monitoring following the soil remediation and institutional controls temporarily restricting the use of ground water from the shallow aquifer until EPA, in consultation with MDE, determines that MCLs or other risk-based chemical specific ARARs are achieved. As discussed in EPA's response to Comment 8, above, the selected remedy also provides a contingency for further ground water evaluation and/or remedial action if necessary. Any necessary changes to the remedy described in the ROD will be made in accordance with procedures required by CERCLA and the NCP.

Comment 18: One commenter asked if EPA had established a soil cleanup number for non-carcinogenic contaminants and stated that at most wood treating sites, cleanup standards are established for total PARs which would include the non-carcinogenic PAHs.

EPA Response: EPA has not established soil cleanup levels for non-carcinogenic PARs for the SMWT site. The cleanup levels are based on carcinogenic PAHs because these contaminants contribute the greatest amount of risk from exposure to Site media and are the most difficult to treat. The cleanup levels are expressed in terms of benzo(a)pyrene (BAP) equivalents because BAP is among the most toxic of the carcinogenic PAHs. EPA believes that if the cleanup levels are achieved for the carcinogenic PAHs, then the non-carcinogenic contaminants will be present at levels that are also protective of human health and the environment.

Comment 19: One commenter expressed the opinion that the carcinogenic risk associated with ground water for Alternative 7, as predicted in the post-remedial risk assessment (9 x 10-5), is a high residual risk. The commenter questioned whether EPA's established cleanup levels are adequate and suggested that perhaps the Site should be capped following remediation to prevent water infiltration and leaching of residual soil contamination into the ground water.

EPA Response: The predicted post-remedial carcinogenic risk of 9 x 10-5 for ground water in Alternative 7, the selected remedy, is within the acceptable risk range of 10-6 to 10-4 as established in the NCP §300.430(e) (2) (i) (A) (2). Thus, the established subsurface cleanup level is adequate and capping is not

necessary. As stated in EPA's response to Comment 17, the modeling performed to predict ground water concentrations is extremely conservative. Actual ground water concentrations and associated risks are likely to be lower than predicted. Ground water monitoring following remediation of soils is included in the selected remedy.

Comment 20: One commenter expressed the opinion that the evaluation of costs is not adequate because Alternative 4 does not include the costs associated with the impact of land disposal restrictions ("LDRs") or with the installation of a liner and a leachate collection system. The commenter suggested that the ARARs associated with this alternative need to be revised and that the associated costs should be included in the cost evaluation.

RPA Response: As stated in EPA's responses to Comments 1, 2 and 13, above, RCRA LDRs are not ARARs for Alternative 4, nor are the RCRA liner and leachate collection system regulations. The cost estimate in the FFS and cost evaluation in the comparative analysis are therefore accurate.

B. Written Comments Received Before the Public Comment Period

On December 1, 1994, EPA attended a meeting held by the St. Mary's County Task Force. The purpose of the meeting was to discuss the EPA's Draft Focused Feasibility Study that had been released for public review on November 14, 1994. At that meeting, when asked by the Task Force which remedial alternative EPA believed to be the most appropriate for the Site at that time, EPA representatives in attendance stated unofficially that Alternative 7, thermal desorption, appeared to be the best choice and that the forthcoming PRAP would likely include that as EPA's preferred alternative. Subsequently, EPA received correspondence from the St. Mary's County Commissioners and the EAC in response to the possibility that thermal desorption would in fact be EPA's preferred remedy. These comments were received before the PRAP was issued and the public comment period opened.

Comment 1: The EAC expressed strong opposition to the capping alternatives (Alternatives 3 and 4). The Task Force commented that the titles of these alternatives should not include the word "containment" because they do not provide a true containment mechanism but rely on the natural clay layer to contain contaminants.

EPA Response: EPA did not choose either of the capping alternatives as the selected remedy for the Site. EPA's position on the integrity of the clay layer beneath the Site, its ability to act as a containment mechanism, and the protectiveness of these alternatives is discussed in the response to Comment 1 of Section A of this Responsiveness Summary.

Comment 2: Both the Commissioners and the EAC endorsed the thermal desorption alternative dependent on the following factors: (1) that the system be "closed loop" and indirectly fired; and (2) that the potential for emissions containing vaporized heavy metals and products of incomplete combustion ("PICs") escaping from the system must be adequately addressed. The EAC expressed a particular concern with the presence of mercury in the soil.

EPA Response: In the ROD, EPA has chosen Alternative 7, thermal desorption, as the selected remedy for the Site. The ROD includes general performance standards and ARARs which will be complied with during the implementation of the remedial design and remedial action. During the remedial design, EPA will determine more detailed specifications for the design of the thermal desorption unit that will be used at the Site to meet those performance standards. Throughout this phase, EPA will continue to work closely with the community to ensure that community concerns, such as those mentioned above, are factored into the design of the remedy as appropriate.

Comment 3: The EAC and the Commissioners expressed disappointment with the quality of work that went into creating the FFS, especially the bioremediation treatability study. The EAC also expressed a concern with the DNAPL characterization.

EPA Response: EPA conducted the FFS and presented the FFS report in accordance with EPA guidance relating to the RI/FS process. Several draft versions of the FFS report were released for public review and comment.

Revisions to the document incorporated changes in accordance with public comments as EPA deemed appropriate.

EPA believes the bioremediation treatability study performed during the FFS provided useful information with regard to the implementation of bioremediation at the Southern Maryland Wood Treating Site. However, the results of that study, combined with other available information on bioremediation, did not demonstrate that this technology was the best alternative for remediation at this Site. Therefore, bioremediation was not chosen as the selected remedy for this Site.

As explained in EPA's response to Comment 1 in Section A of this Responsiveness Summary, EPA believes that the clay layer and DNAPL movement through it, have been adequately characterized in the numerous studies conducted at the Site. Available information allowed EPA to determine that contamination has not penetrated the clay layer and to evaluate the alternatives in the FFS against all evaluation criteria.

Comment 4: The EAC commended EPA and MDE for their efforts to improve community involvement during the FFS.

EPA Response: As explained in Section 2.0, above, EPA made every effort to keep the community informed of activities related to the Site and to take community input into consideration during the decision-making process. EPA will continue to work with the community throughout the remedial design and remedial action phases of the cleanup. Following issuance of the ROD, the Community Involvement Plan will be revised as appropriate to determine the best way to maintain communication between EPA and the community.

Comment 5: The EAC and the Task Force stated that contaminated soil should be remediated adequately to preclude the State from being required to perform and pay for any related long-term operation and maintenance.

EPA Response: In the ROD, EPA has established delisting levels for Site contaminants (see Section 8.0 of the ROD). Following treatment by thermal desorption, if the concentrations of contaminants in the soil have met these levels, the soil can be placed back onsite from where it was excavated. No long-term O&M will be required for the backfilled treated soil.

Comment 6: The Commissioners stated that the Site must be left in a condition that will allow it to be used productively following remediation (i.e., the cleanup levels must be adequate to protect human health and the environment).

EPA Response: The cleanup levels established in the ROD are based on protection of human health and the environment.

Provided these levels are achieved through implementation of the selected remedy, no permanent land use restrictions will be required. The remedy includes temporary institutional controls to restrict ground water use in the shallow aquifer onsite following soil remediation until EPA determines that the ground water is safe to drink (i.e., until MCLs or other risk-based levels have been achieved).

C. Written Comments Received During the Public Comment Period

The only written comments received during the public comment period were submitted by the Maryland Department of the Environment.

Comment 1: Because the selected remedy is a source treatment that does not directly address the issue of ground water contamination, MDE will agree to monitor the ground water for a maximum of five years. If, after five years, ground water contamination exceeds the MCLs or other risk-based chemical-specific ARARs, MDE believes EPA should review the selected remedy and take appropriate actions to address ground water contamination.

EPA Response: While it is true that the selected remedy does not specifically provide for treatment of contaminated ground waterin order to achieve cleanup levels, EPA believes that the removal and treatment of contaminated soils, sediments and NAPLs will result in the reduction of contaminant concentrations in the

ground water.

The selected remedy includes provisions for a ground water monitoring program following soils and sediment remediation. Also included is a provision for institutional controls to restrict ground water use in the shallow aquifer onsite until EPA, in consultation with MDE, determines that the water is safe to drink. While EPA believes that the treatment of the contaminated soils and sediment will result in the reduction of contaminant concentrations in the ground water, it is difficult to predict exactly when the concentrations will be reduced to acceptable levels across the Site. Thus, the ROD does not specify an exact time at which ground water monitoring will cease.

To address the possibility that ground water may remain contaminated for a long or indefinite period of time following the remedial action, Section 11.0 of the ROD provides a ground water contingency. This provision will allow EPA to evaluate ground water data on a continuing basis, but not less often than every five years after the completion of construction of the remedial action, and to take any of the following measures: (1) modify cleanup levels or waive ARARs; (2) modify or maintain institutional controls to restrict access to those portions of the aquifer where contamination is above safe levels; and (3) evaluate remedial technologies for ground water remediation. Any such changes to the remedy described in the ROD will be made in accordance with procedures required by CERCLA and the NCP, and in consultation with MDE.

EPA is required by CERCLA to review remedial actions not less often than every five years for as long as hazardous substances remain on site and prevent unlimited use and unrestricted exposure at the site. While EPA intends to conduct these reviews, it does not believe that it is appropriate at this time to limit the period of ground water monitoring to five years; since, as noted above, there are a variety of measures that EPA may select based on the information evaluated during these five year reviews.

Comment 2: The Proposed Plan states that the volume of soil to be excavated is approximately 78,000 CY. MDE points out that it is more accurate to say that the volume of soil to be excavated and treated is 97,000 CY due to swelling during excavation.

EPA Response: This issue has been addressed in Section 5.3 of the ROD where it is explained that approximately 78,000 CY of soil and sediment will be excavated and that when a swell factor of 1.25 is applied, this volume increases to 97,000 CY of media to be treated following excavation.

Comment 3: The ROD should indicate that all NAPL and grossly contaminated soil collected during excavation will be shipped offsite for treatment and disposal.

EPA Response: Sections 8 through 10 of the ROD discuss the fact that all NAPL and grossly contaminated soil collected during excavation that is not amenable to treatment by thermal desorption will be shipped offsite for treatment and disposal.

Comment 4: To be more complete when discussing the analytical results for surface water and sediment samples, it may be helpful to include the date that the samples were collected, as well as including data results from the background sample collected from the east tributary.

EPA Response: The Proposed Plan included a brief summary of Site characteristics. Section 5 of the ROD provides a more lengthy discussion of Site characteristics to provide the reader with a summary of the data that has been collected to date, though it does not include every detail of all the studies that have been conducted in the last several years. Further details and all relevant documents containing Site characterization information are available for public review in the Administrative Record file.

Comment 5: It is indicated in the Delisting of RCRA Hazardous Wastes section of the Proposed Plan that pursuant to "40 C.F.R. Section 260.22, that if, after treatment, concentrations of hazardous constituents are below the delisting levels as set forth in Table 2, the soil can be delisted." Please change this sentence to read "after treatment, concentrations of hazardous constituents are below the delisting levels as set forth in Table 2, the soil can be backfilled onsite". As stated in paragraph one, MDE and EPA do not view the soil as a hazardous waste due to the presence of the listed constituent. After treatment has been completed, the amount of listed constituent remaining in the soil will have been reduced to the point that it

may be administratively delisted by the EPA. Once the delisting process is completed the soil media, which was never considered to be a solid waste and was only being "managed as a hazardous waste due to a listed constituent", may be reused onsite.

EPA Response: Section 8 of the ROD discusses delisting of RCRA hazardous wastes and states that the hazardous wastes in the soil, not the soil itself, will be dellsted. EPA agrees that the soil is not a hazardous waste but must be managed as such because it is contaminated with RCRA hazardous wastes.

Comment 6: When discussing Alternatives 8 and 9 please explain more thoroughly how contaminants "may become more strongly bonded to the soil particles", reducing the chance of them leaching into the ground water.

EPA Response: The referenced statement has not been included in the ROD.

<IMG SRC 0395197K>

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway ! Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

September 5, 1995

Mr. Thomas Voltaggio, Director
Waste Management Division
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia PA 19107

Re: Record of Decision Southern Maryland Wood Treating Site,
Hollywood, St. Mary's County, MD

Dear Mr. Voltaggio:

The Maryland Department of the Environment (MDE) has worked with the U.S. Environmental Protection Agency (SPA) and the St. Mary's County community on the Southern Maryland Wood Treating site for a number of years. MDE feels that remedial action at the site is long overdue.

MDE has reviewed the Proposed Remedial Action Plan (PRAP), and the Draft/Final Record of Decision (ROD), August 1995, which MDE received on August 29, 1995. Based on the review of the Draft/Final ROD, MDE believes the Site can be remediated in an expeditious and cost effective manner if the remediation plan outlined in the Draft/Final ROD is implemented. Consequently, MDE supports the SPA decision to sign the ROD. The State will make every effort to fund its proportionate cost share for this remedial action, providing the cost associated with implementing the remedy does not significantly escalate during the Remedial Design (RD) Phase.

We look forward to cooperatively implementing the RD and subsequent Remedial Action at this site. If you have any questions

Mr. Thomas Voltaggio, Director

regarding this matter, please contact me at (410) 631-3304, or have your staff contact Mr. Robert A. DeMarco, Administrator of the Environmental Restoration and Redevelopment Program at (410) 631-3437.

Sincerely,

<IMG SRC 0395197L>

Richard W. Collins, Director
Waste Management Administration

RWC:sg

cc: Mr. Stephanie Dehnhard, U.S. EPA
Mr. Peter Ludzia, U.S. EPA
Mr. Robert A. DeMarco
Ms. Hilary Miller
Ms. Michele Mosco-Lascuola