Introduction
This Proposed Remedial Action Plan (Proposed Plan) has been prepared by the U.S. Environmental Protection Agency (EPA) to provide the public with the opportunity to review and comment upon alternatives for remediation of wastes and contaminated ground water and soils at the Woodlawn Landfill Superfund site. It contains a brief comparative evaluation of each remedial alternative considered by EPA.

EPA’s preferred alternative includes the following components: capping; pumping and treatment of contaminated ground water to restore ground water quality and reduce further migration of the contaminant plume; deed and ground water use restrictions; ground water, stream, and landfill gas monitoring; and perimeter fencing.

EPA, which is the lead agency for site activities, will select a final remedial alternative for the Woodlawn Landfill Superfund site in consultation with the Maryland Department of the Environment (MDE), the support agency for this response action, only after the public comment period has ended and the information submitted during this period has been reviewed and considered. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9617(a).

This document summarizes information that can be found in greater detail in the Remedial Investigation and Feasibility Study (RI/FS) reports and other documents contained in the Administrative Record file for this site. EPA and MDE encourage the public to review these documents in order to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted there. The Administrative Record file, which contains the information upon which the selection of the response action will be based, is available at the following locations:

Elkton Public Library
301 Newark Avenue
Elkton, MD 21903
(410) 996-5600
Hours:
Monday–Thursday, 9:00 a.m.–9:00 p.m.
Friday–Saturday, 9:00 a.m.–5:00 p.m.

Perryville Public Library
515 Broad Street
Perryville, MD 21903
(410) 996-6050
Hours:
Monday–Wednesday, 9:30 a.m.–5:00 p.m.
Thursday, 12:30 p.m.–8:00 p.m.
Saturday, 9:30 a.m.–5:00 p.m.

U.S. EPA Region III
Ms. Anna Butch
9th Floor Docket Room
841 Chestnut Building
Philadelphia, PA 19107
(215) 597-3037
Hours:
Monday–Friday, 8:30 a.m.–4:30 p.m.
Based upon the comments received by EPA on each of the alternatives described below, or any new information that may be collected, EPA, in consultation with MDE, may modify the preferred alternative or select an entirely different response action. All comments received within the comment period will be considered and addressed by EPA.

A glossary explaining terms that may be unfamiliar to the general public is provided on pages 19 through 21 of this Proposed Plan. Glossary terms are noted by bold print the first time they appear in the text.

**Site Description and Background**

The Woodlawn Landfill site is located in a rural and residential area approximately one mile north of the intersection of Routes 275 and 276 in northwestern Cecil County, Maryland. The Woodlawn Transfer Station, which began operations in June 1978, is located in the northeast corner of the site near the intersection of Firetower Road and Waibel Road. The Transfer Station accepts and compacts municipal and commercial wastes which are later hauled to the County’s Hog Hill Landfill for disposal. Liquid wastes derived from the compacted trash were discharged to the Transfer Station septic system until May 1990, when these wastes were rerouted to an onsite holding tank. Liquids in the holding tank are periodically taken to the Northeast River Advanced Wastewater Treatment Plant in Charlestown, Maryland.

The 38-acre site property was a privately owned sand and gravel quarry before 1960, when it was purchased by Cecil County. The County owned and operated a municipal landfill at the site from 1960 until June 1978, when the landfill was closed to municipal waste under order from the State of Maryland Department of Health and Mental Hygiene (MDHMH), the predecessor agency to MDE. The landfill was open 24 hours a day without supervision until 1973, when the County hired contractors to operate the facility. From 1960 to 1978, and possibly prior to the County’s acquisition of the property, agricultural, municipal, and industrial wastes were disposed of and sometimes burned at the site. Some of the wastes contained hazardous constituents or may have released hazardous substances upon combustion.

State records pertaining to the site document the disposal of polyvinyl chloride (PVC) sludge by the Firestone Tire & Rubber Company (Firestone). The PVC sludge, which contained residual vinyl chloride, was initially disposed of throughout the landfill. Between March 1978 and early 1981, three designated areas, Cells A, B and C, were used for disposal of the sludge. Since sludge disposal Cell C overlies Cell B, the unit will be referred to in this Proposed Plan as Cell B/C where appropriate. The approximate locations of Cells A and B/C are shown in the map on page 3.

On October 17, 1978, MDHMH issued an Industrial Waste Disposal Permit to Firestone authorizing the disposal of PVC sludge at the Woodlawn Landfill site. The State’s renewal of the permit on July 16, 1980, was conditioned upon Firestone’s agreement to adhere to specific waste disposal practices, document and report its waste disposal activities at the site, implement a ground water monitoring program at the site, and provide a final clay and soil cover over PVC sludge disposal Cell C. In September 1980, Firestone installed three ground water monitoring wells to monitor releases from sludge disposal Cell B/C. Cell C was covered with eight inches of clay and two-and-a-half feet of soil early in 1981.

In the summer of 1981, the State found contaminants including vinyl chloride, benzene, and toluene in ground water samples collected from the monitoring wells located downgradient of Cell B/C. On December 10, 1981, MDHMH issued a Complaint and Order requiring Firestone to assess the nature and extent of ground water contamination beneath the sludge disposal cells. In January of 1982, Firestone installed seven additional monitoring wells in the vicinity of Cells A and B/C in order to define the ground water flow regime and the extent of ground water contamination.
MDMH also ordered the County to install monitoring wells along the perimeter of the former landfill in order to assess hydrogeologic conditions at the site and ground water degradation resulting from the disposal of wastes at the landfill. The County installed five monitoring wells on the landfill property in March 1982. The State installed an additional six wells in June 1982. Analyses of well water samples revealed the presence of acetone, benzene, methanol, methylene chloride, toluene, vinyl chloride, and other organic compounds in ground water beneath the landfill property.

In May of 1984, EPA conducted an inspection of the Woodlawn Landfill site. EPA proposed the site for inclusion on the National Priorities List (NPL) on January 22, 1987, and placed it on the NPL on July 1, 1987. On December 28, 1988, EPA and two of the Potentially Responsible Parties (PRPs), the Firestone Tire & Rubber Company and Cecil County, entered into an Administrative Order on Consent whereby the PRPs agreed to perform a Remedial Investigation and Feasibility Study with EPA oversight.

The purpose of the Remedial Investigation was to identify the types, quantities, and locations of contaminants at the site. During the Remedial Investigation, thirteen additional monitoring wells were installed and ground water underneath the landfill property and adjoining properties was sampled as was water from nearby residential wells. Soils, PVC sludge, leachate seeps and seep sediments, surface water, and stream sediments were also sampled. In addition, samples of PVC sludge and contaminated ground water were collected for treatability studies. Once the nature and extent of contamination were determined, potential cleanup options were developed and evaluated in the Feasibility Study.

Three sources of site contamination were identified during the course of the Remedial Investigation: PVC sludge disposal Cell B/C, wastes disposed of in the general landfill, and waste overflow from the Transfer Station septic system. PVC sludge was not encountered in the area thought to be occupied by disposal Cell A. Therefore, it was not possible to define the boundaries of Cell A or to collect samples of Cell A waste for analysis. The following findings are based on the Remedial Investigation:

- Ground water beneath the landfill property is contaminated with chemicals at levels that exceed Maximum Contaminant Levels (MCLs) for public drinking water supplies and/or risk- and health-based concentrations (i.e., levels that pose an aggregate cancer risk in excess of 1.0 x 10^-4 or correspond to a Hazard Index greater than 1.0). The contaminants include vinyl chloride, 1,2-dichloroethane and other volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), bis(2-ethylhexyl)phthalate, pentachlorophenol, pesticides, arsenic, cadmium and manganese.

- Ground water underlying properties adjoining the landfill to the north and west is contaminated with chemicals at levels that exceed risk-based concentrations (i.e., levels that pose an aggregate cancer risk in excess of 1.0 x 10^-4). The contaminants include arsenic, vinyl chloride, and possibly beryllium. Data generated by the laboratory in which the samples were analyzed suggests that the beryllium detected in off-site ground water may be the result of laboratory contamination. Levels of arsenic detected in these samples are within the range of background levels found in ground water in Cecil County.

- Site-related contaminants were found in two residential wells. One nearby residential well is contaminated with detectable levels of vinyl chloride. A carbon adsorption unit was installed at this residence in December 1990 in order to remove vinyl chloride. No contamination has been detected in the treated well water. Water collected from another residential well was found to contain levels of manganese that exceed the Maximum Contaminant Level Goal (MCLG) and the health-based concentration.
• Whether contamination exists in other residential wells is less certain. Arsenic was found in ground water samples collected from two residential wells. However, the level of arsenic detected in these samples is within the range of background arsenic concentrations found in Cecil County ground water. Analyses of water samples collected from two residential wells indicate the presence of beryllium at levels that exceed health-based concentrations. The beryllium detected in these samples may be the result of laboratory contamination; beryllium was not detected in ground water beneath the landfill property. All of the contaminants detected in domestic well samples were, however, taken into account when evaluating human health risks associated with exposure to off-site residential ground water.

• Available data suggest that the base of the waste material at the site lies approximately ten feet or more above the water table. However, perched water may seasonally saturate areas of the fill and PVC sludge wastes.

• The PVC sludge found in the Cell B/C area is a potential continuing source of vinyl chloride contamination in ground water.

• Contaminants were found in several media at levels which exceed the criteria which EPA has determined are protective of ecological receptors at the site. Cadmium and zinc were found in on-site seep sediments; mercury was found in soils above the former drain field of the Transfer Station septic system.

• Several metals were found in downstream surface water samples collected from an unnamed tributary of Basin Run that flows across the southern tip of the site. Levels of aluminum, copper, lead, and silver were found to exceed federal ambient water quality criteria for the protection of aquatic life.

Scope and Role of Response Action
The cleanup alternatives in this Proposed Plan address the remaining sources of contamination (PVC sludge disposal cells and landfill wastes) and contaminated ground water and soils. The selected alternative will constitute the only response action for this site. The objectives of the remedial action are: (1) to prevent exposure to contaminated ground water; (2) to restore ground water to its beneficial use; (3) to prevent exposure to the landfill contents and the contents of the PVC sludge disposal cells; (4) to prevent migration of contaminants from the landfill and PVC sludge disposal cells to ground water and surface water; (5) to prevent exposure to contaminated soils; and (6) to control landfill gas to ensure protection of human health and the environment.

Summary Of Site Risks
Human health and ecological Risk Assessments were prepared as part of the Remedial Investigation to identify possible existing and future public health risks and potential environmental impacts associated with exposure to site contaminants if conditions at the site were not addressed. The Risk Assessment is used to evaluate the need for remedial action and to help determine the levels to which site contaminants must be reduced to ensure future protection of human health and the environment.

It is important to recognize that exposure to site contaminants can occur only if a complete exposure pathway exists. 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, or 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.
Current exposure pathways and potential future exposure pathways were evaluated in the Risk Assessment. The assessment of current human health risk was based on an assumption of human exposure to contaminants in off-site residential ground water, site surface soils, leachate seeps and seep sediments, and stream water and sediments. Potential future human health risks were evaluated based on hypothetical exposure to contaminated ground water immediately beneath the landfill. An additional hypothetical future-use scenario examined the potential for contaminants to leach from PVC sludge disposal Cell B/C into ground water and considered human exposure to leachate-contaminated ground water. A third hypothetical future-use scenario considered human exposure to ground water beyond the landfill property boundary that would be expected to become contaminated in the future if no response actions were undertaken.

The Risk Assessment indicates that there are no unacceptable human health risks related to exposure to site soils, landfill leachate seeps, seep sediments, or water and sediments in the stream that crosses the southern end of the site. However, unacceptable levels of human health risk are associated with exposure to contaminated ground water and to PVC sludge via exposure to leachate-contaminated ground water. Potential routes of exposure include ingestion of ground water, inhalation of indoor air containing volatilized organic compounds, and dermal absorption during showering and bathing.

Table 1 (on page 7) provides a summary of current carcinogenic and noncarcinogenic human health risks that are based on exposure to the contaminated media (ground water, surface water, leachate seeps, sediments, and soils) evaluated for this site. Table 2 (on page 8) presents a summary of future carcinogenic and noncarcinogenic human health risks associated with exposure to contaminated ground water. The following future exposure scenarios are presented in Table 2: (1) exposure to contaminants currently present in ground water beneath the landfill property, assuming a public water supply well is placed in the center of the contaminant plume (existing conditions scenario); (2) exposure to the highest levels of vinyl chloride that, with the aid of a model, were predicted to occur in ground water beneath the landfill property (on-site) and beyond the property boundary (off-site) 70 years in the future, assuming water supply wells are placed in the portions of the aquifer that are expected to be most highly contaminated at that time (modeled scenario); (3) exposure to contaminants in Cell B/C wastes, assuming they leach into ground water and a water supply well is placed in the leachate-contaminated ground water on the landfill property (leachate scenario).

Remedial action is generally warranted at a site when the calculated carcinogenic risk level exceeds 1 x 10^{-4}, or the Hazard Index for chemicals that produce noncarcinogenic effects exceeds 1.0. A carcinogenic risk level of 1 x 10^{-4} means that an individual has a one in 10,000 chance of developing cancer as a result of exposure to site-related contaminants under the specific exposure conditions at the site. The potential for noncarcinogenic health effects resulting from exposure to chemicals at a site is evaluated by comparing an estimated dose to an acceptable level. If this ratio exceeds 1.0, there is a potential health risk associated with exposure to that chemical. The ratios can be added for exposures to multiple contaminants. The sum, known as the Hazard Index, is not a mathematical prediction of the severity of toxic effects, but rather a numerical indicator of the transition from acceptable to unacceptable levels.

As shown in Tables 1 and 2, the current and future risks presented by contaminants at the site exceed both the acceptable target risk range of 1 x 10^{-4} to 1 x 10^{-6} for carcinogenic effects and the Hazard Index of 1.0 for noncarcinogenic effects. The major contributors to current carcinogenic risk at the site are beryllium, arsenic, and vinyl chloride in ground water. The future
**TABLE 1**
Summary Risk Estimates (Current Conditions) for Selected Child and Adult Receptors Across Multiple Exposure Pathways

## INCREASED LIFETIME CANCER RISK

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>Ingestion/Dermal Contact</th>
<th>Inhalation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-site Adult</td>
<td>$1.6 \times 10^{-4}$</td>
<td>$4.9 \times 10^{-7}$</td>
<td>$1.6 \times 10^{-4}$</td>
</tr>
<tr>
<td>Off-site Child</td>
<td>$1.0 \times 10^{-4}$</td>
<td>$7.5 \times 10^{-7}$</td>
<td>$1.0 \times 10^{-4}$</td>
</tr>
<tr>
<td>On-site Child</td>
<td>$3.0 \times 10^{-6}$</td>
<td>$2.4 \times 10^{-10}$</td>
<td>$3.0 \times 10^{-6}$</td>
</tr>
<tr>
<td>Child On- and Off-site</td>
<td>$1.0 \times 10^{-4}$</td>
<td>$7.5 \times 10^{-7}$</td>
<td>$1.0 \times 10^{-4}$</td>
</tr>
</tbody>
</table>

## NON-CARCINOGENIC HAZARD INDEX

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>Ingestion/Dermal Contact</th>
<th>Inhalation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-site Adult</td>
<td>0.63</td>
<td>0.25</td>
<td>0.88*</td>
</tr>
<tr>
<td>Off-site Child</td>
<td>0.74</td>
<td>0.56</td>
<td>1.3*</td>
</tr>
<tr>
<td>On-site Child</td>
<td>0.15</td>
<td>$8.8 \times 10^{-4}$</td>
<td>0.15</td>
</tr>
<tr>
<td>Child On- and Off-site</td>
<td>0.89</td>
<td>0.56</td>
<td>1.45*</td>
</tr>
</tbody>
</table>

* This Hazard Index is based on data, including reference doses, used to develop the baseline Risk Assessment which is included in the Remedial Investigation report. The oral reference dose for manganese has been revised since the Risk Assessment was prepared. The calculated value of the Hazard Index for this exposure scenario would be greater if the revised reference dose for manganese were used.
### Table 2
Summary Ground Water Risk Estimates (Future Conditions) for Selected Child and Adult Receptors

#### Increased Lifetime Cancer Risk

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>Ingestion/Dermal Contact</th>
<th>Inhalation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site Adult (Existing)</td>
<td>$5.6 \times 10^3$</td>
<td>$2.3 \times 10^{-4}$</td>
<td>$5.8 \times 10^{-3}$</td>
</tr>
<tr>
<td>On-site Adult (Modeled)</td>
<td>$1.4 \times 10^2$</td>
<td>$7.8 \times 10^{-4}$</td>
<td>$1.5 \times 10^{-2}$</td>
</tr>
<tr>
<td>Off-site Adult (Modeled)</td>
<td>$1.7 \times 10^3$</td>
<td>$9.4 \times 10^{-5}$</td>
<td>$1.8 \times 10^{-3}$</td>
</tr>
<tr>
<td>On-site Adult (Leachate)</td>
<td>$7.3 \times 10^2$</td>
<td>$5.0 \times 10^{-3}$</td>
<td>$7.8 \times 10^{-2}$</td>
</tr>
<tr>
<td>On-site Child (Leachate)</td>
<td>$4.9 \times 10^2$</td>
<td>$8.6 \times 10^{-3}$</td>
<td>$5.7 \times 10^{-2}$</td>
</tr>
</tbody>
</table>

#### Non-Carcinogenic Hazard Index

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>Ingestion/Dermal Contact</th>
<th>Inhalation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site Adult (Existing)</td>
<td>$4.8$</td>
<td>$2.1 \times 10^2$</td>
<td>$4.9^*$</td>
</tr>
<tr>
<td>On-site Child (Existing)</td>
<td>$5.7$</td>
<td>$6.4 \times 10^2$</td>
<td>$5.7^*$</td>
</tr>
<tr>
<td>On-site Adult (Leachate)</td>
<td>$0.46$</td>
<td>$2.8 \times 10^3$</td>
<td>$0.46$</td>
</tr>
<tr>
<td>On-site Child (Leachate)</td>
<td>$0.53$</td>
<td>$8.4 \times 10^3$</td>
<td>$0.53$</td>
</tr>
</tbody>
</table>

*: This Hazard Index is based on data, including reference doses, used to develop the baseline Risk Assessment which is included in the Remedial Investigation report. The oral reference dose for manganese has been revised since the Risk Assessment was prepared. The calculated value of the Hazard Index for this exposure scenario would be greater if the revised reference dose for manganese were used.
carcinogenic risk is attributable primarily to the VOCs, PAHs, and arsenic in ground water. Most of the current and future noncarcinogenic health risk is attributable to manganese, cadmium, and arsenic present in ground water.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health or welfare, or the environment.

**Remediation Objectives for Ground Water**

The Risk Assessment indicates that the carcinogenic and noncarcinogenic risks associated with exposure to contaminated ground water at the site exceed acceptable levels and therefore warrant remedial action. Ordinarily, MCLs and non-zero MCLGs would be used as remediation goals for ground water. At this site, however, since there are multiple contaminants, the cumulative carcinogenic risk associated with MCLs for those contaminants exceeds $1 \times 10^{-4}$, meaning the probability of an increase in the incidence of cancer in an exposed population is greater than one in 10,000. In addition, the Hazard Index associated with MCLs and MCLGs for site ground water contaminants is greater than 1.0, meaning that there is a potential for noncarcinogenic health effects in an exposed population. Under such circumstances, risk- or health-based levels are used to develop cleanup standards. Risk-based cleanup levels are levels that would result in a cumulative carcinogenic risk within EPA’s target risk range of $1 \times 10^{-4}$ to $1 \times 10^{-6}$; health-based cleanup levels correspond to a Hazard Index of 1.0 or less. Occasionally, calculated risk- and health-based concentrations are found to be lower than background levels, or below the levels that can actually be detected or accurately measured in the laboratory. Then these situations arise, EPA may also take background conditions, or Practical Quantitation Limits and Instrument Detection Limits into account when establishing cleanup levels.

Based on the considerations outlined above, the following remediation objectives were developed for ground water at this site:

1. RemEDIATE ground water in the area of attainment so that contaminant levels do not exceed the cleanup standards presented in Table 3 (on page 10). The area of attainment encompasses the area outside the boundary of any waste remaining in place and up to the boundary of the contaminant plume.

2. Prevent exposure to ground water that contains Site-related chemicals at concentrations that exceed the cleanup standards presented in Table 3, until the ground water cleanup standards are achieved.

**Remediation Objectives for Wastes**

A cleanup standard was developed for Cell A and Cell B/C wastes in order to evaluate treatment options for this material. The objective for remediating these wastes requires that the concentration of contaminants in leachate that might be generated from the uncontrolled waste will not result in an exceedance of the ground water cleanup standards presented in Table 3. In order to satisfy this requirement, technologies for treatment of Cell A and Cell B/C wastes must meet a treatment standard of 7.7 micrograms of vinyl chloride per kilogram of waste. Alternatively, waste containment technologies must be designed to minimize the infiltration of rainwater and resulting leachate generation.

**Remediation Objectives for Soils**

Levels of mercury in drain field surface soils are above normal background levels and create a potential for mercury to enter the food chain via exposure of soil organisms to contaminated soils. EPA has determined that a soil mercury concentration of one milligram per kilogram of soil is protective of ecological receptors at this site. The remediation objective for drain field soils is to
### TABLE 3
Ground Water Cleanup Standards

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>MCL(^1) (µg/l)(^2)</th>
<th>MCLG(^3) (µg/l)</th>
<th>Cleanup Standard (µg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2-Dichloroethane</td>
<td>5</td>
<td>0</td>
<td>1 (PQL)(^4)</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>5</td>
<td>0</td>
<td>1.5 (Risk-based)(^5)</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>2</td>
<td>0</td>
<td>1 (PQL)</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>—</td>
<td>—</td>
<td>0.13 (PQL)</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>0.2</td>
<td>0</td>
<td>0.023 (MDL)(^6)</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>—</td>
<td>—</td>
<td>0.18 (PQL)</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>—</td>
<td>—</td>
<td>0.17 (PQL)</td>
</tr>
<tr>
<td>Bis(2-ethylhexyl)phthalate</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Chrysene</td>
<td>—</td>
<td>—</td>
<td>1.5 (PQL)</td>
</tr>
<tr>
<td>Pentachlorophenol</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Aldrin</td>
<td>—</td>
<td>—</td>
<td>0.01 (PQL)</td>
</tr>
<tr>
<td>Alpha BHC</td>
<td>—</td>
<td>—</td>
<td>0.013 (Risk-based)</td>
</tr>
<tr>
<td>Endosulfan I</td>
<td>—</td>
<td>—</td>
<td>0.27 (Health-based)(^7)</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>0.4</td>
<td>0</td>
<td>0.016 (Risk-based)</td>
</tr>
<tr>
<td>Arsenic</td>
<td>50</td>
<td>—</td>
<td>1 (IDL)(^8)</td>
</tr>
<tr>
<td>Cadmium</td>
<td>5</td>
<td>5</td>
<td>2.7 (Health-based)</td>
</tr>
<tr>
<td>Manganese</td>
<td>—</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Mercury</td>
<td>2</td>
<td>2</td>
<td>1.6 (Health-based)</td>
</tr>
<tr>
<td>Vanadium</td>
<td>—</td>
<td>—</td>
<td>37 (Health-based)</td>
</tr>
</tbody>
</table>

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\(^1\) MCL: Maximum Contaminant Level

\(^2\) µg/l: micrograms per liter

\(^3\) MCLG: Maximum Contaminant Level Goal

\(^4\) PQL: Practical Quantitation Limit

\(^5\) Risk-based: cleanup level based on carcinogenic health effects

\(^6\) MDL: Method Detection Limit

\(^7\) Health-based: cleanup level based on non-carcinogenic health effects

\(^8\) IDL: Instrument Detection Limit
prevent exposure of ecological receptors to soils contaminated with mercury in excess of this level.

**Summary of Alternatives**

Six alternatives were evaluated to address the risks posed by current and future exposure to contaminants at the Woodlawn Landfill site:

- **Alternative 1:** No Action

- **Alternative 2:** Ground Water, Stream, and Landfill Gas Monitoring; Deed and Ground Water Use Restrictions (Institutional Controls); Perimeter Fencing

- **Alternative 3:** Capping of Landfill and PVC Sludge Disposal Cells; Ground Water, Stream, and Landfill Gas Monitoring; Institutional Controls; Perimeter Fencing

- **Alternative 4:** Capping of Landfill and PVC Sludge Disposal Cells; Extraction and Treatment of Ground Water and Discharge of Treated Ground Water to Surface Water; Ground Water, Stream, and Landfill Gas Monitoring; Institutional Controls; Perimeter Fencing

- **Alternative 5:** Excavation and On-site Thermal Treatment of PVC Sludge from Cells A and B/C; Capping; Extraction and Treatment of Ground Water and Discharge of Treated Ground Water to Surface Water; Ground Water, Stream, and Landfill Gas Monitoring; Institutional Controls; Perimeter Fencing

- **Alternative 6:** Excavation and Off-site Disposal of PVC Sludge from Cells A and B/C; Capping; Extraction and Treatment of Ground Water and Discharge of Treated Ground Water to Surface Water; Ground Water, Stream, and Landfill Gas Monitoring; Institutional Controls; Perimeter Fencing

Each of these alternatives is described briefly below.

**Alternative 1: No Action**
- **Capital Cost:** $0
- **Annual Operation and Maintenance (O&M) Costs:** $0
- **Present Worth:** $0
- **Years to Implement:** 0

The Superfund program requires that the “no action” alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, EPA would take no further action at the site to prevent exposure to wastes and contaminated ground water and soils.

**Alternative 2: Monitoring, Institutional Controls, Fencing**
- **Capital Cost:** $562,000
- **Annual O&M Costs:** $514,000
- **Present Worth:** $4,436,000
- **Years to Implement:** 3

This alternative would not include any action to remediate ground water. However, the stream, landfill gas, and ground water (including water from select residential wells) would be regularly monitored. An alternate water supply or point-of-entry treatment system would be provided at residences where ground water monitoring indicates that contaminant levels exceed remediation standards. A perimeter fence would be erected around the landfill property and select areas of the landfill would be revegetated. Landfill property deed restrictions and area ground water use restrictions would be instituted as necessary to prevent exposure to contaminated ground water and wastes and to ensure that the selected alternative may be effectively implemented.

**Alternative 3: Capping**
- **Capital Cost:** $17,712,000
- **Annual O&M Costs:** $538,000
- **Present Worth:** $15,856,000
- **Years to Implement:** 5
Alternative 3 would not include any action to remediate ground water but would provide physical containment of the source materials. All elements described in Alternative 2 would also be included in Alternative 3.

In addition, approximately 400 cubic yards of mercury-contaminated surface soils would be excavated from the abandoned septic system drain field and, if the soils do not exhibit the characteristic of toxicity as defined in 40 C.F.R. § 261.24, consolidated in the general landfill area. Mercury-contaminated soils that are found to exhibit the toxicity characteristic would be disposed of at a Resource Conservation and Recovery Act (RCRA) hazardous waste (Subtitle C) disposal facility. The currently operating septic system drain field would be relocated in order to eliminate the flow of water from the septic system into areas where PVC sludge and other wastes were placed.

A cap consisting of a gas collection zone, low permeability layer, drainage layer, and soil cover would be placed over the general landfill area, Cells B/C, and the presumed location of Cell A. The low permeability layer would consist of 24 inches of clay with a permeability less than or equal to 1 x 10^-7 centimeters per second or a synthetic liner that is equally protective as determined by EPA and MDE. The total area to be capped would be approximately 31 acres.

Presently, it is not known whether VOC emissions from the landfill gas collection system would exceed levels that require control under federal and State regulations. Field data would be collected before completion of the cap design in order to assess landfill gas management requirements.

**Alternative 4: Capping, Ground Water Extraction and Treatment**

*Capital Cost:* $20,997,000  
*Annual O&M Costs:* $1,609,000  
*Present Worth:* $23,826,000  
*Years to Implement:* 6

Alternative 4 would provide physical containment of source materials and remediation of contaminated ground water. All components described in Alternative 3 would also be included in Alternative 4.

In addition, contaminated ground water would be extracted in order to meet the previously identified remediation objectives, treated on-site to reduce contaminant levels to concentrations that are protective of surface water quality, and discharged to the stream at the southern end of the property.

Extracted ground water would be treated on-site in a three-step process in order to achieve compliance with discharge requirements. The first step would entail precipitation and flocculation/coagulation to remove manganese and other inorganic contaminants. The filtered effluent from the precipitation unit would then enter an air stripper column for removal of VOCs. The ground water discharged from the air stripper would be passed through granular activated carbon to remove semivolatile organic compounds and other remaining contaminants.

The treated ground water would then be discharged to the stream that crosses the site. Solids from the precipitation process and spent carbon would be collected and disposed of off-site. Currently available information indicates that air emissions of VOCs from the air stripper would not exceed risk- and health-based emission limits. However, air emission controls would be implemented as necessary to protect human health and the environment and comply with federal and State regulations.

**Alternative 5: Excavation and On-site Low Temperature Thermal Treatment of PVC Sludge**

*Capping, Ground Water Extraction and Treatment*  
*Capital Cost:* $35,372,000  
*Annual O&M Costs:* $1,609,000  
*Present Worth:* $30,902,000  
*Years to Implement:* 7

This alternative would provide containment of the Woodlawn Landfill Superfund Site Page 12 Proposed Plan
landfill contents and contaminated drain field soils, treatment of the source material in Cell B/C and Cell A (if found), and extraction and treatment of ground water. All elements of Alternative 4 would also be included in Alternative 5.

In addition, approximately 36,000 cubic yards of material would be excavated from cells of definable PVC sludge and treated on-site using low temperature thermal desorption. Samples of the treated material would be analyzed to ensure attainment of remediation standards. The treated sludge would be backfilled into the excavated cell area if the material does not exhibit any of the characteristics of hazardous waste as defined in 40 C.F.R. Part 261, Subpart C. The total time required for treatment of the waste is estimated at one-and-a-half to two years. Further pilot testing would be required prior to implementation of the alternative in order to optimize the design of the thermal treatment unit.

Alternative 6: Excavation, Off-site Disposal, Capping, Ground Water Extraction and Treatment

Capital Cost: $41,253,000
Annual O&M Costs: $1,609,000
Present Worth: $37,135,000
Years to Implement: 7

This alternative would provide containment of the landfill contents and contaminated drain field soils, off-site disposal of the source material in Cell B/C and Cell A (if found), and extraction and treatment of ground water. All elements of Alternative 4 would also be included in Alternative 6.

In addition, approximately 36,000 cubic yards of material would be excavated from cells of definable PVC sludge and transported to an off-site landfill for disposal. Testing conducted during the RI/FS indicates that the Cell B/C sludge material does not exhibit the characteristics of hazardous waste as defined in 40 C.F.R. Part 261, Subpart C, and that these wastes may be accepted by an industrial waste (Subtitle D) landfill. However, the operator of the receiving facility may require additional testing to verify the ability of the disposal facility to accept these wastes.

Evaluation of Alternatives

EPA's preferred alternative for addressing contaminated ground water, soils, and wastes is Alternative 4 (Capping and Ground Water Extraction and Treatment). Based on current information, this alternative appears to provide the best balance of trade-offs among the alternatives with respect to the nine criteria that EPA uses to evaluate alternatives, which are set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. § 300.430(e)(9)(iii).

The following summary profiles the performance of the preferred alternative in terms of the nine evaluation criteria, noting how it compares to the other alternatives under consideration. A summary of the nine criteria (EPA Criteria for Evaluating Alternatives) is included on page 22 of this Proposed Plan.

- Overall Protection of Human Health and the Environment

Alternatives 2 through 6 would provide adequate protection of human health by preventing exposure to contaminated ground water through provision of an alternate water supply or point-of-entry treatment and institution of ground water use restrictions. Each of these alternatives calls for monitoring of the stream that crosses the site which would provide a reasonable means of identifying conditions that would warrant additional actions.

Alternatives 4 through 6 offer advantages over Alternatives 2 and 3, however, because they provide for active treatment of ground water which would minimize migration of contaminants and diminish loading of contaminants to the stream. Alternatives 3 through 6 would also inhibit migration of contaminants into ground water by reducing the amount of precipitation that may infiltrate and mobilize contaminants in the wastes, and would prevent exposure of ecological
receptors to mercury-contaminated soils. Following the completion of the remedial action, the residual risks for each of Alternatives 4, 5, and 6 would be the same.

Alternative 1 (No Action) contains no provisions for preventing exposure to contamination, and is not protective of human health and the environment. Although Alternative 2 includes measures for preventing human exposure to unacceptable levels of site contaminants, Alternative 2 would not prevent exposure of ecological receptors to mercury-contaminated soils. Since Alternatives 1 and 2 do not meet the threshold criterion of protection of human health and the environment, they will not be considered as viable options in the remainder of this section.

- **Compliance with ARARs**

  The federal and state requirements or criteria with which a Superfund remedy must comply are called Applicable or Relevant and Appropriate Requirements (ARARs). In this section of the Proposed Plan, EPA has identified certain of the ARARs which the alternatives will meet. The complete list of ARARs will appear in the Record of Decision (ROD) in which EPA will select the remedy for the site.

  The Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) for public drinking water supplies established under the Safe Drinking Water Act are considered to be relevant and appropriate standards for ground water cleanup under the Superfund program. The concentrations of several contaminants in ground water underlying the landfill property exceed MCLs and/or MCLGs. Since Alternative 3 would do nothing to reduce the concentration of these contaminants, it would not meet the second threshold criterion of compliance with ARARs. Therefore, it will not be considered in the remainder of this section.

  Under Alternatives 4, 5, and 6, ground water would be extracted and treated. These alternatives would ultimately comply with MCLs and non-zero MCLGs for inorganic and organic chemicals (40 C.F.R. §§ 141.11-.12, 141.61-.62, and 141.50-.51). Health Effects Assessments and U.S. EPA Health Advisories were considered in establishing ground water cleanup standards for the site, and will be considered in evaluating the protectiveness of Alternatives 4 through 6.

  The treatment of ground water in Alternatives 4 through 6 would result in VOC emissions from an air stripper to ambient air. Air emission controls may be necessary in order to meet State and federal requirements for air emissions from air strippers. These requirements include State regulations pertaining to toxic air pollutants, including the regulations that establish emission standards for hazardous air pollutants (Code of Maryland Annotated Regulations [COMAR] 26.11.15), federal air emission standards for process vents (40 C.F.R. Part 264, Subpart AA), and State requirements pertaining to emissions of VOCs (COMAR 26.11.06.06). The EPA guidance document entitled Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites will be considered in assessing the need for controlling air emissions from the air stripper.

  The treatment of ground water in Alternatives 4 through 6 may also result in the generation of residual wastes. Any residual wastes would be evaluated in accordance with the hazardous waste identification requirements of 40 C.F.R. Part 261, Subpart C. On-site handling of any residual wastes found to exhibit a characteristic of a hazardous waste would comply with the substantive portions of federal and State regulations that pertain to generators of hazardous waste (40 C.F.R. Part 262 and COMAR 26.13.03) and transporters of hazardous waste (40 C.F.R. Part 263 and COMAR 26.13.04), including the federal land disposal restrictions (40 C.F.R. Part 268).

  Alternative 4, 5, and 6 each entail on-site discharge of treated ground water to a stream that crosses the southern end of the site. Since the State-designated uses of the stream include public water supply and
protection of aquatic life, the discharge of treated ground water in each of these alternatives would comply with the MCLs and non-zero MCLGs listed above, State water quality standards (COMAR 26.08.02.03), and those federal ambient water quality criteria established pursuant to Section 304 of the Clean Water Act (33 U.S.C. § 1314) which apply to protection of aquatic life. Alternatives 4, 5, and 6 would also comply with State and federal requirements pertaining to point source discharges to surface water, including discharge limitations (COMARs 26.08.03.01 and .07), standards for best management practices (40 C.F.R. Part 125, Subpart K), and test procedures (40 C.F.R. Part 136).

Alternatives 5 and 6 require the excavation and placement of waste material from the PVC sludge disposal cells and would comply with federal hazardous waste identification requirements (40 C.F.R. Part 261, Subpart C). Alternative 5 calls for on-site treatment of the wastes by low temperature thermal desorption. Alternative 6 entails off-site disposal of the wastes.

Any on-site storage of hazardous wastes would comply with the substantive portions of federal and State requirements regulating containers (40 C.F.R. Part 261 and COMAR 26.13.03) and transporters of hazardous waste (40 C.F.R. Part 263 and COMAR 26.13.04), including the federal land disposal restrictions (40 C.F.R. Part 268).

Alternatives 4, 5, and 6 each call for construction of a landfill cap and post-closure monitoring and maintenance in compliance with appropriate State landfill closure regulations (COMARs 26.04.07.21 A, B, D, and E and COMARs 26.04.07.22 A, B, and C). COMAR 26.04.07.21 E establishes minimum design requirements for municipal landfill closure caps which have been found, through modeling, not to be adequate for this site. Therefore, the single-barrier cap specifications presented in EPA guidance for Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites (EPA/540-P-91/001, February 1991) were taken into consideration in developing alternatives for the Feasibility Study and will be considered in evaluating the protectiveness of the cap design. Landfill gas emissions would be controlled, if determined by EPA and MDE to be necessary, in order to comply with the substantive portions of State requirements governing air quality (COMARs 26.11.06.02, .03, .06, .08, and .09; COMAR 26.11.15; and COMAR 26.11.19.02 G).

Alternatives 4, 5, and 6 would also comply with the substantive requirements of the following federal and State environmental laws: State requirements associated with well construction and abandonment (COMAR 26.04.04), erosion and sediment control (COMARs 26.09.01.01, .07 B, and .08 A), stormwater management (COMAR 26.09.02), and noise pollution control (COMARs 26.02.03.02 A [2] and B [2] and COMAR 26.02.03.03 A); federal and State regulations for the protection of wetlands (Executive Order 119900 and...
COMAR 08.05.04); and federal regulations for the protection of endangered species (16 U.S.C. § 1531; 50 C.F.R. Part 402) and historical structures (16 U.S.C. § 469 and 16 U.S.C. §§ 470 et seq.).

**Long-Term Effectiveness and Permanence**

Alternatives 4, 5, and 6 would reduce risks to acceptable levels for the ground water pathway since the ground water extraction and treatment system would permanently remove the contaminants of concern from the aquifer which underlies the site. Therefore, Alternatives 4 through 6 satisfy the requirements for long-term effectiveness and permanence with regard to ground water. Ground water use restrictions affecting properties near the landfill could be eliminated once the ground water remediation standards are achieved for each of these alternatives.

Alternative 4 provides containment of landfill wastes and wastes in PVC sludge disposal Cells A and B/C through capping. Capping is a proven technology; a properly maintained cap would provide long-term isolation of source materials and risk reduction.

Alternative 5 has the potential to provide a permanent reduction in the concentration of contaminants that are available for leaching from Cell B/C wastes. However, additional pilot-testing of the low temperature thermal desorption process would be required to ensure that the technology is compatible with the PVC sludge and would meet the remediation standard for vinyl chloride without generating new chemicals in the waste material that may pose unacceptable levels of risk.

Alternative 6 provides off-site disposal of Cell B/C wastes and would permanently eliminate one of the sources of ground water contamination at the site.

Treatment (Alternative 5) and off-site disposal (Alternative 6) of Cell B/C wastes would not provide significant advantages over Alternative 4 with respect to the activities required to maintain effectiveness of the remedy in the long run; each of these alternatives would require long-term maintenance of the landfill cap, monitoring networks, and deed restrictions.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

Alternatives 4, 5, and 6 would reduce the toxicity and volume of contaminated ground water at the site with equal effectiveness. Although VOCs in ground water would ultimately be transferred to the ambient air, controls for reducing the rate of air emissions to the atmosphere would be implemented if they were determined to be necessary by EPA and MDE. In addition, the precipitation, flocculation/coagulation, and carbon adsorption components of the ground water treatment process would produce contaminated sludges and materials which would have to be disposed of off-site.

Alternatives 4, 5, and 6 would each provide in-place containment of landfill wastes and consolidation and containment of mercury-contaminated soils. Alternative 4 provides in-place containment of Cell B/C source materials and does not reduce the toxicity or volume of these wastes. However, the cap would decrease the mobility of contaminants by reducing the amount of water that may infiltrate the wastes and cause certain constituents to leach into ground water.

Alternative 5 provides for treatment of Cell B/C wastes using low temperature thermal desorption. If the low temperature thermal treatment process can be designed and regulated to provide removal of VOCs without generation of toxic by-products, Alternative 5 would provide a long-term reduction in the toxicity, mobility, and mass of contaminants at the Site.

Alternative 6 calls for off-site landfill disposal of Cell B/C waste materials and would not result in any overall reduction of toxicity or volume of hazardous substances in this waste.

**Short-Term Effectiveness**

Alternatives 4 through 6 would effectively manage risk during the construction and implementation phases by employing controls (i.e., ground water monitoring, deed and ground water use restrictions, and alternate water supply or point-of-entry treatment) until the
time that remediation objectives are achieved, thereby preventing exposure to contaminated ground water in residential wells.

Implementation of each of these alternatives would present a potential for exposure of workers to site contaminants during cap construction activities, installation of ground water monitoring and extraction wells, construction and operation of the ground water treatment system, and sampling activities. In addition, workers would be exposed to normal construction hazards. However, these risks could be reduced by following proper health and safety practices for well drilling, sampling, and construction.

Alternatives 4 through 6 also entail emissions of VOCs from the air stripper to ambient air. However, these emissions may be effectively controlled to prevent unacceptable levels of exposure.

Alternatives 5 and 6 would pose an additional short-term risk to workers and neighboring populations as a result of the generation of dust and VOCs during excavation and transportation of Cell B/C wastes, and potential exposure to hazardous vapors in the event of malfunction of the thermal desorption unit. These additional risks can be reduced through implementation of an air monitoring program, emission controls, and continuous monitoring of the thermal treatment system combined with incorporation of automatic shut-off features.

**Implementability**

Construction of the fence, the landfill cap, and the ground water collection and treatment systems would be easily accomplished using conventional methods and materials for each of Alternatives 4 through 6. The ground water treatment technologies that would be implemented under Alternatives 4 through 6 have been successfully demonstrated in full-scale operations for the contaminants of concern. However, a treatability study may be necessary before remedy design in order to optimize the treatment processes and ensure that discharge of treated ground water to surface water would comply with MCLs, the substantive requirements of the National Pollutant Discharge Elimination System program, and federal ambient water quality criteria for protection of aquatic life. Alternatives 5 and 6 would be more difficult to implement than Alternative 4. Both of these alternatives involve substantial excavation of waste which would require additional controls in order to minimize VOC exposure to workers. Low temperature thermal desorption has been included in Alternative 5 as a potentially feasible technology for treatment of PVC sludge wastes. However, pilot testing would be required to confirm that a suitable temperature range exists in which the materials can be satisfactorily treated without creating hazardous PVC decomposition products. Additional monitoring and controls would also be required to protect against potential malfunction of the thermal desorption unit.

Implementation of Alternative 6 would depend upon acceptance of the PVC sludge wastes by an off-site disposal facility. Results of treatability testing conducted during the Feasibility Study indicate that the Cell B/C waste does not exhibit the toxicity characteristic of a hazardous waste and that the material may be accepted by a Subtitle D industrial waste landfill. One such landfill was identified within approximately 80 miles of the site. However, in the event that analyses of excavated wastes indicate that any portion of the material exhibits any characteristic of hazardous waste as defined in 40 C.F.R. Part 261, Subpart C, that portion of the material would have to be treated on-site or transported to an off-site hazardous waste (Subtitle C) disposal facility. This situation would result in delays in implementation and additional costs.

The remaining components of Alternatives 4 through 6 would not present any major implementation difficulties. Ground water, stream, and landfill gas monitoring would be performed using widely practiced techniques. Point-of-entry treatment systems have been
shown to be effective in removing the types of contaminants associated with this site. Residential well replacement, if necessary, would be conducted in accordance with State regulations. Cooperation from property owners would be necessary for well installation, maintenance, and sampling. Ground water use restrictions are currently in effect in the area of the site and mechanisms exist within the State and County governments for enforcement and modification of ground water use restrictions as necessary to ensure protection of public health. Ground water use restrictions would continue to be reviewed and revised as additional site data becomes available. Future use of the landfill property can be effectively controlled through the use of deed restrictions.

• **Cost**
The present worth of the preferred alternative (Alternative 4) is estimated at $23,826,000. Alternative 4 is less costly than Alternatives 5 and 6 but provides the same degree of risk reduction as those alternatives.

• **State Acceptance**
MDE generally supports the preferred alternative (Alternative 4), but reserves its final concurrence until community comments are evaluated.

• **Community Acceptance**
Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be discussed in the Record of Decision (ROD) for the site.

**Community Participation in the Selection Process**

EPA has set a public comment period from May 26, 1993, through June 25, 1993, to encourage public participation in the selection process. The Agency encourages comments on all of the alternatives described above and on the information which supports them which may be found in the Administrative Record file.

Although EPA has proposed a preferred alternative (Alternative 4), a final decision will be deferred until EPA has reviewed comments received during the comment period. As a result of comments received during the public comment period, the final remedy presented in the Record of Decision may be different from the preferred alternative presented here.

EPA will hold a public meeting during the comment period. The public meeting is scheduled for 7:00 p.m. on June 8, 1993, and will be held at the Perryville High School at 1696 Perryville Road, Perryville, Maryland. During the meeting, EPA, with MDE, will present a summary of the Remedial Investigation, the Feasibility Study, and the preferred alternative; answer questions; and accept both oral and written comments.

Written comments must be postmarked on or before June 25, 1993. Following the conclusion of the public comment period, and after consultation with MDE, EPA will select a remedy based on the information in the Feasibility Study and the comments received during the public comment period. The selected remedy will be documented in the Record of Decision, which will summarize EPA's decision process and provide responses to comments received from the public.

To send written comments or obtain further information, please contact one of the two EPA representatives listed below:

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Glossary of Terms

Administrative Order on Consent: A legal agreement between EPA and potentially responsible parties (PRPs) whereby PRPs agree to perform or pay for a Remedial Investigation/Feasibility Study at a Superfund site.

Administrative Record File: An official compilation of documents, data, reports, and other information that form the basis of response actions selected for a Superfund site. The record is placed in the information repository to allow public access to the material. The preparation of such a record is required by CERCLA.

Air Stripping: A treatment system that removes, or "strips," volatile organic compounds from contaminated ground water by forcing an airstream through the water and causing the compounds to evaporate.

Ambient Water Quality Criteria: Nonenforceable guidelines developed by EPA to protect surface waters and aquatic life.

Aquifer: An underground formation composed of materials such as sand, soil, or rock that can supply usable quantities of ground water to wells and springs.

Applicable or Relevant and Appropriate Standards (ARARs): The requirements of federal and state environmental laws with which a selected remedy must comply.

Background Level: The average concentration of a chemical in the environment, or the naturally occurring level.

Carcinogenic: Cancer-causing.

Coagulation: A chemically-induced clumping of particles in wastewater to settle out impurities.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). CERCLA created a trust fund, known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Ecological Receptors: Plant and animal life that may be exposed to hazardous substances.

Effluent: Water that flows out of a treatment system such as an air stripper or filtration unit.

Filtration: A process used for the removal of solids from water by passing the water through a porous material such as sand.

Flocculation: A chemical process by which clumps of solids in water are made to increase in size so that they can be separated from the water.

Ground Water: The water beneath the earth's surface that flows through the soil and rock openings and often serves as a source of drinking water.

Hazard Index: The ratio between the average estimated dose of a toxic substance received by a human population and the reference dose.

Instrument Detection Limit: The lowest concentration of a chemical that can be detected with a particular laboratory instrument.
Leachate: A contaminated liquid that results when water trickles through waste materials and collects components of those wastes. Leaching may occur at landfills and may cause hazardous substances to enter soil, surface water, or ground water.

Maximum Contaminant Levels (MCLs): Enforceable standards for public drinking water supplies under the Safe Drinking Water Act. These standards apply to specific contaminants which EPA has determined have an adverse effect on human health above certain levels.

Maximum Contaminant Level Goals (MCLGs): Nonenforceable health-based goals for drinking water that are established at levels at which no known or anticipated adverse human health effects occur.

Method Detection Limit: The lowest concentration of a chemical that can be detected with a particular laboratory analytical procedure.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The federal regulation that guides the Superfund program.

National Priorities List (NPL): EPA's list of the nation's top-priority hazardous waste sites that are eligible to receive federal money for response under CERCLA.

Organic Compound: A chemical comprised primarily of carbon and hydrogen.

Perched Water: A permanent or temporary zone of ground water separated from an underlying aquifer by an unsaturated zone.

Plume: A measurable discharge of a contaminant from a given point of origin.

Point-of-Entry Treatment: Treatment of ground water which is provided in individual residences as opposed to large-scale treatment of a public water supply.

Polynuclear Aromatic Hydrocarbons (PAHs): A class of organic compounds made up of benzene rings.

Potentially Responsible Party (PRP): An individual or company (such as a facility owner or operator, or a transporter or generator of hazardous substances) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

Practical Quantitation Limit: The lowest level of a chemical that can be accurately measured with a particular analytical method.

Precipitation: A process by which chemicals dissolved in water are converted to solids so that they may be removed from the water.

Present Worth: The amount of money necessary to secure the promise of a future payment, or series of payments, at an assumed interest rate.

Record of Decision (ROD): A legal document that describes the remedy selected by EPA for a Superfund site and presents the reasons the remedy was selected. It summarizes the results of the R/FS reports and the comments received during the comment period for the Proposed Plan.

Reference Dose: An average daily lifetime dose that is expected not to produce adverse effects in human populations.
**Remedial Investigation/Feasibility Study (RI/FS):** Two distinct but related studies conducted as part of the *Superfund* remedial process. The first part, the RI, identifies the nature and extent of contamination at a site. The second part, the FS, identifies and evaluates alternatives for addressing the contamination.

**Resource Conservation and Recovery Act (RCRA):** A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous substances.

**Risk Assessment:** A means of estimating the amount of harm that a *Superfund* site could cause to human health and the environment. The objectives of a risk assessment are: (1) to help determine the need for action by estimating the harm if the site is not cleaned up; (2) to help determine the levels of chemicals that remain at a site and still be protective of human health and the environment; and (3) to provide a basis for comparing different cleanup methods.

**Sediments:** Soils, sand, and minerals washed from land into water.

**Seeps:** Spots where water or *leachate* drain from the earth, often forming the source of a small, trickling stream.

**Semivolatile Organic Compounds:** Chemical compounds that contain carbon and hydrogen and that, at a relatively low temperature, fluctuate between a vapor state (a gas) and a liquid state.

**Sludge:** A semi-solid residue from any of a number of air or water treatment processes.

**Superfund:** The name commonly used for *CERCLA*.

**Treatability Study:** A study conducted before implementation of a particular technology in order to gather information needed to evaluate technology performance.

**Volatile Organic Compound (VOC):** An *organic compound* that readily evaporates (volatilizes) under atmospheric conditions.

**Water Table:** The upper surface of the saturated zone in an *aquifer*. It is the level at which water stands in a well penetrating the aquifer.
EPA Criteria for Evaluating Alternatives

Threshold Criteria

- Overall Protection of Human Health and the Environment
  The assessment against this criterion describes how the alternative, as a whole, achieves and maintains protection of human health and the environment, and how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with ARARs
  The assessment against this criterion addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of Federal and state environmental laws and/or justifies invoking a waiver.

Primary Balancing Criteria

- Long-Term Effectiveness and Permanence
  The evaluation of an alternative against this criterion considers the ability of the remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

- Reduction of Toxicity, Mobility, or Volume through Treatment
  The evaluation of alternatives against this criterion describes the anticipated performance of the treatment technologies that may be employed in a remedy.

- Short-Term Effectiveness
  The assessment against this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of the remedy, until the cleanup levels are achieved.

- Implementability
  This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required goods and services.

- Cost
  This assessment considers the capital and operation and maintenance (O&M) costs of the alternatives.

Modifying Criteria

- State Acceptance
  This assessment indicates whether the state, based on its review of the Proposed Plan, concurs with, opposes, 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 review of the public comments received on the Administrative Record file and the Proposed Plan.