UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUPERFUND PROPOSED PLAN FACT SHEET

STAUFFER CHEMICAL SUPERFUND SITES
COLD CREEK SWAMP

Mobile County, Alabama

INTRODUCTION

The United States Environmental Protection Agency (EPA) is issuing this Proposed Plan Fact Sheet for the Cold Creek Swamp contamination related to the Stauffer Chemical Superfund Sites, in Mobile County. EPA is providing an opportunity for public comment on cleanup alternatives for Operable Unit 3 (OU3). The Plan explains the options EPA evaluated and the rationale for the preferred alternative. EPA, in consultation with the Alabama Department of Environmental Management (ADEM), will select a final remedy on Cold Creek Swamp only after public comments have been considered. Terms in italics print are defined in a glossary on page 18 of the fact sheet.

EPA issues the Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The Plan summarizes information found in greater detail in the Remedial Investigation (RI)/Feasibility Study (FS) and other documents contained in the Administrative Record. The Record and an Information Repository for the Stauffer Chemical Superfund Site, Cold Creek Swamp, can be found at the:

Saraland Public Library
111 Saraland Loop
Saraland, Alabama 36571

PUBLIC INVOLVEMENT OPPORTUNITIES

Public Comment Period
Dates: June 15 through July 14, 1993
Purpose: To comment on the Proposed Plan for Cold Creek Swamp, Stauffer Superfund Sites.

Public Meeting
Date: Tuesday, June 29, 1993
Time: 7:00 p.m.
Place: Little Rock Baptist Church; 11685 Hwy 43, Axis, Alabama 36505
Purpose: To discuss the Proposed Plan for Stauffer Sites.

TECHNICAL ASSISTANCE GRANTS

EPA provides Technical Assistance Grants (TAGs) to enable groups to hire advisors to help them comment on EPA's actions at Superfund or National Priorities List (NPL) sites. Only one grant per site of up to $50,000 may be awarded. For more information on TAGs, contact the community relations coordinator shown below.

Send written comments prior to the close of the comment period or direct questions to:

Joanne Benante,
Remedial Project Manager

OR

Betty Winter,
Community Relations

South Superfund Branch
U.S. EPA
345 Courtland Street, NE
Atlanta, Georgia 30365
1-800-435-9234.
SITE BACKGROUND, OVERVIEW AND HISTORY

The Stauffer Chemical LeMoyne and Cold Creek Superfund Sites are located in Mobile County, on Highway 43, in Axis and Bucks, Alabama, approximately 25 miles north of the city of Mobile. Since the LeMoyne and Cold Creek sites are adjacent to one another, their remedial activities are being completed together; therefore, the two sites are often referred to as the Stauffer Superfund Sites. A Remedial Investigation (RI)/Feasibility Study (FS) was completed for the sites in 1986. These documents divided the sites into five areas of concern: 1) the inactive ponds, 2) the Old Carbon Disulfide Plant Wastewater Treatment Pond drainage line; 3) the landfills; 4) the Cold Creek Swamp, and 5) the groundwater. See page three for a summary of cleanup activities to date.

Stauffer Chemical Company previously owned and operated a multi-product chemical manufacturing plant at LeMoyne, Alabama, and an agricultural chemical facility at the adjacent Cold Creek Site. The LeMoyne Site was acquired by Akzo Chemie America (now Akzo Chemicals, Inc.) in 1987. Akzo operated the Site as a chemical manufacturing plant using carbon disulfide. Several other facilities were subsequently added and include a sulfuric acid plant (on line in 1957), a carbon tetrachloride plant (1963), a caustic/chlorine plant (1964), and a Crystex® (a proprietary sulfur compound) plant (1974). The Cold Creek Plant has been in operation since 1966 and is currently owned by Zeneca Inc. This facility has also expanded its operations over the past 20 years and has manufactured, and continues to manufacture, a variety of agricultural chemicals, including thiocarbamates. Halby Chemical Company (later part of Witco, Inc.) also operated a facility from approximately 1965 to 1979 on a leased section of the LeMoyne property.

Wastewaters from the Stauffer processes were held in clay-lined lagoons and discharged to Cold Creek Swamp, which received discharged wastewater from the LeMoyne and Cold Creek plants as well as from the Halby Chemical Company until approximately 1975. The wastewater from the LeMoyne Plant included discharges of process waters from several production units. Process water discharges from one of the production units contained mercury. Neutralized waste brine from the Cold Creek Plant was also discharged to the swamp during the late 1960's. The contribution from the Halby Chemical Company may have included thiocarbamates and metal-contaminated wastewater. Processed wastewater discharged to Cold Creek Swamp ceased in 1975 when a discharge pipeline was constructed to convey wastewater from treatment areas directly to the Mobile River. Treated effluent discharge to the Mobile River is conducted in accordance with Zeneca and Akzo's individual National Pollutant Discharge Elimination System (NPDES) permit, and no wastewater is currently discharged to the swamp.

Cold Creek Swamp is located in the northeast section of the Stauffer Superfund Sites. The swamp study covers approximately 650 acres situated between U.S. Highway 43 to the west and the Mobile River to the east. The swamp is bounded by the Alabama Power Company canal to the northeast, the Mobile River to the east, and the manufacturing facilities to the south and west. The surrounding area is sparsely populated and consists primarily of river bottom swamp and other wetlands. It is situated approximately 10 miles south of the confluence of the Tombigbee and Alabama rivers and 20 miles north of Mobile Bay. The Mobile River is an important water source for river barge transportation, as well as other industrial, agricultural, and recreational uses. Surrounding land use in the immediate vicinity of

Figure 1
Location of Area Map
Cold Creek Swamp is predominantly industrial, related to chemical processing and electrical power generation.

Cold Creek drains the swamp, flowing generally east through the swamp and ultimately discharging to the Mobile River. The uppermost portion of the swamp (Upper Swamp) is located on the LeMoyne and Cold Creek plant property and is drained by an unnamed tributary to Cold Creek. It is characterized by nearly level to undulating topography with several pools and minimal stream flow through most of the year. See figure 2 for a map of the study area addressed in this plan.

SCOPE OF CLEANUP ACTION

The Operable Units (OUs) identified at the Stauffer Sites are as follows:

OU#1 Contamination of the aquifer emanating from the Site. A groundwater pump and treat system is currently in place. Three groundwater extraction wells are in operation and three more will be on line in the middle of 1993.

OU#2 Contamination of the source areas at the Site. This addresses 18 waste disposal areas including the landfills, the active ponds, and the Old Carbon Disulfide Wastewater Treatment Pond. An RI/FS is currently underway to determine the extent of contamination and evaluate possible cleanup alternatives.

OU#3 This Proposed Plan addresses Cold Creek Swamp (OU#3) which received contaminated wastewaters from the former operations at the manufacturing facilities. A June 1992 Supplemental Remedial Investigation Report documents the details of the study of contamination in the swamp. A November 1992 Supplemental Feasibility Study Report and the March 1993 Supplemental Feasibility Study Report Addendum submitted by Akzo Chemicals Inc./Zeneca Inc. documents the development, screening, and detailed evaluation of potential alternatives and risk posed by the contaminants as they relate to OU#3.

OU#4 Contamination in the Mobile River. The Mobile River Study is an EPA lead investigation of a stretch of the Mobile and Tombigbee Rivers. This study will determine the extent of releases from the Stauffer Superfund Sites into the Mobile River.
STUDY FINDINGS AND RISK SUMMARY

In 1990, EPA, based upon comments from the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration on the original 1988 RI, required that an additional study be done on the swamp to better define the nature and extent of contamination and potential human health and ecological risk. Results of receptors of concern screening and preliminary ecological exposure model were used to scope field activities focusing on biota collection/analysis. The final step in the RI process was development of baseline human health and ecological risk assessments and examination of what happens to contaminants and how they move.

The Supplemental Study for Cold Creek Swamp included the sampling of surface water within the Swamp, collection of sediment samples at various depths at over one hundred locations within the swamp, and extensive biological sampling. Biota samples included finfish, herptiles, and invertebrates from the swamp, and background locations which were analyzed for whole-body mercury tissue concentration.

Chemicals of Concern
Pollutants associated with Cold Creek Swamp are believed to be the result of past disposal practices at the Stauffer Chemical Company processing facility. Mercury contaminated wastewaters from the chlorine processing facility at the LeMoyne Plant were previously discharged into the drainage channel that feeds the Upper Swamp of Cold Creek Swamp.

Assessment of the data indicated that mercury was the primary chemical of concern (COC). Other potential COCs that were identified included thiocarbamates, aluminum, cadmium, copper, and zinc. Detailed examination of these compounds based upon risk assessment and mineralogical analyses revealed that mercury was the only critical COC.

Human-Health Exposure
The site-specific risks for human health are determined through the incidental ingestion (taking in by mouth) or direct contact, and/or inhalation (breathing). The total excess risk of cancer for potential site exposure should be maintained within the range of $1 \times 10^{-4}$ to $1 \times 10^{-6}$. This is equivalent to an increased chance of one additional case of cancer in 10,000 to 1,000,000.

The concentrations of non-carcinogenic chemicals must be lower than those which can lead to chronic health effects. For the Cold Creek Swamp Site, the baseline human health risk assessment indicated that the potential human health exposure did not present unacceptable health risks based on the anticipated exposure pathways.

The anticipated exposure pathway was based upon the scenario that the conditions at the swamp are not conducive to swimming or wading activities. Potential incidental ingestion of water while swimming or contact with sediment while wading were considered non-viable routes of exposure. Two routes of potential exposure that were examined were oral ingestion of fish and/or shellfish caught recreationally within swamp waters and dermal contact with potentially contaminated water within the swamp during recreational fishing.

The swamp was characterized as being too dry for much of the year to support year-round fishing. Land access to the swamp was limited by posted restrictions for trespassers and the position of the manufacturing facilities. The only access route entailed entrance from the Mobile River, a process considered difficult. Typical fish in the swamp waters were small in size, limiting the ingestible amounts of tissue and hence of potential contaminants. With respect to dermal (skin) contact with potentially contaminated water during the course of recreational fishing, exposure was limited to incidental splashing of water on exposed body surfaces. Based upon the isolated nature of the swamp and the limited exposure pathway, the Human Health Risk Assessment did not indicate that the swamp presents an unacceptable risk now or in the future.

It is important to note that on May 7, 1992, the Mobile County Department of Health issued a "Fish Consumption Advisory" on Cold Creek Swamp. The decision to issue this advisory was based on the findings of the RI, specifically that mercury was detected in fish samples in concentrations greater than the 1 part per million standard set by the Food and
No fishing' signs were posted along the swamp. Again, the assumption in the Risk Assessment was that land access to the swamp area is limited. Any trespassers into the swamp might be at risk if they were to consume contaminated fish/shellfish or were to be splashed with contaminated water on exposed body surfaces.

Ecological Risk
The finding of the Baseline Ecological Risk Evaluation were that levels of mercury in Cold Creek Swamp sediments pose a potential risk to receptors. The mercury contamination found in sediments in the swamp were well above the Regional ecological screening value of 0.15 parts per million for potential effects and 1.3 parts per million for probable ecological effects. The mercury concentrations in ecological receptors in the swamp also displayed elevated levels. Carnivorous fish and predatory herptiles showed the highest mercury levels. These levels are above the recommended safe limit of 0.1 ppm for ingestion by sensitive species of birds. Although there are no data indicating mercury levels in birds, concentrations of this magnitude in food items utilized by many birds species which forage in the swamp are likely to result in reproductive impairment. Based upon these findings, an unacceptable ecological risk is present in Cold Creek Swamp.

The Feasibility Study Report showed that two areas of the swamp are of particular concern. These areas not only have high levels of mercury in sediment, but the risk assessment shows a potential risk to biota in the swamp. These areas are the Upper Arm (Upper Arm Swamp Zone) of the Upper Swamp and the Middle/Lower Swamp (Transition Zone). The Upper Arm Swamp Zone is the original point of discharge and remains the most highly concentrated source area for contamination driven risks to receptors. The Transition Zone is a sediment depositional area that receives mercury contaminated sediment from the Upper Arm Swamp Zone (see Figure 3).

**DESCRIPTION OF ALTERNATIVES**

**UPPER ARM SWAMP ZONE**

**Alternative No. 1: No Action**
Superfund requires that "no action" be evaluated to establish a baseline for comparison. This alternative would involve assessment of the potential for natural recovery through a long-term monitoring program with specified performance milestones, including a five year review. The monitoring program would require the sampling of the biota and careful measurement of the natural sedimentation process.

The Upper Arm Swamp Zone sediment contamination would not be further treated, removed, immobilized, nor reduced. Monitoring would continue from 10 to 30 years, depending on the rate of natural sedimentation which could be estimated in five years.

The 30-year total cost of this alternative is estimated to be $300,000.

**Alternative No. 2a: Soil Capping with Surface Water Diversion**
This alternative would involve a closure of the contaminated area through capping with clean soil taken from elsewhere onsite. The cap, a 2-ft-thick soil layer with a geotextile fabric layer underneath, would be constructed over the area of proposed remediation within the Upper Arm Swamp Zone and would cover the mercury contaminated sediments in the area. The purpose of the cap is to minimize exposure of the swamp biota to mercury-contaminated sediment and to minimize transport to the Lower Swamp Zone by containing the primary mercury source area in the swamp.

Sheet piling would be used as in-stream barriers to isolate the Upper Arm Swamp Zone. The sheet piling would be used in two cross-sections of the Upper Arm Swamp Zone to create "cells" to be filled. Capping soil would then be used to fill the cells. Finally, reestablishment of native wetland would be needed in the Upper Arm Swamp Zone. In addition a new channel would be cut to divert the creek around the soil capped Upper Arm Swamp Zone. This new channel would be revegetated in order to create new wetlands. The extent of the area limits would be determined by topography of the Site (Figure 3).
Post-cleanup biota monitoring would be required to assess the long-term effectiveness of capping as a containment action. Annual monitoring would be conducted for the first ten years after remedial action completion.

The Total Cost for the alternative would be approximately $1.45 million.

**Alternative No. 2b: Cement Capping with Surface Water Diversion**
This alternative would be the same as 2a except with the added protection of a cement cap. Restoration would not be possible on the cement cap, but a new drainage channel to divert the creek would create a new wetland onsite.

The Total Cost for this alternative would be approximately $11,870,000.

**Alternative No. 2c: Asphalt Capping with Surface Water Diversion**
This alternative would be the same as 2b except with an asphalt cap.

The Total Cost for this alternative would be approximately $11,170,000.

**Alternative No. 2d: Multi-layer Capping with Surface Water Diversion**
This alternative would be the same as 2b except with a multi-layer cap appropriate for the disposal of solid waste under the Resource Conservation and Recovery Act (RCRA). This type of cap would consist of a compacted clay layer, a high density polyethylene layer, a drainage layer, and a soil revegetation layer. This cap would provide additional protection from infiltration and erosion of rainwater.

The Total Cost for this alternative is approximately $11,170,000.

**Alternative No. 3: Excavation with Onsite Treatment and Offsite Disposal**
This alternative would involve the excavation of mercury-contaminated sediment in the Upper Arm Swamp Zone, onsite treatment of the soil by stabilization, loading of the treated material onto trucks, and transportation to an approved disposal facility. After contaminated materials had been removed, the Site would be backfilled with clean fill material from an offsite source and, then, revegetated. The Site layout would require specific areas for material handling and preparation, storage, treatment, and loading.

After excavation, soils analyzed and determined to be at risk would be required to be chemically stabilized onsite prior to transport to an approved land disposal facility. Post cleanup monitoring would be required to assess the long term performance of this remedial action. Annual Monitoring would be conducted for 10 years after implementation of remedial actions.

The total cost for this alternative would be between $21.2 million and $78.2 million.

**Alternative No. 4: Excavation with Onsite Treatment and Onsite Disposal**
The primary components of No. 4 are excavation of mercury-contaminated sediments in the Upper Arm Swamp Zone, onsite treatment of the soil by stabilization, onsite disposal in newly constructed onsite landfill, backfilling with clean soil, revegetation, and monitoring. The new landfill construction would require extensive siting, design, and regulatory review.

After excavation, soils analyzed and determined to be at risk would require chemical stabilization onsite prior to disposal in an onsite land facility. Post cleanup monitoring would be required to assess the long term performance of this remedial action. Annual Monitoring would be conducted for 10 years after implementation of remedial actions. Post cleanup monitoring would be required to assess long-term effectiveness of the action. Annual monitoring would be conducted for 10 years after implementation of remedial actions.

The total cost for Alternative 4 would be approximately $30.6 million.

**Alternative No. 5 - IN SITU Solidification/Stabilization**
Alternative 5 would consist of adding mercury complexing agents directly to contaminated sediment in the Upper Arm Swamp Zone areas of concern to bind the mercury (decrease its availability to the biota). Cement and lime would also be added to solidify the sediments. A total of 25 acres would be treated. This alternative would effectively destroy the 25 acre wetlands of the Upper Arm Swamp Zone, but would allow this zone to continue to function as a channel for stream flow. As a component of this option, mitigation of the destroyed wetlands through the creation of new wetlands at another location on the Site would be necessary. This alternative would
also provide for an extensive study and verification effort to demonstrate ecosystem viability under existing conditions. The total cost of this alternative is estimated at $36.5 million.

TRANSITION ZONE

The alternatives that were developed for the Transition Zone are summarized in the chart on page 9. These alternatives are variations of excavation and capping of the contaminated areas.

Alternative No. 1, the No Action Alternative, would allow for natural sedimentation of the Transition Zone. The total cost for this alternative would be estimated at 625,000.
Alternatives 2, 3, and 4 would include variations on excavation of contaminated areas in the Transition Zone. Contaminated sediment would be hauled to the Upper Arm Swamp Zone and placed for capping or brought to either an onsite or offsite landfill. If contaminated sediment is hauled from the Transition Zone to the Upper Arm Swamp Zone it would not trigger the RCRA Land Disposal or Minimum Technology Regulation because it would be movement of remediation wastes within a Corrective Action Management Unit (CAMU). The CAMU is the entirety of Cold Creek Swamp (Figure 2). The excavated area would then be backfilled with clean soil and revegetated. Alternative 2 would cost between $1.47 million and $6.57 million, Alternative 3 between $2.37 million and $28.67 million, and Alternative 4 between $7.67 million and $69.97 million.

Alternative No. 5 would emphasize containment of the contaminated sediment. Sheet piling would be installed in order to isolate the contaminated sediment. If necessary, any wooded areas would be cleared and removed. A geotextile filter fabric would then be placed over the contaminated area followed by a 2-ft cap of soil which would be revegetated. This Alternative will cost between $1 million and $11.2 million.

Alternative Nos. 6 and 7 would also emphasize containment of contaminated sediment. Alternative No. 6 would make use of cement or asphalt capping materials which would be placed after regrading and compacting the area and establishing a proper base. Alternative No. 7 would utilize a multimedia capping approach with highly impermeable clay as part of a system of layers comprising the cap. These Alternatives have costs similar to Alternative 5 above.
### Remedial Action Alternatives

**Cold Creek Swamp, Alabama**

#### Middle/Lower Swamp Transition Zone

<table>
<thead>
<tr>
<th>Alt</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Action/Natural Recovery/Verification of Ecosystem Viability.</td>
</tr>
<tr>
<td>2a</td>
<td>Excavate 7 acres (1 ft), haul contaminated sediment to the Upper Arm for containment and capping, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>2b</td>
<td>Clear/remove 14 acres of woods, excavate 25 acres (1 ft), haul contaminated sediment to the Upper Arm for containment and capping, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>2c</td>
<td>Excavate 7 acres (2 ft), haul contaminated sediment to the Upper Arm for containment and capping, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>2d</td>
<td>Clear and remove 14 acres of woods, excavate 25 acres (2 ft), haul contaminated sediment to the Upper Arm for containment and capping, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>3a</td>
<td>Excavate 7 acres (1 ft), stabilize contaminated sediment if required, haul contaminated sediment to onsite landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>3b</td>
<td>Clear/remove 14 acres of woods, excavate 25 acres (1 ft), stabilize contaminated sediment if required, haul contaminated sediment to onsite landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>3c</td>
<td>Excavate 7 acres (2 ft), stabilize contaminated sediment if required, haul contaminated sediment to onsite landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>3d</td>
<td>Clear and remove 14 acres of woods, excavate 25 acres (2 ft), stabilize contaminated sediment if required, haul contaminated sediment to onsite landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>4a</td>
<td>Excavate 7 acres (1 ft), stabilize contaminated sediment if required, haul contaminated sediment to offshore landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>4b</td>
<td>Clear/remove 14 acres of woods, excavate 25 acres (1 ft), stabilize contaminated sediment if required, haul contaminated sediment to offshore landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>4c</td>
<td>Excavate 7 acres (2 ft), stabilize contaminated sediment if required, haul contaminated sediment to offshore landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>4d</td>
<td>Clear and remove 14 acres of woods, excavate 25 acres (2 ft), stabilize contaminated sediment if required, haul contaminated sediment to offshore landfill for disposal, backfill excavation (2 ft), and revegetate.</td>
</tr>
<tr>
<td>5a</td>
<td>Contain 7 acres with sheet piling, isolate with geotextile filter fabric, cap with 2 ft of soil, and revegetate.</td>
</tr>
<tr>
<td>5b</td>
<td>Clear and remove 14 acres of woods, contain 25 acres with sheet piling, isolate with geotextile filter fabric, cap with 2 ft of soil, and revegetate.</td>
</tr>
<tr>
<td>6a</td>
<td>Contain 7 acres with sheet piling, isolate with geotextile filter fabric, dewater containment area, cap with 5 ft of soil, 6 inches crushed stone, and 4 in. concrete or asphalt.</td>
</tr>
<tr>
<td>6b</td>
<td>Clear/remove 14 acres of woods, contain 25 acres with sheet piling, dewater containment area, isolate with geotextile filter fabric, cap with 5 ft of soil, 6 in. crushed stone and 4 in. concrete or asphalt.</td>
</tr>
<tr>
<td>7a</td>
<td>Contain 7 acres with sheet piling, dewater containment area, isolate with geotextile filter fabric, cap with 5 ft of clay soil, geomembrane, drainage layer, 2 ft cover soil, and revegetate.</td>
</tr>
<tr>
<td>7b</td>
<td>Clear and remove 14 acres of woods, contain 25 acres with sheet piling, dewater containment area, isolate with geotextile filter fabric, cap with 5 ft of clay soil, geomembrane, drainage layer, 2 ft cover soil, and revegetate.</td>
</tr>
</tbody>
</table>
EPA evaluated each alternative by the standard criteria shown at the top of page 12 to determine which would best reduce risks posed by Cold Creek Swamp.

Protection of Human Health and Environment

Upper Arm Swamp Zone
All of the alternatives would provide adequate protection of human health since the RI indicated that the Site does not represent a human health risk based upon the exposure assumption. All of the alternatives, except Alternative No. 1 (No Action/Natural Recovery With Monitoring), would provide protection to the environment. Alternative No. 3 (Excavation/Onsite Treatment/Offsite Disposal), and Alternative No. 4 (Excavation/Onsite Treatment/Onsite Disposal) provide a short-term reduction in ecological risk. Alternative No. 2 (Capping With Surface Water Diversion) and Alternative No. 5 (In Situ Solidification/Stabilization) would provide source area containment.

Transition Zone
All of the alternatives would provide adequate protection of human health since the RI indicated that the Site does not represent a human health risk based upon the exposure assumption.

The FS indicated the Transition Zone as an area of "concern" and that it may be contributing to continued uptake of mercury by the biota. All alternatives except for Alternative #1 would provide for protection of the environment.

Alternative Nos. 2, 5, 6, and 7 would be actions totally within the confines of Cold Creek Swamp. Alternative Nos. 3 and 4 would be designed to remove sources of contamination from Cold Creek Swamp. Alternative No. 1 is also expected to immobilize the contaminant source area in the long-term through natural sedimentation, but would not do so in the short term.

Alternative No. 2 (Excavation/Haul to Upper Arm Swamp Zone for Capping), Alternative No. 3 (Excavation/Treatment/Onsite Disposal) and Alternative 5, 6, and 7 are all capping alternatives. They would change the topography of the Transition Zone with resulting change in hydrology and a definite ecological impact, but to an uncertain degree.

Alternative No. 4 (Excavation/Treatment/Offsite Disposal) would result in an immediate short-term ecological risk due to resuspension of contaminated sediments. Alternative 3 and 4 would permanently remove the contamination from Cold Creek Swamp.

Compliance with ARARs

Upper Arm Swamp Zone
All alternatives would meet their respective standards except for Alternative No. 1 (No Action). Alternative No. 2 would provide for the creation of a new wetland in the area where the new drainage channel would be excavated. Alternative Nos. 3 and 4 assume restoration of wetlands in the Upper Arm Swamp Zone subsequent to source area excavation activities. Alternative No. 5 would require the creation of a wetland at some other location at the Plant Site. Any mitigation (creation) of wetlands will comply with the requirements of Section 404 of the Clean Water Act, and applicable regulations.

Transition Zone
All alternatives would meet their respective ARARS except for Alternative No. 1 (No action). Wetland and sediment erosion control requirements must be considered for Alternative 2 through 7. Excavation alternatives (2, 3, 4) would have to satisfy Clean Water Act requirements during the excavation operations. Any mitigation (restoration) of wetlands will comply with the requirements of Section 404 of the Clean Water Act, and applicable regulations.

Long-Term Effectiveness and Permanence

Upper Arm Swamp Zone
The capping alternative (No. 2), the excavation/disposal alternatives (Nos. 3 and 4), and the in situ treatment alternative (No. 5) would
provide long-term effectiveness and permanence, because these alternatives would use processes to reduce hazards posed by all known contaminants at the Site.

Transition Zone
Alternative Nos. 1 through 7 would provide long-term effectiveness and permanence. Alternative Nos. 2, 3, and 4 are excavation/disposal alternatives. These options would require that contaminated material be excavated and removed from the designated source area. Alternative Nos. 2, 3, and 4 would remove mercury contaminated sediments and backfill 2 feet of soil to render any residual contamination non-bioavailable.

Alternative No. 2 would involve disposal in the Upper Arm Swamp Zone and is conditional upon the selection of capping or the remedial alternative for the Upper Arm Swamp Zone being a selected remedy. In Alternative No. 3, waste would be treated and disposed of in a newly constructed landfill on the Cold Creek/LeMoyne Plant Site. Alternative No. 3 would provide for source area removal, but not for removal of contaminants from the Plant Site. In Alternative No. 4, waste is treated and taken to an EPA-approved offsite disposal facility. This approach moves contaminated sediment to another location. Alternative No. 4 would provide for permanent removal of the source of mercury contamination from the Site provided capacity is available.

Alternative Nos. 5, 6, and 7 would cover contaminated sediment and provide a barrier to prevent contact of the contaminated sediments by biota. This barrier should effectively preclude bioaccumulation of mercury as a result of contact with the source area. Capping would only be an effective long-term action provided that regular inspection and maintenance are conducted.

Reduce Toxicity, Mobility, or Volume by Treatment

Upper Arm Swamp Zone
Alternative No. 1 would provide good reduction of the toxicity and mobility after a period of time; however, the period of time is uncertain. It would not provide for volume reduction.

Alternative No. 2 (Capping) would provide for the highest reduction of the toxicity and mobility of contaminated sediment, but would not provide volume reduction because material remains onsite.

Alternative Nos. 3 and 4 would provide for good long-term reduction of toxicity and mobility, in addition to providing the highest reduction of volume, because these alternatives would provide for removal, treatment, and offsite disposal of contaminated soils. These alternatives, however, would allow for short-term increase in contaminant mobility and toxicity for the first year after implementation of the action due to resuspension/increased bioavailability of mercury.

Alternative No. 5 would provide for good reduction of toxicity and mobility of contaminants through treatment, but would not provide volume reduction since materials remain onsite.

Transition Zone
Alternative No. 1 would provide good reduction of toxicity and mobility after an uncertain period of time, but would not reduce volume.

Alternative Nos. 2, 3, and 4 would provide for long-term reduction of toxicity and mobility. These alternatives, however, would allow for short-term increase in contaminant mobility and toxicity after implementation of the action due to resuspension/increased bioavailability of mercury.

Alternative No. 5, 6, and 7 would provide reduction of the toxicity and mobility of contaminated sediment, but would not provide volume reduction.

Short-Term Effectiveness

Upper Arm Swamp Zone
All alternatives except for No. 1 would provide short-term effectiveness. Alternative No. 2 (Capping) is anticipated to have the greatest short-term effectiveness.

The excavation/disposal alternatives (Nos. 3 and 4) would present the greatest short-term risks to site workers and the public. Releases of mercury vapors during excavation would be very difficult to control. Workers would be directly exposed to dermal and respiratory hazards during excavation, materials handling, and loading of wastes. Hazards associated with offsite transport of contaminated sediment must be considered. Another short-term risk associated with Alternative No. 4 would be storage of excavated wastes prior to treatment. Environmental risk from
CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES

In selecting a preferred cleanup alternative, EPA uses the following criteria to evaluate each of the alternatives developed in the Feasibility Study (FS). The first two criteria are essential and must be met before an alternative is considered further. The next five are used to further evaluate all options that meet the first two criteria. The final two criteria are used to further evaluate EPA's proposed plan after the public comment period has ended and comments from the community and the State have been received. All nine criteria are explained in more detail here.

- Overall Protection of Human Health and the Environment — Assesses degree to which alternative eliminates, reduces, or controls health and environmental threats through treatment, engineering methods, or institutional controls.

- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) — Assesses compliance with Federal-State requirements.

- Cost — Weighing of benefits of a remedy against the cost of implementation.

- Implementability — Refers to the technical feasibility and administrative ease of a remedy.

- Short-Term Effectiveness — Length of time for remedy to achieve protection and potential impact of construction and implementation of the remedy.

- Long-Term Effectiveness and Performance — Degree to which a remedy can maintain protection of health and environment once cleanup goals have been met.

- Reduction of Toxicity, Mobility, or Volume Through Treatment — Refers to expected performance of the treatment technologies to lessen harmful nature, movement, or amount of contaminants.

- State Acceptance — Consideration of State's opinion of the preferred alternatives.

- Community Acceptance — Consideration of public comments on the Proposed Plan.

Sediment suspension and transport would be significant, but is not as great as for Alternative No. 5. Also there is a short-term ecological risk to biota due to resuspension of contaminated sediment.

The in situ treatment action (Alternative No. 5) would result in exposure to contaminated sediment by workers during the stabilization/solidification process. It would provide minimal exposure to the surrounding community. It could be completed in 6-9 months, but requires significant Site disturbance to implement. It would provide the least short-term environmental impact as sediments are made non-bio-available during the in situ mixing process.

Alternative Nos. 2 and 5 could be implemented within 6-9 months. Alternative No. 3 could be completed within 6-9 months. Alternative No. 4 would require at least 1-3 years.

Transition Zone
Alternative No. 1 (No Action) would have little or no effect on the surrounding environment in the short-term.
The excavation alternatives (Nos. 2, 3, and 4) would present the greatest short-term risks to site workers and the public. Releases of mercury during excavation will be very difficult to control. Workers would be directly exposed to dermal and respiratory hazards during excavation, materials handling, and loading of wastes. Hazards associated with offsite transport of contaminated sediment must be considered. Another short-term risk associated with Alternative Nos. 3 and 4 would be storage of excavated wastes prior to treatment. Environmental risk from sediment suspension and transport is significant.

Alternative Nos. 5, 6, and 7 would be anticipated to have the greatest short-term effectiveness. These alternatives would present the least amount of risk to workers, the community, and the environment. Alternative No. 5 could be implemented within 6-9 months. Alternative No. 2 could be completed in 9-12 months and would be implemented simultaneously with capping of the Upper Arm Swamp Zone if this remedy were selected. Alternative No. 4 could also be implemented in 9-12 months.

Alternative No. 3 could take several years to implement because of the technical issues associated with the capping and specification process. Alternative 6 and 7 would also take several years to implement because of the need to allow for sediment dewatering. This could be a problem due to the high rainfall in the local area.

### Implementability

#### Upper Arm Swamp Zone

**Alternative No. 1 (No Action/Natural Recovery)** would be the simplest to implement. This alternative would include long-term monitoring of sediment, biota, and surface water to assess performance of natural recovery.

**Alternative No. 2 (capping)** would also be relatively simple to construct and operate. Alternative No. 2 would include construction of a cap to eliminate the mercury sediment-water interface where methylation occurs and to contain source area contamination in-place. This activity would not be a difficult construction practice and does not require specialized expertise. Long-term monitoring and maintenance would be an essential component of this alternative.

**Alternative No. 3 (Excavation/Offsite Disposal)** would present significant difficulties during excavation and handling of contaminated sediment. Excavation/dredging would present construction-related and health-related concerns. Transport and offsite disposal would require permitting and coordination with the State of Alabama and the EPA-approved facility and might require consideration of RCRA transport and disposal requirements.

**In situ Solidification/Stabilization (Alternative No. 5)** would be more complex than alternatives previously discussed, particularly due to the swamp environment.

**Alternative No. 4 (Onsite Disposal)** would present the most difficulties in implementation. Excavation and material handling concerns would also apply to this alternative. Onsite treatment would require construction of a facility for treating the contaminated sediments. Onsite disposal would require construction of a landfill on plant property. Storage provisions for excavated wastes are required.

#### Transition Zone

**Alternative No. 1** would be the simplest to implement. This alternative would include a 5 year monitoring of sediment and mercury body burdens in fish. It would also include an analysis of the Cold Creek Swamp system viability by way of comparison to a similar non-contaminated swamp system(s).

**Alternative No. 2** would be relatively simple to implement. However, it could only be done in conjunction with the capping of the Upper Arm Swamp Zone if this approach is selected. Excavation/dredging would present construction-related and health-related concerns. Transport and offsite disposal would require coordination with the State of Alabama and the EPA-approved facility and might require consideration of RCRA transport and disposal requirements, subject to results of TCLP (Toxicity Characteristic Leaching Procedure) testing. If contaminated sediment is hauled from the Transition Zone to the Upper Arm Swamp Zone it would not trigger the RCRA Land Disposal or Minimum Technology Regulation because it would be movement of remediation wastes within a Corrective Action Management Unit (CAMU). The CAMU is the entirety of Cold Creek Swamp (Figure 2).

**Alternative No. 3** would present the most difficulties in implementation. Excavation and materials
handling concerns described above would apply to this alternative. Onsite treatment, if necessary, would require construction of a facility for treating the contaminated sediments. Onsite disposal would require construction of a landfill on Cold Creek/LeMoyne plant property. Provisions for storage of excavated wastes would be required.

Alternative No. 4 would present some concern with transporting contaminated sediment across the Plant Site and to the disposal facility. Excavation and dredging concerns would be the same as Alternative 2 above.

Alternative No. 5 would also be relatively simple to construct and operate. Alternative No. 5 would include construction of a cap to eliminate the mercury sediment-water interface where methylation occurs and to contain source area contamination in-place. This activity is not a difficult construction practice and would not require specialized expertise. Long-term monitoring and maintenance would be essential.

Alternative 6 and 7 would present significant construction difficulties due to the need to establish a base for cap construction. Dewatering effectiveness might be a problem. This could ultimately lead to a cap which quickly fails due to cracking. These alternatives would also require evaluation of impact to the powerline support structures.

**Cost**

**Upper Arm Swamp Zone**

Examination of costs indicates that the capital costs for Alternative No. 3 (Excavation/Disposal) are 45 times more than the capital costs for Alternative No. 2. Alternative Nos. 4 and 5 (assuming mercury-contaminated sediment to be classified as non-hazardous under RCRA) are 20 to 25 times more than capital costs for Alternative No. 2. Operation and maintenance costs for all alternatives are fairly comparable.

### SUMMARY OF COSTS

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>CAPITAL COST (IN MILLIONS)</th>
<th>PRESENT WORTH O&amp;M COST (IN MILLIONS)</th>
<th>TOTAL PRESENT WORTH COST (IN MILLIONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper Arm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.25</td>
<td>0.30</td>
<td>0.325</td>
</tr>
<tr>
<td>2</td>
<td>0.9-11.7</td>
<td>0.20</td>
<td>1.45-11.87</td>
</tr>
<tr>
<td>3</td>
<td>64</td>
<td>0.20</td>
<td>64.20</td>
</tr>
<tr>
<td>4</td>
<td>30.4</td>
<td>0.20</td>
<td>30.60</td>
</tr>
<tr>
<td>5</td>
<td>36.3</td>
<td>0.20</td>
<td>36.50</td>
</tr>
<tr>
<td><strong>Transition Zone</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.025</td>
<td>0.6</td>
<td>0.625</td>
</tr>
<tr>
<td>2</td>
<td>1.3-6.4</td>
<td>0.17</td>
<td>1.47-6.57</td>
</tr>
<tr>
<td>3</td>
<td>2.2-28.5</td>
<td>0.17</td>
<td>2.37-28.67</td>
</tr>
<tr>
<td>4</td>
<td>7.5-69.8</td>
<td>0.17</td>
<td>7.67-69.97</td>
</tr>
<tr>
<td>5,6,7</td>
<td>0.9-11.7</td>
<td>0.17</td>
<td>1.07-11.17</td>
</tr>
</tbody>
</table>
Transition Zone
Alternative No. 1 would be the least expensive. For cleaning up the 7 acres under the powerline cuts, the costs of Alternative Nos. 2 and 5 would be comparable.

Alternative No. 6 and 7 would be far more complicated capping approaches than just using a natural soil cap (Alternative No. 5) and would be three times more expensive than Alternative 5. The most expensive would be Alternative Nos. 3 and 4 if treatment were required prior to disposal. A summary of costs is presented on page 14.

State Acceptance
EPA has consulted with the Alabama Department of Environmental Management and will seek State concurrence on the Record of Decision (ROD), which will document EPA's remedy selection.

Community Acceptance
The purpose of the Proposed Plan, the comment period, and the public meeting is to encourage input from the public in the remedy selection process. EPA will determine community acceptance of the preferred alternative after considering comments received. EPA will include a Responsiveness Summary as an attachment to the ROD explaining how it addressed those comments.

EPA'S PREFERRED ALTERNATIVE

EPA's preferred cleanup alternative for Cold Creek Swamp is based upon a number of factors including mercury levels in sediment, mercury levels in biota, recommended levels of safety as found in the literature, the ecological risk assessment, and the risk to the ecosystem presented by the selected remedy. For the Upper Arm Swamp Zone of Cold Creek at the Stauffer Chemical Superfund Sites, the preferred alternative is No. 2d, Multi-layer Capping and Containment of the Upper Arm Swamp Zone with a Surface Water Diversion including Long-Term Monitoring of the entire swamp. This alternative would include burial of the mercury-contaminated soils in place. A multi-layer cap would be required to add additional protection. Creation of a new channel to divert the creek that currently runs through the Upper Arm Swamp Zone and revegetation of the new channel as a swamp. The remedy also includes long-term monitoring of the swamp to determine if making contaminants immobile will provide necessary protection of people and the environment. The criteria for this determination will be 0.5 ppm of mercury in whole body fish (bottom feeders, carnivores, omnivores) and 1.1 ppm of mercury in muscle, liver, and brain tissue of upper trophic levels of mammals. Also an evaluation of the toxicity to biota in Cold Creek Swamp will be required. This would provide the best balance of the evaluation criteria. The total estimated cost is $11,170,000. EPA believes these remedies would be fully protective, will meet standards, and uses permanent solutions.

EPA's preferred alternative for the Transition Zone of Cold Creek is Alternative 2d which is the excavation of significantly contaminated soil in the Transition Zone to a depth of 2 feet and hauling it to the Upper Arm Swamp Zone for capping. This will also include revegetation of the Transition Zone and continued monitoring of the entire swamp as described for the Upper Arm Swamp Zone. The total estimated cost would be $6,570,000. The total cost of remediation of the Upper Arm Swamp Zone and the Middle/Lower Transition Zone is $17,740,000.

In addition EPA would require a building up of the levees between Cold Creek Swamp and the Mobile River so as to limit exchange of contaminants from Cold Creek Swamp to the Mobile River. This is the addition of clean fill sediment to the current levees. Furthermore, posting of "No Fishing and Hunting" signs and strict security to prevent trespassing into Cold Creek Swamp would also be included.

EPA feels this proposed remedy will reduce high levels of mercury concentration in sediment and reduce risk of mercury contamination in all exposure pathways for ecological receptors in Cold Creek Swamp.
Administrative Record: Material documenting EPA’s selection of cleanup remedies at Superfund Sites, usually placed in the information repository near the Site.

ARARs: Applicable or Relevant and Appropriate Requirements. Refers to the federal and state requirements that a remedy that EPA selects must attain. These requirements may vary from site to site.

Biota: The flora and fauna of a region.

Waste Brine: A waste material composed of calcium sulfate, calcium carbonate, sodium chloride, magnesium hydroxide, and mercury.

Carbon Disulfide: A colorless, flammable organic liquid used in the manufacture of carbon tetrachloride and as an intermediate in the production of pesticides.

Carbon Tetrachloride: A colorless, non-flammable organic liquid with a characteristic odor. It has been classified as a probable human carcinogen and a systematic liver and kidney toxin.

Herptiles: Reptiles and amphibians.

Information Repository: File of data and documents located near a Superfund site.

In-situ: In the natural or original position requiring no moving or digging up.

Invertebrates: Animals without a backbone.

Methylate: The addition of a methyl group (CH₃) to a chemical or compound. Bacteria are able to methylate mercury.

Monitoring: Collection of data on contaminants in different environmental media (air, surface or groundwater, sediments, soils) to determine extent and impact or effectiveness of cleanup.

National Pollutant Discharge Elimination System (NPDES): A provision of the Clean Water Act prohibiting discharge of pollutants into U.S. waters unless issued special permit by EPA, a state, or (where delegated) a tribal government on an Indian reservation.

Part Per Million (ppm): Unit to express low concentrations of contaminants. For example, 1 oz. of xylene in 1 million ounces of water is 1 ppm.

Proposed Plan: Superfund public participation fact sheet which summarizes the preferred cleanup strategy and the rationale and a summary of the RI/FS.

Resource Conservation and Recovery Act (RCRA): Federal law establishing system to track hazardous substances from generation to disposal with requirements for safe treatment, transportation, storage, and disposal. RCRA is designed to prevent Superfund sites.

Remedial Investigation/ Feasibility Study (RI/FS): Study under Superfund long-term cleanup process to collect necessary data to determine the type and extent of contamination at NPL sites and examine possible alternatives for reducing risks posed by sites.

Record of Decision (ROD): Document explaining cleanup remedy to be used at NPL sites.

Thiocarbamates: A class of organic compounds used as herbicides.

Thiocyanates: A class of organic compounds containing sulfur and cyanide used as pesticides.

Wetland: Ecological communities, such as tidal flats, swamps, or bottomland hardwoods, containing standing water or high soil moisture over extended periods of time.
STAUFFER CHEMICAL SUPERFUND SITES
PUBLIC COMMENT SHEET

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the Stauffer Superfund Sites - Cold Creek Swamp is important in helping EPA select a final remedy for the site. You may use the space below to write your comments, then fold and mail. Additional comments may be included with this form.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Name__________________________________________
Address________________________________________
Phone #________________________________________
STAUFFER CHEMICAL SUPERFUND SITES

PUBLIC COMMENT SHEET

Name
Address
City     State     Zip

Betty Winter, Community Relations Coordinator
South Superfund Remedial Branch/Waste Division
U. S. EPA, Region 4
345 Courtland Street, NE
Atlanta, GA 30365
MAILING LIST ADDITIONS/CORRECTIONS

If you would like your name and address placed or corrected on the mailing list for the Stauffer Chemical Superfund Sites, please complete this form and return to Betty Winter, EPA, 345 Courtland Street, NE, Atlanta, GA 30365.

NAME: ____________________________________________

ADDRESS: _________________________________________

_____________________________________________________

TELEPHONE: _________________________________________

AFFILIATION (If any): ________________________________

United States Environmental Protection Agency
South Superfund Remedial Branch
Region 4
345 Courtland Street, NE
Atlanta, Georgia, 30365

Official Business
Privacy for Private Use
$300

Betty Winter
Community Relations Coordinator

INSIDE:
STAUFFER CHEMICAL SUPERFUND SITES
FACT SHEET