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EPA Superfund
Record of Decision Amendment:

COLEMAN-EVANS WOOD PRESERVING CO.
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WHITEHOUSE, FL
09/25/1997

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AMENDED RECORD OF DECISION
-INTERIM ACTION-

COLEMAN-EVANS WOOD PRESERVING

DUVAL COUNTY
WHITEHOUSE, FLORIDA

Prepared By
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

DECLARATION FOR THE AMENDED RECORD OF DECISION
-INTERIM ACTION-

SITE NAME AND LOCATION

Coleman-Evans Wood Preserving
Duval County
Whitehouse, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document represents an amendment to the selected remedial action for the Coleman-Evans Wood Preserving Site (Site) in Whitehouse, Florida. This decision is made in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record for the Site.

This amendment is necessary because during design of the remedy that was selected in the 1990 Amended Record of Decision, dioxin was discovered at the Site as a new contaminant of concern. Subsequent treatability studies have shown that the selected treatment train of soil washing, biotreatment, and solidification/stabilization, is not effective in reducing the concentrations of dioxin at the Site to acceptable levels.

This document selects a new interim remedy to address an estimated 45,000 cubic yards of pentachlorophenol (PCP) and dioxin-contaminated source material (i.e., soil, sediment, and debris) and expands the scope of the groundwater remedy to permanently address PCP-, and potentially dioxin-, contaminated groundwater in the upper surficial aquifer.

This amendment is considered an interim action because the U.S. Environmental Protection Agency (EPA) is selecting a soil dioxin cleanup level of 1.0 Ig/kg as an interim cleanup level for the Site. EPA believes that this cleanup level is protective of human health and the environment, but that the Agency should defer a final cleanup decision at this site pending release of EPA's final dioxin reassessment (embodied in the documents entitled "Health Assessment Document for 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds" and "Estimating Exposure to Dioxin-like Compounds") and pending an evaluation of the effects of the findings of the final dioxin reassessment on Superfund dioxin cleanup levels. EPA believes it is appropriate to take an interim action at this time to achieve significant risk reduction quickly while the reassessment is being completed.

The Florida Department of Environmental Protection (FDEP) has providod input as the support agency throughout the remedy selection process. Based on FDEP's comments to date, EPA expects that concurrence on this remedy will be forthcoming, although a formal concurrence letter has not yet been received.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF AMENDED REMEDY-INTERIM ACTION

The major components of the amended interim remedy include:

- Excavating approximately 45,000 cubic yards of PCP and dioxin-contaminated soil, sediment, and wood debris from the on-site and off-site areas;

- Treating the excavated soil, sediment, and some wood debris (primalily sawdust)in an on-site thermal desorber, followed by treatment of the off-gas;
- Backfilling the excavated area with treated material and/or clean fill and re-grading and re-vegetating all excavated areas;

- Recovering and treating PCP-contaminated groundwater in the upper surficial aquifer and collecting free-product for recycling and/or off-site disposal;

- Relocating residents, as necessary, to facilitate construction;

During pre-design, a treatability study will be conducted to verify the effectiveness of the thermal desorption treatment system. Should implementation of the selected interim remedy prove ineffective or remediation of PCP and dioxin-contaminated source material, a contingency remedy will be implemented. The contingency remedy is also an interim action pending release of the Agency's final dioxin reassessment.

The major components of the contingency remedy include:

- Excavating approximately 5,000 cubic yards of off-site contaminated soil and sediment and distributing it on-site;

- Backing the excavated area with clean fill and re-grading and re-vegetating all excavated areas;

- Constructing a multi-layer RCRA cap to contain the affected on-site area, including surface drainage controls;

- Recovering and treating PCP-contaminated groundwater in the upper surficial aquifer and collecting free-product for recycling and/or off-site disposal;

- Relocating residents, as necessary, to facilitate construction;

- Implementing deed restrictions and/or other institutional controls to prohibit future use of the Site in a manner that would compromise the integrity of the cap and its associated systems.

STATUTORY DETERMINATIONS

This amended interim action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although it is partially addressed by this remedy, will be addressed by the final response action. Subsequent actions may be used to address fully the threats posed by the conditions at this Site. Because the contingency remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action decision, review of this Site and of the selected and contingency remedies will be continuing as EPA continues to develop final remedial alternatives for the Site.

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AMENDED RECORD OF DECISION
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COLEMAN-EVANS WOOD PRESERVING
DUVAL COUNTY
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1.0 SITE LOCATION, BACKGROUND, AND DESCRIPTION

The Coleman-Evans Wood Preserving Site (Site) is an 11 acre, former wood preserving-facility, located in the town of Whitehouse, Florida approximately eight miles west of Jacksonville (Figure 1.1). The Site is bordered on the north by the Seaboard Coastline Railroad, on the south by residential homes along General Avenue, on the east by heavy vegetation, and on the west by residential homes, across Celery Avenue (Figure 1.2).

From 1954 to the mid 1980s, the Coleman-Evans facility (Coleman-Evans) treated wood products with a mixture of pentachlorophenol (PCP) and fuel oil. The treatment process included steaming, drying and pressure soaking the wood, all of which were carried out within a single pressurized chamber.

During the steaming process, wood products were impregnated with PCP and No. 2 fuel oil, using 255 degree Fahrenheit steam for a period of eight hours. During this process, wood extracts were driven from the pores of the wood which settled on the bottom of the chamber along with PCP and wastewater from the condensed steam.

Prior to 1970, the effluent waste-water from the treatment process was precipitated with caustic soda and aluminum sulfate, passed through a sand filter and discharged into a drainage ditch which channeled the water south to McGirts Creek. The precipitated sludge was deposited into two unlined pits, each approximately 100 feet by 50 feet, located along the southeastern boundary of the Site. In 1970, usage of the sludge disposal pits was discontinued when the company began storing its waste sludge in above ground storage tanks located adjacent to the pit area near the southwestern edge of the Site. The company voluntarily engaged the engineering firm of Reynolds, Smith and Hill to design a wastewater treatment system. Chlorination and lime precipitation were then incorporated into the treatment system to clarify waste-water.

Although wood treating operations ceased in the late 1980s, sawing and kiln drying of untreated lumber continued at the Site until mid-1994. Currently, all commercial activities at the Site have ceased.

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The Site is currently composed of two distinct areas. The first area, located on the western portion of the property, comprises the former wood treatment facility. The second area, located on the eastern portion of the property, comprises the landfill which was used for the disposal of wood chips and other facility wastes. Site surface features formerly include two unlined disposal pits, the contents of which were partially removed in July 1985 under an U.S. Environmental Protection Agency (EPA) Emergency Response Action, and the inactive wood treatment facility. The treatment facility was composed of a large pressure filter system and several storage sheds, most of which also were removed from the Site during early Emergency Response Actions.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In September 1980, groundwater contamination was confirmed at the Site by the City of Jacksonville, Department of Health, Welfare and Bio-Environmental Services. As a result, Coleman-Evans incorporated activated charcoal filters into its existing waste-water treatment system to improve the removal of organics.

In 1981, a closed-loop steam treatment system was constructed on-site which resulted in no discharge of process water. In that same year, Coleman-Evans was found by EPA to be in violation of hazardous waste reporting, planning, and safety requirements enforced under the Resource Conservation Recovery Act (RCRA). In October 1981, the Site was proposed for inclusion on the National Priorities List based on a hazard ranking score of 59.14.

In March 1983, the proposed inclusion of the Site on the National Priorities List became final. In that same year, Coleman-Evans was identified by EPA as a generator and storer of hazardous waste, in violation of RCRA requirements.

In September 1984, a Remedial Investigation/Feasibility Study (RI/FS) was initiated. The RI was delayed by Coleman-Evans' refusal to allow access to the Site. As a result, EPA and the Department of Justice filed a motion in Federal Court to obtain an order, granting access to the Site.

In June 1985, EPA and its agents were granted access to the Site. In that same year, EPA issued a Section 106 Removal Order to Coleman-Evans pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Coleman-Evans did not comply with the Section 106 Removal Order. As a result, in July 1985, EPA conducted an Emergency Response Action at the Site to control the major source of PCP contamination in the upper surficial aquifer. Two unlined pits were excavated and the contaminated soil/sludge was shipped off-site to a hazardous waste management facility in Emelle, Alabama. The pits were backfilled with clean material and french drains were installed.

In April 1996, the RI was completed which characterized the extent of contamination at the Site. In that same year, a Public Health Evaluation (baseline risk assessment) identified PCP as the primary contaminant of concern at the Site. PCP was shown to be present in sediment, soil, surface water and in the upper surficial aquifer. In July 1986, the draft FS was released to the public and in August 1986, a public meeting was held to present the FS alternatives to the community. In September 1986, the Record of Decision (1986 ROD) was signed. The 1986 ROD called for the: 1) excavation and incineration of soil (approximately 9000 cubic yards) contaminated with PCP at levels greater than 10 mg/kg, and 2) recovery of PCP-contaminated groundwater during excavation and treatment via a granular activated carbon adsorption unit. In October 1986, a General Notice letter was issued to Coleman-Evans regarding implementation of the Remedial Design/Remedial Action (RD/RA). Citing financial inability, Coleman-Evans declined to implement the RD/RA.

In December 1987, a Special Notice Letter was issued by EPA, giving Coleman-Evans an opportunity to enter into negotiations with EPA to implement the RD/RA. Citing financial inability, Coleman-Evans agains declined to implement the RD/RA.

In April 1988, a CERCLA Section 106 Order was issued to Coleman-Evans to implement the RD/RA. In response, Coleman-Evans requested a settlement conference with EPA. In April and May 1998, demand letters were issued to Coleman-Evans and Jack Coleman (president) for past costs incurred in the 1985 Emergency Response Action. In July 1988, the Department of Justice filed a civil action against Coleman-Evans, seeking recovery of those funds and punitive damages for failure to comply with the Section 106 Order.

Due to Coleman-Evans' refusal to cooperate with the Section 106 Order, EPA decided to use Federal funding to implement the RD. Based on data collected during RD, the volume of PCP-contaminated soil needing treatment was increased to approximately 27,000 cubic yards. Due to the increased cost associated with treating this material, EPA and the Florida Department of Environmental Protection (FDEP) decided to evaluate other alternatives in a treatability study.

The treatability study was initiated in March 1989. PCP-contaminated soil samples were obtained from the Site in order to investigate the technical effectiveness of other treatment technologies, particularly, soil washing, biotreatment, and solidification/stabilization (S/S). The treatability study was completed in March 1990.

In April 1990, Coleman-Evans settled with the United States Government for $350,000 and a complete covenant not to sue. In August 1990, a public meeting was held to present the treatability study recommendations and EPA's proposed amended remedy. In September 1990, an amended Record of Decision (1990 AROD) was signed calling for the: 1) remediation of soil contaminated with PCP at levels greater than 25 mg/kg via a treatment train consisting of soil washing, biotreatment and S/S, and 2) recovery of PCP-contaminated groundwater during excavation and treatment via a granular activated carbon adsorption unit. This treatment train was considered to be the most effective overall source control method.

At the request of the EPA's Site Assessment Section, Waste Management Division, an additional soil sampling investigation was conducted in June 1992. This investigation determined that dioxins/furans (henceforth referred to as dioxin) are also a contaminant of concern at the Site. As a result of the finding, further sampling was performed to determine the extent of the dioxin contamination. A removal action was performed in 1993 to remove the surface contamination from adjacent home owner yards, and install fencing between the street and drainage ditch to eliminate the possibility of the public coming in contact with the contamination.

Due to the presence of dioxin, the selected technology train was reevaluated. EPA completed a Focused Feasibility Study in April 1995 as part of that reevaluation.

Although PCP wood treatment operations ceased in the late 1980s, sawing and kiln drying of untreated lumber continued on the Site until 1994. Currently all commercial activities at the Site have ceased.

3.0 REASONS FOR ISSUING THE ROD AMENDMENT

During the design of the remedy for the 1990 AROD, soil samples were obtained as part of a treatability study to assess the levels of performance achievable by the selected treatment train. The samples revealed the presence of both PCP and dioxin at the Site.

The results of the treatability study show that the 1990 AROD treatment train is not effective in treating the dioxin found at the Site. Although soil washing is marginally effective on separating dioxin and PCP contaminants from soil particles, a large portion of the contaminants are bound up in the high percentage of wood fiber in the soil. Bio-treatment was found to be ineffective on the dioxin contamination found at the Site. The effectiveness of S/S is also questionable due to the high percentage of wood fiber in the soil, which presents problems in reaching the necessary S/S compressive strength. Attempts to separate the wood fiber from the soil were unsuccessful due to the heavy laden fuel oil on the wood fiber. At best, if the dioxin and PCP wood fiber could be separated from the soil, an undetermined volume of wood fiber still would require some form of treatment or disposal beyond that found in the 1990 AROD.

Based on the ineffectiveness of the 1990 AROD treatment train on the dioxin contamination at the Site, EPA and FDEP decided that other alternatives would be evaluated in a Focused Feasibility

Study. The remedial alternatives evaluated in the Focused Feasibility Study are presented in Section 8 of this AROD.

4.0 HIGHLIGHTS OF COMMUNITY INVOLVEMENT

In accordance with Sections 113 and 117 of CERCLA, as amended, and the National Contingency Plan (NCP) º300.435 (c)(2)(ii), EPA has conducted community involvement activities at the Site to solicit community input and ensure that the public remains informed about Site activities. EPA has relied upon a number of methods for keeping the public informed, including press releases, fact sheets, public meetings, establishment of information repositories, and holding public comment periods. The following summary presents the community involvement activities that were implemented in support of this document.

In October 1992, EPA and FDEP held a pubhc meeting to inform the public of the discovery of dioxin contamination at the Site. Although the public meeting was announced in the Florida Times Union, only a few members of the community participated.

Door-to-door community interviews were conducted in April 1995 to listen to the concerns of the community and explain the limited alternatives for addressing the dioxin contamination. EPA's mailing list was also updated at this time.

The Proposed Plan was released to the public in May 1995. Documents supporting the Proposed Plan were made available to the public for review in the Administrative Record maintained at EPA's Region IV office in Atlanta, Georgia, and at the Information Repository maintained at the Whitehouse Elementary School in Whitehouse, Florida. A notice of the Public Meeting was published in the Florida Times Union in June 1995.

A Proposed Plan public meeting was held on June 7, 1995 at the Whitehouse Elementary School. During this meeting, representatives from EPA presented various alternatives for addressing the Site, presented EPA's preferred alternative, and answered questions.

The 30-day public comment period was held from May 31, 1995 through June 30, 1995. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is part of this AROD (Appendix A).

During the public comment period, FDEP expressed concern with EPA's proposed cleanup levels for the site. Specifically, FDEP requested that EPA select a PCP cleanup level that would be protective of groundwater, and a dioxin cleanup level that provides a 1 x 10 -6 risk level. Finalization of this AROD was delayed from July 1, 1995 to July 31, 1997, while EPA and FDEP evaluated appropriate cleanup levels for the site and while additional Site characterization was performed to delineate dioxin contaminate levels off-site. A Community Update Fact Sheet was released to the public in August 1997 reporting the results of the off-site dioxin delineation.

This AROD will be added to the Administrative Record as required by the NCP º300.825(a)(2). The Administrative Record for the Site has been placed at the following Information Repositories:

U.S. Environmental Protection Agency, Region IV
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-3104
Phone: (404) 562-8855
Hours: Mon-Fii 8:00 a.m. to 4:00 p.m.

Whitehouse Elementary School
11160 General Avenue
Whitehouse, Florida 32220
Phone: (904) 693-7542
Hours: Mon-Fri 9:00 a.m. to 4:00 p.m.

5.0 SCOPE AND ROLE OF THE OPERABLE UNIT

EPA has organized the work at this Site into one operable unit to address groundwater, soil, sediment, and debris. Based on data currently available, this interim action is protective of human health and the environment and to the extent possible, is consistent with future actions planned for the Site. The scope of the contaminated media are as follows:

Soil, Sediment, and Debris: PCP and dioxin contamination on the 11- acre former Coleman Evans Wood Preserving property, residential area surrounding the Site, off-site drainage ditch leading from the southeastern portion of the Site through the residential area, and the off-site drainage ditch leading from the southwestern portion of the Site through the residential area to Interstate 10.

Groundwater: PCP contamination in the upper surficial aquifer underlying the Site and residential area.

The 11-acre Coleman-Evans property is the main area of soil contamination and debris at the Site.
This contamination has migrated, mostly through surface water runoff, to other nearby areas including the drainage ditches and residential area surrounding the property. Groundwater contamination primarily appears to be contained to the upper-surficial aquifer in the on-site area underlying the 11-acre property and in the nearby residential area.

6.0 SUMMARY OF SITE CHARACTERISTICS

This section provides a description of the Site surface features, under-lying strata and hygrogeologic information, as well as a summary of the sampling data that was collected for the purpose of characterizing the extent of Site contamination.

6.1 General Site Conditions

This Site is relatively flat, with less than ten feet of relief over the entire 11 acres. The Site drains by way of drainage ditches which flow southward, subsequently draining into McGirts Creek. Within a one mile radius of the Site, land use is primarily residential and light commercial/industrial. Agriculture near the Site is limited to small gardens. Outside of the one mile radius, the area is primarily undeveloped rural land up to the outskirts of Jacksonville, about eight miles to the can.

Locally, there is no municipal water supply. Thus, approximately 1000 residents rely on groundwater resources for drinking water. Surface waters in Duval County are used extensively for sport and recreation.

6.2 Site Geology and Hydrogeology

The top four to six feet of material covering the Site consists of poorly cemented fine grained quartz sand with minor amounts of clay and silt. Below this soil cover is a well cemented fine grained quartz sand unit which extends to 35 feet below ground surface (BGS). This unit is considered the upper surficial aquifer at the Site. A sandy clay unit with intermittent clay lenses and sand layers exists from 35 feet BGS to approximately 100 feet BGS. This 65 foot thick unit appears to act as a confining layer which separates the upper surficial aquifer and the deeper limestone aquifer. The limestone unit is present from 100 feet BGS to approximately 130 feet BGS. Both the upper surficial aquifer and the deeper limestone aquifer comprise the surficial aquifer system (Figure 6.1).

Groundwater flow in the upper surficial aquifer is predominantly from northeast to southwest. The depth to water is generally between two to five feet BGS, and the average horizontal hydraulic gradient is approximately 0.01. The saturated thickness of the upper surficial aquifer is 31 feet, horizontal hydraulic conductivity is 5.4 feet/day, specific yield is estimated to be 0.02, and storativity is 0.003. Recharge to the upper surficial aquifer occurs in the vicinity of the Site and groundwater discharges to McGirts Creek to the southwest.

Groundwater flow in the deeper limestone aquifer is toward the west-southwest under a horizontal hydraulic gradient of 0.04. The saturated thickness of the deeper limestone aquifer is 30 feet, horizontal hydraulic conductivity is 9.7 feet/day, and storativity is 0.0015. Based on water level measurements collected from both units, the upper surficial aquifer and the deeper limestone aquifer are not in hydraulic communication.

6.3 Nature and Extent of Contamination

Results of on-site and off-site sample analyses reveal a widespread occurrence of both dioxin and PCP contamination in soil and sediment and the presence of PCP in the upper surficial aquifer. The aerial extent of the dioxin and PCP contamination covers most of the Site, portions of the off-site residential area, as well as the drainage ditches south of the Site leading to McGirts Creek.

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6.3.1 Soil and Sediment

The two major sources of contamination are the process area on the western side of the Site, and the landfill area on the eastern side of the Site. Included in the process area is the southern border of the Site where the storage tanks and pits once were located.

Sampling data indicates the majority of on-site contamination is limited to the upper three feet of soil. Soil in the vicinity of boreholes 38, 40, and 44 however, contain PCP-contaminated soil down to 15 feet below ground surface. It is estimated there are approximately 300 cubic yards of contaminated soil at each of these areas (900 cubic yards total). No apparent hot-spots of contamination have been identified. Concentrations of PCP and dioxin (TEQ) vary across the Site, with the maximum concentrations detected at 3120 mg/kg and 230 Ig/kg respectively for the two contaminants. Table 6.1 shows the maximum soil concentrations detected at the Site.

Table 6.1: Maximum Concentrations of Contaminants Detected in Soil, Coleman-Evans Wood Preserving Site, Whitehouse, Florida

	SOIL SAMPLE DEPTH 1	DIOXIN 2,3 (Ig/kg)	PENTACHLOROPHENOL (mg/kg)
On-SITE	Surface	230 J	3120
	Subsurface	0.00037 J	2423
OFF-SITE	Surface	54 J	480
	Subsurface	7.11	430

1 Surface samples were taken from 0-6 inches below ground surface. Subsurface samples were taken from 24-30 inches below ground surface.
2 Dioxin concentrations are total 2,3,7,8 TCDD Toxicity, Equivalents: I-TEQs/89.
3 Estimated concentrations are represented by "J".

Some dioxin contamination also has been identified in the residential area new the off-site drainage ditches, some of which was removed during previous Emergency Response Actions. Sampling conducted in August 1995 indicates that dioxin is present underneath one home at a concentration of 16 Ig/kg, and in the backyard of another home at a concentration of 1.6 Ig/kg. Maximum concentrations of PCP and dioxin in the off-site areas have been detected at 480 mg/kg and 54 Ig/kg, respectively.

A total estimated (on-site and off-site) volume of 45,000 cubic yards of PCP and dioxin-contaminated soil and sediment are estimated to require remediation at the Site. This estimate is based upon an interim cleanup level of 1.0 Ig/kg for dioxin, and a final cleanup level of 2.0 mg/kg of PCP. Figure 6.2 shows the dioxin and PCP boundaries requiring remediation.

In general, the soil found at the Site is a fine sand. In the landfill area there is visible humic and organic material, much of this being small wood chips. In the old process area the soil is stained and oily. Table 6.2 lists the general characteristics of composite soil samples taken from these two area.

6.3.2 Groundwater

The contaminant of concern in the upper surficial aquifer is PCP and associated petroleum hydrocarbons and free product. Analytical results from borehole and temporary monitoring well samples collected in 1980, 1983, and 1985 were used to delineate the extent of PCP contamination in the upper surficial and deeper limestone aquifers in the 1986 ROD and 1990 AROD. This data shows there is no PCP contamination in the deeper limestone aquifer.

There are presently 12 monitoring wells associated with the Site; two of the wells are located northwest of the Site, two wells are located in the southwest corner of the Site and the remaining eight wells are located off-site near the southern Site boundary. In January 1994, these wells were sampled by EPA and the results showed non-detect concentrations for PCP in the upper surficial aquifer. This recent upper surficial aquifer data was added to the historical upper surficial aquifer data (obtained over the five-year period between 1980 and 1985 from boreholes and temporary monitoring wells that are no longer in place), and a new contour map of PCP contamination in the upper surficial aquifer was constructed. This data is illustrated in Figure 6.3. This updated map does not differ considerably from the original maps included in the 1986 ROD and 1990 AROD, but the new analytical data appears to further define the western and southern (downgradient) extent of the PCP plume in the upper surficial aquifer. It is assumed that PCP contamination, noted in the historical borehole data, is still present on-site.

The reliability of the data used in this AROD to accurately define the extent of groundwater contamination is questionable due to the use of analytical methods with quantitation limits (50 to 200 Ig/l) significantly above the anticipated cleanup level. Therefore, additional groundwater data will be collected during RD to accurately define the PCP plume.

PCP-laden oil, or free-product, has been observed in the southeastern section of the Site; however, limited data is available on its extent. In March 1994, EPA placed seven boreholes along the southern portion of the Site and found no measurable oil. There was however measurable oil in a two inch pipe just south of the Site boundary. At this time it appears that the free product is localized in pockets and not in a distinct plume. Since there is not enough documentation at this time to estimate the volume of free-product, further characterization will be conducted during RD.

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Table 6.2 Characteristics of Contaminated Soil in the Process and Iandfill Areas.
Source: Focused Feasibility Study, April 1995

Characteristic	Process Area	Landfill Area
PCP (mg/kg)	6300	16
Dioxin/Furan (TEQ)(Ig/l)	43	23
Total Petroleum Hydrocarbon (mg/kg)	49,000	2200
Total Organic Carbon (mg/kg)	180,000	170,000
Total Chloride (mg/kg)	62	60
Ash (%)	93	68
BTU (MJ/kg)	2.9	6.4
Abrasiveness (Wt.loss rate mg/hr)	8 - 11	25 - 29
Organic Content (%)	6.4	28.3
% Gravel, >#10 mesh	2	7
% Sand, < #10 - > #200 mesh	92	80
% Clay & Silt, < #200 mesh	6	13

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Analytical results from groundwater samples collected from monitoring wells screened in the deeper limestone aquifer during 1980-85 show that the deeper limestone aquifer is not contaminated with PCP. During the 1994 sampling event, only one deeper limestone aquifer sample had any detectable PCP. This was from monitoring well MW-56 which had a PCP concentration of 12 I/kg. The first set of sampling data demonstrated that the upper surficial aquifer is unlikely to impact the deeper limestone aquifer, therefore, it is doubtful that the contamination from the upper surficial aquifer has contaminated the deeper limestone aquifer. Monitoring well MW-56 is located near the area where free-product has been observed and high levels of PCP have been reported in the upper surficial aquifer. It is suspected that monitoring well MW-56 is providing a conduit for PCP-contaminated groundwater from the upper surficial aquifer to the deeper limestone aquifer. The monitoring well cluster (consisting of MW-55 and MW-56) will be re-sampled during RD to confirm EPA's conclusion that the deeper limestone aquifer is not contaminated. If necessary, MW-55 and MW-56 will be plugged, abandoned, and replaced.

No dioxin contamination has been identified in groundwater from the upper surficial aquifer or deeper limestone aquifer. Dioxin is generally not mobile in the groundwater environment, therefore, the theoretical potential for future migration is low. However, since dioxin and PCP is associated with the free-product found at the Site, the carrier fuel oil may expedite their movement through the groundwater.

6.4 Contaminant Fate and Transport

The primary contaminants of concern for the Site are PCP and dioxin. These contaminants of concern have migrated from the source areas on-site as evidenced by the off-site contamination. The migration pathways appear to be basically lateral, in other words; floating product, dissolved aqueous phase, and runoff. The surficial soil contamination appears to be consistent with surface water patterns. There are two particular sources of concern. First, the floating product has been observed on-site, but not fully characterized; and second, in deep contamination areas around boreholes 38, 40, and 44, which are in the surficial aquifer.

Predicting contaminant fate can be done, but, requires the organization of complex Site characterization data for each contaminant of concern. This data assists in determining where a specific waste compound is located, where it is going, how fast it is moving, and what types of environmental degradation or chemical transformation it is undergoing in the process. This knowledge enables prediction of the persistence, mobility, rate of transport, and migration pathways of a given contaminant, as well as its concentration and toxicity, both in place and during environmental transport. This type of modeling has not been done for the Site.

Before groundwater transport modeling can be done at the Site the following data would be needed: 1) saturated soil samples must be collected and analyzed for total organic carbon, bulk density, percent clay, and PCP contamination; 2) co-located groundwater samples must be collected and analyzed for PCP at the same time.

At this point, no air pathway analysis has been performed. There is a series of Air Superfund National Technical Guidance Studies that can be utilized during the RD to estimate the air emissions during cleanup.

7.0 SUMMARY OF SITE RISKS

A baseline risk assessment is conducted to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action.

A Public Health Evaluation was developed in 1986 based on the presence of PCP, the only contaminant of concern known at the time. Since subsequent sampling has indicated the widespread presence of dioxin, a Focused Baseline Risk Assessment Addendum was prepared in 1996 to supplement the 1986 evaluation.

7.1 Summary of 1986 Public Health Evaluation

In order to assess the current and potential future risks for the Site, a Public Health Evaluation was performed as part of the remedial investigation in 1986. This evaluation identified only PCP as a contaminant of concern.

7.1.1 Identification of Potential Receptors

Potential receptors of Site contamination are the residents of Whitehouse, Florida, who live in the vicinity of the Site, and the users of private water supply wells located down-gradient of the Site.

Approximately six homes in Whitehouse share a common boundary with the Site. All of the residences in the vicinity of the Site use private wells as a source of drinking water. It is estimated that there are 180 domestic wells within a one mile radius of the Site and 1,620 wells within a three mile radius of the Site. Several homes are downgradient and very close to the Site and their wells may be candidates for contamination from wastes percolating into the surficial aquifer, which may supply these wells. The Florida Department of Health and Rehabilitative Services (HRS) has been sampling private wells for PCP and metals within the immediate vicinity of the Site since 1990 and has found the water safe for human consumption.

7.1.2 Identification of Exposure Pathways

Based on the considerations of potential receptors and migration characteristics of PCP, the evaluation identified five exposure pathways. The current industrial exposure pathways identified in the 1996 Public Health Evaluation are:

1. Ingestion and dermal contact with contaminated soil.
2. Inhalation of airborne particles.
3. Dermal contact with surface waters.

The future residential exposure pathways identified in the 1986 Public Health Evaluation are:

4. Ingestion of contaminated groundwater.
5. Ingestion of vegetables grown in contaminated soil.

Potential exposure levels were determined for each pathway based on the mean and maximum concentration of PCP detected in the appropriate media.

7.1.3 Risk Characterization

A hazard index (HI) value was calculated for each of the five pathways. All three current exposure scenarios yielded HI values well below 1.0 indicating that no health risk would be anticipated. However, both future exposure scenarios gave unacceptable HI values. Potential future exposure (by ingestion) to the maximum detected level of PCP in water from the surficial aquifer gave an HI value of 12. The consumption of root crops irrigated with this water could produce exposure to PCP in consumers at an HI level of 4.

This 1986 Public Health Evaluation concluded that the potential future exposures to unacceptable levels of PCP in groundwater, plus the existing soil source of PCP discharge to groundwater, necessitates remediation of the Site.

Potential environmental effects may also occur from contaminants observed in surface waters associated with the Site. The surface water concentrations of PCP alone indicate that the Site poses a threat to aquatic species.

7.2 1996 Focused Baseline Risk Assessment Addendum

The majority of waste generated by the wood preserving operation were managed, treated, and disposed of on-site throughout the Site's history. The 1986 Public Health Evaluation determined that Site-associated contamination could be localized to both soil and groundwater. To develop a list of indicator chemicals (i.e., chemicals of potential concern), soil sampling data for metals were compared to blanks as well as to textbook background values (Conner and Shacklette, 1977). According to the 1986 evaluation, the final fist of contaminants did not include any metals since their concentrations were "within or close to the normal range present" in the Site area.

The organic contaminants detected most frequently in on-site soil samples, according to the 1986 Public Health Evaluation, was PCP. Other organic contaminants detected on-site included tetrachlorophenol, napthalenes, alkanes, and xylenes. Also, dioxin was detected during the screening of five surface samples, with the highest concentration being 0.1 Ig/kg.

Considering the distribution, toxicity, persistence, and mobility of the contaminants at the Site, the 1996 Public Health Evaluation concluded that the indicator chemicals be narrowed to include PCP (primarily because of its widespread presence) and total xylenes.

According to the 1996 Focused Baseline Risk Assessment Addendum, xylene was not considered a potential chemical of concern due to its low toxicity and the fact that the detected concentration did not exceed the residential toxicity screening level of 16,000 mg/kg. Also, dioxin (and its congeners) was added as a potential chemical of concern based on it being identified as a widespread contaminant. Consequently, PCP and dioxin are the chemicals of potential concern that were carried through the calculations performed as part of the 1996 Focused Baseline Risk Assessment Addendum. For the purpose of the 1996 Focused Baseline Risk Assessment Addendum, contaminants were subdivided into four separate areas based on the PCP contamination pattern: 1) on-site inside of the known PCP boundaries, 2) on-site outside the known PCP boundaries, 3) off-site inside of the known PCP boundaries, and 4) off-site outside of the known PCP boundaries.

7.2.1 Exposure Assessment

The 1986 Public Health Evaluation calculated a "Most Probable Case" exposure concentration by determining the geometric mean of the detected contaminants (using one half the detection limit when the detection limit was less than the minimum reported concentration). The "Realistic Worst Case" concentration reflected the maximum detected concentration for each contaminant.

The reasonable maximum exposure (RME) point concentration term was calculated based on the distribution of contamination as presented in the 1995 Focused Feasibility Study. Whenever greater than two samples were collected, a log normal distribution was predicted statistically (W- Test), as also seen in Table 7.1. Also, in all cases (except for PCP localized to the "On-Site Outside Known PCP Boundaries" area), the RNE log normal concentration was greater than the maximum concentration. Therefore, the maximum concentrations were used in the calculations per EPA guidance. It is important to note that the "maximum concentrations" used in the 1996 Focused Baseline Risk Assessment Addendum may not represent the actual maximum concentrations that have been detected at the Site. Use of concentrations less than the actual maximum concentrations does not change the conclusions reached for the Site. The dioxin RMEs for the on-site areas, inside and outside the known PCP boundary were 31 Ig/kg and 72 Ig/kg, respectively. The corresponding PCP concentrations were 430,000 Ig/kg and 220,000 Ig/kg respectively. The dioxin RMEs for the off-site areas, inside and outside the known PCP boundary, were 10 Ig/kg and 38 Ig/kg, respectively. The corresponding PCP concentrations were 360,000 Ig/kg and 25,000 Ig/kg, respectively.

7.2.2 Identification of Exposure Pathways

According to the 1986 Public Health Evaluation, two potential exposure pathways were presented at that time with respect to soil contamination. The current scenarios included a worker scenario (reflective of the plant during its operation) and a trespasser scenario ("persons living in or visiting areas in the vicinity of the Site"). The document concluded that the worker exposure is likely to carried through the risk assessment process. For the future scenario, the 1986 Public Health Evaluation developed two scenarios for groundwater only. These included a plant uptake of chemicals from solution (e.g., "soil water") and a residential groundwater ingestion pathway. The 1996 Focused Baseline Risk Assessment Addendum concurred that the worker scenario is the best representative of current land use and thus carried it through the updated analysis for on-site contamination. However, since the Site is near a residential neighborhood and thus could potentially become a residential area, a future residential scenario (child only) was evaluated for on-site contamination. Additionally, off-site contamination was not characterized prior to the 1986 Public Health Evaluation. Thus, since recent sampling indicates that contamination has migrated off-site, an off-site residential scenario is considered complete and calculated under both current and future scenarios. Table 7.2 lists the complete exposure pathways associated with the Coleman-Evans Site.

Table 7.1 Reasonable Maximum Exposure Point Concentrations for Contaminants of Potential Concern

On-Site Known PCP Boundaries

Chemical	Range of Detected Conc. (mg/kg) 1	95% UCL Concentration	W-Test Number	Distribution	RME Exposure Point Conc. 3	Source of RME
Dioxin	0.0077 - 0.031]	0.0349	0.8	Lognormal	0.031	Maximum
PCP	8.7-430	34,600	0.9	Lognormal	430	Maximum

On-Site Outside Known PCP Boundaries

Chemical	Range of Detected Conc. (mg/kg) 1	95% UCL Concentration	W-Test Number	Distribution	RME Exposure Point Conc. 3	Source of RME
Dioxin	0.000022 - 0.072	7.13	0.87	Lognormal	0.072	Maximum
PCP	0.57-240	220	0.85	Lognormal	220	950% UCL

off-site Inside Known PCP Boundaries

Chemical	Range of Detected Conc. (mg/kg) 1	95% UCL Concentration 2	W-Test Number 2	Distribution 2	RME Exposure Point Conc. 3	Source of RME
Dioxin	N/A - 0.01	NC	NC	ND	0.01	Maximum
PCP	N/A - 360	NC	NC	ND	360	Maximum

Off-site Outside Known PCP Boundaries

Chemical	Range of Detected Conc. (mg/kg) 1	95% UCL Concentration 2	W-Test Number 2	Distribution 2	RME Exposure Point Conc. 3	Source of AME
Dioxin	0.0000060 - 0.038	NC	NC	ND	0.038	Maximum
PCP	0.13 - 25	NC	NC	ND	25	Maximum

1 All dioxin concentrations are in parts per million TEQ. All PCP concentration are in parts per million. All data for the "on-site" and "off-site" areas are from the 1992 sampling round (Table 34, as described in the 1995 Focused Feasibility Study).

2 ND indicates that the calculation was not determined since there was only one or two samples NC indicates that the corresponding value was not calculated since there was only one or two samples NA indicates that no concentration range could be determined since there was only one sample

3 RME Exposure Point Concentration is the maximum concentration (as suggested by the 1986 Public Health Evaluation for the Coleman-Evans Site) and were used in the risk calculations. It is important to note that the "maximum concentrations" used in the 1996 Focused Baseline Risk Amendment addendum may not represent the actual maximum concentrations that were detected at the Site Use of concentrations less than the actual maximum concentrations does not change the conclusions reached for the Site

Table 7.2 Potential Human Exposure Pathways Under Current and Future Land Use

Exposure Medium	Exposure Point	Potential Receptor	Potential Routes of Exposure	Is Pathway Valid (basis)	Quantitative vs Qualitative Evaluation
Surface Soils	Soils associated with the on-site area.	Workers (current)	Incidental ingestion, dermal absorption, particulate inhalation	Yes, surface soil is available for direct contact	Quantitative for ingestion only-evaluation based on surface soil samples
		Resident (future)	Incidental ingestion, dermal absorption, particulate inhalation	Yes, surface soil is available for direct contact	Quantitative for ingestion only-evaluation based on surface soil samples
	Soils associated with the off-site area	Residential (current adult and child	Incident ingestion, dermal absorption, particulate inhalation	Yes, surface soil is available for direct contact	Quantitative for ingestion only-evaluation based on surface soil samples
		Resident (future adult and child	Incidental ingestion, dermal absorption, particulate inhalation	Yes, surface soil is available for direct contact	Quantitative for ingestion only evaluation based on surface soil samples

Note: The worker is the most probable on-site current exposure scenario. For the future, child and adult residential on-site scenario is considered likely and therefore the pathway is assumed to be complete. Off-site current and future exposure pathways include residential (child and adult) receptors. Although all exposure routes are considered complete, the risk assessment addendum only calculates risks based on ingestion only.

7.2.3 Summary of Exposure Assumptions

The 1996 Focused Baseline Risk Assessment Addendum utilized the following exposure assumptions for the pathways identified at the Site.

Current Worker - The risk assessment assumed an on-site worker with 8 hours of exposure a day, at 250 days per year, for 25 years. It assumed a 70 kg adult that would incidentally ingest 50 mg of soil per day.

Future Child Resident - The risk assessment assumed a 1-6 year old on-site resident with an average body weight of 15 kg. It assumed the child would ingest 200 mg of soil per day, 350 days per year, for 6 years.

Future Adult Resident - The risk assessment assumed an off-site adult resident with an average body weight of 70 kg. It assumed the adult would ingest 100 mg of soil per day, 350 days per year, for 24 years.

For current land use, the worker assumptions that approximated current risk assessment parameters are drawn from the 1986 Public Health Evaluation with additional parameters selected from various recent guidance documents. However, all citations in the tables are from the most recent reference sources. The adult worker is on-site 250 days/year for 25 years with an ingestion rate of 50 mg/day (OSWER 9285.6-03). In the on-site future and off-site current and future exposure scenarios, exposure assumptions are adopted from the most recent guidance documents. The child resident (1-6 years of age) ingests 200 mg of soil per day and is exposed 350 days per year for 6 years (OSWER 9285.6-03). For the future off-site land use, the adult resident ingests 100 mg of soil per day and is exposed 350 days per year for 24 years (OSWER 9285.6-03). A complete list of exposure assumptions used in the 1996 Focused Baseline Risk Assessment Addendum are included in Tables 7.3 and 7.4.

7.2.4 Toxicity Assessment

The toxicity for the two chemicals of potential concern, dioxin and PCP, are described in this section. The Integrated Risk Information System's (IRIS) information is presented in Table 7.5.

For dioxin, there is no chronic oral reference dose (RFD) according to IRIS. However, the oral slope factor (slope) is 1.5xl0 +5. The chemical is considered to be a class B 2 carcinogen. PCP has an oral RfD of 0.03 mg/kg-day and a slope of 1.2 x10 -1 reflective of its class B 2 classification, both according to IRIS.

Dioxin

Chlorinated dibenzo-p-dioxins are a class of compounds that are commonly referred to as dioxin. There are 75 possible dioxins of which 2,3,7,8-TCDD is the most widely studied and is believed to be the most toxic. It is colorless and odorless and does not occur naturally and is not intentionally manufactured except as a reference standard. It is in-advertently produced in very small amounts during the manufacture of certain herbicides and germicides while it is also a by product from the incineration of municipal and industrial wastes. It also is formed in the manufacture of pulp and paper, the burning of wood in the presence of chlorine, the accidental burning of transformers and capacitors, and the burning of leaded gasoline by automobile engines (ATSDR, 1989).

Table 7.3: Exposure Parameters for Incidental Ingestion of Contaminants in Surface Soils Under Current and Future Land-Use On-Site

On-Site Scenario Parameter	Current Worker		Future Resident	
Age Period	Adult		1.6 Years of Age	
Ingestion Rate (mg soil/day) (c)	50	OSWER 9215.6-03	200	OSWER 9285.6-03
Fraction Ingested from Contaminated Source (Unitless) (c)	1.0	Health Assessment	1.0	EPA/540/1-89/002
Exposure Frequency (days/year) (c)	250	Health Assessment	350	OSWER 9285.6-03
Exposure Duration (years) (c)	25	OSWER 9285.6-03	6	OSWER 9285.6-03
Body Weight (kg) (c)	70	OSWER 9285.6-03	15	OSWER 9285.6-03
Averaging Time (noncarcinogens: days/life) (c)	6250	EPA/540/1-89/002	2100	EPA/540/1-89/002
Average Time (carcinogens: days/70 yrs) (c)	25550	EPA/540/1-89/002	25550	EPA/540/1-89/002
Intake Coefficient-Worker (noncancer/cancer): Child Resident (noncancer/cancer)	1.14E-07	1.33E-07	1.33E-05	1.10E-06

* The worker scenario and the assumptions are primarily from the 1986 Public Health Evaluation for the Coleman-Evans Wood Preserving Site, Whitehouse, Florida. Athough the 1986 document looked at ingestion, dermal and inhalation, the document concluded that ingestion is likely more protective than the other routes. It is therefore used as an indicator in the 1996 Focused Baseline Risk Assessment Addendum. The child represents the possible future land use scenario for the Site. The source of the child resident's assumption are provided in Table 7.4. All assumptions for the child resident are drawn from current guidance documents.

(a) The 50 mg ingestion rate is quoted in the 1986 Public Health Evaluation and is supported by OSWER 9285.6-03.

(b) Assumes that all of the soil ingested comes from the Site as per the 1986 Public Health Evaluation and is supported by EPA/540/1-89/002 (RAGS).

(c) The worker's exposure frequency is based on 5 days/week and 50 weeks/year as found in the 1986 Public Health Evaluation and is supported by OSWER 9285.6-03

(d) The exposure duration for the worker value is default value as referenced.

(e) Body weight of the worker is the default as presented in the 1986 Public Health Evaluation and is supported by OSWER 9285.6-03.

(f) The averaging time is calculated by multiplying the exposure frequency times the exposure duration in each exposure scenario. For carcinogens, the default value of 25550 days per year is used.

Table 7.4: Exposure Parameters for Incidental Ingestion of Contaminants in Surface Soils Under Current and Future Land-Use Off-site

Off-Site Scenario Parameter	Child Resident		Adult Resident	
Age Period	1-6 years of age		1-6 Years of Age	
Ingestion Rate (mg soil/day) (c)	200	OSWER 9215.6-03	100	OSWER 9285.6-03
Fraction Ingested from Contaminated Source (Unitless) (c)	1.0	EPA/540/1-89/002	1.0	EPA/540/1-89/002
Exposure Frequency (days/year) (c)	350	OSWER 9285.6-03	350	OSWER 9285.6-03
Exposure Duration (years) (c)	6	OSWER 9285.6-03	24	OSWER 9285.6-03
Body Weight (kg) (c)	15	OSWER 9285.6-03	70	OSWER 9285.6-03
Averaging Time (noncarcinogens: days/life) (c)	2100	EPA/540/1-89/002	8400	EPA/540/1-89/002
Average Time (carcinogens: days/70 yrs) (c)	25550	EPA/540/1-89/002	25550	EPA/540/1-89/002
Intake Coefficient-Child (noncancer/cancer): Adult (noncancer/cancer)	1.33E-05	1.10E-06	1.43-06	4.70E-07

(a) The soil ingestion rates are default values as referenced for children of the age range 1-6 and adults.

(b) Assumes that all of the soil ingested comes from the Site's contaminated areas.

(c) The exposure frequencies are defaults for a child and adult resident as referenced.

(d) The exposure durations are defaults for a child and adult resident as reference.

(e) Body weights are defaults for a child and adult resident as referenced.

(f) The averaging time is calculated by multiplying the exposure frequency times the exposure duration in each exposure scenario. For carcinogens, the default value of 25550 days per year is used.

Table 7.5: Oral Toxicity Values for the Contaminants of Potential Concern

Chemical	Chronic Oral Reference Dose (RfD) (mg/kg-day)	Uncertainty Factor	Target Organ/ Critical	RfD Source	Oral Slope Factor (mg/kg-day)-1	Weight of Evidence Class	Slope Factor Source
Dioxin	_ 4	_ 4	_ 4	IRIS 2	1.5x10 +5	B 2	Heast 3
PCP	3.00E-02	100	Liver and Kidney	IRIS 2	1.2x10 -1	B 2	IRIS 2

Liver and

1   Uncertainty factors presented are the products of specific uncertainty factors and modifying factors. Uncertainty factors used to develop reference doses generally consist of multiples for 10, with each factor representing a specific area of uncertainty in the date of the major study. Standard factors are listed: a factor of 10 for variation in sensitivity among members of the human population, 10 fold factor to account for uncertainty in extrapolating from animal data to humans, 10 fold factor for the uncertainty in extrapolating from less-than-chronic NOAELs to chronic NOAELs, and a 10 fold factor for the uncertainty in extrapolating from LOAELs to NOAELs.

2   IRIS is the Integrated Risk Information System.

3   Heast is the Health Effects Assessment Summary Tables.

4   - Indicates that toxicity values are not available.

2,3,7,8-TCDD and related compounds are extremely potent at producing a variety of effects in experimental animals at levels hundreds of thousands of times lower than most chemicals of environmental interest. Based on animal studies, the effects of dioxin include wasting syndrome, teragenesis, fetal toxicity and mortality, endocrine effects, immunotoxicity, carcinogenicity, chloracnegenic effects, porphyria, hepatotoxicity, edema, testicular atrophy, and bone marrow hypoplasia. The no-observable-adverse-effect-level for this compound is believed to be below 1.0 ng/kg. The developmental effects in infants, based on Yusho and Yu-Cheng rice oil poisoning episodes, include mild effects such as accelerated tooth eruption and effects on the skin, nails, and Meibomian glands while more adverse effects include growth retardation, deficit in cognitive function, and effects on the developing reproductive system, immune system, and altered learning behavior. Cleft palate, hydronephrosis, and reduced spermatogenesis were observed in the offspring of pregnant female rats and mice that were exposed to dioxin. In adult animals, alteration of immune function and increased susceptibility to infectious diseases was also observed in studies involving rodents, guinea pigs, rabbits, monkeys, marmosets, and cattle. It also decreases circulating testosterone, increases the risk of developing diabetes, and increases the risk of developing endometriosis (EPA, 1994a).

Pentachlorophenol

Commercial PCP preparations contain impurities that include hexachlorobenzene, polychlorinated dibenzo-furans, and polychlorinated dibenzo-dioxin. It is difficult to determine the extent to which the toxicity of the commercial products are due to PCP or to the very toxic impurities. The PCP used in comparative studies is generally free of impurities. PCP is rapidly absorbed following oral, dermal or inhalation exposure. Absorption following ingestion of drinking water is reported to be essentially complete. Absorption following inhalation has been reported to be in the range of 76-88 percent.

There is a large amount of human epidemiological studies describing that long term exposure to low levels of PCP can cause damage to the liver, kidneys, blood, immune system, and nervous system. Inhalation exposure causes inflammation of the upper respiratory tract and bronchitis. The primary cardiovascular effects observed in humans was tachycardia. Hematologic effects include hemolytic anemia as well as the onset of aplastic anemia and pure red blood cell aplasia. Also, PCP exposure causes increased numbers of immature leukocytes and reduced glomerular filtration rate and tubular function. Dermal and ocular effects range from eye and nose irritation and inflammation of the skin and subcutaneous tissue to extensive cysts and pus-forming abbesses prominently over the face, chest, abdomen, and proximal part of the extremities. PCP may also be linked to habitual abortion, unexplained infertility, menstrual disorders, and the onset of menopause. In neurological studies, adverse effects in the central nervous system were observed. In cancer studies, PCP was associated with Hodgkin's disease, soft tissue sarcoma, and acute leukemia. However, this carcinogenicity was not corroborated by other epidemiology studies or animal studies (ATSDR, 1994).

7.2.5 Risk Characterization

The non-carcinogenic hazard indices (sum total of the hazard quotients) for the chemicals of potential concern are listed in Table 7.6. For the on-site current worker and future resident, the hazard indexes for PCP, both within and outside the known PCP boundaries, are less than 1. Off- site, the current and future resident hazard indices, both inside and outside the known PCP boundaries, are less than 1.

Table 7.6: Non-Cancer and Cancer Risks Associated With Exposure to Surface Soils Under the Current And Future Land Use Scenarios

ON-SITE INSIDE KNOWN PCP BOUNDARIES

	Non-carcinogenic		Carcinogenic	
Chemical	Current Worker Ingestion Dose/RfD Ratio	Future Resident Ingestion Dose/RfD Ratio	Current Worker Ingestion Dose X Slope Product	Future Resident Ingestion Dose X Slope Product
Dioxin	ND	ND	8.12E-04	5.10E-03
PCP	0.01024	0.19111	9.02E-06	5.65E-05
Total	0.01024	0.19111	8.2E-04	5.15E-03

ON-SITE OUTSIDE KNOWN PCP BOUNDARIES

	Non-carcinogenic		Carcinogenic	
Chemical	Current Worker Ingestion Dose/RfD Ratio	Future Resident Ingestion Dose/RfD Ratio	Current Worker Ingesttion Dose X Slope Product	Future Resident Ingestion Dose X Slope Product
Dioxin	ND	ND	1.89E-03	1.18E-02
PCP	0.00524	0.09778	4.61E-06	2.89E-05
Total	0.00524	0.09778	1.89E-03	1.19E-02

OFF-SITE INSIDE KNOWN PCP BOUNDARIES

Chemical	Non-carcinogenic: Resident Child Ingestion Dose/RfD Ratio	Non-carcinogenic: Resident Adult Ingestion Dose/RfD Ratio	Carcinogenic: Resident Child Ingesttion Dose X Slope Product	Carcinogenic: Resident Adult Ingestion Dose X Slope Product
Dioxin	ND	ND	1.64E-03	7.05E-04
PCP	0.16000	0.01714	4.73E-05	2.03E-05
Total	0.16000	0.01714	1.69E-03	7.25E-04

OFF-SITE OUTSIDE KNOWN PCP BOUNDARIES

Chemical	Non-carcinogenic: Resident Child Ingestion Dose/RfD Ratio	Non-carcinogenic: Resident Adult Ingestion Dose/RfD Ratio	Carcinogenic: Resident Child Ingesttion Dose X Slope Product	Carcinogenic: Resident Adult Ingestion Dose X Slope Product
Dioxin	ND	ND	6.25E-03	2.68E-03
PCP	0.01111	0.00119	3.29E-06	1.41E-06
Total	0.0111	0.00119	6.25E-03	2.68E-03

The carcinogenic risks for the chemicals of potential concern are also listed in Table 7.6. For the on-site current worker and future resident, the total cancer risks for PCP and dioxin are 8.2×10^{-4} and 5.2×10^{-3} respectively inside the known PCP boundary. Outside the PCP boundary, the current worker and future resident's total cancer risks for PCP and dioxin are 1.9×10^{-3} and 1.2×10^{-2}, respectively. Off-site, the current and future resident's carcinogenic risks are 1.7×10^{-3} (child) and 7.3×10^{-4} (adult) respectively inside the known PCP boundaries. Outside the known boundaries, the carcinogenic risks to the current and future residents are 6.3×10^{-3} and 2.7×10^{-3} respectively.

Clearly, unacceptable risk levels of greater than 10^{-4} are located in all areas both on-site and off site. However, the hazard indices for PCP are all less than unity. Thus, the cancer risks support remediation using either scenario.

Overall, dioxin is one of the most toxic substances known. It exhibits delayed biological responses in many species and is highly lethal at low doses. It is persistent (10 year half-life) and bioconcentrates readily (5000 1/kg, EPA, 1986). Thus, it is a threat to both terrestrial life as well as aquatic life. The most toxic forms of dioxins and furans are comprised of chlorine atoms at the 2,3,7, and 8 positions (Sittig, 1985). PCP will not readily evaporate in environmental media in that its volatization half-life, under ideal conditions, is greater than 100 days (EPA, 1982) and its predicted biodegradation rate is 18 percent in 7 days (Dragun, 1988). Its bioconcentration factor is 770 1/kg (EPA, 1986) indicating that it too will bioaccumulate, but not as readily as dioxin. Therefore, the persistence, toxicity, concentration, and potential for adverse health effects based on the exposure scenarios presented, all support the need for remediation.

7.3 Remedial Action Objectives

Remedial Action Objectives consist of medium-specific or Site problem area-specific goals for protecting human health and the environment. Remedial Action Objectives are established under the broad guidelines of meeting all Applicable or Relevant and Appropriate Requirements (ARARs). During the development of Remedial Action Objectives, other regulatory guidance and criteria to be considered and risk-based values are evaluated to establish preliminary remediation goals.

Remedial Action Objectives are accomplished to the maximum extent practicable through treatment and/or destruction of contaminants at the Site. However, protection of the environment can be accomplished by addressing sources of contamination and limiting migration of contaminants from source areas to receptors.

The objectives of this interim response action are:

- Prevent ingestion/direct contact with contaminated soils and sediments in excess of the interim dioxin and final PCP cleanup levels.

- Protect groundwater as a current or potential drinking water supply by reducing contaminants to Maximum Contaminant Levels (MCLs) or other protection levels established by EPA and FDEP.

- Prevent future groundwater contamination.

7.4 Groundwater Cleanup Levels

The 1986 ROD and the 1990 AROD addressed remediation of groundwater that is collected during excavation of the source materials. Groundwater clean-up and surface-water discharge levels were established for PCP. The cleanup criteria as specified in the 1986 ROD and 1990 AROD is still applicable, however in this ARO, EPA is adding a cleanup level for dioxin and setting a more stringent cleanup level for PCP.

Although no dioxin contamination has been found in the groundwater at the Site, it is suspected that dioxin and PCP laden fuel oil tied up in soils, may release dioxin to the groundwater over time. Therefore, setting a cleanup level for dioxin is necessary. The permissible concentration for dioxin in drinking water is very stringent. The MCL for 2,3,7,9-TCDD is 0.03 ng/l. The one and ten day health advisories for 2,3,7, 8-TCDD are 1.0 ng/l and 0.1 ng/l respectively for children and adults respectively. The lifetime health advisory for an adult is 0.035 ng/l (EPA, 1996).

There is a specific State drinking water standard for PCP, but not for dioxin. The drinking water standard for PCP is 1.0 Ig/l. The MCL for PCP is also 1.0 Ig/l. The State of Florida has also published a drinking water criterion for dioxin, which is not a standard, but can be implemented on a site specific basis. The carcinogenic based criterion for dioxin is 3x10 -6 Ig/l.

Based on guidance concentrations for dioxin in groundwater, EPA and FDEP have established 1.0 ng/l as the groundwater dioxin cleanup level for the Site. The 1.0 Ig/l cleanup level for PCP in groundwater is based on site-specific calculations that are protective of groundwater.

7.5 Soil and Sediment Cleanup Levels

Cleanup levels were established to ensure that any persons exposed to Site soil and sediment in the future will not be exposed to unsafe levels of Site-related chemicals. The cleanup levels determined for this Site are shown in Table 7.7 and a summary of how these levels were determined is included in Sections 7.5.1 and 7.5.2.

Table 7.7: Cleanup Levels for Soil and Sediment at the Coleman-Evans Wood Preserving Site

Constituent	Cleanup Level
Pentachlorophenol	2.0 mg/kg
Dioxin a	1.0 Ig/kg b

a Interim cleanup level for dioxin and furans and all their congeners
b 1989 Toxicity Equivalents

7.5.1 Pentachlorophenol

The cleanup level for PCP is based upon the protection of groundwater. In September 1995, FDEP issued a memo regarding "Soil Clean-up Goals for Florida." This memo gives two equations for calculating cleanup goals; the first equation is based on direct exposure to contaminants in the soil via ingestion and dermal contact. The second equation is based on leaching of organic contaminants to groundwater. The memo also includes a table of cleanup levels (excluding dioxin) that were calculated using the above mentioned equations and generic assumptions regarding exposure and soil characteristics. The PCP cleanup levels from the table are 5.4 mg/kg (residential) based on direct contact, or 0.01 mg/kg based on leaching. The memo states: "The lowest of the two should be the final cleanup goal..." Based on this memo the PCP cleanup level for the Site would be 0.01 mg/kg based on leaching. FDEP does, however, allow deviations from the leaching criteria based on a site specific evaluation.

EPA requested the Emergency Response Team to evaluate the 0.01 mg/kg cleanup level for the Site. The evaluation involved assessing the proposed cleanup level itself, comparing it to EPA's leach-based Soil Screening Level (SSL), applying site specific values to calculate a SSL, performing leach tests to calculate a SSL, evaluating whether a leach based or a direct contact based cleanup level is more appropriate, and evaluating how the use of various SSLs as cleanup levels will affect remediation of the Site.

The SSL was determined by performing leach tests on two Site soil samples. The leach test used was the Synthetic Precipitation Leaching Procedure (SPLP). The results of the SPLP leach data are shown in Table 7.9.

Table 7.3: SPLP Test Results in Soil at the Coleman-Evans Wood Preserving Site

Sample Location	Initial Concentration (mg/kg)	pH 5 Leachate Concentration (Ig/l)	pH 8 Leachate Concentration (Ig/l)
Area B	0.12	1.3	0.5
Area D	5.9	2.7	2.0

When the data in Table 7.8 is plotted, the SSL for a soil pH of 5 lies outside the range of data and was not calculated. The SSL for soil pH of 8 is approximately 2 mg/kg. Since the average pH of the Site soil is 8.0, the SSL for the Site based on the SPLP leach test is 2 mg/kg. The results indicate that the generic assumptions used in FDEP's policy memo are not representative of Site conditions, therefore, a PCP cleanup level of 2 mg/kg represents the actual cleanup level that is protective of groundwater at the Site.

7.5.2 Dioxin

EPA and PDEP are continuing discussions on the selection of a cleanup level for dioxin in residential soil and sediment at the Coleman-Evans Wood Preserving Site. While these discussions continue, EPA and FDEP agree that it is appropriate for EPA to select a soil dioxin cleanup level of 1.0 Ig/kg (TEQ) as an interim cleanup level for residential soils at the Site.

EPA believes that this cleanup level is protective of human health and the environment, but that the agencies should defer a final cleanup decision at this Site pending release of EPA's final dioxin reassessment (embodied in the documents entitled "Health Assessment Document for 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds" and "Estimating Exposure to Dioxin-like Compounds") and pending an evaluation of the effects of the findings of the final dioxin reassessment on Superfund dioxin cleanup levels. EPA's dioxin reassessment report, which is expected to be finalized in 1998, will represent the culmination of six years of EPA effort to collect, analyze, and synthesize all of the available information about dioxin. It has undergone significant internal and external review and is one of the most comprehensive evaluations of toxicity of a chemical ever performed by EPA.

EPA and FDEP both believe that information contained in the report may assist the two agencies in determining a final cleanup level, either at 1.0 ug/kg (TEQ) or some other value. Therefore, EPA and FDEP believe it is appropriate to take an interim action at this time to achieve significant risk redaction quickly while the reassessment is being completed. EPA will make a final remedy decision following the release of the final dioxin reassessment and further discussions with FDEP.

1.0 Ig/g (TEQ) is an appropriate interim cleanup level for residential soils at the Site because it is the level that EPA has generally adopted as a cleanup level for residential sites where dioxin is driving the remedy and is protective of human health and the environment. Based on presently available information, the cancer risk associated with a lifetime of exposure to this concentration of dioxin is at the upper bound of the range of cancer risks that are generally acceptable at Superfund sites. It is unlikely, given the preliminary information available from EPA's dioxin reassessment, that the final cleanup level for the Site would be higher than 1.0 Ig/kg (TEQ). Accordingly, this interim action should not be inconsistent with the final remedy.

EPA notes that it may well select 1.0 Ig/g (TEQ) as the final cleanup level for this Site following release of the dioxin reassessment. Although the reassessment will provide a more comprehensive analysis of dioxin risk information than has previously been available, it may not significantly alter the final cleanup criteria for the Site. Accordingly, EPA's decision to take an interim, rather than a final, action at this point should not be interpreted as an indication that the final level will necessarily, or likely, differ from the interim level.

In summary, rather than defer action at the Site, EPA and FDEP have chosen to set an interim cleanup level as a basis for immediate action to achieve significant risk reduction while EPA completes the dioxin reassessment and EPA and FDEP can determine how, if at all, its findings should affect the dioxin cleanup level at the Site.

8.0 DESCRIPTION OF ALTERNATIVE

Four alternatives are presented in this Amended Record of Decision for the remediation of contaminated soil, sediment, and groundwater at the Site. These alternatives are discussed in detail in the Focused Feasibility Study (FS) dated April 1995 and summarized in this section.

8.1 Alternative 1: No Action

This alternative consists of No Action at the Site for soil or groundwater. No action is evaluated as a baseline against which the other alternatives can be compared. Under this alternative, several natural processes may, to some extent, treat or destroy the compounds of interest. These natural processes include bio-degradation, volatilization, photolysis, leaching, and adsorption. This alternative includes no further action other than periodic monitoring of the groundwater.

Since no remedial activities would be performed, there would be no capital costs incurred for Alternative 1. The only cost associated with this alternative relates to Operation and Maintenance (O&M) for groundwater monitoring. Groundwater monitoring would be accomplished utilizing existing monitoring wells plus additional new wells may need to be installed. O&M costs for monitoring the contaminants of concern for soil and groundwater for the 30 year life of this remedy is $574,000. These O&M costs are present value based on an assumed annual interest rate of 7% and escalation at 4%.

8.2 Alternative 2: Containment by Capping With Groundwater Recovery and Treatment

This alternative consists of constructing a containment system within the Site boundaries. This alternative includes excavating the contaminated soil and sediment from the area off-site and the areas of deep contamination on-site, backfilling the excavated areas, and consolidating the excavated soil within the containment area. A multi-layer RCRA-approved cap would then be constructed over identified areas of contamination.

Groundwater recovery wells would be installed. All recovered groundwater both from excavation and recovery wells would be treated to meet the performance standards established in the AROD in an on-site water treatment system prior to discharge to an on-site drainage ditch. The system would utilize granular activated carbon -(and if necessary filters or flocculants) and would be designed to treat a minimum of 50 gallons of contaminated water per minute. Storm water and sediment retention basins would be constructed (on-site or off-site) as needed to control surface water run-off (pre-cap and post-cap construction). Security fencing would be installed around the Site to prevent un-authorized access.

Containment systems such as this are designed to prevent erosion and direct contact with contaminated surface soils and to control contaminant migration via air, surface water, groundwater, and sediment pathways. This alternative can be implemented with proven construction techniques. Although the soil contamination is not destroyed or removed, human health and environmental impacts would be minimized.

The total present worth cost for Alternative 2 is $10,384,552. This consists of a capital cost of $2,789,552 in 1997 dollars (escalation costs excluded) based on a preliminary design for the cap and construction/installation of the groundwater recovery and treatment system; and an O&M cost of $7,595,000 to operate the groundwater recovery and treatment system for 30 years. This O&M cost is present value based on an assumed annual interest rate of 7% and escalation at 4%.

3.3 Alternative 3: Incineration With Groundwater Recovery and Treatment

This alternative consists of thermally destroying the contaminants in the soil and sediment by an on-site incinerator. This alternative involves excavating all contaminated soils, backfilling the excavated areas, and then processing the material through an incinerator.
Three types of incinerators are widely used: rotary kiln, fluidized bed, and infrared conveyor. Rotary kiln systems are the most commonly used systems. Incinerators generally have two thermal chambers: the primary which operates between 600 5F and 1200 5F and desorbs the contaminants, and the secondary chamber which operates between 1800 5F and 2400 5F and destroys the contaminants. In addition to the thermal chambers, incineration systems are composed of feed preparation, air pollution control, ash handling, and water treatment systems.

Groundwater recovery wells would be installed. All recovered groundwater both from excavation and recovery wells would be treated to meet the performance standards established in the AROD in an on-site water treatment system prior to discharge to an on-site drainage ditch. The system would utilize granular activated carbon (and if necessary filters or flocculants) and would be designed to treat a minimum of 50 gallons of contaminated water per minute. Storm water and sediment retention basins would be constructed (on-site or off-site) as needed to control surface water run-off (pre-cap and post-cap construction). Security fencing would be installed around the Site to prevent un-authorized access.

Since the contaminants are destroyed, this alternative would result in significant reduction or elimination of the potential health risks and environmental impacts resulting from the migration of contaminants.

The total present worth cost for Alternative 3 is $26,454,962. This consists of capital costs of $23,571,962 based on a cost of $300/ton to process 45,000 cubic yards of soil and sediment in 1997 dollars (escalation costs excluded); and an O&M cost of $2,983,000 to operate the groundwater recovery and treatment system for nine years. This O&M cost is present value based on an assumed annual interest rate of 7% and escalation at 4%

9.4 Alternative 4: Thermal Desorption With Groundwater Recovery and Treatment

This alternative involves desorbing the contaminants from the soil and sediment and treating the condensed contaminants to a nontoxic form. As with incineration the material would need to be excavated, and the excavated areas backfilled. The contaminated material could then be treated on-site.

Thermal desorption is a two step process. The first step involves passing the soil through a thermal chamber that elevates the soil temperature and volatilizes the contaminants. These chambers generally operate in the temperature range of 300 5F to 500 5F with some commercial units having upper operating limits as high as 1950 5F. Many of these units utilize non-oxidizing gases (such as nitrogen) to prevent unwanted oxidation from occurring. The volatilized contaminants are then captured by a train of air pollution control devices that collect and concentrate the compounds into an off-gas or a condensed liquid for further treatment (e.g., dechlorination or incineration).

Groundwater recovery wells would be installed. All recovered groundwater both from excavation and recovery wells would be treated to meet the performance standards established in the AROD in an on-site water treatment system prior to discharge to an on-site drainage ditch. The system would utilize granular activated carbon (and if necessary filters or flocculants) and would be designed to treat a minimum of 50 gallons of contaminated water per minute. Storm water and sediment retention basins would be constructed (on-site or off-site) as needed to control surface water run-off (pre-cap and post-cap construction). Security fencing would be installed around the Site to prevent un-authorized access.

This alternative would result in a significant reduction or elimination of potential health risks and environmental impacts resulting from the migration of contaminants, because the contaminants are first removed and then detoxified.

The total present worth cost for Alternative 4 is $20,720,000. This consists of a capital post of $18,020,000 based on a cost of $250/ton to process 45,000 cubic yards of soil and sediment in 1997 dollars (escalation costs excluded); and an O&M cost of $2,700,000 to operate the groundwater recovery and treatment system for nine years. This O&M cost is present value base on an assumed annual interest rate of 7% and escalation at 4%.

9.0 EVALUATION OF ALTERNATIVES

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory criteria in Section 121 of CERCLA and in Section 300.430 of the NCP. The NCP categorizes the nine evaluation criteria into three groups:

1. THRESHOLD CRITERIA - overall protection of human health and the environment and compliance with ARARs (or invoking a waiver) are threshold criteria to be eligible for selection,

2. PRIMARY BALANCING CRITERIA - long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability, and cost are primary balancing factors used to weigh major trade-offs among alternative hazardous waste management strategies; and

3. MODIFYING CRITERIA - state and community acceptance are modifying criteria that are formally taken into account after public comment is received on the proposed plan and incorporated in the ROD.

The selected alternative must meet the Threshold Criteria -and comply with all ARARs or be granted a waiver from compliance with ARARs. Any alternative that does not satisfy both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis is primarily based. The final two criteria are known as Modifying Criteria, assess the public's and the state agency's acceptance of the alternative. EPA may modify aspects of a specific alternative based upon these criteria.

A summary of the relative performance of each alternative, including the remedy from the 1990 AROD, with respect to each of the nine criteria follows. This summary provides the basis for determining which alternative provides the best balance of tradeoffs with respect to the nine evaluation criteria.

9.1 Threshold Criteria

9.1.1 Overall Protection of Human Health and Environment

A primary requirement of CERCLA is that the selected remedial action be protective of human health and the environment. This criterion assesses whether alternatives adequately protect human health and the environment and to what degree an alternative will eliminate, reduce, or control the risks to human health and the environment associated with the Site through treatment, engineering, or institutional controls.

The remedy selected in the 1990 AROD would not be protective because the unacceptable human health risk associated with dioxin-contaminated soil would not be addressed by the selected technology. Alternative 1 would not protect human health and the environment because, the transport pathways would not be eliminated due to unacceptable levels of contaminants (on-site and off-site) remaining in the soil and groundwater for an indefinite period of time. Since protection of human health and the environment is a threshold criterion for any CERCLA action, the remedy selected in the 1990 AROD and Alternative 1 cannot be considered and thus will not be evaluated any further with regard to the other evaluation criteria.

Alternative 2 would protect human health and the environment because the transport pathways would be eliminated through containment of contaminated soil and treatment of contaminated groundwater. Alternatives 3 and 4 would protect human health and the environment because the remedies would significantly reduce contaminant levels through treatment of contaminated soil and eliminate the threat from contaminated groundwater.

9.1.2 Compliance with ARARs

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs" unless such ARARs are waived under CERCLA section 121(d)(4), Applicable requirements are those substantive environmental protection requirements, criteria, limitations promulgated under Federal or State law that specifically address hazardous substances found at the Site, the remedial action to be implemented at the Site, the location of the Site, or other circumstances present at the Site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law which, while not applicable to the hazardous materials found at the Site, the remedial action itself, the Site location or other circumstances at the Site, nevertheless address problems or situations sufficiently similar to those encountered at the Site that their use is well-suited to the Site.

Alternatives 2, 3 and 4 would attain their respective Federal and State ARARs. A detailed listing of ARARs is included in Table 11.1 of this document that pertain to this interim action.

9.2 Balancing Criteria

9.2.1 Long Term Effectiveness and Permanence

This criterion assesses whether a remedial alternative will carry a potential, continual risk to human health and the environment after the remedial action is completed. An evaluation is made as to the magnitude of the residual risk present after the completion of the remedial actions as well as the adequacy and reliability of controls that could be implemented to monitor and manage the residual risk remaining.

Alternative 2 would be effective in the long-term because contaminated soil would be contained, and precipitation would be controlled, thus reducing the rate at which contaminants would leach to groundwater. Alternatives 3 and 4 would be effective in the long-term because contaminated soil would be treated, thus reducing the potential volume of contaminated groundwater and therefore shortening the length of time in which contaminated groundwater would need to be treated. Based on presently available information regarding the toxicity of dioxin, Alternatives 3 and 4 would also significantly reduce the threat from direct contact with Site contaminants until a final remedy can be determined.

9.2.2 Reduction of Mobility, Toxicity or Volume

This criterion assesses the degree to which a remedial alternative, by utilizing treatment technologies, would permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances at the Site. The assessment focuses on the degree and irreversibility of treatment.

Alternative 2 would reduce the mobility of contaminated soil and groundwater by containment and plume control by the recovery and treatment system, respectively. Alternatives 3 and 4 would reduce the mobility, toxicity and volume of contaminated soil and groundwater by treatment.

9.2.3 Short-Term Effectiveness

This criterion assesses the degree to which human health and the environment would be impacted during the construction and implementation of the remedial alternative. The protection of workers, the community, and the surrounding environment as well as the time to achieve the remedial response objectives are considered in making this assessment.

Alternative 2 would be effective in the short-term because contaminated soil would be contained and contaminated groundwater would be treated. Alternatives 3 and 4 would be effective in the short-term because contaminated soil and groundwater would be treated.

It should be noted that short-term human health risks would exist from excavation activities associated with Alternatives 2, 3 and 4 and fugitive emissions must be controlled with Alternatives 3 and 4. Engineering controls to mitigate short-term risks and air quality monitoring would be employed during activities associated with Alternatives 2, 3 and 4 to limit these short-term risks.

9.2.4 Implementability

This criterion assesses the technical and administrative feasibility of implementing a remedial alternative and the availability of services and materials required during implementation.

Alternative 2 would be implementable because capping is a well established technology in the industry and the equipment is readily available. Alternatives 3 and 4 are implementable, from a technical standpoint, based on results of the 1995 Focused Feasibility Study. However, Duval County has passed an ordinance that prohibits the incineration of PCBs in the county. While this ordinance does not directly apply to Alternative 3, it will likely cause problems with implementing any incineration remedy in the county. The ordinance is not likely to impact the implementability of Alternative 4, but a thermal desorption treatability study would need to be performed to prove its full effectiveness on contaminated material from this Site.

9.2.5 Cost

This criterion assesses the capital costs, operation and maintenance costs, and total present worth costs associated with implementing a remedial alternative. The capital costs are divided into direct costs and indirect costs. Direct capital costs include construction costs, equipment costs, and Site development costs. Indirect capital costs include engineering expenses and contingency allowances. Operation and maintenance costs are post-construction costs necessary to ensure the continued effectiveness of a remedial action.

The cost of Alternative 2 is estimated to be $10,384,552 ($2,789,552: capital and $ 7,595,000: O&M at 30 years). Alternative 3 is estimated to cost $26,454,962 ($23,571,962: capital and $ 2,883,000: O&M at nine years). Alternative 4 is estimated to cost $20,720,000 ($18,020,000: capital and $ 2,700,000: O&M at nine years). These estimates include cost for recovery and treatment of contaminated groundwater. The number of years calculated for O&M costs vary between Alternatives 2, 3 and 4 due to the length of time in which the groundwater would have to be treated following the source control remedy (i.e., 30 years if contaminated soil and sediment are contained, versus nine years if treated).

9.3   Modifying Criteria

9.3.1 State Acceptance

This criterion assesses the technical and administrative issues and concerns the State of Florida may have regarding each of the remedial alternatives. FDEP and its predecessor, FDER, have been the support agency during the previous remedy selections, providing input into all activities conducted by EPA.

FDEP has reviewed all documents and worked directly with EPA in evaluating the alternatives to support EPA's selection of the interim amended remedy. Based on FDEP's comments to date, EPA expects formal concurrence on the selected remedy will be forthcoming. Once a formal concurrence letter is received, it will be included as Appendix B of this AROD.

9.3.2 Community Acceptance

EPA has conducted community involvement activities throughout the history of this Site to advise interested persons of EPA's activities and solicit community input.

The Whitehouse community residents have shown an interest in the Site (especially since dioxin has been identified as a contaminant of concern) during the public meeting and public comment period. Responses to specific comments received during the public comment period have been addresssed in the Responsiveness Summary, which is included in Appendix A of this document.

Based on interviews conducted in April 1995, the community surrounding the Site prefers treatment over containment. The primary interest of the community seems to be that the Site be returned to productive use.

10.   SUMMARY OF THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, and public comments, EPA has determined that Alternative

4, Thermal Desorption With Groundwater Recovery and Treatment, is the most appropriate alternative for remediating the Site.

In the event that thermal desorption is shown not to be effective in treating the Site contamination, Alternative 2, Containment by Capping With Groundwater Recovery and Treatment will be implemented as the contingency remedy. EPA will confer with FDEP in evaluating the results of the thermal desorption treatability study and decisions regarding the contingency remedy.

10.1 Selected Interim Remedy--Thermal Desorption With Groundwater Recovery and Treatment, Alternative 4

The selected interim remedy involves the use of an innovative technology known as thermal desorption. This thermal treatment method will separate organic contaminants from Site soils and sediments through vaporization at temperatures likely to exceed 1000 degrees Fahrenheit. Though the contaminants will not be destroyed, the off-gas will be contained and undergofurther treatment.

An estimated 45,000 cubic yards of PCP and dioxin-contaminated soil, sediment, and wood debris will be excavated at the Site. Of this material, approximately 39,000 cubic yards of on-site contaminated soil and sediment (including some wood fiber) exceeding cleanup goals will be excavated to the top of the water table (a depth of approximately three feet). Approximately 900 cubic yards of on-site contaminated soil exceeding the PCP cleanup goal in the vicinity of boreholes 38, 40, and 44 will be excavated below the water table to a depth of approximately 18 feet. Additionally, approximately 5000 cubic yards of off-site contaminated soil and sediment exceeding cleanup goals will be excavated to a depth of approximately one foot. De-watering will be performed, as needed, to facilitate excavation and backfilling. Any water collected/ generated during remediation will be treated in an on-site treatment system to meet State and Federal surface water standards and discharged to on-site surface water. Security fencing shall be installed around the Site to prevent access to the Site by un-authorized personnel.

The thermal desorption system shall employ the use of an indirect-fired heat source, both in the desorption chamber and in any air pollution control devices. The excavated material will be fed into the desorption chamber, exposing it to elevated temperatures. The unit will operate in a non-oxidizing environment. Thermal energy within the unit will volatilize the organic constituents and convert them to a gas (off-gas). Dioxin and PCP (chlorinated compounds) in the collected off-gas will undergo further treatment. Off-gas treatment varies depending on the vendor, but usually consists of either: 1) Thermal oxidation in a chamber similar to incinerators; 2) condensing and concentrating the organics into a significantly smaller mass for further treatment (e.g., incineration or dechlorination); or 3) passing the off-gas through activated carbon to adsorb the contaminants and then regenerating the carbon. This amended ROD will not select the off-gas treatment so as not to limit vendor competition, however, EPA will specify that the off-gas treatment be non-combustive (i.e., units employing thermal oxidation chambers, afterburners, and other similar equipment will not be used).

A treatability study of the thermal treatment system shall be conducted during pre-design, to demonstrate the effectiveness of the system in meeting the performance standards. Material, as a by-product of the treatment system, will be analyzed for dioxin and PCP for confirmation of the effectiveness of the treatment system. A full-scale proof of process test will also be performed to ensure that the thermal desorption system is in compliance with local, state, and federal air emission regulations.

Excavation, material preparation, treatment, and backfilling will continue concurrently. All excavated material shall be transported on-site, if not already there, where it will be screened to prepare it for treatment. Oversized material and debris not suitable for treatment in the thermal desorber may be chipped and/or crushed and treated, or sent off-site for disposal depending on the makeup of the material.

The off-site excavated area shall be backfilled to pre-excavation grades using clean fill and re-vegetated as necessary. Two homes are located off-site within the estimated excavation zone, and two homes are surrounded on three sides by the excavation zone. These homeowners may need to be temporarily or permanently relocated during the excavation. Other homeowners may also be relocated as necessary to facilitate construction. EPA will confer FDEP during evaluation and decisions on relocation during RD. If it is necessary to permanently relocate these, or other homeowners, approximately $100,000 per relocation will be added to the estimated capitol cost of this remedy.

Once treated, material from the process will be analyzed to verify that it meets the treatment standards and will be used as on-site backfill. Any material not meeting performance standards will be again treated by the thermal desorption unit until performance standards are achieved. Backfilling of the on-site area that is backfilled with treated material to support vegetation. Immediately following the treatment of all contaminated material, the thermal desorption unit shall be de-mobilized from the Site.

All groundwater recovered during excavation and backfilling will be treated in an on-site treatment unit prior to discharge to on-site surface water. Free-product floating on the upper surficial aquifer will be recovered for recycling and/or off-site disposal. Modifications may be added to the groundwater treatment unit to handle any free product that may be recovered. Details of free-product recovery and treatment will be finalized during RD.

A water treatment system utilizing granular activated carbon (and if necessary filters or flocculation) will be set up on Site. This system will handle 50 gallons per minute, and would be used to treat water recovered during excavation and groundwater recovery. An oil water separator may need to be added to handle free phase product recovery.

The groundwater recovery system will be installed to capture the plume of contaminated groundwater. Based on Quickflow modeling results it is estimated that this system will be operated for nine years (long enough to purge three pore volumes). This estimate may be optimistic since additional data is required to complete a groundwater flow and contaminant transport model.

EPA may modify or refine the selected interim remedy during the RD/RA. Such modifications or refinements, if any, would generally reflect results of the engineering design process. However, it may include changes necessary to handle process residuals resulting from the selection of an appropriate off-gas treatment. EPA will confer with FDEP in the selection of the appropriate off-gas treatment system and corresponding changes to the selected interim remedy or associated remedial costs.

10.1.1 Performance Standards For Soil and Sediment

In order to facilitate this remedy expeditiously and effectively, the Coleman-Evans Site is designated as a Corrective Action Management Unit (CAMU) and an Area of Contamination (AOC) for purposes of this amended ROD. All waste managed within the CAMU/AOC must comply with the requirements set out in this amended ROD for soil remediation. The designated CAMU/AOC consists of the contamination on the 11-acre former Coleman-Evans Wood Preserving Site, the contaminated off-site residential area surrounding the Site, and the contaminated off-site drainage ditches leading to Interstate 10, contaminated groundwater related to the Site, and all suitable areas in close proximity to the contamination necessary for implementation of the remedy selected in this AROD.

Excavation shall continue until the remaining soil and sediment achieve the maximum concentration levels in Table 10.1. Pertinent testing methods will be determined during RD and used to confirm that cleanup levels have been achieved.

Table 10.1: Performance Standards for Soil and Sediment

Constituent	Cleanup Level
Pentachlorophenol	2.0 mg/kg
Dioxin a	1.0 Ig/kg b

a Interim cleanup level for dioxin and furans and all their congeners
b 1989 Toxicity Equivalents

All excavated soil, sediment, and some wood debris (primarily sawdust) will be treated in the on-site thermal desorber in a manner that reduces dioxin and PCP concentrations to the levels in Table 10.1. All excavation shall comply with ARARs. Oversized material and debris not suitable for treatment in the thermal desorber may be chipped and/or crushed and treated, or sent off-site for disposal depending on the makeup of the material. Treated material will be used to backfill the on-site area if it achieves the performance standards, otherwise it will be again treated by the thermal desorption unit until performance standards are achieved.

10.1.2 Performance Standards For Groundwater

Groundwater will be recovered from the upper surficial aquifer at a rate to be determined during RD and shall be treated until the following performance standards set out in Table 10.2 are achieved. Groundwater monitoring wells that will be used to determined compliance with the performance standards will be determined during RD. There are also other contaminants in the groundwater, such as free product and petroleum hydrocarbons associated with diesel fuel used in the wood treatment process. The appropriate performance standards for these additional contaminants will be addressed during RD since they are not listed as contaminants of concern and are not individually addressed in this AROD.

Table 10.2: Performance Standards for Groundwater

Constituent	Cleanup Level
Pentachlorophenol	1.0 Ig/l
Dioxin	1.0 ng/l

All groundwater collected during the source removal excavation and groundwater recovered via extraction wells will be treated in the on-site treatment unit and discharged to an on-site drainage ditch. Florida Surface Water Discharge requirements will be met in the treated groundwater prior to surface water discharge (F.A.C. 62-302).

The goal of the groundwater recovery system is to restore groundwater to its beneficial use, which is, at this Site, a potential drinking water source. Based on information obtained during the remedial investigation and on careful analysis of all remedial alternatives, EPA and FDEP believe that the selected remedy will achieve this goal. It may become apparent, during implementation or operation of the groundwater extraction system and its modifications that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal over some portion of the contaminated plume. In such case, the system performance standards and/or the remedy may be reevaluated.

The selected remedy will include groundwater extraction for an estimated period of nine years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and to allow absorbed contaminants to partition to groundwater; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup goals continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of every five years following discontinuation of groundwater extraction.

It will take approximately three years to complete the remedial action for soil, sediment, and wood debris, and about 10.5 years to complete the groundwater remedial action. These times take into account one year for the RD phase, contracting and procurement, and development plans. The actual processing of material in the thermal desorber should take about 18 months including mobilization and demobilization of the equipment. The actual recovery and treatment of groundwater remediation of the upper surficial aquifer is estimated to require nine years.

10.1.3 Cost

The total present worth cost for Alternative 4 is $20,720,000. This consists of a capital cost of $18,020,000 based on a cost of $250/ton to process 45,000 cubic yards of soil and sediment in 1997 dollars (escalation costs excluded); and an O&M cost of $2,700,000 to operate the groundwater recovery and treatment system for nine years. This O&M cost is present value based on an assumed annual interest rate of 7% and escalation at 4%.

10.2 Contingency Remedy--Containment by Capping With Groundwater Recovery and Treatment, Alternative 2

A contingency ROD is appropriate when the performance of an innovative treatment technology appears to be the most promising option, but additional testing will be needed during RD to verify the technology's performance capabilities; in this case, a more "proven approach" is identified as the contingency remedy.

Should implementation of Alternative 4 prove ineffective for remediation of PCP and dioxin-contaminated soil, Containment by Capping With Groundwater Recovery and Treatment, will be implemented as the contingency alternative.

The criterion that EPA, in conjunction with FDEP, will use to decide to implement the contingency alternative is if the selected remedy fails to achieve established performance standards based upon the results of a treatability study conducted during pre-design.

Alternative 2 consists of the construction of approximately an eight-acre cap over the on-site contaminated area. Approximately 5,000 cubic yards of off-site contaminated soil exceeding the Site-specific cleanup goals will be excavated to a depth of approximately one foot. Also, contaminated soils in the vicinity of boreholes 38, 40, and 44 will be excavated down to 15 feet and the excavated areas backfilled with imported clean soil. For each of the deeper contaminated areas, approximately 300 cubic yards of contaminated soil will be replaced by the clean soil. De-watering would be performed, as needed, to facilitate excavation and backfilling. All excavated soil would be spread on the ground surface on-site within the capping limits along with foreign borrow soil required to achieve minimum Site grades. A multi-layer cap meeting RCRA Subtitle C requirements would be placed over the contaminated material. As part of this cap, a clean soil cover would be placed over the contaminated area (approximately two feet thick) and graded in accordance with RCRA requirements.

A water treatment system utilizing granular activated carbon (and if necessary filters or flocculation) will be set up on-site. This system will handle 50 gallons per minute, and be used to treat groundwater, and water recovered during excavation on-site. An oil water separator may need to be added to handle any free product that may be recovered.

A system of recovery wells will be installed, both internal and external to the cap footprint, to pump out contaminated groundwater and contain the PCP plume. These wells can be equipped with either dual pumps or with two phase pumps to facilitate free product recovery. Details of free product recovery and treatment will be finalized during the RD. The recovered water will subsequently be transferred to the on-site treatment system. Since the source of contamination will not be removed in this alternative, and the required data to perform transport modeling is not available, it is assumed that the groundwater recovery and treatment system will need to operate for the 30 year life of this alternative.

The excavated area off-site will be backfilled with clean fill to pre-excavation grades and re-vegetated, as necessary. Two homes are located within the estimated excavation zone, and two homes are surrounded on three sides by the excavation zone. These homeowners may need to be temporarily or permanently relocated during the excavation. Other homeowners may also be relocated as necessary to facilitate construction. EPA will confer with FDEP during evaluation and decisions on relocation during RD. If it is necessary to permanently relocate these, or other homeowners, approximately $100,000 per relocation will be added to the estimated capitol cost of this remedy.

Storm water and sediment retention basins will be constructed (on-site or off-site), as needed, to control surface water run-off both during and after construction of the cap. It is possible that one of these basins will need to be located south of the Site, therefore, approximately one-acre of land will need to be purchased.

Prior to cap placement, the construction of an interceptor trench will be completed around the Site to re-route the surface water drainage. This trench will also serve to drain storm water from the retention basins to McGirts Creek. The existing on-site drainage ditch (between the landfill area and the old wood treatment facility area on the east portion of the Site) will be graded over. Security fencing will be installed around the Site to prevent un-authorized access.

All groundwater recovered during excavation and backfilling as well as long-term groundwater recovery and treatment for Site remediation will be treated in an on-site treatment unit prior to discharge to on-site surface water. Free-product floating on the upper surficial aquifer will be recovered for recycling and/or off-site disposal. Modifications may be added to the treatment unit to handle any free product that may be recovered. Details of free-product recovery and treatment will be finalized during RD.

It will take approximately one year to complete design, procurement, and work plans for the containment system. Once Site activities begin, it should take approximately twelve months to complete construction of the containment system and to install the groundwater recovery and treatment system. The groundwater recovery and treatment system will operate for the 30-year life of this alternative.

EPA may modify or refine the selected contingency remedy during the remedial design and remedial action. Such modifications or refinements, if any, would generally reflect results of the engineering design process. EPA will confer with FDEP on changes to the selected contingency remedy or associated remedial cost.

10.2.1 Performance Standards For Soil and Sediment

In order to facilitate this remedy expeditiously and effectively, the Coleman-Evans Site is designated as a Corrective Action Management Unit (CAMU) and an Area of Contamination (AOC) for purposes of this amended ROD. All waste managed within the CAMU/AOC must comply with the requirements set out in this amended ROD for soil remediation. The designated CAMU/AOC consists of the contamination on the 11-acre former Coleman-Evans Wood Preserving Site, the contaminated off-site residential area surrounding the Site, and the contaminated off-site drainage ditches leading to Interstate 10, contaminated groundwater related to the Site, and all suitable areas in close proximity to the contamination necessary for implementation of the remedy selected in this AROD.

Excavation shall continue off-site until the remaining soil and sediment achieve the maximum concentration levels in Table 10.3. Pertinent testing methods will be determined during remedial design and used to confirm that cleanup levels have been achieved.

The excavated soil and sediment will be consolidated on-site within the capping limits along with foreign borrow soil required to achieve minimum Site grades. A multi-layer cap meeting RCRA Subtitle C requirements would be placed over the contaminated material.

Table 10.3: Performance Standards for Soil and Sediment

Constituent	Cleanup Level
Pentachlorophenol	2.0 mg/kg
Dioxin a	1.0 Ig/kg b

a Interim cleanup level for dioxin and furans and all their congeners
b 1989 Toxicity Equivalents

10.2.2 Performance Standards For Groundwater

Groundwater shall be recovered from the upper surficial aquifer at a rate to be determined during remedial design and shall be treated until the following performance standards set out in Table 10.4 are achieved at wells that are designated by EPA in the RD. There are also other contaminants in the groundwater, such as free product and petroleum hydrocarbons associated with diesel fuel used in the wood treatment process. The appropriate performance standards for these additional contaminants will be addressed during RD since they are not listed as contaminants of concern and are not individually addressed in this AROD.

Table 10.4: Performance Standards for Groundwater

Constituent	Cleanup Level
Pentachlorophenol	1.0 Ig/l
Dioxin	1.0 ng/l

All groundwater collected during the source removal excavation and groundwater recovered via extraction wells will be treated in the on-site treatment unit and discharged to an on-site drainage ditch. Florida Surface Water Discharge requirements will be met in the treated groundwater prior to surface water discharge (F.A.C. 62-302).

The goal of the groundwater recovery system is to restore groundwater to its beneficial use, which is, at this Site, a potential drinking water source. Based on information obtained during the remedial investigation and on careful analysis of all remedial alternatives, EPA and FDEP believe that the selected remedy will achieve this goal. It may become apparent, during implementation or operation of the groundwater extraction system and its modifications, that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal over some portion of the contaminated plume. In such case, the system performance standards and/or the remedy may be reevaluated.

The selected remedy will include groundwater extraction for an estimated period of 30 years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and to allow absorbed contaminants to partition to groundwater; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup goals continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occupance of every five years following discontinuation of groundwater extraction.

It will take approximately one year to complete design, procurement, and work plans for the containment system. Once Site activities begin, it should take approximately twelve more months to complete construction of the containment system and to install the groundwater recovery and treatment system. The groundwater recovery and treatment system will operate for the 30 year life of this alternative.

10.2.3 Cost

The total present worth cost for Alternative 2 is $10,384,552. This consists of a capital cost of $2,789,552 in 1997 dollars (escalation costs excluded) based on a preliminary design for the cap construction and installation of the groundwater recovery and treatment system; and an O&M cost of $7,595,000 to operate the groundwater recovery and treatment system for 30 years. This

O&M cost is present value based on an assumed annual interest rate of 7% and escalation at 4%.

11.0 STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that, when complete, the selected remedial action for this Site must comply with applicable or relevant and appropriate environmental standards as established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected interim remedy meets these statutory requirements.

11.1 Protection of Human Health and the Environment

The selected interim remedy protects human health and the environment through isolating and treating the soil contamination at the Site. Based on presently available information, the selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through treatment and engineering controls. The contingency remedy protects human health and the environment through isolating and containing threats of Site contamination in the soil. The contingency remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through containment, engineering and/or institutional controls.

11.2 Attainment of Applicable or Relevant and Appropriate Requirements

Remedial actions under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy will meet or exceed the ARARs listed in Table 11.1 that pertain to this interim response action.

11.3 Cost Effectiveness

Cost-effectiveness is determined by comparing the costs of all alternatives being considered with their overall effectiveness to determine whether the costs are proportional to the effectiveness achieved. EPA evaluates the incremental cost of each alternative as compared to the increased effectiveness of the remedy. Both the selected and contingency remedies result in an acceptable degree of long-term effectiveness, reduction of mobility, toxicity, and volume, and short-term effectiveness. When the relationship between the cost and overall effectiveness of the selected remedy is viewed in light of the relationship between the cost and overall effectiveness afforded by other alternatives, the selected interim remedy appears to be the most cost effective. The contingency remedy can be implemented with less cost than the selected remedy, but does not utilize treatment.

11.4 Utilization of Permanent Solutions and Alternatives

Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate.

11.5 Preference for Treatment as a Principal Element

Because this action does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although it is partially addressed by this remedy, will be addressed by the final response action.

Table 11.1: Applicable or Relevant and Appropriate Requirements (ARARs) for the Coleman-Evans Wood Preserving Site

ARAR	ENVIRONMENTAL LAWS AND REGULATIONS	APPLICATION	COMMENTS
RESOURCE CONSERVATION AND RECOVERY ACT			
A	40 CFR Part 261 Identification and Listing of Hazardous Waste	Action Specific for Soil	Identifies those solid wastes which are subject to regulation as hazardous wastes. Defines the term "solid waste" and "hazardous waste."
A&R	40 CFR Part 262 Standards Applicable to Generators of Hazardous Waste	Action Specific for Soil	Establishes standards for generators of hazardous waste.
R&A	40 CFR Part 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal (TSD) Facilities	Action Specific for Soil	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.

ARAR	ENVIRONMENTAL LAWS AND REGULATIONS	APPLICATION	COMMENTS
R&A	40 CFR Part 268 Land Disposal Restrictions	Chemical Specific for Soil	Identifies hazardous wastes that are restricted from land disposal and describes those circumstances under which an otherwise prohibited waste may be land disposed
A	Federal Register/Vol. 58 February 16, 1993 40 CFR Part 260 et al Corrective Action Management Units and Temporary Units; Corrective Action Provisions; Final Rule	Action Specific for Soil and Groundwater	Finalizes provisions for corrective action management units (CAMUs) and temporary units under Subpart S of 40 CFR Part 264. Defines the term "remediation waste".
A	40 CFR 264 Subpart X Miscellaneous Units	Action Specific for Soil	Requires that miscellaneous units (thermal desorbers) be designed, operated, and closed in a manner that is protective of human health and the environment.

CLEAN WATER ACT

R&A	40 CFR Parts 122-124 NPDES Requirements	Chemical Specific for Groundwater	Sets forth requirements for direct discharge of treated groundwater and surface water to on-site streams.
R&A	40 CFR Part 131 Ambient Water Quality Criteria Requirements	Chemical Specific for Groundwater	Provides for the establishment of water quality based on toxicity to aquatic organisms and human health.
R&A	40 CFR Part 141 National Primary Drinking Water Regulations	Chemical Specific for Groundwater	Establishes primary drinking water regulations pursuant to Section 1412 of the Public Health Service Act, as amended by the amended Safe Drinking Water Act; and related regulations applicable to public water systems.
R&A	40 CFR Part 142 National Primary Drinking Water Regulations Implementation	Chemical Specific for Groundwater	Sets forth Sections 1413-1416, 1445, and 1450 of the Public Health Service Act, as amended.
R&A	40 CFR Part 143 National Secondary Drinking Water Regulations	Chemical Specific for Groundwater	Establishes National Secondary Drinking Water Regulations pursuant to Section 1412 of the Safe Drinking Water Act, as amended (42 U.S.C. 300g-1); and control contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptable of drinking water.
A	40 CFR Part 457 Effluent Guidelines	Chemcial Specific for Groundwater	Sets forth effluent water quality standards to be applied to on-site discharge of treated waters.

ARAR	ENVIRONMENTAL LAWS AND REGULATIONS	APPLICATION	COMMENTS
SAFE DRINKING WATER ACT			
A	40 CFR Parts 141 and 143 Maximum Contaminant Levels (MCLs)	Chemical Specific for Groundwater	Sets forth maximum contaminant levels for drinking water.
CLEAN AIR ACT			
R&A	40 CFR Part 50 National ambient air quality standards (NAAQS)	Action Specific for Soil	Thermal Desorption and earthmoving operations will result in emissions to air. Wind erosion or dust generated by human activities may result in contaminant dispersal.
U.S. DEPARTMENT OF TRANSPORTATION (DOT) REQUIREMENTS			
A	U.S. Department of Transportation (DOT) Regulations (40 CFR Parts 170-179)	Action Specific for Soil	Contents of tanks and construction rubble may be transported offsite for treatment or disposal.

STATE OF FLORIDA

R&A	Florida Administrative Code Chapter 62-3	Action Specific for Water	Water quality standards for surface water and groundwater affected by leachate and storm runoff from the site must be met.
A	Florida Administrative Code Chapter 62-6	Action Specific for Groundwater	Effluent limitations and operating requirements for wastewater facilities treating contaminated groundwater must be met.
R&A	Florida Administrative Code Chapter 62-2	Action Specific for Soil	Air emissions
R&A	Florida Administrative Code Chapter 62-25	Action Specific for Soil	Storm Water Control Standards.
A	Florida Administrative Code Chapter 62-302	Action Specific for Groundwater and Soil	Surface Water Quality Standards
A	Florida Administrative Code Chapter 62-520	Chemical Specific for Groundwater	Groundwater Classes, Standards and Exemptions

ARAR	ENVIRONMENTAL LAWS AND REGULATIONS	APPLICATION	COMMENTS
A	Florida Administrative Code Chapter 62-550	Chemical Specific for Groundwater	Drinking Water Standards, Monitoring and Reporting.
R&A	Florida Administrative Code Chapter 62-730	Chemical Specific for Groundwater and Soil	Hazardous Waste (Trans from 17-30)
A	Florida Administrative Code Chapter 62-736	Action Specific for Groundwater and Soil	Warning Signs at Contaminated Sites
A	Florida Administrative Code Chapter 62-770	Action Specific for Soil	State Underground Petroleum Environmental Response (Trans from 17-71)
R&A	Florida Administrative Code Chapter 62-296	Action Specific for Soil	Thermal Treatment Facilities

A----- REFERS TO APPLICABLE REQUIREMENTS WHICH WERE PROMULGATED UNDER FEDERAL OR STATE LAW TO SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION LOCATION OR OTHER CIRCUMSTANCE AT THE COLEMAN-EVANS SITE.

R&A--- RELEVANT AND APPROPRIATE REQUIREMENTS WHICH WHILE THEY ARE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT THE COLEMAN-EVANS SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT THE COLEMAN-EVANS SITE THAT THEIR USE IS WELL SUITED TO THE SITE.

11.6 Documentation of Significant Changes

The selected remedy for the Site was refined somewhat after the proposed plan fact sheet was published and the public meeting was held. These refinements include: 1) selecting an interim remedy instead of a final action, 2) not specifying the type of off-gas treatment for the thermal desorption remedy, and 3) expanding the scope of the groundwater remedy.

EPA is taking an interim action at the Site by selecting a soil dioxin cleanup level of 1.0 Ig/kg (TEQs) as an interim cleanup level for the Site. EPA believes that this cleanup level is protective of human health, but that the Agency should defer a final cleanup decision at this Site pending release of the EPA's final dioxin reassessment (embodied in the documents entitled "Health Assessment Document for 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds" and "Estimating Exposure to Dioxin-like Compounds") and pending an evaluation of the effects the findings of the final dioxin reassessment on Superfund dioxin cleanup levels. EPA believes it is appropriate to take an interim action at this time to achieve significant risk reduction quickly while the reassessment is being completed.

EPA indicated in the proposed plan fact sheet that the thermal desorption unit would utilize dechlorination as a means to treat the off-gas residuals from the process. To maximize vendor competition, EPA will not specify these details in this A ROD.

The 1986 ROD and 1990 AROD called for the recovery of PCP-contaminated groundwater only during the excavation of the on-site source materials. EPA's proposed plan fact sheet for this AROD indicated that the amended remedy would not change the previously selected groundwater remedy, with the exception of adding a cleanup level for dioxin. However, during the June 7 1995, Public Meeting, EPA explained that groundwater would be recovered form the upper surficial aquifer and treated as a component of Alternatives 2 and 4. Remediation of the upper surficial aquifer was also included as a component of Alternatives 2 and 4 in the 1995 Focused Feasibility Study. As a clarification to the 1995 proposed plan and public meeting, EPA believes it is necessary to actively remediate groundwater in the upper surficial aquifer to ensure contaminant levels are reduced to acceptable levels in a reasonable time frame (i.e., nine years). Therefore, the scope of the original groundwater remedy is being clarified to provide for the recovery and treatment of PCP-, and potentially dioxin-, contaminated groundwater in the upper surficial aquifer via extraction wells.

APPENDIX A

RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) established a public comment period from May 31, 1995 through June 30, 1995 for interested parties to comment on EPA's Proposed Plan for remedial action at the Coleman-Evans Wood Preserving Site. The comment period included a public meeting on June 7, 1995, conducted by EPA and held at the Whitehouse Elementary School in Whitehouse, Florida. The meeting presented the results of the studies undertaken and the preferred remedial alternative for the Site.

A responsiveness summary is required by Superfund policy to provide a summary of citizen comments and concerns about the site, as raised during the public comment period, and the responses to those concerns. All comments summarized in this document have been factored into the final decision of the preferred alternative for cleanup of the Coleman-Evans Wood Preserving Site.

This responsiveness summary for the Coleman-Evans Wood Preserving Site is divided into the following sections.

I. Overview: This section discusses the recommended alternative for remedial action and the public reaction to this alternative.

II. Background on Community Involvement and Concerns: This section provides a brief history of community interest and concerns regarding the Coleman-Evans Wood Preserving Site.

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses: This section presents both oral and written comments submitted during the public comment period, and provides EPA's response to these comments.

IV. Remaining Concerns: This section discusses community concerns that EPA should be aware of in design and implementation of the remedial alternative for the Site.

I. Overview

During the design of the remedy for the 1990 AROD, soil samples were obtained as part of a treatability study to assess the levels of performance achievable by the selected treatment train. The samples revealed the presence of both PCP and dioxin at the Site.

The results of the treatability study show that the 1990 AROD treatment train is not effective in treating the dioxin found at the Site. Although soil washing is marginally effective on separating dioxin and PCP contaminants from soil particles, a large portion of the contaminants are bound up in the high percentage of wood fiber in the soil. Bio-treatment was found to be ineffective on the dioxin contamination found at the Site. The effectiveness of S/S is also questionable due to the high percentage of wood fiber in the soil, which presents problems in reaching the necessary S/S compressive strength. Attempts to separate the wood fiber from the soil were unsuccessful due to the heavy laden fuel oil on the wood fiber. At best, if the dioxin and PCP wood fiber could be separated from the soil, an undetermined volume of wood fiber still would require some form of treatment or disposal beyond that found in the 1990 AROD.

This AROD selects a new interim remedy to address an estimated 45,000 cubic yards of pentachlorophenol (PCP) and dioxin-contaminated source material (i.e., soil, sediment, and debris) and expands the scope of the groundwater remedy to permanently address PCP-, and potentially dioxin-, contaminated groundwater in th upper surficial aquifer.

This AROD is considered an interim action because the U.S. Environmental Protection Agency (EPA) is selecting a soil dioxin cleanup level of 1.0 Ig/kg as an interim cleanup level for the Site. EPA believes that this cleanup level is protective of human health and the environment, but that the Agency should defer a final cleanup decision at this site pending release of EPA's final dioxin reassessment (embodied in the documents entitled "Health Assessment Document for 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds" and "Estimating Exposure to Dioxin-like Compounds") and pending an evaluation of the effects of the findings of the final dioxin reassessment on Superfund dioxin cleanup levels. EPA believes it is appropriate to take an interim action at this time to achieve significant risk reduction quickly while the reassessment is being completed.

The major components of the amended interim remedy include:

- Excavating approximately 45,000 cubic yards of PCP and dioxin-contaminated soil, sediment, and wood debris from the on-site and off-site areas;
- Treating the excavated soil, sediment, and some wood debris (primarily sawdust) in an on-site thermal desorber, followed by treatment of the off-gas;
- Backfilling the excavated area with treated material and/or clean fill and re-grading and re-vegetating all excavated areas;
- Recovering and treating PCP-contaminated groundwater in the upper surficial aquifer and collecting free-product for recycling and/or off-site disposal;
- Relocating residents, as necessary, to facilitate construction;

During pre-design, a treatability study will be conducted to verify the effectiveness of the thermal desorption treatment system. Should implementation of the selected interim remedy prove ineffective for remediation of PCP and dioxin-contaminated source material, a contingency remedy will be implemented. The contingency remedy is also an interim action pending release of the Agency's final dioxin reassessment.

The major components of the contingency remedy include:

- Excavating approximately 5,000 cubic yards of off-site contaminated soil and sediment and distributing it on-site;
- Backfilling the excavated area with clean fill and re-grading and re-vegetating all excavated areas;
- Constructing a multi-layer RCRA cap to contain the affected on-site area, including surface drainage controls;
- Recovering and treating PCP-contaminated groundwater in the upper surficial aquifer and collecting free-product for recycling and/or off-site disposal;
- Relocating residents, as necessary, to facilitate construction;
- Implementing deed restrictions and/or other institutional controls to prohibit future use of the Site in a manner that would compromise the integrity of the cap and its associated systems.

Based on public input, the community surrounding the Site favors the selected interim remedy, but also supports the contingency interim remedy.

II. Background on Community Involvement and Concern

The Jacksonville community has been aware of the contamination problem at the Coleman-Evans Wood Preserving Site for several years. The first public meeting was held on August 7, 1986, to discuss the findings of the Remedial Investigation/Feasibility Study (RI/FS). The public meeting served to initiate a three week public comment period which closed on August 28, 1986.

During this public comment period, EPA submitted a proposal for remedial action at the Site. That proposal suggested treatment of the contamination by incineration. As noted in this AROD, that alternative was rejected due to concern over the cost effectiveness of the action due to a reassessed volume increase. Subsequently, EPA initiated a treatability study to examine bioremediation and solidification/stabilization as a viable remedy for the Coleman-Evans Wood Preserving Site. The results of the study confirmed that the amended remedy described in the previous section satisfies EPA's goal for source control.

The treatability study for the Coleman-Evans Wood Preserving Site was released to the public on August 9, 1990. Also, the modified proposed remedial action plan which revised the remedy EPA had proposed in its initial 1986 Record of Decision (ROD), was placed in the information repositories.

EPA conducted the second public meeting on August 23, 1990. The purpose of this meeting was to explain the results of the site studies, to present the recommendations for site cleanup, and to accept questions and comments from the public on any aspect of the site or its cleanup. The first AROD for the site was signed on September 26, 1990.

In October 1992, EPA and FDEP held a public meeting to inform the public of the discovery of dioxin contamination at the Site. Although the public meeting was announced in the Florida Times Union, only a few members of the community participated.

Door-to-door community interviews were conducted in April 1995 to listen to the concerns of the community and explain the limited alternatives for addressing the dioxin contamination. EPA's mailing list was also updated at this time.

Another Proposed Plan was released to the public in May 1995 with the purpose of selecting a new remedy to address the newly identified dioxin contamination. Documents supporting the Proposed Plan were made available to the public for review in the Administrative Record maintained at EPA's Region IV office in Atlanta, Georgia, and at the Information Repository maintained at the Whitehouse Elementary School in Whitehouse, Florida. A notice of the Public Meeting was published in the Florida Times Union in June 1995.

A Proposed Plan public meeting was held on June 7, 1995 at the Whitehouse Elementary School. During this meeting, representatives from EPA presented various alternatives for addressing the Site, presented EPA's preferred alternative, and answered questions.

The 30-day public comment period was held from May 31, 1995 through June 30, 1995. During the public comment period, the FDEP expressed concern with EPA's proposed cleanup levels for the site. Specifically, FDEP requested that EPA select a PCP cleanup level that would be protective of groundwater, and a dioxin cleanup level that a 1 x 10 -6 risk level. Finalization of this AROD was delayed from July 1, 1995 to July 31, 1997, while EPA and FDEP evaluated appropriate cleanup levels for the site and while additional Site characterization was performed to delineate dioxin contaminate levels off-site.

A Community Update Fact Sheet was released to the public in August 1997 reporting the results of the off-site dioxin delineation.

During the 30-day public comment period held in 1995, few issues and concerns were identified by the community. The following section summarizes the key issues and concerns identified.

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses

Public Meeting held June 7, 1995

1) One commentor asked if the Florida Department of Environmental Protection (FDEP) is in agreement with EPA's proposed alternative.

EPA Response: The FDEP has reviewed all documents and worked directly with EPA in evaluating the alternatives to support EPA's selection of the interim amended remedy. FDEP also supports EPA's choice of Alternative 2 as the contingency remedy. Based on FDEP's comments to date, EPA expects formal concurrence on the selected remedy will be forthcoming.

2) A representative for the City of Jacksonville, Air Quality Division was concerned about air quality standards being met during site remediation and also expressed a preference that site contamination be treated (as opposed to being contained) to prevent future problems.

EPA Response: EPA shares the City of Jacksonville's concern regarding air emissions during site remediation and has already been in contact with the City of Jacksonville, Air Quality Division to discuss appropriate requirements. EPA will work directly with State and local officials during preliminary remedial design to identify appropriate air monitoring requirements to ensure protection of human health and the environment.

3) One commentor expressed concern with whether a risk assessment had been performed for the site to address the newly discovered dioxin contamination.

EPA Response: A baseline risk assessment is required to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action.

A Public Health Evaluation was developed in 1986 based on the presence of PCP, the only contaminant of concern known at the time. Since subsequent sampling has indicated the widespread presence of dioxin, a Focused Baseline Risk Assessment Addendum was prepared in 1996 to supplement the 1986 evaluation. The findings from both the 1986 Public Health Evaluation and the 1996 Focused Baseline Risk Assessment support the decision to remediate the site.

4) One commentor expressed concern that some nearby residents may use the surficial aquifer for irrigation which would be another potential pathway for exposure to dioxin and PCP contamination.

EPA Response: The 1986 Public Health Evaluation determined that the consumption of root crops irrigated with groundwater from the upper surficial aquifer could produce unacceptable levels of exposure to PCP. For this reason, EPA believes it is necessary to remediate groundwater in the upper surficial aquifer to prevent the possibility of future exposure. While EPA agrees with the commentor that groundwater in the upper surficial aquifer is a potential future source of PCP contamination to local residents, the Agency is not aware of any wells that currently access this aquifer that are used for either drinking water or irrigation.

5) A representative for the City of Jacksonville Air Quality Division asked what type of dioxins have been found at the site.

EPA Response: The term "dioxin" at the Coleman-Evans Wood Preserving Site refers to a toxicity weighted concentration of (TEQ) of over 200 polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzodioxins (PCDDs). Small amounts of PCDDs and PCDFs can be potentially produced in the wood treatment process. Consequently, the types of dioxin found at the Coleman-Evans Wood Preserving Site are consistent with those typically found at all wood treating sites (i.e., primarily Hepta and Octa). Very little 2,3,7,8-TCDD has been found at the site, which is the most widely studied and believed to be the most toxic.

Comment Letter: Department of Regulatory & Environmental Services, Water Quality Division, City of Jacksonville, Florida, dated June 13, 1995

1) This division supports the selection of Remedial Alternative #4, Thermal Desorption and Dechlorination. It also supports and requests that your contractor conduct air monitoring as stated in the fact sheet.

EPA Response: Support for Alternative 4 is noted. EPA shares the City of Jacksonville's concern regarding air emissions during site remediation and has already been in contact with the City of Jacksonville, Air Quality Division to discuss appropriate requirements. EPA will work directly with State and local officials during remedial design to identify appropriate air monitoring to ensure the protection of human health and the environment.

2) In the event the Treatability Study demonstration is not effective, the Contingency Remedy must be revised before it is acceptable to this agency. Alternative #2 is unsatisfactory as described because it does not properly dispose or treat the excavated soil presently stored on-site nor the soil that will be excavated off-site. The Water Quality Division could support capping the site "as is"; however, all excavated soil must be removed for disposal or treated prior to spreading under the stabilized cap.

EPA Response: Alternative 2 provides for the excavation of approximately 5000 cubic yards of off-site contaminated soil and sediment exceeding cleanup goals. The excavated material will be consolidated on-site within the capping limits along with foreign borrow soils required to achieve minimum site grades. A multi-layer cap meeting RCRA Subtitle C requirements will be placed over the contaminated area (approximately two feet thick, and graded in accordance with RCRA requirements.

The primary objectives of Alternative 2 are to prevent the possibility of direct contact to site contaminants above the specified cleanup levels and to prevent the affected media from continuing to act as a source to groundwater. These objectives are met by the planned remedial action and EPA does not believe a modification to the remedy is necessary. Furthermore, it is not cost effective to treat or dispose of contaminated material that is otherwise effectively controlled by the on-site containment system.

IV. Remaining Concerns

The community's concerns surrounding the Coleman-Evans Wood Preserving Site will be addressed in the following areas: community involvement support throughout RD/RA and incorporation of comments/suggestions from the community during RD.

Community involvement will consist of making available final documents (i.e., RD Workplan, RD reports, etc..) in a timely manner to the local information repository for the site. EPA will also issue fact sheets to individuals on the mailing list to provide further information on progress of the project and schedules for future activities at the site. EPA will inform the community of any principal design changes made during the project design. If, at any time during the RD/RA, new information is revealed that could affect the implementation of the remedy or if the remedy fails to achieve the necessary design criteria, the AROD may be revised to incorporate new technology that will attain the necessary performance standards.

Community involvement activities will remain an active aspect of the RD/RA phase of the project.

APPENDIX B

STATE CONCURRENCE LETTER

<IMG SRC 97184H>

Mr. John Hankinson
March 13, 1998

The EPA has selected an interim remedial action which includes recovery and treatment of contaminated water, and excavation and thermal desorption of contaminated soil, sediment and wood debris. In the event the pilot study indicates that thermal desorption is unable to accomplish site remedial goals, a contingency remedy will be implemented whereby off-site contaminated soils will be relocated to the site and placed untreated under a RCRA cap. The groundwater remedy would proceed as planned. Remedial goals for groundwater at the site include 1.0 Ig/l for pentachlorophenol (PCP) and 1.0 ng/l for dioxin. Both onsite and off site soils and sediment will be remediated to meet the 2.0 mg/kg goal for PCP and 1.0 Ig/kg for dioxin under both the selected and contingent remedies.

We understand that the 1.0 Ig/kg level for dioxin in soils is an interim cleanup level. And we agree that it is appropriate to move ahead with the interim action in order to achieve significant risk reduction quickly while the federal dioxin toxicity reassessment is being completed. Following the release of the EPA's final dioxin reassessment and a re-evaluation of the appropriate and final dioxin cleanup levels consistent with a 10 -6 risk management goal for unrestricted future residential use, a final Record of Decision for the site will be issued.

As a federally funded cleanup, we understand that there will be a ten percent State cost share for construction, operation, and maintenance at an estimated present worth of $2.07 million for the selected remedy or $5.6 million if the contingent remedy is necessary.

We look forward to completion of the cleanup of the Coleman Evans Superfund site.

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Secretary

VBW/lkb