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EPA Superfund Record of Decision:

Stauffer Chemical Company, Tampa, FL 12/01/1995

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

STAUFFER MANAGEMENT COMPANY SITE

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ATLANTA, GEORGIA

RECORD OF DECISION
DECLARATION

SITE NAME AND LOCATION

Stauffer Management Company Superfund Site
Tampa, Hillsborough County, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision), presents the selected remedial action for the Stauffer Management Company Superfund Site, Tampa, Hillsborough County, Florida, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300.

This decision is based on the administrative record for the Stauffer Management Company Superfund Site. The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has reviewed the reports which are included in the administrative record for the Stauffer Management Company Site. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided EPA with input on those reports. Based on comments received from FDEP, it is expected that written concurrence will be forthcoming; however, a letter formally recommending concurrence with the remedy has not yet been received.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Stauffer Management Company Superfund Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This action is the first and final action planned for the Site. This action addresses soil, sediment, and ground water contamination at the Site and calls for the implementation of response measures which will protect human health and the environment. The selected remedy includes ex situ anaerobic treatment (i.e., bioremediation) of pesticide contaminated surface soils and sediments to levels appropriate for future industrial use of the Site. In addition, the selected remedy includes ground water recovery and treatment with activated carbon to remove pesticides. Since bioremediation is an innovative treatment technology for pesticide removal, ex situ thermal treatment of contaminated soils/sediments is being proposed as a contingency remedy in the event that bioremediation cannot be implemented.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy results in hazardous substances remaining onsite in sub-surface soils, a review will be conducted within five years after commencement of the remedial action and reviews will continue to be conducted at five-year intervals to ensure that the remedy continues to provide adequate protection of human health and the environment.

1 DEC 95

RICHARD D. GREEN
ASSOCIATE DIRECTOR OF SUPERFUND
AND EMERGENCY RESPONSE

DATE

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1.0 SITE LOCATION AND DESCRIPTION

The Stauffer Management Company Superfund Site (hereinafter referred to as the "SMC Site" or the "Site") is located at 2009 Orient Road in Section 14, Township 29 South, Range 19 East, Hillsborough County, Tampa, Florida (see Figure 1-1). The Site is an inactive pesticide manufacturer/distribution facility which encompasses approximately 40 acres of land in an industrialized area of Tampa. Land use surrounding the Site is predominantly commercial/industrial.

Several structures are on the Site including an office, warehouse, laboratory, and additional buildings in the north-central and western corners of the property (see Figure 1-2). The Site is bordered by Universal Waste & Transit, Inc. to the west, the Hillsborough County Correctional Facility to the south, and the Tampa Bypass Canal to the east. The CSX Railroad easement is adjacent to the Site's northern perimeter while a construction materials plant is located directly north of the easement. A petroleum pipeline runs through the easement north of the Site. The Helena Chemical Company is located northwest of the Site.

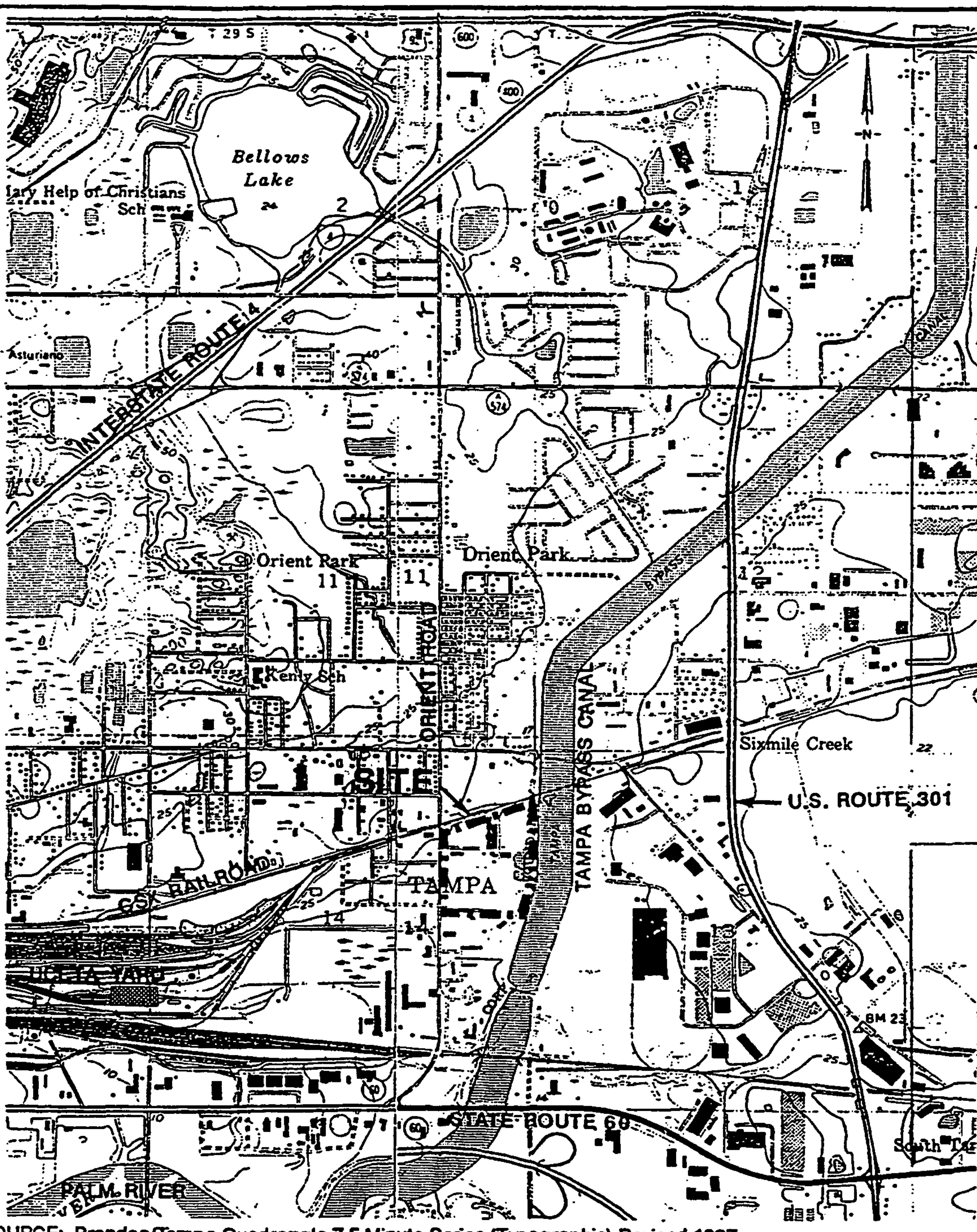
The northern portion of the Site is maintained by a caretaker. The southern and eastern portions are wooded and overgrown. Most of the Site is vegetated, except for the areas where support facilities are located and an area in the northern portion where sulfur is known to have been stored. Two secluded bodies of water, a large and small pond, are located on the Site. The large pond ranges in depth from 3.5 to 11 feet. The small pond ranges in depth from 1 to 10 feet.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The SMC Site was used to formulate agricultural chemical products from 1951 until 1986 and is now inactive. Agricultural pesticides, such as herbicides and insecticides were combined at the plant with raw materials such as kerosene, xylene, clay, solvents, and diatomaceous earth to form pesticide dusts, granules, and liquids that were packaged for distribution. A small incinerator located at the Site was used to burn packaging materials that formerly contained raw materials.

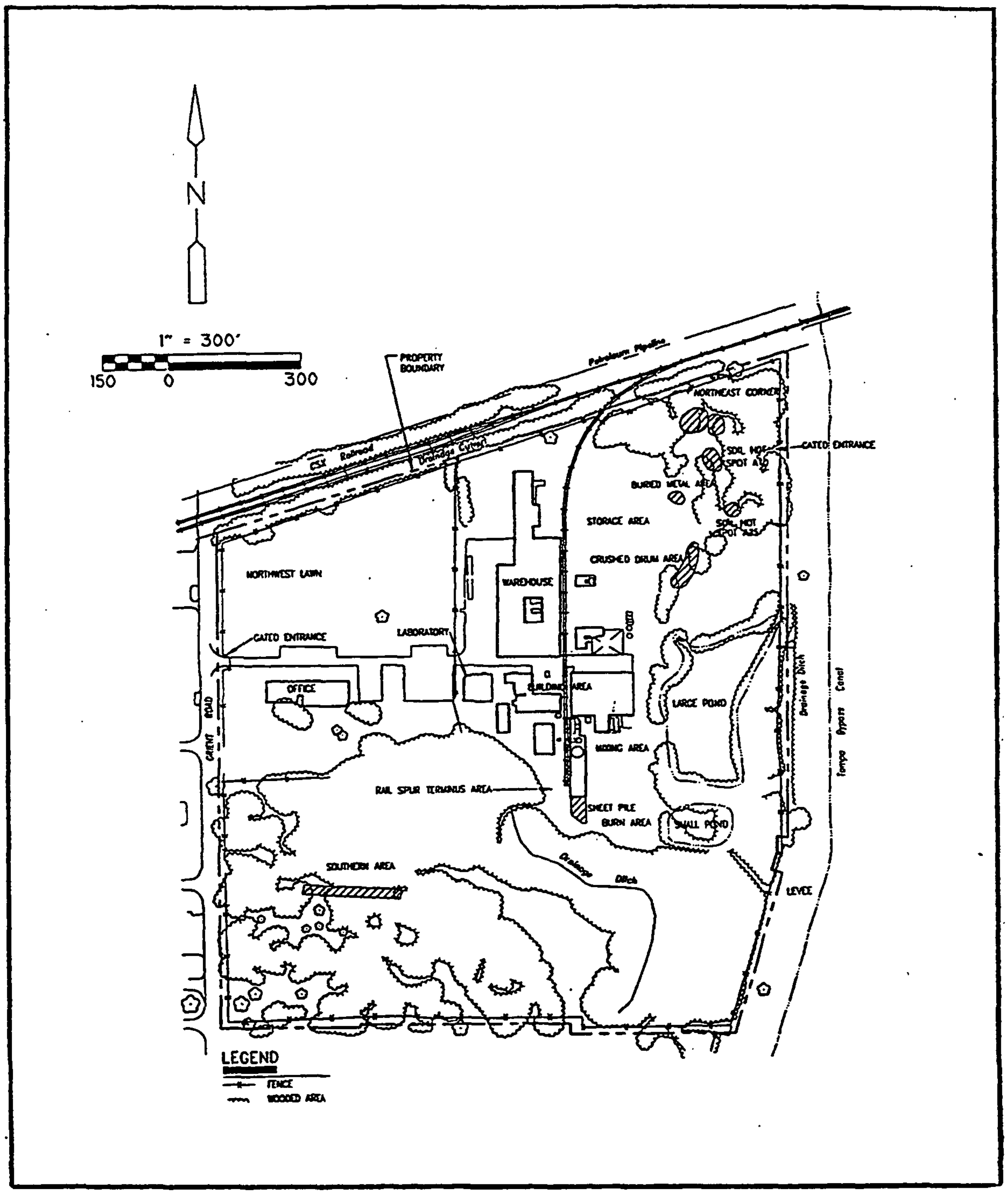
Between 1953 and 1973, waste materials from the facility were disposed of onsite. Several site investigations by various organizations were conducted at the SMC Site between 1987 and 1992. A site investigation conducted by NUS Corporation (NUS) in 1987 revealed the presence of pesticides in onsite soil, surface water and sediment in onsite ponds, and in ground water underlying the Site. A geophysical survey was also completed during the investigation which concluded buried metal was present. Further investigations were conducted at the Site by NUS in 1988 to assess the threat to human health and the environment posed by the Site, and subsequently to characterize the Site using the Hazard Ranking System.

FIGURE 1-1 GENERAL LOCATION MAP



SOURCE: Brandon/Tampa Quadrangle 7.5 Minute Series (Topographic) Revised 1987

FIGURE 1-2 SITE MAP



In 1990, a more extensive geophysical survey was performed at the Site by Environmental Resource Management - South, Inc. (ERM). Additional areas containing buried metal were identified. As a result, the U.S. Environmental Protection Agency (EPA) requested a supplemental investigation be conducted at the SMC Site. Camp Dresser & McKee (CDM) conducted additional site investigation activities in preparation for initiating a removal action at the Site.

In March 1992, EPA formally requested that Stauffer Management Company perform a removal action at the SMC Site. The removal action for the Site as well as the cleanup criteria were outlined in an Administrative Order of Consent (AOC) which was signed with the EPA in March 1992, with the agreement that further remedial activities would be conducted at the Site. Removal activities completed under the March 1992 AOC were divided into two phases. Phase I included the removal of buried metal and drums, and onsite soils containing a total pesticide concentration of 1,000 ppm or greater from seven separate areas onsite: the Northeast Corner, the Crushed Drum Area, the Buried Metal Area, Soil Hot Spot A10, Soil Hot Spot A25, the Rail Spur Terminus Area, and the Southern Area. Phase II included the treatment, transportation, and or disposal of all hazardous substances excavated pursuant to the AOC.

A total of 3,415 cubic yards (CY) of soil was removed from seven different areas and treated onsite. Of the 3,415 CY excavated, approximately 3,265 CY of contaminated soils were treated using Low Temperature Thermal Desorption (LTTD) technology. The remaining 150 CY were set aside for use in treatability studies. Seventeen rolloff boxes, equivalent to 510 CY of debris, which includes crushed drums, wood, and other miscellaneous metal, were also removed from the areas onsite; the rolloff boxes (six profiled as RCRA hazardous and ten profiled as non-hazardous) were shipped offsite to a RCRA approved facility. The excavated areas onsite were backfilled with clean soil.

In September 1992, EPA issued an Administrative Order on Consent (AOC) that required SMC to conduct a remedial investigation and feasibility study (RI/FS) of remaining soil, sediment, and surface water contamination at the Site. In October 1992, the AOC was amended to include the investigation of ground water contamination.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

All basic requirements for public participation under CERCLA sections 113(k)(2)(B)(i-v) and 117 were met in the remedy selection process. A Fact Sheet on the Site was first distributed in September 1993. Since that time, a community relations plan was further developed and implemented at the Site. An information repository was established in July 1995, at the Tampa Campus Library of the University of South Florida, at 4202 East Fowler Avenue, Tampa, Florida.

The Remedial Investigation/Feasibility Study Reports, the Baseline Risk Assessment Report, and Proposed Plan for the SMC Site were released to the public in July 1995. These documents are incorporated in the Administrative Record for the Site. A copy of the Administrative Record, upon which the remedy is based, is located at the information repository. In addition, the Administrative Record and the Site (project) files are available for review at the EPA Region IV offices in Atlanta, Georgia. Notices of availability of these documents were published in the *Tampa Tribune* on July 20, 23, 26, and 27, 1995.

On July 27, 1995, EPA presented its preferred remedy for the Stauffer Management Company Superfund Site during a public meeting at the Kenley Park Recreation Center, 1301 North 66th Street, Tampa, Florida. At this meeting, representatives of EPA answered questions about sampling at the Site and the remedial alternatives under consideration. A transcript of the meeting was prepared and is available at the information repositories.

A 60-day public comment period was held from July 20, 1995 through September 17, 1995. EPA's responses to comments which were received during the comment period are contained in Appendix A of this Record of Decision.

4.0 SCOPE AND ROLE OF ACTION

This ROD addresses the cleanup of pesticide contamination in soils, sediments, and ground water at the SMC Site. The contaminants are similar to those produced and distributed at the Site. Contact with contaminants at the Site pose a risk to human health because EPA's unacceptable risk range is exceeded and concentrations are above ARARs. Contaminants also pose a risk to environment receptors. The purpose of this proposed action is to prevent current or future exposure to contamination. This will be the final response action for this Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Physiography and Topography

The Site is located in the Gulf Coastal Lowlands Physiographic Province of Southwest Florida. This physiographic region is characterized by wetlands interspersed with pine-palmetto flatwoods. Topographic relief at the Site is gentle and slopes eastward toward the Tampa Bypass Canal. Elevations at the Site range from approximately 28 feet above mean sea level (amsl) in the western portion of the Site, to a low of 15 feet amsl in the southeastern portion of the Site in the vicinity of the Tampa Bypass Canal. All surface water runoff at the Site drains to the onsite ponds or to the onsite ditch.

5.2 Geology/Hydrogeology

The regional geology and hydrogeology of Hillsborough County consists of 8,000 to 13,000 feet of unconsolidated and consolidated sediments overlying a crystalline basement of metamorphic or igneous rock. The two hydrogeologic units most widely used for water supply are the surficial aquifer and the Floridan aquifer. The Hawthorn Group exists between the surficial aquifer and Floridan aquifer and has limited use in some parts of Hillsborough County. In western Hillsborough County the Hawthorn Group is comprised of three lithostratigraphic units. These units are, in descending order, the Peace River Formation, the Arcadia Formation, and the Tampa Member. Productive carbonate zones existing within the Hawthorn Group can be considered as the upper Floridan Aquifer.

The surficial aquifer at the Site varies in thickness from 5 to 17 feet, appearing thickest toward the eastern Site boundary. The aquifer is composed predominately of fine- to medium-grained quartz sands, with some clayey sand lenses. Recharge to the surficial aquifer comes directly from rainfall infiltration. Ground water flow in the aquifer, based on historical water level data, is generally toward the Tampa Bypass Canal. Because the Tampa Bypass Canal channel fully penetrates the entire surficial aquifer, ground water from the surficial aquifer discharges to the canal.

The confining unit at the Site, below the surficial aquifer and above the sandy limestone aquifer, consists primarily of bluish to greenish gray clay with lenses of sand, shell fragments, and sandy clay, and varies in thickness from 10 to 22 feet. This hydrogeologic unit is anticipated to correspond with the Peace River Formation. The unit is regarded as semi-confining due to the presence of permeable sand lenses.

The carbonate rock below the semi-confining unit is considered the upper water-bearing zone of the Floridan aquifer and is the Arcadia Formation, including the Tampa Member. The thickness of the unit beneath the Site is unknown; only the top 20 to 25 feet of the formation was penetrated during previous site investigative activities. Deeper portions of the Floridan aquifer investigated during the RI are referred to as the intermediate Floridan aquifer. Regional literature indicates that the upper Floridan may be as thick as 200 feet. The grey to white sandy limestone and dolostone contain varying amounts of fine-grained, well rounded sand, chert, concretions, and marl.

Recharge to the upper Floridan aquifer is through water leakage through the sandy clay lenses of the confining unit. The ground water flow direction in the upper Floridan aquifer at the Site is toward the Tampa Bypass Canal. The Tampa Bypass Canal cuts through the surficial aquifer and into the upper Floridan aquifer, providing a discharge point for both aquifers.

5.3 Surface Water Hydrology

The surface water hydrology at the Site is markedly influenced by the surficial sands. The surficial sands are very permeable, allowing precipitation to infiltrate into the sands and recharge the surficial aquifer. The surficial sands are permeable enough such that overland flow does not occur during most precipitation events. In the event that the precipitation rate exceeds the infiltration capacity of the sands, overland flow drains to the east into the ponds along the eastern side of the Site and to the ditch in the wooded southern portion of the Site. Surface waters entering the ditch are directed into the Tampa Bypass Canal, which flows into the Palm River, McKay Bay, Hillsborough Bay, Tampa Bay, and eventually into the Gulf of Mexico.

5.4 Wildlife/Natural Resources

The U.S. Fish and Wildlife Service (USFWS) and the Florida Game and Fresh Water Fish Commission (FGFWFC) were contacted concerning the available information on wildlife and natural resources in the vicinity of the SMC Site. CDM also conducted a comprehensive threatened and endangered species survey to better define environmental receptors at the Site. The investigation concluded that there is a wide diversity of habitats which support an abundance of plant and animal life.

Portions of the vegetated area have been disturbed and community structures have been recently changed due to site investigation activities. Since much of the area has been disturbed, opportunistic plants such as weeds and vines have grown on the Site and produced dense thickets in the southeast portion of the Site. Small stands of live oak (*Quercus virginiana*) with and understory of palmettos (*Sabel palmetto* and/or *Serenoa repens*) are found over most of the Site area. Bamboo vine (*Smilax laurilolia*) and Brazilian Pepper (*Schinus terebinthifolius*) provide significant ground cover in the southern portion of the surveyed area. The Brazilian Pepper is an exotic species commonly found in disturbed fields. The Cajeput Tree (*Melaleuca quinquenervia*) is another aggressive plant, and an indicator species of disturbed areas, noted at the SMC Site.

Based on previous Site visits and interviews with federal and state representatives, the wildlife expected at the Site included a variety of migratory and resident birds, especially wading birds, songbirds, and water fowl; mammals, such as raccoon, marsh rabbits, and squirrels; and a variety of reptiles and amphibians. However, recent habitat disturbance at the Site has likely disrupted traditional wildlife usage patterns. The following endangered species (E) and species of special concern (SSC) were identified at the SMC Site at the time of the survey:

- American alligator (*Alligator mississippiensis*) - SSC
- Brown Pelican (*Pelecanus occidentalis*) - SSC

- Snowy Egret (*Egretta thula*) - SSC
- Wood Stork (*Mycteria americana*) - E

A number of other endangered species and species of special concern were not observed, but could be expected to be present in habitats at the Site.

5.5 Summary of Site Contaminants

5.5.1 Substances Detected in Soil

Fifteen composite surficial soil samples were collected in the western and southern areas of the SMC Site, as shown in Figure 5-1, during the RI. Each sample consisted of 5-point composite samples collected from the ground surface to a depth of 6 inches below land surface (bls). Each sample was analyzed for the contaminants of concern (proprietary pesticides, chlorinated pesticides, and VOCs). In addition, eight of the samples were analyzed for target analyte list (TAL) metals and extractables. Sample CS-1 was used as a background sample to compare to all soil analytical results.

Eight soil borings were advanced from the ground surface to a depth of 10 feet bls; boring locations are shown in Figure 5-2. Forty 2-foot interval samples (0 to 2 feet, 2 to 4 feet, 4 to 6 feet, 6 to 8 feet, and 8 to 10 feet), five from each boring, were collected and analyzed for proprietary pesticides, chlorinated pesticides, and VOCs. Eight composite samples from 0 to 10 feet were analyzed for extractables, chlorinated pesticides and polychlorinated biphenyls (PCBs), and TAL metals. VOC samples were collected from the horizon with the highest flame ionization detector (FID) headspace reading.

In addition to the surface and subsurface soil samples collected during the RI, analytical data from soil samples collected in the 1990 ERM investigation and analytical data from soil samples collected in the 1991 CDM investigation were considered in evaluating remaining soil contamination at the Site. The 1990 and 1991 samples were analyzed for proprietary pesticides, chlorinated pesticides, and VOCs. These sample results were originally used to determine which areas were to be addressed in the removal action conducted in 1993 and 1994, and were applicable in determining areas where soil contamination remains at the Site.

Soil at the Site was found to contain pesticide contamination. The extent of pesticide contamination in surface and subsurface soils at the Site are illustrated in Figure 5-3. VOCs, extractables, and metals were detected in soils at the Site, but are generally co-located where pesticide contamination remains. A summary of substances detected in surface soils (0-2 ft) at the Site is provided in Table 5-1. Substances detected in subsurface soils are summarized in Table 5-2.

FIGURE 5-1: SURFACE SOIL COMPOSITE SAMPLING LOCATIONS

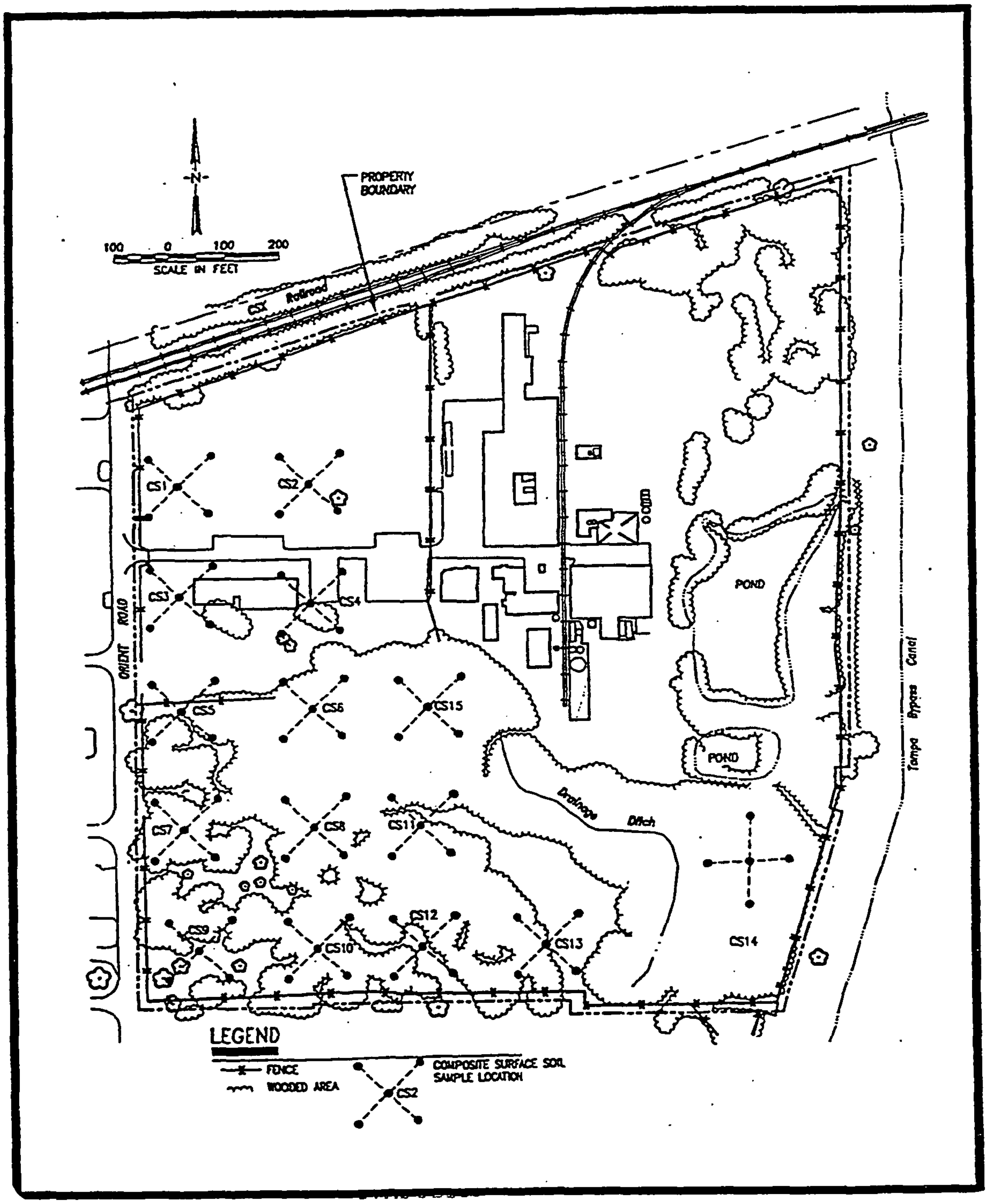


FIGURE 5-2: SOIL BORING LOCATIONS

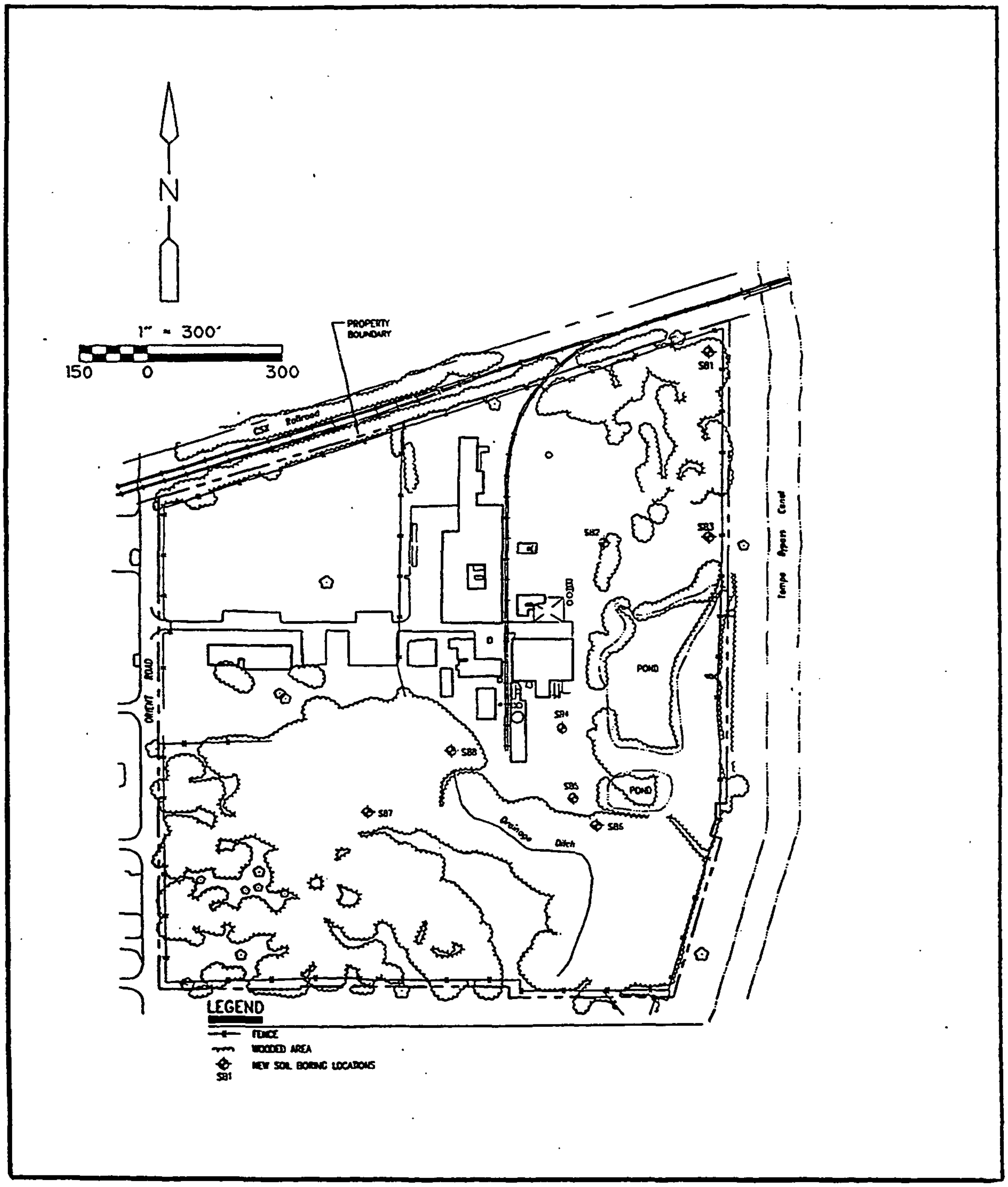


TABLE 5-1: SUBSTANCES DETECTED IN SURFACE SOILS

Ground Water Analyte	Site-Related Samples			Background Samples		
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Average Detected Concentration (mg/kg)	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Average Concentration (mg/kg)
Proprietary Pesticides:						
Atrazine	1/19	0.026	0.026	ND	ND	ND
Butylate	5/27	0.037-47	9.5	ND	ND	ND
Carbophenothion	6/27	0.070-20	4.2	ND	ND	ND
Cycloate	4/27	0.091-0.288	0.185	ND	ND	ND
EPTC	3/27	0.032-0.072	0.042	ND	ND	ND
Fonofos	4/41	0.028-1.3	0.367	ND	ND	ND
Molinate	5/41	0.022-2.9	1.1	ND	ND	ND
Pebulate	4/27	0.046-0.296	0.144	ND	ND	ND
Vernolate	4/27	0.032-0.7	0.276	ND	ND	ND
Chlorinated Pesticides:						
4,4'-DDD	16/41	0.009-16.7	13.4	ND	ND	ND
4,4'-DDE	20/41	0.003-43.9	2.9	ND	ND	ND
4,4'-DDT	21/41	0.002-72	9.8	ND	ND	ND
Aldrin	1/28	0.05	0.05	ND	ND	ND
Alpha-BHC	1/28	1.54	1.54	ND	ND	ND
Chlordane	3/41	0.31-148	59	ND	ND	ND
Dieldrin	2/41	0.098-4.6	2.3	ND	ND	ND
gamma-BHC (Lindane)	1/19	0.71	0.71	ND	ND	ND
Toxaphene	7/27	0.2-457	181.0	ND	ND	ND
Volatile Organic Chemicals						
Acetone	2/22	0.068-0.28	0.174	ND	ND	ND
Ethylbenzene	2/8	0.004-0.006	0.005	ND	ND	ND
Methylene Chloride	3/22	0.004-0.006	0.005	ND	ND	ND
Xylenes	3/8	0.004-210.0	52.5	ND	ND	ND
Inorganics:						
Aluminum	7/7	139.0-6,960.0	1,612.3	1/1	351.0	351.0
Arsenic	4/7	0.59-1.4	1.0	ND	ND	ND
Barium	4/7	9.85-75.4	41.0	1/1	45.8	45.8
Beryllium	1/7	0.63	0.6	ND	ND	ND
Cadmium	2/7	0.28-0.44	0.4	1/1	0.45	0.45
Calcium	7/7	180.0-40,900.0	7,673.1	1/1	1,040.0	1,040.0
Chromium(IV)	3/7	3.45-14.6	8.2	1/1	3.1	3.1
Copper	6/7	3.7-105.0	30.0	1/1	11.4	11.4
Iron	7/7	334.0-5,630.0	1,524.6	1/1	1,720.0	1,720.0
Lead	7/7	15.3-43.6	24.2	1/1	75.1	75.1

TABLE 5-1: SUBSTANCES DETECTED IN SURFACE SOILS (continued)

Ground Water Analyte	Site-Related Samples			Background Samples		
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Average Detected Concentration (mg/kg)	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Average Concentration (mg/kg)
Inorganics:						
Magnesium	4/7	79.9-504.0	259.0	ND	ND	ND
Manganese	6/7	3.0-36.7	12.8	1/1	17.3	17.3
Nickel	1/7	3.6	3.6	ND	ND	ND
Selenium	1/7	0.16	0.2	ND	ND	ND
Sodium	2/7	69.0-224.0	146.5	ND	ND	ND
Thallium	1/7	0.14	0.1	ND	ND	ND
Vanadium	3/7	3.6-11.3	6.5	ND	ND	ND
Zinc	7/7	14.2-187.0	47.9	1/1	88.4	88.4

mg/kg = milligrams per kilogram

ND = Not Detected above quantitation limit

NA = Not Analyzed

TABLE 5-2: SUBSTANCES DETECTED IN SUBSURFACE SOILS

Parameter	Soil (2-4 ft)		Soil (4-6 ft)		Soil (6-8 ft)		Soil (8-10 ft)	
	Frequency of Detection	Range of Conc. (mg/kg)	Frequency of Detection	Range of Conc. (mg/kg)	Frequency of Detection	Range of Conc. (mg/kg)	Frequency of Detection	Range of Conc. (mg/kg)
Proprietary Pesticides								
Butylate	1/8	4.5	1/8	12	1/8	1.5	ND	
Carbophenothion	1/8	3.6	2/8	2.3-16	2/8	0.79-3.2	1/8	2
Cycloate	1/8	7.8	1/8	11	1/8	4.3	ND	
EPTC	1/8	1.2	1/8	4.5	1/8	0.87	1/8	0.057
Fonofos	1/8	0.45	1/8	5.1	1/8	0.61	ND	
Molinate	1/8	1.7	1/8	20	1/8	2.7	1/8	1.7
Pebulate	1/8	1.2	1/8	11	1/8	1.8	1/8	1.7
Vernolate	1/8	4.4	1/8	30	1/8	2.9	1/8	1.2
Chlorinated Pesticides								
4,4-DDD	2/8	0.29-0.52	2/8	2.7-11	4/8	0.16-7.9	3/8	0.36-56
4,4-DDE	ND		1/8	11	1/8	0.089	1/8	1.4
4,4-DDT	3/8	0.27-1.4	2/8	0.31-7.1	4/8	0.068-53	2/8	0.97-4.5
Aldrin	ND		1/8	1.5	1/8	0.065	ND	
alpha-BHC	1/8	0.088	ND		ND		ND	
beta-BHC	ND		1/8	2.3	ND		ND	
Chlordane	ND		1/8	7.2	ND		ND	
delta-BHC	ND		ND		1/8	0.21	1/8	0.22
Dieldrin	1/8	0.2	1/8	6.1	1/8	0.49	1/8	0.64
Endosulfan I	ND		1/8	4.4	ND		1/8	0.082
Endosulfan Sulfate	ND		ND		ND		1/8	0.11
Endrin	2/8	0.089-36	2/8	2-24	1/8	110	1/8	0.24
Endrin Aldehyde	ND		1/8	2.6	1/8	0.65	1/8	0.87
Ethion	ND		1/8	5.6	1/8	0.16	2/8	0.12-98
Heptachlor	ND		ND		ND		1/8	59
Heptachlor Epoxide	ND		1/8	1.8	ND		1/8	0.2
Malathion	ND		ND		1/8	0.29	1/8	0.17
Toxaphene	1/8	130	ND		1/8	330	1/8	310
Volatile Organic Chemicals								
Acetone	3/8	0.043-0.160	3/8	0.028-0.71	5/8	0.030-1.1	5/8	0.029-3.6
Ethylbenzene	1/8	28	3/8	0.0049-17	2/8	0.46-4.1	2/8	1.7-12
Toluene	1/8	0.0049	1/8	0.28	1/8	1.6	ND	
Xylenes, Total	2/8	0.0029-180	3/8	0.012-110	3/8	0.0072-32	2/8	29-76

mg/kg = milligrams per kilogram

ND = Not Detected above quantitation limit

NA = Not Analyzed

In addition to results from the remedial investigation, data from the removal action indicated that pesticides remain in subsurface soils. Table 5-3 presents the results of confirmatory sampling and analyses by compound for each removal action area.

5.5.2 Substances Detected in Ground Water

5.5.2.1 Monitoring Well Network

Fourteen new ground water monitoring wells were installed during the remedial investigation. A total of 30 monitor wells in 12 well clusters now exist at the Site and were sampled in the remedial investigation. At each well cluster, a surficial aquifer well (A) and an upper Floridan aquifer well (B) are present. At six well cluster locations, an additional intermediate Floridan aquifer well (C) as been installed at greater depths in the Floridan aquifer. Well clusters MWT-01 and MWT-03 were considered background ground water locations. Figure 5-3 shows the location of the ground water monitoring wells.

5.5.2.2 Substances Detected in the Surficial Aquifer

Twelve surficial aquifer wells were sampled and analyzed for priority pesticides, chlorinated pesticides, and VOCs. Two surficial aquifer well samples (MWT-14A and MWT-16A) were also analyzed for TAL metals and extractables. Sampling results are summarized in Table 5-4. Ground water flow directions in the surficial aquifer were determined to be generally to the south east toward the Tampa Bypass Canal. The hydraulic gradient across the Site was determined to be 0.01 feet per foot (ft/ft) in the surficial aquifer. A ground water mound is evident in the vicinity of the ponds indicating a recharge location for the surficial aquifer. The aquifer transmissivity is expected to vary considerably due to the presence of the intermittent clayey sand layers throughout the surficial aquifer sands. The Tampa Bypass Canal acts as a barrier and discharge point for the surficial aquifer.

5.5.2.3 Substances Detected in the Floridan Aquifer

Eighteen surficial aquifer wells were sampled and analyzed for priority pesticides, chlorinated pesticides, and VOCs. Two upper Floridan aquifer well samples (MWT-1B and MWT-6B) and one intermediate Floridan aquifer well sample (MWT-12C) were also analyzed for TAL metals and extractables. Sampling results are summarized in Table 5-5. At locations with upper and intermediate Floridan aquifer monitoring wells, maximum detected concentrations were considered. Ground water flow directions in the Floridan aquifer were determined to be generally to the east- southeast toward the Tampa Bypass Canal. The onsite ponds do not affect ground water flow patterns in the Floridan aquifer. The hydraulic gradient across the Site was determined to be 0.006 feet per foot (ft/ft) in the Floridan aquifer. Other aquifer are not known. The Tampa Bypass Canal intersects the Floridan aquifer, permitting an upward hydraulic gradient along the eastern portion of the Site.

TABLE 5-3: REMOVAL ACTION CONFIRMATORY SAMPLING SUMMARY

Parameter	North east Corne r	A10 Hot Spot	Crushed Drum Area	A25 Hot Spot	Rail Spur Terminus Area	Southern Area	Buried Metal Area
***Proprietary Pesticides* (mg/kg)**							
Butylate	150	BDL	BDL	BDL	2	BDL	BDL
Carbophenothion	32	BDL	73	BDL	1	89	BDL
M-Carbophenathion	1,405	BDL	1	BDL	98	129	BDL
Cycloate	9	BDL	BDL	BDL	5	BDL	BDL
EPTC	119	BDL	BDL	BDL	7	BDL	BDL
Fonofos	442	BDL	BDL	BDL	BDL	BDL	BDL
M-Parathion	BDL	BDL	BDL	BDL	2	BDL	BDL
Molinate	146	BDL	BDL	BDL	3	BDL	BDL
Vernolate	263	BDL	BDL	BDL	17	BDL	25
***Chlorinated Pesticides* (mg/kg)**							
Aldrin	BDL	BDL	32	BDL	BDL	BDL	BDL
alpha-BHC	6	BDL	BDL	BDL	BDL	BDL	BDL
gamma-BHC	30	BDL	BDL	BDL	BDL	BDL	BDL
delta-BHC	1	BDL	BDL	BDL	BDL	BDL	BDL
4,4'-DDD	453	28	2	2	1	49	23
4,4'-DDE	2	BDL	BDL	BDL	BDL	1	15
4,4'-DDT	2,514	200	6	5	BDL	10	154
Dieldrin	4	BDL	BDL	BDL	4	BDL	BDL
Toxaphene	BDL	BDL	1,506	BDL	BDL	BDL	BDL

NOTES:

1. Only those pesticides detected are indicated above.
2. Values represent a summation of concentrations from all samples collected in each area.
3. BDL - Below detection limit of 1 mg/kg.

FIGURE 5-3: GROUND WATER SAMPLING LOCATIONS

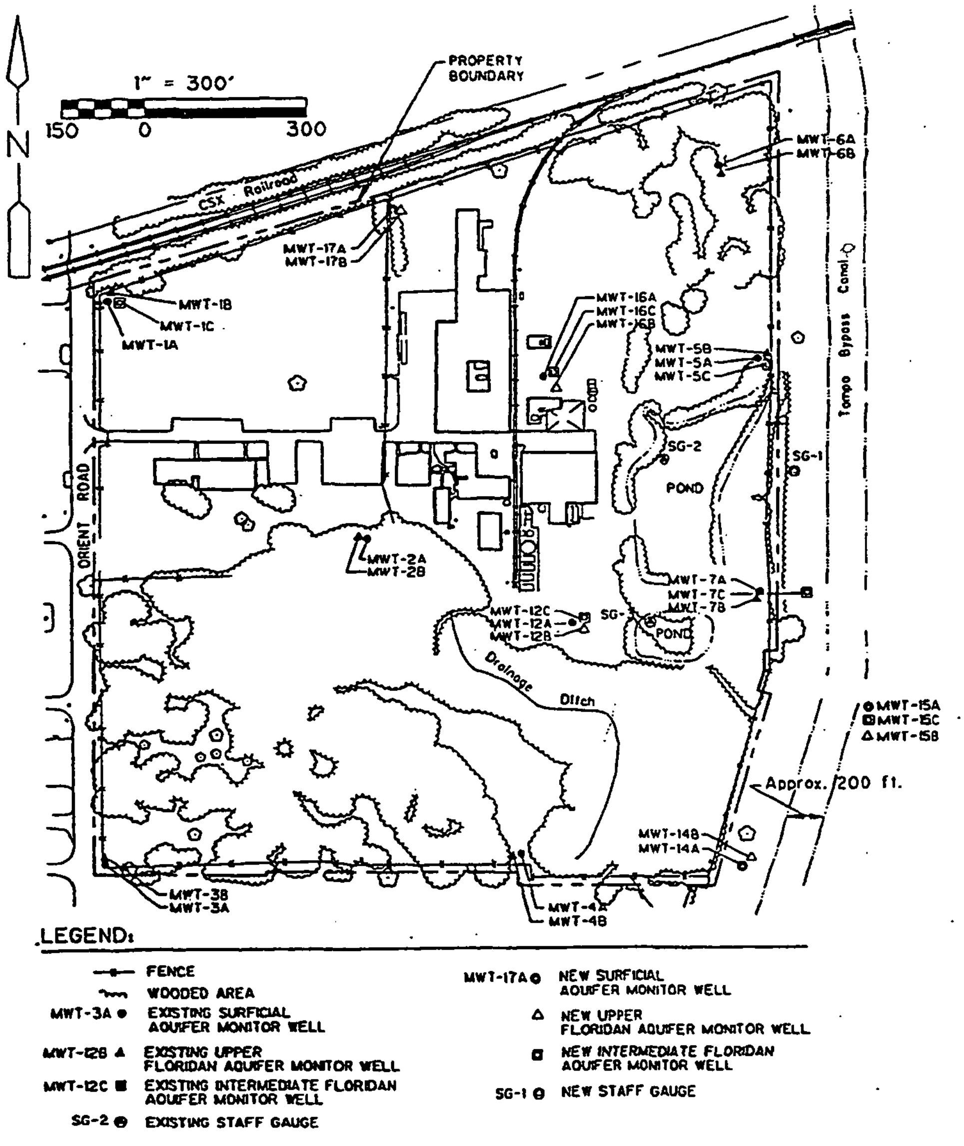


TABLE 5-4: SUBSTANCES DETECTED IN SURFICIAL AQUIFER

Ground Water Analyte	Site-Related Samples			Background Samples		
	Frequency of Detection	Range of Detected Concentrations (µg/L)	Average Detected Concentration (µg/L)	Frequency of Detection	Range of Detected Concentrations (µg/L)	Average Concentration (µg/L)
INORGANICS:						
Aluminum	2/2	415-6,420	3,418	NA	NA	NA
Cadmium	1/2	16	16	NA	NA	NA
Calcium	2/2	74,300-375,000	224,650	NA	NA	NA
Iron	2/2	18,000-18,200	18,100	NA	NA	NA
Lead	1/2	8	8	NA	NA	NA
Magnesium	2/2	12,400-23,900	18,150	NA	NA	NA
Manganese	2/2	227-392	248	NA	NA	NA
Potassium	2/2	2,160-3,840	3,000	NA	NA	NA
Sodium	2/2	18,400-36,200	27,300	NA	NA	NA
Zinc	2/2	70-169	120	NA	NA	NA
PESTICIDES:						
4,4-DDD	1/10	0.3	0.3	ND	ND	ND
Aldrin	2/10	0.07-0.2	0.1	ND	ND	ND
Alpha-BHC	3/10	0.1-9	3	1/2	2.5	2.5
Atrazine	1/10	3	3	ND	ND	ND
Beta-BHC	1/10	6	6	ND	ND	ND
Butylate	3/10	0.8-130	51	ND	ND	ND
Cycloate	2/10	2-590	296	ND	ND	ND
Dieldrin	2/10	0.06-0.1	0.09	ND	ND	ND
Endosulfan II	1/10	0.2	0.2	ND	ND	ND
EPTC	5/10	7-9,400	2,087	ND	ND	ND
Heptachlor	1/10	0.1	0.1	ND	ND	ND
Heptachlor Epoxide	1/10	0.6	0.6	ND	ND	ND
Molinate	5/10	1-7,700	1,622	ND	ND	ND
Pebulate	3/10	0.6-18,000	6,012	ND	ND	ND
Vernolate (Vernam)	3/10	4-130	47	ND	ND	ND
VOLATILE ORGANIC COMPOUNDS:						
Chlorobenzene	4/10	3-25	13	1/2	1	1
Xylene (total)	2/10	32-740	386	1/2	4	4

µg/L = micrograms per liter

ND = Not Detected above quantitation limit

NA = Not Analyzed

TABLE 5-5: SUBSTANCES DETECTED IN FLORIDAN AQUIFER

Ground Water Analyte	Samples Taken In Floridan Aquifer			Background Samples: Surficial Aquifer		
	Frequency of Detection	Range of Detected Concentrations (μg/L)	Average Concentration (μg/L)	Frequency of Detection	Range of Detected Concentrations (μg/L)	Average Concentration (μg/L)
INORGANICS:						
Aluminum	1/2	532	532	ND	ND	ND
Calcium	1/2	134,000	134,000	1/2	631,000	631,000
Iron	2/2	364-5,010	2,687	1/2	3,840	3,840
Magnesium	2/2	9,620-9,980	9,800	1/2	41,300	41,300
Manganese	1/2	188	188	1/2	122	122
Potassium	2/2	666-1,260	963	1/2	7,270	7,270
Sodium	2/2	13,750-27,400	20,575	1/2	32,100	32,100
PESTICIDES:						
Aldrin	1/10	0.2	0.2	ND	ND	ND
Alpha-BHC	1/10	0.06	0.06	ND	ND	ND
Beta-BHC	2/10	0.06-0.2	0.1	ND	ND	ND
Delta-BHC	1/10	1	1	ND	ND	ND
Butylate	4/10	3-12	7	ND	ND	ND
Cycloate	2/10	1-13	7	ND	ND	ND
4,4-DDD	2/10	0.08-0.5	0.3	ND	ND	ND
4,4-DDE	1/10	0.07	0.07	ND	ND	ND
4,4-DDT	5/10	0.07-9	2	ND	ND	ND
Dieldrin	1/10	0.1	0.1	ND	ND	ND
Endosulfan I	1/10	0.07	0.07	ND	ND	ND
Endosulfan Sulfate	4/10	0.08-0.2	0.1	ND	ND	ND
EPTC	5/10	3-97	37	1/2	3.5	3.5
Fonofos	1/10	18	18	ND	ND	ND
Heptachlor	1/10	0.08	0.08	1/2	1.8	1.8
Molinate	6/10	1-230	57	ND	ND	ND
Pebulate	4/10	1-76	20	ND	ND	ND
Vernolate (Vernam)	5/10	1-50	16	ND	ND	ND
VOLATILE ORGANIC COMPOUNDS:						
Acetone	1/10	10	10	1/2	86	86
Bromodichloromethane	2/10	4-6	5	ND	ND	ND
Chlorobenzene	5/10	1-9	4	1/2	10	10
Chloroform	4/10	2-14	9	ND	ND	ND
1,2-Dichloroethane (total)	2/10	2-8	5	ND	ND	ND
Trichloroethane	1/10	2	2	ND	ND	ND
SEMI-VOLATILE ORGANICS:						
Bis(2-ethylhexyl) phthalate	1/10	370	370	ND	ND	ND

μg/L = micrograms per liter

ND = Not Detected above quantitation limit

NA = Not Analyzed

5.5.3 Substances Detected In Surface Water

Thirteen surface water samples were collected from both onsite and offsite locations (Figure 5-4). SW-1 was designated as representative of background conditions in the Tampa Bypass Canal. All samples were analyzed for TCL parameters, TAL metals, proprietary pesticides, and inorganics. Sampling results are summarized in Table 5-6. Surface water in the onsite ponds and ditch contained a number of pesticide concentrations. Only one pesticide was detected in surface water from offsite ditches, and no pesticides were detected in the Tampa Bypass Canal.

5.5.4 Substances Detected in Sediment

Thirteen sediment samples were collected from the same locations onsite and offsite as surface water samples (Figure 5-4). SD-1 was designated as representative of background conditions in the Tampa Bypass Canal. All samples were analyzed for TCL parameters, TAL metals, proprietary pesticides, and inorganics. Sampling results are summarized in Table 5-7. Sediment in the onsite ponds and ditch contained a number of pesticide concentrations. No pesticides were detected in sediment from offsite ditches, and no pesticides were detected in the Tampa Bypass Canal.

6.0 SUMMARY OF SITE RISK

6.1 <u>Risk Assessment Overview</u>

CERCLA directs EPA to conduct a Baseline Risk Assessment (BRA) to determine whether a superfund site poses a current or potential threat to human health and the environment in the absence of any 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.

The risk assessment is based on the data gathered in the Remedial Investigation (RI) and includes analyses of samples of ground water, surface water, sediment and soil. Estimates of current risks are based on this investigation and in the absence of any site-specific remediation, future risk estimates are based on the assumption that current soil and ground water chemical concentrations will persist. Sections 6.2 through 6.6 address the risk assessment evaluation for human health due to exposure to ground water. Section 6.7 describes the potential impacts on aquatic and terrestrial life associated with contamination in sediment and surface water at the SMC Site.

FIGURE 5-4: SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

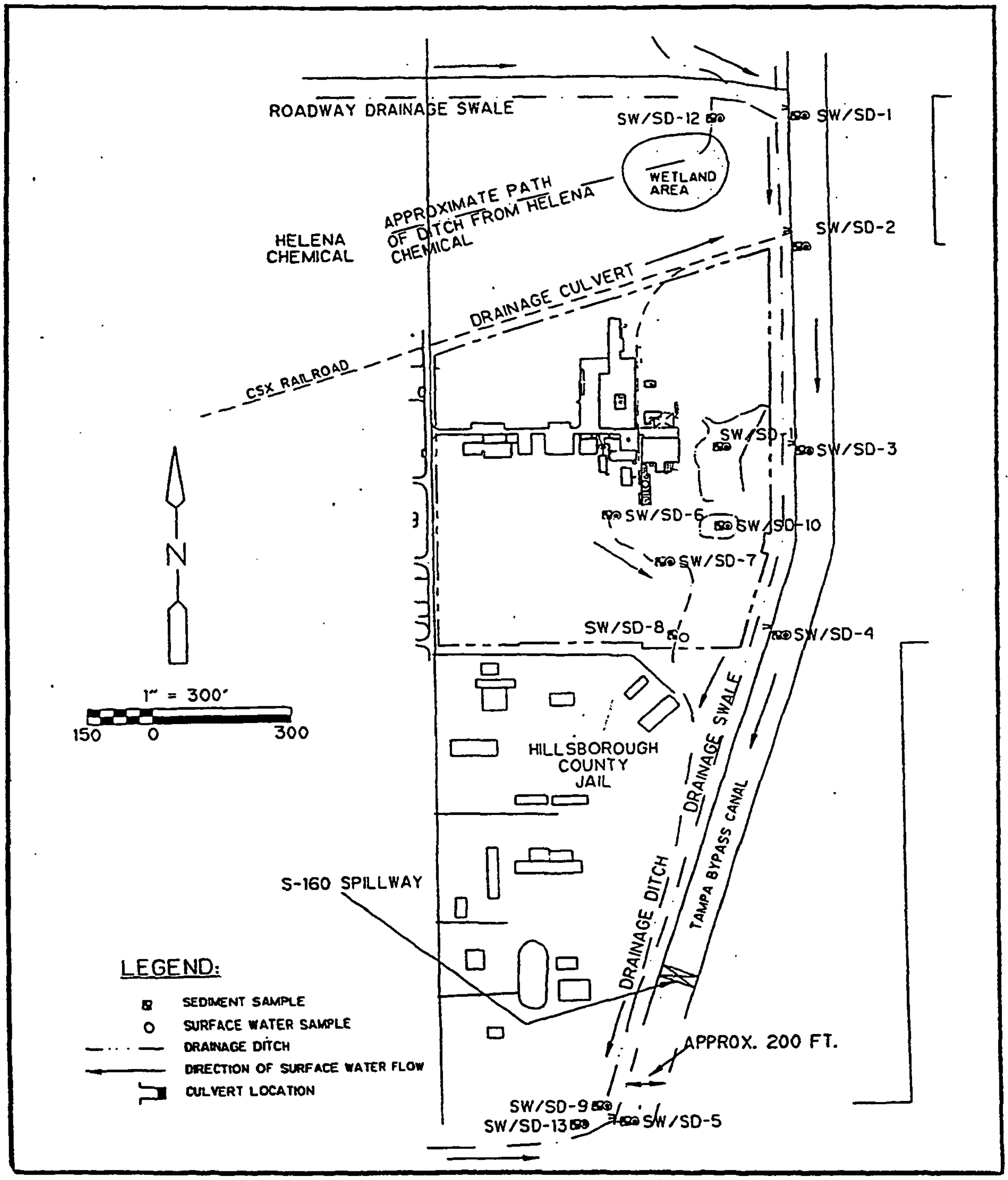


TABLE 5-6: SUBSTANCES DETECTED IN SURFACE WATER

Parameter	Concentrations (ug/L)												
	Tampa Bypass Canal					Onsite Ditch			Onsite Ponds		Offsite Ditches		
	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-10	SW-11	SW-9	SW-12	SW-13
Proprietary Pesticides Butylate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EPTC	ND	ND	ND	ND	ND	ND	ND	2.8	7.2	ND	ND	ND	ND
Molinate	ND	ND	ND	ND	ND	41	ND	5.5	47	ND	ND	ND	ND
Pebulate	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	0.74J	ND	ND
Vernolate	ND	ND	ND	ND	ND	ND	0.65J	ND	12	ND	ND	ND	ND
Chlorinated Pesticides 4,4'-DDD	ND	ND	ND	ND	ND	0.47	0.19J	ND	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	0.7	0.14	ND	ND	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	0.51*	ND	ND	ND	ND	ND	ND	ND
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.091J	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND	1.4	0.29	0.29	26*	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND	ND	0.64	0.12	ND	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND	0.70	0.5	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND	ND	ND	ND
Ethion	ND	ND	ND	ND	ND	1.5*	ND	ND	ND	ND	ND	ND	ND
Malathion	ND	ND	ND	ND	ND	2.1*	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND	0.39*	ND	ND	ND	ND	ND	ND
VOCs Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	15	ND	ND	ND	ND	ND	ND	ND
Inorganics Aluminum	ND	ND	ND	ND	ND	335	ND	ND	ND	9,510	ND	254	ND
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26.8	ND
Calcium	60,700	64,800	66,300	61,000	327,000	68,000	77,500	86,100	179,000	183,000	87,000	198,000	59,400
Iron	ND	ND	ND	ND	ND	3,600	1,300	1,830	ND	3,750	ND	5,760	800
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND	ND	ND
Magnesium	6,080	6,680	6,810	6,170	914,000	3,850	4,630	4,870	6,370	4,980	22,000	7,950	16,800
Manganese	ND	ND	ND	ND	71	220	296	279	ND	176	ND	927	337
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	80.5
Potassium	4,240	3,730	4,380	4,050	226,000	1,800	2,840	2,870	2,390	1,290	6,740	ND	ND
Sodium	12,500	15,200	15,400	12,400	732,000	10,700	12,400	12,500	23,400	4,960	151,000	21,000	36,500
Zinc	ND	ND	ND	ND	ND	ND	ND	ND	ND	118	ND	ND	ND

NOTES: ND - Not detected
* - Quantitation confirmation not conclusive
J - Estimated value.

TABLE 5-7: SUBSTANCES DETECTED IN SEDIMENT

PARAMETERS	CONCENTRATIONS (mg/kg)												
	Tampa Bypass Canal					Onsite Ditch			Onsite Ponds		Offsite Ditches		
	SD-1	SD-2	SD-3	SD-4	SD-5	SD-6	SD-7	SD-8	SD-10	SD-11	SD-9	SD-12	SD-13
Proprietary Pesticides													
Butylate	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.3	ND	ND	ND
Carbophenothion	ND	ND	ND	ND	ND	ND	ND	ND	130	19	ND	ND	ND
Fonofos	ND	ND	ND	ND	ND	ND	ND	ND	ND	22	ND	ND	ND
Molinate	ND	ND	ND	ND	ND	ND	ND	ND	12	ND	ND	ND	ND
Pebulate	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.1	ND	ND	ND
Vernolate	ND	ND	ND	ND	ND	ND	ND	ND	5.1J	5.0	ND	ND	ND
Chlorinated Pesticides													
4,4'-DDD	ND	ND	ND	ND	ND	8.8	ND	ND	16*	28	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND	1.1	ND	ND	82	3.5*	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	120*	12	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	20	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	170	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	26	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	3.4	ND	ND	110*	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	36*	11*	ND	ND	ND
VOCs													
Acetone	ND	0.052J	ND	0.064J	0.039J	0.220	0.062J	2.0	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	0.0073J	ND	ND	1.7	0.37	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	0.010J	ND	ND	ND	0.0021J	ND	ND
Toluene	ND	ND	ND	ND	ND	0.013	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	210	6.5	ND	ND	ND
Inorganics													
Aluminum	278	3,020	3,140	9,460	1,140	1,730	4,070	1,160	11,700	3,610	606	1,170	1,180
Arsenic	ND	0.99	1.6	1.4	1.1	2.1	ND	2.7	8.1	5.2	ND	2.7	1.8
Barium	ND	24.5	27.8	48.6	10.1	ND	39.5	11.5	94.2	42.1	ND	21.1	23.6
Cadmium	ND	0.48	0.55	0.65	0.87	0.76	2.7	0.95	2.7	1.3	0.38	ND	0.66
Calcium	2,650	20,300	19,900	20,500	49,500	2,250	49,000	5,420	16,300	2,760	2,130	49,300	21,800
Chromium	ND	10.6	16.3	24.3	8.4	ND	14.5	4.7	380	58.7	ND	5.1	8.7
Copper	ND	5.9	6.4	10.8	10.1	62.4	93.8	19	116	195	ND	4.4	19.1
Iron	301	2,820	3,190	5,540	2,250	1,130	5,990	2,640	23,400	10,900	603	1,680	3,180
Lead	5.3	25.6	31	35.4	44.6	40.1	106	30.2	1,800	95.4	9.2	10.2	49.7
Magnesium	ND	835	747	993	985	93.7	1,220	192	1,560	285	555	262	688
Manganese	3.2	26.2	30.8	40.4	28.3	7.2	52.1	15.5	195	33.9	16.6	44.9	338
Nickel	ND	ND	ND	5.4	ND	ND	8.8	63.6	ND	ND	ND	ND	3.6
Potassium	ND	147	210	488	319	ND	634	90.5	1,340	ND	113	84.8	75.3
Selenium	ND	0.49	0.6	0.96	ND	ND	2.3	0.43	ND	ND	ND	ND	ND
Sodium	ND	86.4	106	108	2,540	ND	ND	81.5	1,420	ND	794	75.9	509
Vanadium	ND	9.6	13.9	19.8	5	9.7	25.0	7.4	ND	13.1	ND	3.8	4.0
Zinc	14.4	252	606	405	195	97.5	659	168	407	200	69.4	136	262

NOTES: ND - Not detected
* - Quantitation confirmation not conclusive
J - Estimated value.

6.2 Contaminants of Potential Concern (COPCs) to Human Health

6.2.1 Screening Criteria

The chemicals measured in the various environmental media during the RI were evaluated for inclusion as chemicals of potential concern in the risk assessment by application of screening criteria. The screening criteria which resulted in elimination and selection of chemicals included the following:

- Inorganic contaminant concentrations less than two times greater than the average detected value of the respective background sample may be deleted.
- Essential nutrients present at low concentrations (i.e., only slightly elevated above naturally occurring levels) and only toxic at very high doses may be deleted.
- Inorganic and organic chemicals detected in ground water that exceed state or federal maximum contaminant levels (MCLs) should be selected as COPC.
- Inorganic and organic chemicals detected in ground water that exceed concentrations that represent a cancer risk level greater than 1×10^{-6} or a Hazard Quotient (HQ) of 0.1 using residential tap water assumptions should be selected as COPC. Region III Risk-Based Concentration Tables were used to screen chemicals.

As a result of applying the above listed criteria, Table 6-1 lists the contaminants of potential concern (COPC) associated with the SMC Site. The chemicals listed in Table 6-1 are of greatest concern because of their toxicity, their relation to background concentrations, their prevalence onsite, and the likelihood of human exposure.

6.2.2 Contaminants of Potential Concern in Surficial Soil

Two inorganics were eliminated because concentrations are within two times background concentrations. Four naturally occurring essential nutrients were eliminated. Eighteen chemicals were eliminated because they occur at concentrations below the Region III Risk-Based screening criteria. Fourteen chemicals reported in the surface soil onsite meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

Region IV does not consider direct exposure to subsurface soils to be a standard scenario that should be evaluated in the baseline risk assessment. Therefore,

TABLE 6-1: CONTAMINANTS OF POTENTIAL CONCERN

Chemical	Floridan Aquifer	Surficial Aquifer	Surface Soil	Onsite Surface Water	Offsite Surface Water	Onsite Sediment	Offsite Sediment
Pesticides: 4,4'-DDD	X	X	X	X		X	
4,4'-DDT	X		X			X	
4,4'-DDE			X	X		X	
Aldrin	X		X	X		X	
alpha-BHC	X	X	X				
Atrazine		X					
beta-BHC	X	X		X		X	
Carbophenothion			X			X	
Chlordane			X			X	
Cycloate	X	X	X				
delta-BHC	X			X		X	
Dieldrin	X	X	X	X		X	
Endosulfan I	X						
Endosulfan II		X					
Endosulfan Sulfate	X						
Endrin				X		X	
EPTC	X	X		X			
Fonofos						X	
Gamma-BHC (Lindane)			X				
Heptachlor	X	X					
Heptachlor Epoxide		X					
Molinate	X	X		X			
Pebulate		X		X	X		
Toxaphene			X				
Vernolate (Vernam)		X		X			
Volatile Organics: Bis(2-ethylhexyl)phthalate	X						
Bromodichloromethane	X						
Chlorobenzene	X	X					
Chloroform	X						
1,2-Dichloroethene (total)	X						
Trichloroethane	X						
Xylene (total)		X					
Inorganics: Aluminum				X	X		
Arsenic			X		X	X	X
Beryllium			X				
Cadmium		X					
Chromium						X	
Lead		X	X	X		X	X
Manganese	X	X		X	X	X	X
Nickel			X				
Thallium			X				
Zinc				X			

chemicals of potential concern were not selected for subsurface soil; however, subsurface soil contamination was evaluated to determine what concentration would be protective of ground water (Section 7.1).

6.2.3 Contaminants of Potential Concern in Surficial Ground Water

Five naturally occurring essential nutrients were eliminated because they are toxic only at very high doses. Three chemicals were eliminated because they were below the Region III Risk-Based screening criteria. Nineteen chemicals reported in the site-related monitoring wells meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

6.2.4 Contaminants of Potential Concern in the Floridan Aquifer

Five naturally occurring essential nutrients were eliminated because they are toxic only at very high doses. Six chemicals were eliminated because they were below Region III Risk-Based screening criteria. Twenty chemicals reported in the site-related monitoring wells meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

6.2.5 Contaminants of Potential Concern in Surface Water

Five naturally occurring essential nutrients were eliminated because they are toxic only at very high doses. One chemical was eliminated because concentrations did not exceed National Abient Water Quality Criteria. Fourteen chemicals reported in the onsite surface water (i.e., ponds and ditch) meet the COPC criteria; four chemicals reported in the offsite surface water (i.e., Tampa Bypass Canal and ditches) meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

6.2.6 Contaminants of Potential Concern in Sediment

Five naturally occurring essential nutrients were eliminated because they are toxic only at very high doses. Twenty chemicals were eliminated because concentrations did not exceed Region III Risk-Based screening criteria. Fifteen chemicals reported in the onsite sediment (i.e., ponds and ditch) meet the COPC criteria; three chemicals reported in the offsite sediment (i.e., Tampa Bypass Canal and ditches) meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

6.3 Exposure Assessment

6.3.1 Introduction

The purpose of the exposure assessment is to estimate the magnitude of potential human exposure to the contaminants of potential concern at the SMC Site. Whether a contaminant is actually a concern to human health and the environment depends upon the likelihood of exposure, i.e. whether the exposure pathway is currently complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a contaminant) is defined by the following four elements:

- a source and mechanism of release from the source;
- a transport medium (e.g., surface water, air) and mechanisms of migration through the medium;
- the presence or potential presence of a receptor at the exposure point; and
- a route of exposure (ingestion, inhalation, dermal absorption).

If all four elements are present, the pathway is considered complete.

6.3.2 Source, Mechanism of Release, and Transport

Surface and subsurface soils beneath the Stauffer Management Company Site became contaminated through the leaching of waste from buried drums and the former pesticide disposal areas, and from leaks or spills from past plant operations. The subsequent infiltration of precipitation resulted in contaminant movement from surface and subsurface soil to ground water. Runoff and erosion resulted in contamination of surface water and sediment.

Most of the source was remediated during removal activities; however, the soils containing total pesticide concentrations greater than 1000 mg/kg (the removal standard) may still be contributing to ground water contamination. The major constituent release and transport mechanisms potentially associated with the Site are the infiltration of precipitation and runoff and erosion of contaminants.

6.3.3 Potential Receptors and Routes of Exposure

6.3.3.1 Current/Future Worker

The current onsite worker was assumed to be exposed to site-related contaminants in surface soil, onsite surface water and sediment, and air during maintenance, landscaping, or other outdoor activities. The routes of exposure considered for the current onsite worker were dermal contact with surface water; incidental ingestion and dermal contact with surface soil and sediment; and inhalation of volatile emissions or fugitive dust. It was assumed that if the Site remains industrial in the future, a future worker would be exposed to site-related contaminants in a similar manner as the current worker; therefore, the future worker scenario is the same as the current worker scenario.

6.3.3.2 Current/Future Offsite Resident

Overland flow at the site drains to the east into ponds along the eastern side of the Site and to the ditch in the southern portion of the Site. Surface waters entering the ditch are directed to the Tampa Bypass Canal. Ground water in both the surficial and Floridan aquifers also discharge to the canal. The Tampa Bypass Canal is used for sport fishing. Therefore, it was assumed that nearby residents could be exposed to site-related contaminations in the Tampa Bypass Canal or offsite drainage ditches during recreational and fishing activities. Potential exposure routes included incidental ingestion, dermal contact, and ingestion of contaminated fish that may exist in the Tampa Bypass Canal.

6.3.3.3 Future Resident

Based on surrounding land use, it was assumed that residential development might occur onsite in the future. The routes of exposure considered for the future resident were incidental ingestion and dermal contact with surface soil, surface water and sediment; and consumption of contaminated fish. Ground water was evaluated due to the possibility of future contamination of offsite private wells or the installation of a private well onsite.

6.3.4 Exposure Point Concentrations

The 95 percent upper confidence limit (UCL) on the arithmetic mean was calculated and used as the reasonable maximum exposure (RME) point concentration of contaminants of potential concern in each-media evaluated, unless it exceeded the maximum concentration. Where this occurred, the maximum concentration was used as the RME concentration for that contaminant. Exposures point concentrations are summarized in the Baseline Risk Assessment. The exposure point concentrations for each of the contaminants of potential concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways.

6.3.5 Dose Assumptions

The U.S. EPA has developed exposure algorithms for use in calculating chemical intakes through the exposure pathways and routes that are relevant for this Site. Doses are averaged over the number of days of exposure (years of exposure x 365 days/year) to evaluate non-carcinogenic effects, and over a lifetime (70 years x 365 days/year) to evaluate potential carcinogenic health effects. Assumptions used to evaluate each receptor are described below.

- The body weights used for the child (age 1-6) and adult are 15 kg and 70 kg, respectively.

- Exposed to soil occurs 5 days/week for 50 weeks/year (250 days/year) for the onsite worker and 350 days/year for the onsite resident. Exposure to surface water and sediment occurs 45 days/year for 24 years for onsite and offsite adult residents; 26 days/year for 25 years for the onsite worker; and 12 days/year for 6 years for the onsite child resident. Exposed to ground water occurs 350 days/year for the onsite adult and child resident.

- Incidental soil ingestion occurs at a rate of 100 mg/day for the onsite worker and future adult resident and 200 mg/day for the future child resident.

- Incidental sediment ingestion occurs at a rate of 100 mg/day for the onsite worker and future adult resident and 200 mg/day for the future child resident.

- Dermal exposure to soil considered an adsorption factor of 1.0 percent for organics and 0.1 percent for inorganics, with an adherence factor of 1.0 mg/cm^2.

- Dermal exposure to sediment considered an adsorption factor of 1.0 percent for organics and 0.1 percent for inorganics, with an adherence factor of 0.6 mg/cm^2.

- The drinking water ingestion rate was assumed to be 2 L/day for the adult resident and 1 L/day for the child resident.

- The surface water ingestion rate was assumed to be 0.01 L/hour and the exposure time 2.6 hours/day by adult or child residents.

- Exposure to contaminated fish was assumed to occur through ingestion of 0.145 kg of local fish per meal, 48 meats per year for 30 years.

6.4 Toxicity Assessment

The purpose of the toxicity assessment is to assign toxicity values (criteria) to each contaminant evaluated in the risk assessment. The toxicity values are used in conjunction with the estimated doses to which a human could be exposed to evaluate the potential human health risk associated with each contaminant. In evaluating potential health risks, both carcinogenic and non-carcinogenic health effects were considered.

Cancer slope factors (CSFs) are developed by EPA under the assumption that the risk of cancer from a given chemical is linearly related to dose. CSFs are developed from laboratory animal studies or human epidemiology studies and classified according to route of administration. The CSF is expressed as $(mg/kg/day)^{-1}$ and when multiplied by the lifetime average daily dose expressed as mg/kg/day will provide an estimate of the probability that the dose will cause cancer during the lifetime of the exposed individual. This increased cancer risk is a probability that is generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). This is a hypothetical estimate of the upper limit of risk based on very conservative or health protective assumptions and statistical evaluations of data from animal experiments or from epidemiological studies. To state that a chemical exposure causes a $1x10^{-6}$ added upper limit risk of cancer means that if 1,000,000 people are exposed one additional incident of cancer is expected to occur. The calculations and assumptions yield an upper limit estimate which assures that no more than one case is expected and, in fact, there may be no additional cases of cancer. U.S. EPA policy has established that an upper limit cancer risk falling below or within the range of $1x10^{-6}$ to $1x10^{-4}$ (or 1 in 1,000,000 to 1 in 100,000) is acceptable.

The toxicity criteria used to evaluate potential non-carcinogenic health effects are reference doses (RfDs). The RfD is expressed as mg/kg/day and represents that dose that has been determined by experimental animal tests or by human observation to not cause adverse health effects, even if the dose is continued for a lifetime. The procedure used to estimate this dose incorporates safety or uncertainty factors that assume it will not over-estimate this safe dose. If the estimated exposure to a chemical expressed as mg/kg/day is less than the RfD, the exposure is not expected to cause any non-carcinogenic effects, even if the exposure is continued for a lifetime. In other words, if the estimated dose divided by the RfD is less than 1.0, there is no concern for adverse non-carcinogenic effects.

6.5 Risk Characterization

6.5.1 Overview

To evaluate the estimated cancer risks, a risk level lower than $1x10^{-6}$ is considered a minimal or de minimis risk. The risk range of $1x10^{-6}$ to $1x10^{-4}$ is an acceptable risk range and would not be expected to require a response action. A risk level greater than $1x10^{-4}$ would be evaluated further and a remedial action to decrease the estimated risk considered.

A hazard quotient (HQ) of less than unity (1.0) indicates that the exposures are not expected to cause adverse health effects. An HQ greater than one (1.0) requires further evaluation. For example, although the hazard quotients of the contaminants present are added and exceed 1.0, further evaluation may show that their toxicities are not additive because each contaminant affects different target organs. When the total effect is evaluated on an effect and target organ basis the hazard index of the separate chemicals may be at acceptable levels.

Carcinogenic risks and non-carcinogenic hazards were evaluated for potential exposures to contaminants of potential concern in soil, surface water, sediment, and ground water. The receptor population was current/future onsite worker, current/future offsite resident and future residents. The results are summarized in Table 6-2 and are described below.

6.5.2 Current/Future Onsite Worker

The total incremental lifetime cancer risks for the current/future onsite worker through exposure to chemicals in surface soil, sediment, and surface water was 2×10^{-04}, primarily due to incidental ingestion of and dermal contact with chlordane, toxaphene, and dieldrin in surface soil. The total hazard index for the current/future worker was 2, primarily due to incidental ingestion of and dermal contact with chlordane and 4,4'-DDT in surface soil.

6.5.3 Current/Future Offsite Resident

Current residents near the Site were assumed to be exposed to chemicals in offsite surface water and sediment via incidental ingestion and dermal contact. Ingestion of contaminated fish was an additional pathway that was evaluated for the offsite surface water medium. The total cancer risk for the current offsite resident through all pathways was 8×10^{-06}. The total hazard index for the current offsite resident was 0.1.

6.5.4 Future Onsite Resident/Future Resident

Potential future onsite residents at the Site were assumed to be exposed to chemicals in onsite surface soil, and onsite and offsite sediment and surface water through incidental ingestion and dermal contact, and fish ingestion. In addition, the future resident (onsite or offsite) was assumed to be exposed to chemicals in ground water through drinking water ingestion.

The total cancer risk for the future resident (adult and child) through all pathways was 1×10^{-03} when exposed to chemicals in either the surficial or Floridan aquifers; however, the individual pathway risks from ingesting ground water from the surficial aquifer is 5×10^{-04} while the individual pathway risk from ingesting ground water from the Floridan aquifer is 6×10^{-05}. Due to the characteristics of the two aquifers, it is most likely that drinking water wells in the vicinity of the Site would be installed in the Floridan aquifer. Primary contaminants of concern (COC's) in surface soil are toxaphene, 4,4-DDD, 4,4-DDT, chlordane, and dieldrin; while the primary COC's in ground water are alpha-BHC, heptachlor epoxide, beta-BHC, dieldrin, and aldrin. Surface water was not found to be a pathway of concern; while the primary COC's in sediment include aldrin, chlordane, and dieldrin.

TABLE 6-2: SUMMARY OF CANCER AND NON-CANCER RISKS

Exposure Medium/Pathway	Current/Future Maintenance Worker		Current Offsite Resident		Future Onsite Resident		
	Cancer	HQ	Cancer	HQ	Cancer	HQ	
						Adult	Child
Surface Soil							
Incidental Ingestion	$1x10^{-4}$	1	NE	NE	$5x10^{-4}$	1	10
Dermal Contact	$7x10^{-5}$	0.5			$3x10^{-4}$	2	5
Ground Water							
Ingestion	NE	NE	NE	NE	$5x10^{-4}$	10[a]	30[a]
Surface Water							
Incidental Ingestion	NE	NE	$9x10^{-7}$	0.01	$1x10^{-6}$	0.04	0.006
Dermal Contact	$3x10^{-6}$	0.01	$7x10^{-6}$	0.09	$3x10^{-5}$	0.1	0.5
	NE	NE	–	0.000006	–	0.000006	0.000006
Sediment							
Incidental Ingestion	$5x10^{-5}$	0.2	$.4x10^{-7}$	0.002	$1x10^{-4}$	0.7	2
Dermal Contact	$1x10^{-5}$	0.1	$2x10^{-8}$	0.0001	$3x10^{-5}$	0.1	0.2
TOTAL	$2x10^{-4}$	2	$8x10^{-6}$	0.1	$1x10^{-03}$ [b]	10[b]	50[b]

NOTES: NE Not Evaluated for this receptor.

– Carcinogenic toxicity value not applicable.

[a] The lifetime carcinogenic risk or hazard index is provided for ingestion of ground water from the surficial aquifer. The lifetime carcinogenic risk for ingestion of ground water from the Floridan Aquifer is $6x10^{-5}$. The hazard indices for ingestion of ground water from the Floridan Aquifer for adult and child residents are 1 and 4, respectively.

[b] The total carcinogenic risk or hazard index provided includes ingestion of ground water from the surficial aquifer only. The total carcinogenic risk including ingestion of ground water solely from the Floridan aquifer is also $1x10^{-3}$. The total hazard indices including ingestion of ground water solely from the Floridan aquifer for adult and child residents are 4 and 20.

The total hazard index for the future adult resident was 10 when exposed to chemicals in the surficial aquifer, primarily due to ingestion of manganese, heptachlor epoxide, molinate, and pebulate in ground water. When exposed to chemicals in the Floridan aquifer, the total hazard index for the future adult resident was 4, primarily due to ingestion of manganese and molinate.

The total hazard index for the future 1-6 year old child was 50, primarily due to ingestion of manganese, cadmium, heptachlor epoxide, molinate, EPTC, and vernolate in the surficial aquifer. When exposed to chemicals in the Floridan aquifer, the total hazard index for the future child was 20, primarily due to ingestion of molinate. Also, exposure to aldrin, chlordane, and dieldrin also contributed hazard quotients that were greater than unity through incidental ingestion of onsite sediment.

6.6 Identification of Uncertainties

Uncertainty is inherent in the risk assessment process. Each of the three components of risk assessment (data evaluation, exposure assumptions, and toxicity criteria) contribute uncertainties. For example, the assumption that ground water concentrations will remain constant over time may overestimate the lifetime exposure. Contaminants are subject to a variety of attenuation processes. In addition, for a risk to exist, both significant exposure to the pollutants of concern and toxicity at these predicted exposure levels must exist. The toxicological uncertainties primarily relate to the methodology by which carcinogenic and non-carcinogenic criteria (i.e., cancer slope factors and reference doses) are developed. In general, the methodology currently used to develop cancer slope factors and reference doses is very conservative, and likely results in an overestimation of human toxicity and resultant risk.

The use of conservative assumptions throughout the risk assessment process are believed to result in an over-estimate of human health risk. Therefore, actual risk may be lower than the estimates presented here but are unlikely to be greater.

6.7 Ecological Evaluation

6.7.1 Overview

The risk to the environment is determined through the assessment of potentially adverse effects to ecosystems and populations resulting from Site-related contamination using qualitative methods. Surface soil, ground water, and surface water and sediments from the in onsite ponds and ditches, as well as, offsite ditches and the Tampa Bypass Canal were sampled to determine the extent of contamination, as described in Section 5. Contaminants detected in each media are listed in Table 5-1 through 5-7.

6.7.2 Contaminants of Potential Ecological Concern

Contaminants of potential ecological concern (COPECs) were selected by eliminating from the analysis essential nutrients considered toxic only at very high concentrations, pesticides occurring at low frequencies, and by eliminating inorganic analytes whose concentrations were within background concentrations.

6.7.3 Exposure Assessment

Two major habitats, terrestrial and aquatic, are represented on or near the Site. There are two small forested areas located on the Site that may provide habitat for terrestrial species. The aquatic habitat is represented by the two onsite pond areas, as well as, fresh and estuarine deep-water habitat provided by the Tampa Bypass Canal. Areas adjacent to the Site are heavily urbanized, with very little contiguous vegetative cover.

Once the contaminants have reached the habitat, one or more of three possible exposure routes may come into play for a specific receptor. These exposure routes are ingestion, respiration, and adsorption (direct contact). The exposure point concentration is the concentration of a contaminant in an environmental media to which a specific receptor is exposed. The 95 percent upper confidence limit (UCL) on the arithmetic mean was calculated and used as the exposure point concentration of contaminants of potential concern in each-media evaluated, unless it exceeded the maximum concentration. Where this occurred, the maximum concentration was used as the exposure point concentration for that contaminant. In addition, average concentrations were evaluated as exposure point concentrations, for consideration in making risk management decisions. The exposure point concentrations for each of the contaminants of potential concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways.

Direct contact of aquatic receptors with contaminated surface water and sediment was evaluated. Sediment concentrations of contaminants of concern were compared to ecological toxicity criteria for benthic invertebrate organisms. Surface water concentrations of contaminants of concern were compared to toxicity-based water quality criteria for all aquatic life, including plants, invertebrates, and fish. Two surrogate terrestrial receptors (American robin and short-tailed shrew) were studied for exposure to contaminated surface soil via transfer through the carnivorous food-chain or secondarily through incidental ingestion of the soil.

6.7.4 Toxicity Assessment

6.7.4.1 Surface Water/Sediment

As a means of characterizing aquatic toxicity, the EPA Region IV Waste Management Division has established screening levels for surface water at hazardous waste sites, primarily based upon the Ambient Water Quality Criteria. The pond sediments were evaluated by comparing maximum sediment concentrations with NOAA Effects Range Low (ER-L) values. Exceedence of these screening levels might indicate a potential for adverse ecological effects (depending upon factors such as frequency of detection, degree of exceedence, etc.), thus indicating a need for more site-specific ecological investigations, such as toxicity testing. Maximum surface water and sediment exposure point concentrations for each contaminant of concern were compared to screening values for a particular contaminant of concern.

6.7.4.3 Surface Soil

To characterize the terrestrial toxicity due to exposure to surface soil, toxicity reference values were developed for each terrestrial species from No-Observed-Adverse-Effect-Levels (NOAELs) obtained from the Integrated Risk Information System (IRIS) or from mortality events such as the death of 50 percent of the individuals in an experimental environment (LC_{50} and LD_{50} values). Exceedence of these screening levels might indicate a potential for adverse ecological effects (depending upon factors such as frequency of detection, degree of exceedence, etc.), thus indicating a need for more site-specific ecological investigations, such as toxicity testing.

6.7.5 Risk Characterization

6.7.5.1 Surface Water

Comparison of the concentrations of contaminants of concern in surface water with regional screening values was used to assess the likelihood of adverse effects of surface water to aquatic life. A number of contaminants in surface water exceeded regional screening values. Water quality criteria were not available for all detected contaminants; therefore, the contribution of all the contaminants of potential concern could not be evaluated. Despite the absence of some criteria, the results show that both chronic and acute adverse effects may have already occurred to aquatic life inhabiting the onsite ponds. Surface water in the adjacent Tampa Bypass Canal and offsite ditches does not appear to be adversely affected by site-related contamination.

6.7.5.2 Sediment

Comparison of the concentrations of contaminants of concern in sediment with regional screening values was used to assess the likelihood of adverse effects of sediment to aquatic life. A significant number of contaminants in sediment exceeded screening values. Sediment screening levels were not available for all the detected contaminants; therefore, the contribution of all the contaminants of potential concern could not be evaluated. Despite the absence of some criteria, the results show that benthic organisms in onsite ponds may be severely affected by the presence of pesticides. Sediment in the adjacent Tampa Bypass Canal and offsite ditches does not appear to be adversely affected by site-related contamination.

6.7.5.3 Surface Soil

Comparison of the concentrations of contaminants of concern in surface soil with toxicity reference values was used to assess the likelihood of adverse effects of soil to terrestrial life. A significant number of contaminants in soil exceeded toxicity reference values calculated for two surrogate species. The site-related chemicals which contribute the most to the increased risk are 4,4'-DDD, 4,4'-DDE, dieldrin, and endrin. There is an indication of possible adverse biological effects to avian and mammalian species through food chain exposure to soil contaminants.

6.7.6 Uncertainty Analysis

The main sources of uncertainty associated with this ecological evaluation can be attributed to the items below.

- Information necessary to evaluate the potential effects of aquatic exposures to sediment chemicals is limited.

- The possibility that organisms may be acclimated or adapted to chronic exposure to some chemicals was not considered, and as a result, risks associated with exposure may be overestimated.

- Risk estimates based solely on maximum concentrations in samples collected during one sampling event may overestimate or underestimate the actual population- or community-level effects.

- Sediments and surface water constitute complex chemical mixtures and it is possible that antagonistic or synergistic toxicity effects may occur between any of the chemical constituents. These factors were not accounted for.

7.0 DESCRIPTION OF ALTERNATIVES

7.1 Remedial Action Objectives

Remedial action objectives (RAOs) were developed for the contaminants and media of concern at the Stauffer Management Company Site. RAOs include restoring the Site to beneficial use, reducing risk to human health within EPA's acceptable risk range (i.e., total residual cancer risk between $1x10^{-4}$ to $1x10^{-6}$ and individual contaminant HQ of 1), reducing ecological risk, and protecting ground water from continued degradation by Site contaminants. Remediation goals (RGs) established to satisfy these RAOs are presented in Section 7.1.5 and Table 7-1.

7.1.1 Beneficial Land Use

The Site is currently zoned for industrial use and future land use is expected to remain industrial/commercial. Since zoning is expected to remain industrial/ commercial, remediation goals (RGs) were developed based on industrial use. The alternatives considered will rely on institutional controls to restrict the Site to an industrial use. Hillsborough County officials have expressed an interest in expanding the Hillsborough County Correctional Facility onto the Site, which could be done under current zoning. EPA toxicologists have determined that although a correctional facility could be considered short-term residential use, outdoor exposure of inmates is restricted. With institutional controls to prevent gardening or excessive outdoor activity in the areas where residual pesticides are found, industrial cleanup standards are considered protective of the health of inmates.

7.1.2 Human Health Risk

The estimated potential cancer and non-cancer risks to human health from exposure of current and future onsite workers to contaminants in surface soil and future offsite residents to contaminants in ground water are above EPA's target cancer risk range and above a HQ of 1. EPA considered RGs to reduce the carcinogenic risk of individual contaminants to $1x10^{-5}$ and $1x10^{-6}$ and the non-carcinogenic risk represented by the HQ to 1.

If the carcinogenic risk of individual contaminants in soils/sediments are reduced to $1x10^{-5}$, the residual risk remaining after remediation totals slightly less than $1x10^{-4}$. If the carcinogenic risk of individual contaminants are reduced to $1x10^{-6}$, the residual risk remaining after remediation totals slightly less than $1x10^{-5}$. EPA's acceptable carcinogenic risk range is between $1x10^{-6}$ and $1x10^{-4}$; therefore either the $1x10^{-5}$ or $1x10^{-6}$ individual contaminant RGs would result in a residual risk in the acceptable range. Other RAOs were considered to determine which carcinogenic RG would be most appropriate. A individual contaminant HQ of 1 for soil/sediment is generally considered acceptable unless there is reason to believe that a large number of contaminants affect the same target organ.

Ground water is required to meet drinking water standards onsite and surface water standards prior to entering the Tampa Bypass Canal. For many of the pesticide contaminants in ground water, primary or secondary maximum contaminant levels (MCLs) are not available. For those contaminants guidance concentrations based on health effects were considered. Bioassay tests will be required during remedial design to determine acceptable surface water standards for many of the contaminants.

7.1.3 Ecological Risk

Plant and animal life will be protected to some extent by remediation of surface soil and ground water to levels which protect human health. As ground water is remediated, surface water, which is hydraulically connected to ground water, also will be remediated. But sediment contamination, and the risk to wildlife and biota from contaminated sediment, will remain high unless some action is taken to reduce contaminant levels. Sediment RGs were calculated based on the Ecological Risk assessment for DDD, DDE, DDT, Aldrin, Chlordane, Dieldrin, and Endrin; RGs ranged from 0.02 to 3.3 ug/L. If remediation to these RGs requires more than one foot of sediment removal, elimination of this exposure pathway should be considered. This pathway may be eliminated by removing one foot of contaminated sediments from the ponds and replacing the sediment with a one-foot thick layer of clean fill.

7.1.4 Protection of Ground Water

Subsurface soil contamination is not considered a threat to human health because there is no current exposure pathway. Institutional controls may be required to ensure that there are no future exposure pathways which could result due to development at the Site. But subsurface soils, also, may contribute significantly to ground water contamination. The ground water pathway was determined to exceed acceptable risk levels at the Site; therefore, determination of subsurface RGs for the protection of ground water were considered.

Soil RGs for the protection of ground water at the Stauffer Management Company Site were determined using the Summers Model (EPA, 1989). The soil RGs derived by this method address the possibility of contaminants leaching to ground water at concentrations greater than the ground water RGs. Pesticides are the primary contaminants of concern at the Site. The remediation of pesticides will reduce the concentrations of the other contaminants to levels that are protective of ground water, therefore soil RGs for protection of ground water were determined only for pesticides.

7.1.5 Remediation Goals

Surface soil RGs for protection of human health and protection of ground water, subsurface soil RGs for protection of ground water, and ground water RGs are presented in Table 7-1. Surface soil RGs are reflective of $1x10^{-6}$ cancer risk RGs or ground water protection RGs for two reasons: residual risk is lower; and $1x10^{-6}$ RGs are generally in the same order magnitude as the ground water protection RGs.

7.2 Soil/Sediment Remedial Alternatives

The FS report included an evaluation of numerous cleanup methods for soil/sediment. As required by CERCLA, a no further action alternative was evaluated to serve as a basis for comparison with the other active cleanup methods. The cleanup methods to address site-related contamination are presented below. A total of eight (8) soil/sediment remediation alternatives have been considered. These alternatives represent the range of remedial actions considered appropriate for the Site. Potential Action-Specific Applicable or Relevant and Appropriate Requirements (ARARs) are summarized in Table 8-2 for these alternatives.

7.2.1 Alternative No. 1S: No Action

The no action alternative was developed as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the regulation implementing the Superfund law. It is used as a baseline for comparing other alternatives. Under this alternative, EPA would take no action to remedy any contaminated soil and sediment at the Site. The potential risks posed by the presence of contamination in soil and sediment will not be minimized by this action.

7.2.2 Alternative No. 2S - Institutional Action

This alternative involves physical and legal controls to restrict human behavior and reduce risks to human health. Physical controls would involve the use of existing fence to limit future exposure to contaminated areas at the Site. Legal controls would involve the filing of deed notices and/or restrictions in public property records. The present worth cost of this remedy represents only periodic fence maintenance and repairs. This alternative reduces the potential risk associated with dermal contact with soil/sediment by minimizing exposure at the Site. This alternative poses little risk short-term or long-term, as long as access restrictions are enforced. Mobility, toxicity and volume are not reduced by this remedy. The present worth cost estimate for this alternative would be approximately $ 12,000.

TABLE 7-1: REMEDIAL GOALS

Chemicals of Concern	Practical Quantitation Levels (1)	Federal or State ARARs	Health-Based Remedial Goal Concentrations(2)	Ground Water Protection Remedial Goals	Selected Remediation Goal
SURFACE SOIL	(mg/kg)				
4,4'-DDD	NA	NA	12.6	NR	12.6
4,4'-DDE	NA	NA	8.9	NR	8.9
4,4'-DDT	NA	NA	8.9	5.8	8.9
Chlordane	NA	NA	2.3	NR	2.3
Dieldrin	NA	NA	0.19	0.101	0.19
Molinate	NA	NA	NR	0.74	0.74
Toxaphene	NA	NA	2.76	NR	2.76
SUB-SURFACE SOIL	(mg/kg)				
4,4'-DDT	NA	NA	NR	5.8	5.8
Aldrin	NA	NA	NR	0.10	0.10
alpha-BHC	NA	NA	NR	0.004	0.004
beta-BHC	NA	NA	NR	0.008	0.008
Dieldrin	NA	NA	NR	0.101	0.101
Heptachlor	NA	NA	NR	0.19	0.19
Heptachlor Epoxide	NA	NA	NR	0.16	0.16
Molinate	NA	NA	NR	0.74	0.74
Vernolate	NA	NA	NR	3.28	3.28
SEDIMENT	(mg/kg)		(ECO. RISK)		
4,4-DDD	NA	NA	0.003	NR	0.003
4,4-DDE	NA	NA	0.003	NR	0.003
4,4-DDT	NA	NA	0.003	5.8	0.003
Aldrin	NA	NA	0.003	0.10	0.003
Chlordane	NA	NA	0.002	NR	0.002
Dieldrin	NA	NA	0.003	0.101	0.003
Endrin	NA	NA	0.00002	NR	0.00002
GROUND WATER	(ug/L)				
4,4'-DDT	0.1	0.1 4)	0.24	NR	0.24
Aldrin	0.05	0.05 4)	0.007	NR	0.05
alpha-BHC	0.05	0.05 4)	0.017	NR	0.05
Atrazine	0.25	3 3)	0.471	NR	3
beta-BHC	0.1	0.1 4)	0.059	NR	0.1
delta-BHC	0.05	0.05 4)	0.059	NR	0.06
Dieldrin	0.1	0.1 4)	0.007	NR	0.1
EPTC	NA	NA	940	NR	940
Heptachlor	0.1	0.4 3)	0.024	NR	0.4
Heptachlor Epoxide	0.1	0.2 3)	0.011	NR	0.2
Molinate	NA	NA	77	NR	77
Pebulate	NA	NA	1860	NR	1860
Vernolate	NA	NA	108	NR	108
Xylene (Total)	4	20 5)	NR	NR	20

NA – Not Available
NR – Not Required

NOTES:

1) Practical Quantitation Levels (PQLs) are an estimate of the lowest concentration usually quantifiable by most analytical laboratories. The source of information was the FDEP Groundwater Guidance Concentrations, June 1994.
2) Health based concentrations are based on $1x10^{-6}$ carcinogenic risk or a HQ of 1 for non-carcinogens.
3) Value based on a Federal and State Primary Maximum Contaminant Level (MCL).
4) Value based on Florida Groundwater Guidance Concentrations (To Be Considered (TBCs).
5) Value based on a State Secondary Maximum Contaminant Level (MCL).

7.2.3 Alternative No. 3S - Native Soil Barrier

Alternative 3S consists of implementing the following remedial actions:

- Physical and legal controls as described in Alternative 2S;
- Installation of a 2-foot thick pervious soil cap over surface soil above remediation goals;
- Removal of contaminated sediment and placement of sediment in area to be capped; and
- Placement on 1-foot thick layer of clean fill in small and large onsite ponds to reduce ecological risk.

This alternative involves installation of a pervious soil cap (2-feet minimum thickness) over approximately 13.4 acres of the Site. Contaminated sediment from the small ponds would be mechanically dredged and placed into drying beds. Dried sediment would be placed in the area to be capped. Excess water from the drying beds would be treated with activated carbon, as necessary, and discharged back into the ponds. Storm water would be collected and retained outside the capped area. Land Use restrictions described in Alternative 2S would also be implemented. The estimated present worth cost of this remedy is $1,720,000, including $1,430,000 in capital expenditures and $290,000 for Operation and Maintenance over thirty years.

7.2.4 Alternative No. 4S - In Situ Anaerobic Treatment of Surficial Soil/Sediment

Alternative 4S consists of implementing the following remedial actions:

- Remove and dewater contaminated sediments onsite above sediment RGs or to a depth on one foot;
- Anaerobically biodegrade contaminants in surface soils and sediments *in situ;*
- Place legal controls on Site as described in Alternative 2S; and
- Place on 1 foot of clean fill in onsite ponds to reduce ecological risk.

This alternative involves ***in situ*** (i.e., in place) treatment of both surficial soil/sediment using anaerobic biodegradation. Contaminated sediment from onsite ponds would be mechanically dredged and placed into drying beds. Dried sediment would be treated along with soil. Excess water from the drying beds would be treated with activated carbon and discharged back into the ponds.

Implementation of this alternative involves injection of chemicals and nutrients. *In situ* treatment cells would be created using high density polyethylene (HDPE) liners placed over the surface of and vertical barriers around the perimeter of each area where surficial soil/ sediment contamination exists. Land Use restrictions described in Alternative 2S would also be implemented. The estimated present worth cost of this remedy is $3,630,000, including $2,180,000 in capital expenditures and $1,450,000 for Operation and Maintenance over four years.

7.2.5 Alternative No. 5S - Ex Situ Thermal Treatment of Surficial Soil/Sediment

Alternative 5S consists of implementing the following remedial actions:

- Excavation of contaminated surface soils (0-2 feet) above RGs;
- Remove and dewater contaminated sediments onsite above sediment RGs or to a depth on one foot;
- Thermally treat contaminated surface soils and sediments *ex situ;*
- Place legal controls on Site as described in Alternative 2S; and
- Place 1 foot of clean fill in onsite ponds to reduce ecological risk.

This alternative involves excavation, consolidation, and treatment of surficial soil and sediment *ex situ* (i.e., out of place). Contaminated sediment from both ponds would be mechanically dredged and placed into drying beds. Dried sediment would be treated along with soil. Excess water from the drying beds would be treated with activated carbon and discharged back into the ponds. The thermal desorption system used to treat the surficial soil/sediment at the Site would be similar to the low-temperature thermal desorption unit previously used to treat soils excavated during the 1992 Removal Action at the Site. Land Use restrictions described in Alternative 2S would also be implemented. The estimated present worth cost of this remedy is $7,440,000, which is a capital expenditure only.

7.2.6 Alternative 6S: Ex Situ Anaerobic Treatment of Surficial Soil/ Sediment

Alternative 6S consists of implementing the following remedial actions:

- Excavation of contaminated surface soils (0-2 feet) above RGs;
- Remove and dewater contaminated sediments onsite above sediment RGs or to a depth on one foot;
- Biologically treat contaminated surface soils and sediments *ex situ;*
- Place legal controls on Site as described in Alternative 2S; and

- Place 1 foot of clean fill in onsite ponds to reduce ecological risk.

This alternative involves excavation, consolidation, and *ex situ* bioremediation of soil and sediment using compost piles. Contaminated sediment from both ponds would be mechanically dredged and placed into drying beds. Dried sediment would be treated along with soil. Excess water from the drying beds would be treated with activated carbon and discharged back into the ponds.

Bioremediation would be accomplished by constructing treatment cells to inhibit the entrance of oxygen. A leachate collection system and a gas collection system would be installed in each cell. The leachate and gas would be treated as necessary before discharge. Land Use restrictions described in Alternative 2S would also be implemented. The estimated present worth cost of this remedy is $4,130,000, including $3,600,000 in capital expenditures and $ 530,000 for Operation and Maintenance over two years.

7.2.7 Alternative 7S: Disposal of Surficial Soil/Sediment at an Offsite RCRA TSD Facility.

Alternative 7S consists of implementing the following remedial actions:

- Excavate contaminated surface soils (0-2 feet) above surface soil RGs;
- Remove and dewater contaminated sediments onsite above sediment RGs or to a depth on one foot;
- Ship excavated soils and sediments to offsite RCRA facility;
- Place legal controls on Site as described in Alternative 2S; and
- Place 1 foot of clean fill in onsite ponds to reduce ecological risk.

This alternative involves the excavation and disposal of pesticide-laden surficial soil/sediment at an offsite RCRA treatment, storage, and disposal (TSD) facility for subsequent treatment and disposal. The excavated areas would be backfilled and compacted with clean soil from an offsite source.

Since land ban restrictions would apply to the contaminated soil, pretreatment by the facility would be required prior to disposal. Pretreatment would likely involve stabilization or incineration. Land Use restrictions described in Alternative 2S would also be implemented. The estimated present worth cost of this remedy is $18,270,000, which represents capital expenditures only.

7.2.8 Alternative 8S: Ex Situ Anaerobic Treatment of Deep Soil/Sediment.

Alternative 8S consists of implementing the following remedial actions:

- Excavate contaminated surface soils (0-2 feet) and subsurface soils (>2 feet) above RGs;
- Remove and dewater contaminated sediments onsite above sediment RGs or to a depth of one foot;
- Biologically treat contaminated surface and subsurface soils and sediments *ex situ;*
- Place legal controls on Site as described in Alternative 2S; and
- Place 1 foot of clean fill in onsite ponds to reduce ecological risk.

This alternative involves the excavation to 10 feet below land surface, consolidation and bioremediation of deep soil (surface and subsurface soil) and sediment. Contaminated sediment from both ponds would be mechanically dredged and placed into drying beds. Dried sediment would be treated along with soil. Excess water from the drying beds would be treated with activated carbon and discharged back into the ponds.

Bioremediation would be accomplished by constructing treatment cells to inhibit the entrance of oxygen. A leachate collection system and a gas collection system would be installed in each cell. The leachate and gas would be treated as necessary before discharge. Land Use restrictions described in Alternative 2S would also be implemented. The estimated present worth cost of this remedy is $24,050,000, including $19,200,000 in capital expenditures and $ 4,850,000 for Operation and Maintenance over two years.

7.3 <u>Ground Water Remedial Alternatives</u>

The FS report included an evaluation of numerous cleanup methods for ground water contamination at the Site. As required by CERCLA,.a no further action alternative was evaluated to serve as a basis for comparison with the other active cleanup methods. The cleanup methods to address site-related contamination are presented below. A total of four (4) ground water remediation alternatives have been considered. These alternatives represent the range of remedial actions considered appropriate for the Site.

7.3.1 Alternative No. 1GW: No Action

The no action alternative was developed as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the regulation implementing the Superfund law. It is used as a baseline for comparing other alternatives. Under this alternative, EPA would take no action to remedy any contaminated ground water at the Site. The potential risks posed by the presence of contamination in ground water will not be minimized by this action.

7.3.2 Alternative 2GW: Institutional Actions

This alternative involves several physical and legal controls to restrict human behavior and reduce risks to human health and the environment through the filing of deed restrictions to limit use of the Site and the placement of supply wells on the Site. The existing fence would continue to limit access to the Site. Annual monitoring of ground water would be used to monitor natural attenuation of contaminant concentrations. It is expected that natural attenuation of current contamination could occur in 44 years due to biodegradation only. The ability of this remedy to meet remediation goals depends on how well the soils and sediments at the Site are remediated. Additionally, adsorption of contaminants to soil and/or dilution of contaminants should contribute to attenuation of contamination in ground water. The present worth cost is for annual ground water monitoring only and totals $ 97,000.

7.3.3 Alternative 3GW: Recovery and Treatment by Activated Carbon Adsorption with Discharge to Onsite Ponds or the Tampa Bypass Canal

Alternative 3GW consists of implementing the following remedial actions:

- Extract contaminated ground water;
- Treat contaminated ground water to meet surface water discharge standards;
- Discharge treated ground water to onsite ponds or to the Tampa Bypass Canal under an NPDES permit; and
- Place legal controls on Site as described in Alternative 2S until RGs are met.

This alternative involves ground water recovery and treatment. Ground water would be recovered using an interceptor trench approximately 15 feet deep along the eastern property boundary line and a series of extraction wells on the Site. Ground water would be extracted at an approximate rate of 20 gallons per minute (gpm) from the trench with a total extraction rate less than 200 gpm. Ground water collected would be pretreated to remove iron and suspended solids by greensand filtration prior to treatment with activated carbon, anaerobic biodegradation, or ultraviolet light enhanced chemical oxidation. The processes used would be further evaluated during remedial design; carbon adsorption was assumed for cost purposes.

Treated effluent would be pumped to onsite ponds or the Tampa Bypass Canal for discharge. A National Pollution Discharge Elimination System (NPDES) permit is required to discharge treated ground water to offsite surface water. Discharge requirements for the contaminants of concern are provided in Table 7-2. The estimated present worth cost of this remedy is $3,540,000, including $1,640,000 in capital expenditures and $ 1,900,000 for Operation and Maintenance over thirty years.

7.3.4 Alternative 4GW: In Situ Anaerobic Treatment of Ground Water

This alternative involves *in situ* treatment of ground water using anaerobic biodegradation. Implementation of this alternative involves

- Create *in situ* treatment cells using HDPE liner placed over the surface of and vertical barriers around the perimeter of the area where ground water contamination exists;
- Inject easily oxidized substrate chemicals (e.g., benzoate), sulfate to replace oxygen electron receptors, and other nutrients;
- Monitor ground water extensively; and
- Place legal controls on Site as described in Alternative 2S until RGs are met.

A treatability study would be required prior to design of the treatment process. Extensive ground water monitoring would be required to maximize the use of additives and verify cleanup of pesticides. The estimated present worth cost of this remedy is $2,790,000, including $1,700,000 in capital expenditures and $ 1,090,000 for Operation and Maintenance over five years.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

8.1 Statutory Balancing Criteria

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory balancing criteria in Section 121 of CERCLA, 42 U.S.C. § 9621, and in the NCP, 40 CFR § 300.430. The major objective of the feasibility study (FS) was to develop, screen, and evaluate alternatives for the remediation of the SMC Site. A wide variety of alternatives and technologies were identified as candidates to remediate the contamination at the SMC Site. These were screened based on their feasibility with respect to the contaminants present and the Site characteristics. After the initial screening, the remaining alternatives/technologies were combined into potential remedial alternatives and evaluated in detail. One soil/sediment remedial alternative and one ground water

TABLE 7-2: SURFACE WATER DISCHARGE REQUIREMENTS

Ecological Chemical Of Concern	Range of Detects in Shallow Ground Water (ug/L)	Surface Water Discharge Standards 1)	
		Annual Average (ug/L)	Maximum (ug/L)
Aluminum	415-6,420	87	750
Cadmium	16	0.66	1.79
Iron	18,000-18,200	–	1000
Lead	8	1.3	33.78
Manganese	227-392	–	–
Zinc	70-169	59	65
Xylene (Total)	34-740	TBD	TBD
4,4'-DDD	0.3	–	–
Aldrin	0.07-0.2	0.00014	3
alpha-BHC	0.1-9	–	–
Atrazine	3	TBD	TBD
beta-BHC	6	0.046	–
Butylate	0.8-130	TBD	TBD
Cycloate	2-590	TBD	TBD
Dieldrin	0.06-0.1	0.00014	0.0019
Endosulfan II	0.2	–	0.056
EPTC	7-9,400	TBD	TBD
Heptachlor	0.1	0.00021	0.0038
Heptachlor Epoxide	0.6	0.00021	0.0038
Molinate	1-7,700	TBD	TBD
Pebulate	0.6-18,000	TBD	TBD
Vernolate	4-130	TBD	TBD

Notes: 1. Inorganics Based on Region IV Freshwater Quality Criteria and Pesticides Based on Florida Administrative Code (FAC) Chapter 17 Part 302.530.

TBD No Data Available. Discharge Criteria To Be Determined During Remedial Design.

remedial alternative were selected from the screening process using the following nine evaluation criteria:

- overall protection of human health and the environment;
- compliance with applicable or relevant and appropriate requirements (ARARS);
- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume of hazardous substances or contaminants;
- short-term effectiveness or the impacts a remedy might have on the community, workers, or the environment during the course of implementation;
- implementability, that is, the administrative or technical capacity to carry out the alternative;
- cost-effectiveness considering costs for construction, operation, and maintenance of the alternative over the life of the project;
- acceptance by the State, and
- acceptance by the Community.

The NCP categorizes the nine 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 that must be satisfied in order for an alternative to be eligible for selection;

(2) Primary Balancing Criteria - long-term effectiveness and permanence; reduction of toxicity, mobility or volume; 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 comments are received on the proposed plan and incorporated into the ROD.

The following analysis is a summary of the evaluation of alternatives for remediating the SMC Site under each of the criteria. A comparison is made between each of the alternatives for achievement of a specific criterion.

8.2 Threshold Criteria

8.2.1 Overall Protection of Human Health and the Environment

With the exception of the No Action alternatives (Alternatives 1S and 1GW), all of the alternatives would provide protection for human health and the environment to some degree. Alternatives 2S and 2GW would limit access and exposure to contaminants but would not control migration of contaminants to ground water and outside the Site boundaries. Alternatives 3S through 7S and 3GW through 4GW would limit access and exposure, eliminate further migration, and reduce risk by removing contamination from soil/sediment and ground water. Alternative 8S would be most protective because it would remediate soils/sediment to protect ground water. Since Alternatives 1s and 1GW did not pass this threshold criteria for providing protection of human health and the environment, they will be eliminated from further consideration.

8.2.2 Compliance With ARARs

The remedial action for the SMC Site, under Section 121(d) of CERCLA, must comply with federal and state environmental laws that either are applicable or relevant and appropriate (ARARs). Applicable requirements are those standards, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those that, while not applicable, still address problems or situations sufficiently similar to those encountered at the Site and that their use is well suited to the particular site. To-Be-Considered Criteria (TBCs) are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary level of cleanup for protection of human health or the environment. While TBCs do not have the status of ARARS, EPA's approach to determining if a remedial action is protective of human health and the environment involves consideration of TBCs along with ARARs.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely on the basis of location. Examples of location-specific ARARs include state and federal requirements to protect floodplains, critical habitats, and wetlands, and solid and hazardous waste facility siting criteria. Table 8-1 summarizes the potential location-specific ARARs and TBCs for the SMC Site.

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial site, various requirements can be ARARs. Table 8-2 lists potential action-specific ARARs and TBCs for the SMC Site.

Chemical-specific ARARs are specific numerical quantity restrictions on individually-listed contaminants in specific media. Examples of chemical-specific ARARs include the MCLs specified under the Safe Drinking Water Act as well as the ambient water quality criteria that are enumerated under the Clean Water Act. Because there are usually numerous contaminants of potential concern for any remedial site, various numerical quantity requirements can be ARARs. Table 8-3 lists potential chemical-specific ARARs and TBCs for the SMC Site.

Alternatives 2S through 8S would meet or exceed all chemical-specific ARARs and would be designed to meet location- and action-specific ARARs. Alternatives 2GW through 4GW may meet all ARARs.

8.3 Primary Balancing Criteria

8.3.1 Long-Term Effectiveness and Permanence

Alternatives 4S, 5S, 6S, 8S, 3GW, and 4GW are effective and permanent, but some would require a long time period to remove all contamination. Alternative 3S and 2GW do not actively remove contamination, but biodegradation and attenuation would reduce contamination over time and the reduction would be permanent.

8.3.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative 3S would aid in the reduction of mobility, but toxicity and volume of contaminated soils/sediments would not be reduced for a long period of time (natural biodegradation and flushing). Alternatives 4S through 7S would be effective at completely reducing toxicity, mobility, and volume of contaminants in surface soil/sediment. Alternative 8S would be effective at completely reducing toxicity, mobility, and volume of contaminants in surface and sub-surface soil/sediment and ground water.

Sorption of contaminants to soil particles would aid in the reduction of mobility of contaminated ground water for Alternative 2GW, but toxicity and volume would not be reduced for a long period of time (natural biodegradation). Alternatives 3GW and 4GW would actively reduce toxicity, mobility, and volume of contaminated ground water at the Site. The success of the ground water remedy depends in large part on the success of the source control conducted at the Site.

8.3.3 Short-Term Effectiveness

Equipment and personnel decontamination facilities would be necessary for all alternatives, except Alternative 2S. Handling of chemicals to sustain anaerobic conditions would be conducted under strict health and safety protocol for Alternatives 4S, 6S, 8S and 4GW. Air monitoring would be necessary during

TABLE 8-1: POTENTIAL LOCATION SPECIFIC ARARS AND TBCs

Standard Requirement Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Clean Water Act	33 USC Section 1251-1376		
Dredge or Fill Requirements (Section 404)	40 CFR 230	Requires permit for discharge of dredge or fill material into aquatic environment.	May be applicable at the SMC Site if sediments are to be removed from the onsite ponds and ditch.
Rivers and Harbors Act of 1899 (Section 10 Permit)	33 USC Section 403	Requires permit for structures or work in or affecting navigable waters.	Alternatives may involve work that would affect a navigable waterway, if surface water, sediment, and/or biota are determined to be risks.
Wilderness Act	16 USC 1311	Area must be administered in such a way as to leave it unimpaired as wilderness and to preserve it as a wilderness.	No wilderness areas exist onsite or adjacent to the site.
National Wildlife Refuge System	16 USC 688; 50 CFR 27	Restricts activities within National Wildlife Refuges.	No wildlife refuge area exists onsite or adjacent to the site.
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6901, 6905, 6912, 6924, 6925		
RCRA Location Standards	40 CFR 264.18(b)	A TSD facility must be designed, constructed, operated, and maintained to avoid washout on a 100-year floodplain.	Potential remedial alternatives may be implemented within the 100-year floodplain. Requirement is relevant and appropriate if onsite capping or landfilling is selected.
Fish and Wildlife Coordination Act	16 USC 661-666	This regulation requires that any federal agency that proposes to modify a body of water must consult with the U.S. Fish and Wildlife Service. This requirement is addressed under CWA Section 404 Requirements.	Potential remedial alternatives may include stream redirection during sediment dredging activities. Potentially relevant and appropriate.
Floodplain Management Executive Order	Executive Order 11988; 40 CFR 6.302	Actions that are to occur in floodplain should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial value.	Remedial actions are to prevent incursion of contaminated groundwater onto forested floodplain.
Endangered Species Act	16 USC 1531	Requires action to conserve endangered species or threatened species, including consultation with the Department of Interior.	Only applies if threatened or endangered species or critical habitats are identified in or near the site.

TABLE 8-2: POTENTIAL ACTION SPECIFIC ARARS AND TBCs

Standard Requirement Criteria or Limitation	Citation	Description	Comment
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6901, 6905, 6912, 6924, 6925		
RCRA Land Disposal Restrictions	40 CFR Part 268	Provides for proper disposal of regulated contaminants found in soils.	Potentially applicable to the SMC Site.
RCRA Waste Management Program	40 CFR 2 Part 64	Requires owner/operator to control wind dispersal of particulate matter and provides technical criteria of hazardous waste material and treatment, storage, and disposal (TSD).	The control of fugitive dust emissions is potentially relevant to this site.
Clean Air Act			
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Sets primary and secondary air standards at levels to protect public health and public welfare.	May be relevant or appropriate if onsite treatment units are part of remedial actions.
National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61	Provides emissions standard for hazardous air pollutants for which no ambient air quality standard exists.	May be relevant or appropriate if groundwater recovery and/or onsite treatment units are part of remedial actions.
Occupational Safety and Health Administration	29 CFR 1910 Part 120	Provides safety rules for handling specific chemicals for site workers during remedial activities.	Health and safety requirements are applicable to all potential remedial actions.

TABLE 8-3: POTENTIAL CHEMICAL SPECIFIC ARARS AND TBCs

Standard Requirement, Criteria, or Limitation	Citation	Description	Comment
FEDERAL			
Safe Drinking Water Act	40 USC Section 300		
National Primary Drinking Water Standards	40 CFR Part 141	Establishes health-based standards for public water systems (maximum contaminant levels).	The MCLs for organic and inorganic contaminants are potentially applicable to the groundwater contaminated by the site since it is a potential drinking water source.
Maximum Contaminant Level Goals	Publication L. № 99-399, 100 Stat. 642 (1986)	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects.	Proposed MCLGs for organic and inorganic contaminants are potentially applicable to the groundwater used for drinking water.
Clean Water Act	33 USC Section 1251-1376		
Ambient Water Quality Criteria	40 CFR Part 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	The AWQC for organic and inorganic contaminants are potentially relevant and appropriate.
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6901, 6905, 6912, 6924, 6925		
RCRA Groundwater Protection	40 CFR Part 264	Provides for groundwater protection standards, general monitoring requirements, and technical requirements.	The RCRA MCLs are relevant and appropriate for groundwater at the site.
STATE			
FDEP Drinking Water Standards, Monitoring and Reporting	F.A.C. Chapter 17-550	Regulates water systems within the state that supply drinking water that may affect the public health.	Provides the state with the authority needed to assume primary enforcement responsibility under the federal act. Potentially applicable to groundwater at the site.
Florida Surface Water Quality Standards	F.A.C. Chapter 17-302	Establishes surface water quality standards within the state.	These standards are established for the protection of aquatic organisms and human health. Potentially applicable for site surface water.
FDEP Water Quality Standards	F.A.C. Chapter 17-3	Establishes groundwater classification and water quality standards. Applicable to groundwater at the site.	Guidelines for allowable levels of toxic organic and inorganic compounds in groundwater used for drinking water. Applicable to groundwater at the site.
NOAA Suggested Guidance for Evaluation of Sediment Contamination Data	To Be Considered (TBC)	Evaluates sediment values based on in stream studies.	Not a standard, but used as TBC values related to sediment contamination and potential ecological impacts. Potentially applicable to site sediments.

construction of Alternatives 3S through 8S and 3GW and during operation of alternative 4S, 5S, 6S, 8S and 4GW to ensure that workers and the public are protected from air emissions. The heavy construction equipment may also create some noise nuisance.

During the implementation of all the alternatives, both onsite workers and people surrounding the site will be protected from possible impacts caused by construction or O&M activities.

8.3.4 Implementability

The implementability of an alternative is based on technical feasibility, administrative feasibility and the availability of services and materials. Alternative 2S involves only access restrictions, which are easily implemented. Alternative 3S is relatively easy to implement since most of the contaminated soil remains in place and capping the material requires very little design effort. Alternative 4S would be difficult to implement, since it requires creating anaerobic conditions *in situ* while controlling leachate and offgas emissions. Alternative 5S has been used at the Site in previous work and would be moderately easy to implement, since required controls are known. Alternative 6S would be moderately easy to implement, since anaerobic conditions and leachate and offgas collection would be easier to control than in Alternative 4S and pilot tests are already underway. Alternative 7S would be easy to implement because it primarily involves excavation and shipping materials. Alternative 8S would be more difficult to implement since large scale excavation might be required.

Alternative 2GW could be implemented immediately since there are no engineering considerations involved. Alternative 2GW involves monitoring ground water annually. Alternative 3GW would require approximately 14 months to implement and annual monitoring for 30 years. Alternative 4GW would take longer than 14 months to implement because pilot studies would be required to design the system and more engineering controls would be required to create anaerobic conditions in ground water while controlling offgases, but annual monitoring would not be required when complete.

8.3.5 Cost

A summary of the present worth costs which includes the capital as well as the operation and maintenance cost for each of the alternatives is presented in Table 8-4. These costs were presented in the FS and are based on less stringent Remedial Action Performance Standards than presented in Section 7-1. However, the present worth costs to clean up to the recommended performance standards are within the range the FS cost estimates are considered accurate (+50% to -30% accuracy), and the relative cost of each alternative should be similar to that presented in the FS.

TABLE 8-4: COMPARISON OF COSTS			
Alternative	Present-worth Cost	Capital Cost	Operation and Maintenance Cost
SOIL/SEDIMENT 1S. No-Action	$ 0	$ 0	$ 0
2S. Institutional Actions	$ 12,000	$ 0	$ 12,000
3S. Native Soil Barrier	$ 1,720,000	$ 1,430,000	$ 290,000
4S. In Situ Anaerobic Treatment of Surficial Soil/Sediment	$ 3,630,000	$ 2,180,000	$1,450,000
5S. Ex Situ Thermal Treatment of Surficial Soil/Sediment	$ 7,440,000	$ 7,440,000	$ 0
6S. Ex Situ Anaerobic Treatment of Surficial Soil/Sediment	$ 4,130,000	$ 3,600,000	$ 530,000
7S. Disposal of Surficial Soil/Sediment at Offsite RCRA TSD Facility	$ 18,270,000	$ 18,270,000	$ 0
8S. Ex Situ Anaerobic Treatment of Deep Soil/Sediment	$ 24,050,000	$ 19,200,000	4,850,000
GROUND WATER 1GW. No Action	$ 0	$ 0	$ 0
2GW. Institutional Actions	$ 97,000	$ 0	$ 97,000
3GW. Recovery and Treatment by Activated Carbon Adsorption with Discharge to Onsite Ponds or the Tampa Bypass Canal.	$ 3,540,000	$ 1,640,000	$ 1,900,000
4GW. In Situ Anaerobic Treatment of Ground Water	$ 2,790,000	$ 1,700,000	$ 1,090,000

Alternatives 2S and 2GW are the least costly alternatives, other than the No Action alternatives. Of the treatment alternatives, Alternatives 6S and 3GW are less expensive than Alternative 8S, which affords the same level of protection. A summary of the present worth costs which includes the capital as well as the operation and maintenance cost for each of the alternatives is presented in Table 8-4.

8.4 Modifying Criteria

8.4.1 State Acceptance

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the Remedial Investigation and Feasibility Study (RI/FS) process for the SMC Site. In accordance with 40 C.F.R. § 300.430, FDEP as the support agency, has provided input during this process by reviewing and providing comments to EPA on all major documents in the

Administrative Record. Based upon comments received from FDEP, it is expected that written concurrence will be forthcoming; however, a letter formally recommending concurrence with EPA's selected remedy has not yet been received.

8.4.2 Community Acceptance

Based on comments expressed at the July 27, 1995, public meeting and receipt of 6 written comments during the comment period, it appears that the community does not disagree with the selected remedy. Specific responses to issues raised by the community can be found in Appendix A, The Responsiveness Summary.

9.0 SUMMARY OF SELECTED REMEDY

Based upon the comparison of alternatives in the feasibility study (FS) and upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected Alternatives 6S (Ex Situ Anaerobic Treatment of Surficial Soil/Sediment) and 3GW ([Ground Water] Recovery and Treatment by Activated Carbon Adsorption with Discharge to Onsite Ponds or to the Tampa Bypass Canal) for this Site. If, after pilot tests are complete, Alternative 6S cannot economically meet the remedial goals for soil/sediment at this Site, a contingency soil/sediment remedy, Alternative 5S (Ex Situ Thermal Treatment of Surficial Soil/Sediment), will be implemented instead. The selected alternatives for the Stauffer Site are consistent with the requirements of Section 121 of CERCLA and the NCP. Based on the information available at this time, the selected alternatives represent the best balance among the criteria used to evaluate remedies. The selected alternatives will reduce the mobility, toxicity, and volume of contaminated ground water at the Site. In addition, the selected alternatives are protective of human health and the environment, will attain all federal and state ARARs, are cost-effective and utilize permanent solutions to the maximum extent practicable. The estimated present worth cost of Alternatives 6S and 3GW are $ 4,130,000 and $ 3,540,000, respectively. The estimated present worth cost of the contingency soil/sediment remedy, Alternatives 5S, is $ 7,440,000.

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

9.1 <u>Source Control</u>

9.1.1 Major Components of Source Control

Since subsurface soil contamination is not addressed in Alternative 6S, sediment removal to a depth of one foot and placement of one foot of clean fill in the onsite ponds is likely to be more cost effective than remediation to sediment RGs. Performance standards for the selected remedy will reflect 1 foot of sediment removal rather than RGs in Table 7-1.

The major components of source control in the selected remedy (Alternative 6S) to be implemented include:

- Excavation of contaminated surface soils (0-2 feet) above RGs;
- Removal and dewatering of a 1-foot thick layer of contaminated sediments from onsite ponds;
- Biological treatment of contaminated surface soils and sediments *ex situ* to soil RGs;
- Placement of controls on the Site to restrict excavation and gardening through the filing of deed notices and the use of existing fence to limit exposure to contaminated areas until RGs are met; and
- Placement of 1 foot of clean fill in onsite ponds to eliminate exposure pathway.

9.1.2 Performance Standards

The performance standards for surface soil remediation are based on protection of ground water and/or protection of human health, and are listed in Table 7-1. This remedy does not require sub-surface remediation of contaminated soils to levels listed in Table 7-1. Since subsurface soil contamination is not addressed, sediment removal to a depth of one foot and placement of one foot of clean fill in the onsite ponds is likely to be more cost effective than remediation of sediments to RGs. Performance standards for the selected remedy will reflect 1 foot of sediment removal rather than RGs in Table 7-1.

9.2 Ground Water Remediation

9.2.1 Major Components of Ground Water Remediation

The major components of the ground water remediation portion the selected remedy (Alternative 3GW) are as follows:

- Extract contaminated ground water;
- Treat contaminated ground water to meet surface water discharge standards;

- Discharge treated ground water to onsite ponds or to the Tampa Bypass Canal under an NPDES permit; and
- Place controls on Site to restrict use of ground water beneath the Site through the filing of deed notices in order to limit exposure to contaminated ground water until RGs are met.

9.2.2 Performance Standards

9.2.2.1 Extraction Standards

Ground water will be extracted from the surficial aquifer at a rate of to be determined during remedial design.

9.2.2.2 Treatment Standards

Ground water will be monitored in the Floridan and surficial aquifer until the maximum concentration levels for ground water in Table 7-1 are attained.

9.2.2.3 Discharge Standards

Discharges from the ground water treatment system shall comply with all ARARs, including, but not limited to, substantive requirements of the NPDES permitting program under the Clean Water Act, 33 U.S.C. § 1251 et seq., and all effluent limits established by EPA in Table 7-2.

9.2.2.4 Design Standards

The design, construction and operation of the ground water treatment system shall be conducted in accordance with all ARARs, including the RCRA requirements set forth in 40 C.F.R. Part 264 (Subpart F).

9.3 Compliance Testing

Ground water and surface water monitoring shall be conducted at this Site. Ground water shall be sampled from existing and new monitoring wells, as determined during remedial design. After demonstration of compliance with Performance Standards, the Site shall be monitored for five years. If monitoring indicates that the Performance Standards set forth in Paragraph B.3 are being exceeded at any time after pumping has been discontinued, extraction and treatment of the ground water will recommence until the Performance Standards are once again achieved. If monitoring of the surface water indicates contaminant levels are not decreasing, the effectiveness of the source control component will be re-evaluated.

9.4 Contingency Remedy for Soil/Sediment

Should pilot studies demonstrate that the selected remedy described above (biological treatment), cannot achieve performance standards established for the Site, in an economical manner, then the treatment technology used for soil/sediment remediation at the Site will be low temperature thermal desorption (LTTD) instead of biological treatment. LTTD has been successfully used in the past at this Site to treat pesticide contaminated soils. The performance standards described in Section 9.2.1 apply to LTTD as well as biological treatment.

10.0 STATUTORY DETERMINATION

Under Section 121 of CERCLA, 42 U.S.C. § 9621, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through engineering controls and/or institutional controls and soil/sediment and ground water treatment as delineated through the performance standards described in Section 9.0 - SUMMARY OF SELECTED REMEDY. The residual risk due to individual contaminants will be reduced to a probability of $1x10^{-6}$ for carcinogens and HQ of 1 for non-carcinogens. The residual carcinogenic risk at the Site, which is the sum of individual carcinogenic risks, will be reduced to acceptable levels (i.e., cancer risk between $1x10^{-6}$ and $1x10^{-4}$) once performance standards are achieved. Implementation of this remedy will not pose unacceptable short-term risks or cross media impact.

10.2 Attainment of the Applicable or Relevant and Appropriate Requirements (ARARs)

Remedial actions performed under Section 121 of CERCLA, 42 U.S.C. § 9621, 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 was found to meet ARARs identified in Tables 8-1, 8-2, and 8-3. The following is a short narrative explaining the attainment of pertinent ARARs.

Chemical-Specific ARARs
Performance standards are consistent with ARARs identified in Table 8-3.

Action-Specific ARARs
Performance standards are consistent with ARARs identified in Table 8-2.

Location-Specific ARARs
Performance standards are consistent with ARARs identified in Table 8-1.

The selected remedy is protective of species listed as endangered or threatened under the Endangered Species Act. Requirements of the Interagency Section 7 Consultation Process, 50 CFR Part 402, will be met. The Department of the Interior, Fish & Wildlife Service, will be consulted during the remedial design to assure that endangered or threatened species are not adversely impacted by implementation of this remedy.

Waivers
Waivers are not anticipated at this Site at this time.

Other Guidance To Be Considered
Other Guidance To Be Considered (TBCs) include health-based advisories and guidance. TBCs have been utilized in estimating incremental cancer risk numbers for remedial activities at the Site and in determining RCRA applications to contaminated media.

10.3 Cost Effectiveness

After evaluating all of the alternatives which satisfy the two threshold criteria, protection of human health and the environment and attainment of ARARs, EPA has concluded that the selected remedy, Alternatives 6S and 3GW, affords the highest level of overall effectiveness proportional to its cost. Section 300.430(f)(1)(ii)(D) of the NCP also requires EPA to evaluate three out of five balancing criteria to determine overall effectiveness: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. The selected remedy provides for overall effectiveness in proportion to its cost.

The selected remedy has a relatively high present worth, capital, and operation and maintenance cost compared to other remedies, but best satisfies the criteria for long-term effectiveness and permanence and short-term effectiveness. This alternative will reduce toxicity, mobility, or volume through treatment.

The estimated present worth costs for the soil/sediment and ground water selected remedies are $ 4,130,000 and $ 3,540,000, respectively.

10.4 Utilization of Permanent Solutions to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final remediation at the SMC Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that Alternative 6S, combined with Alternative 3GW, provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and consideration of state and community acceptance.

10.5 Preference for Treatment as a Principal Element

The statutory preference for treatment is satisfied by the selected remedy.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes in the selected remedy, Alternatives 6S and 3GW, from the preferred remedy described in the proposed plan. The remedial goals listed in Table 7-1 of the ROD are slightly different than the goals listed in Table 1 in the proposed plan due to errors noted and corrected in response to comments in Appendix A. Sub-surface soil RGs for atrazine, delta-BHC, EPTC, and Pebulate were dropped because detected onsite concentrations are lower than concentrations required for ground water protection or ground water detections are lower than ground water RGs. The sub-surface soil RG for dieldrin was changed from 0.007 mg/kg to 0.01 mg/kg because the Practical Quantitation Level (PQL) for dieldrin is 0.01 mg/kg. A ground water RG for xylenes (total) of 20 ug/L was added because xylenes enable pesticide transport in ground water; 20 ug/L is a Florida secondary MCL. Sediment RGs for protection of human health were eliminated because the pathway (i.e., ingestion of sediment) did not exceed 1×10^{-4} carcinogenic risk or HQ greater than 1. Sediment RGs for the protection of plant and animal life were added to reduce the ecological risk; however, based on the remedy selected, removal on one foot of contaminated sediment in ponds and replacement with one foot of clean fill was selected to eliminate the sediment exposure pathway.

APPENDIX A - RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
STAUFFER MANAGEMENT COMPANY SUPERFUND SITE
TAMPA, HILLSBOROUGH COUNTY, FLORIDA

Introduction

This responsiveness summary for the Stauffer Management Company Superfund Site documents for the public record concerns and issues raised during the comment period on the proposed plan. EPA's responses to these concerns and issues are included.

Overview of Comment Period

The proposed plan for the Stauffer Management Company Superfund Site was issued on July 18, 1995. A sixty-day public comment period for the proposed plan began July 20, 1995, and ended September 17, 1995. Two written comments with multiple concerns were received during that comment period. A public meeting was held on July 27, 1995, at the Kenley Park Recreation Center at 1301 North 66th Street, Tampa, Florida. Many comments were received and addressed during that meeting. A transcript of the meeting was prepared and is available at the information repository near the Site.

Concerns Raised During the Comment Period

Private Well User Concerns:

1. One commentor asked if EPA plans to test private wells near the Site. The commentor asked when EPA was going to take some action to help "everybody", in particular the private well users in the area of the Site. The commentor noted the large number of hazardous sites located in the area.

   Response: A well survey was conducted as part of the RI/FS for the Helena Chemical Company Site, located across the street from SMC, and was cross-referenced in the SMC Site Administrative Record. The results of the well survey indicate that only monitoring wells are open to the surficial aquifer; drinking water wells around the Site are open to the Floridan Aquifer. Ground water contamination at the Site is primarily located in the surficial aquifer. Minor amounts of contamination have been detected in the Floridan Aquifer beneath the Site.

   Private wells were not sampled during the RI/FS; contaminated ground water in the surficial aquifer, from the SMC Site, discharges to the Tampa Bypass Canal and does not extend to any private wells. If the contamination migrates to an area where private wells exist, EPA will require that the private wells be monitored to ensure that human health is protected.

EPA does not have the authority or funds to address all local ground water issues. Local water quality is generally considered to be under the jurisdiction of local government. If contamination from a Superfund Site affects the water quality in a private well, EPA can require that the responsible parties provide an alternate drinking water source to the well users. However, EPA's Superfund program cannot provide public water supplies to well users just because of the number of hazardous waste sites in the area.

EPA recommends that the commentor work with the county and state health departments to determine if privates wells might be affected by sites upgradient from the wells. The health department may also agree to test a well and determine if alternate water sources are available.

Concerns Related to Past Exposures:

2. One commentor questioned why EPA is proposing to remediate the Site now when residents have already moved out and the area is industrial. The commentor wanted to know what was going to be done to help former residents and address their past exposure.

   Response: EPA is proposing to remediate the Site in order to protect current and future onsite workers and to protect the waters in the Tampa Bypass Canal and Floridan aquifer from contaminated ground water. EPA wants to prevent current and future exposure at the Site. The Agency for Toxic Substances and Disease Registry (ATSDR) and the State of Florida Department of Health and Rehabilitative Services (HRS) should be contacted to address past exposure issues. ATSDR and HRS can perform surveys and studies to track public health concerns and determine if they can be linked to discharges from a particular facility.

Concerns about the Remedial Investigation/Feasibility Study:

3. Camp Dresser & McKee Inc. (CDM) requested that in the future EPA remove the CDM logo from document pages modified by EPA or include a written disclaimer on modified document pages.

   Response: EPA modified pages by striking through incorrect information and writing in more appropriate information. The EPA modifications were necessary because the document was submitted several weeks late and the schedule for completion of the ROD prohibited EPA from offering CDM a third opportunity to make corrections. The modified pages were attached to a memorandum which clearly indicated that the changes were being made by EPA. If EPA needs to revise information on future documents, the CDM logo will be removed.

4. One commentor suggested that the RI/FS did not consider past drainage paths or investigate fully those paths. The commentor suggested that EPA investigate further downstream in McKay Bay since most of the contamination in adjacent drainage ways may have been removed when the Tampa Bypass Canal was constructed. The commentor suggested that more sources are likely present than those identified in the RI/FS.

   Response: EPA's investigations typically begin onsite and are extended offsite if data indicates that contamination has migrated offsite. Since the Tampa Bypass Canal was constructed in the early 1970s, contamination that may have migrated to the old Six Mile Creek was probably removed or covered with fill. Since numerous facilities discharge water to McKay Bay, there is no direct pathway to link contamination at the Site to contamination in McKay Bay. An investigation and clean up of McKay Bay may be pursued by another agency in a separate action, but it will not be investigated further as part of the SMC Site.

   A review of the RI/FS will reveal that EPA and SMC have attempted to identify all possible sources of contamination at the Site. Since ground water remediation is dependent on source removal to be effective, it should be evident during the course of cleanup if additional sources are present. If additional sources of ground water contamination are discovered during the course of remediation, the sources will be removed and treated.

5. One commentor asked EPA to explain bioremediation.

   Response: Bioremediation is a method of treating contaminated material by means biological processes. Biological treatment of hazardous organic substances (bioremediation) is based on the use of either aerobic or anaerobic bacteria. Aerobic biodegradation is accomplished in the presence of oxygen and is particularly effective on aromatic hydrocarbons (VOCs and petroleum-based compounds). Anaerobic biodegradation is carried out in an oxygen-free environment and has been shown to degrade chlorinated compounds such as pesticides and herbicides. Success depends on using microorganisms well-acclimated to the specific waste type and having sufficient nutrients available.

6. One commentor asked EPA to explain the difference between thermal desorption and incineration.

   Response: Low Temperature Thermal Desorption (LTTD) is a treatment process in which contaminated soil/sediment is excavated and placed in a heat exchanger (thermal processor) with temperatures much lower (<1000°F) than those achieved by incineration (>2000°F). Air emissions from LTTD are less costly to deal with than for incineration. LTTD leaves the soil intact and vaporizes the pesticides, whereas incineration leaves ash that must be disposed of in accordance with regulatory requirements.

7. One commentor asked if bioremediation has been used successfully at other Sites.

   Response: No, not yet. However, bioremediation of pesticide contaminated soil is considered an innovative technology and is currently being considered for use at several Sites in EPA Region IV. At least two different companies are developing the technology. Results are not yet available to demonstrate complete success at other sites.

8. One commentor asked EPA what the difference was in the timeframe to remediate contamination using bioremediation versus doing nothing.

   Response: Bioremediation of contaminated soils is expected to take four years at the SMC Site. The timeframe required for natural degradation/attenuation of contaminants in soil has not been determined. Pesticide levels in soils are expected to remain at current levels indefinitely unless remediated.

9. One commentor asked why air sparging was not considered if oxygen levels were important to bioremediation.

   Response: It is possible that air sparging might be used in the remediation process if oxygen is needed to induce bioremediation. This will be determined in remedial design. Air sparging is not adequate as a stand alone process for remediation of pesticides.

10. One commentor asked how far south of the Helena site contamination was located.

    Response: Soil contamination was found on the CSX railroad easement south of the Site and on the property south of CSX railroad. Ground water contamination was determined to extend approximately 200 ft south of the Site under several adjacent properties, including the SMC Site.

11. One commentor wanted to know the total volume of contaminated soil.

    Response: Exact volumes based on the clean up levels proposed by EPA are not available. Based on earlier cleanup level assumptions, the responsible parties estimate that approximately 5,100 cubic yards of material would require excavation, and approximately 6,400 cubic yards would require treatment, assuming expansion of soils after excavation. The volumes now are expected to be slightly higher due to the lower clean up standards proposed by EPA.

12. One commentor questioned EPA regarding elimination of COCs in an Amendment to the FS. Page 2-2 of the Final FS (EPA mark-up page Al) states that no remediation goals were calculated for certain chemicals of concern (COCs). The commentor requested that language be provided giving rationale

for elimination. In addition, the commentor stated that EPA developed remediation goals for heptachlor in groundwater, which is not consistent with the text on page Al.

Response: The sentence that states that no remediation goals were calculated for certain chemicals should have been crossed out. This section is supposed to be a summary of the Baseline Risk Assessment and should reflect every contaminant for which remediation goals were calculated because of risk. The appropriate section to discuss the need for eliminating remediation goals is Section 3.

13. One commentor questioned EPA regarding revisions to Table 3-6 in an Amendment to the FS. The commentor asked why the revised Table 3-6 is not consistent with the rest of the Final FS. The commentor stated that if only industrial land use is considered for the site, residual risks for onsite residents should not be shown; it would be more appropriate to only show residual risks for the onsite worker.

    Response: The consultant that prepared the FS evaluated residual risk based on residential and industrial land use in order to provide the PRPs, EPA, and the public with the differences in cost required to remediate to stricter levels. The purpose of the markup pages in the amendment was to provide an indication of where EPA considered the changes to be necessary and to give the reader an idea of what the changes described in the July 12, 1995, Memorandum to the Administrative Record would look like in the document. EPA agrees that it would have been preferable, had time permitted, to have the whole document revised. Since EPA was concerned primarily about residual risk to the industrial worker, that is what was calculated in EPA's revisions to Table 3-6. There is enough information available in the record to determine those the residual residential risk if needed in the future.

14. One commentor questioned EPA regarding Table 4 of Attachment B in EPA's Amendment to the FS. The commentor stated that Table 4 should present recommended remediation goals for subsurface soil. Also, footnote 2 is missing and should be added, footnote 1 appears to be mislabelled and should be corrected, and acronyms should be defined.

    Response: The commentor is correct. This error has been corrected in EPA's November 27, 1995 memorandum to the Administrative Record concerning revisions to the Final Feasibility Study Amendments (hereafter referred to as the "November 27, 1995 FS Revision Memo").

15. One commentor requested that EPA justify requiring ground water cleanup when future land use was considered to be commercial.

Response: Future land use at the Site is expected to remain commercial, and EPA anticipates restricting ground water use at the Site so that no future onsite exposure to ground water can occur. However, unless the ground water is contained with a barrier or extraction system, there is no way to prevent the contaminated ground water from migrating offsite. Contaminated ground water currently discharges into the Tampa Bypass Canal. Although contaminant levels are not detected in the Tampa Bypass Canal due to the effects of dilution, discharge is occurring. In addition, contaminants have been detected at unacceptable levels in the Floridan aquifer, the primary drinking water aquifer in Tampa. Therefore, future exposure to contaminated ground water could occur if contaminants migrate offsite and if private wells are used on adjacent properties.

16. One commentor noted that the fact sheet states that remediation goals for the SMC site are based on industrial use of the Site; however, the remediation goals stated for groundwater are not based on industrial use, but are based on the Federal Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs), Florida Groundwater Standards, or residential health-based concentrations. The commentor requested clarification.

    Response: Only surface soil remediation goals are based on a future industrial use scenario. Since contaminated ground water beneath the Site is currently allowed to migrate offsite and to the Floridan aquifer, Federal Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs), Florida Ground Water Standards, and residential health based concentrations were considered to determine remediation goals for ground water. This information has been clarified in the ROD.

Concerns about Remediation Goals for Sediments:

17. One commentor questioned EPA regarding revisions to Table 3-4 in an Amendment to the FS. EPA's memorandum regarding the amendment to the Final FS states (4th paragraph, p. 2) that Table 2-5 should represent remediation goals for carcinogenic risk of 10^{-5} to 10^{-6} and hazard quotient (HQ) of 1. However, the sediment remediation goals for residents (Table 3-4) are based on an HQ of 0.1. This should be corrected.

    Response: The sediment remediation goals for residents in the Table 3-4 on page A-12 of EPA's amendment to the Final FS should reflect 10^{-6} carcinogenic risk goals and goals reflecting a HQ of 1, as follows: aldrin = 8.33 mg/kg, chlordane = 12.7 mg/kg, dieldrin = 1.5 mg/kg). This error has been corrected in EPA's November 27, 1995 FS Revision Memo.

18. One commentor questioned EPA regarding revisions to Table 3-4 in an

Amendment to the FS. The commentor asked why the sediment remediation goals for the residential scenario were crossed out?

Response: The goals on Table 3-4 were crossed out because they were incorrect. The goals listed in the response to comment 13 should have been written in adjacent to the crossed out numbers. This error has been corrected in EPA's November 27, 1995 FS Revision Memo.

19. On commentor asked how or why EPA calculated sediment remediation goals for the worker scenario. EPA's Final Revised BRA states that, "remedial goal options were developed for all exposure pathways that have a total carcinogenic risk exceeding 1×10^{-4} or a total hazard index that exceeds 1 (p. 6-1). These risk levels were not exceeded for pathways associated with sediment exposure by workers, and remediation goals for sediment based on the worker scenario were therefore not calculated in the Final Revised BRA. Because there is no excess risk from future exposure to sediment at the site, remediation of sediment should not be required.

    Response: The commentor is correct, remediation of sediment based on worker exposure should not be required and the error has been corrected in EPA's November 27, 1995 FS Revision Memo and Section 11 (Significant Changes) in the ROD. However, sediment contamination remains a significant source of risk to ecological life at this Site, though difficult to quantify. EPA recommends that one foot of sediment be removed from the onsite ponds and replaced with one foot of clean fill. The clean fill will eliminate one exposure pathway to ecological life at the Site.

Concerns about Remediation Goals for Soils:

20. One commentor questioned EPA regarding revisions to Table 3-4 in an Amendment to the FS. The commentor asked why the health-based remediation goal for chlordane in soil for the residential scenario should be 0.495 mg/kg, not 0.33, as presented. A concentration of 0.495 mg/kg corresponds to a 10^{-6} cancer risk, and 0.33 mg/kg corresponds to an HQ of 0.1.

    Response: The health based remediation goal for chlordane in soil for the residential scenario should be 0.495 mg/kg, not 0.33, as presented. This error has been corrected in EPA's November 27, 1995 FS Revision Memo.

21. One commentor asked why the remediation goals for soils did not increase exactly two times if EPA revised the worker soil ingestion rate from 100 to 50 mg/day.

Response: The remediation goals for surface soils are based on assumed worker exposure due to incidental ingestion of contaminated soils and dermal contact with contaminated soils. The dermal contact component did not change when the ingestion rate was lowered. Therefore, the remediation goals did not increase by exactly two times.

Concerns about Remediation Goals for Ground Water:

22. One commentor questioned EPA regarding revisions to Table 3-5 in an Amendment to the FS. The commentor asked why the MCL for bis(2-ethylhexyl)phthalate (0.006 mg/1) is less than the PQL (0.010 mg/1).

    Response: Since remediation below the PQL is impractical, the PQL should have been selected as the remediation goal for bis(2-ethylhexyl)phthalate in groundwater. This error has been corrected in EPA's November 27, 1995 FS Revision Memo.

23. One commentor requested that EPA justify not establishing ground water remediation goals for manganese, cadmium, arsenic, bis(2-ethylhexyl)phthalate, bromodichloromethane, and chloroform.

    Response: EPA is not aware of any evidence that would indicate that metals were disposed of in any waste streams onsite. There are no know low pH areas onsite that would lead to dissolution of metals. Exceedances of screening levels for manganese, cadmium, and arsenic required that these metals be maintained as contaminants of concern in ground water; however, there are no known sources of metals being remediated at the Site. For that reason, remediation goals are not recommended at this time; however EPA recommends that metals be monitored in the surficial aquifer and the Floridan aquifer to ensure that high levels do not persist.

    Bis(2-ethylhexyl)phthalate was detected in one monitoring well screened in the Floridan aquifer. Since it was not detected in surficial soil, subsurface soil, or surficial aquifer ground water, EPA does not believe that the contaminant is Site-related. EPA recommends that SMC monitor the Floridan aquifer for bis(2-ethylhexyl) phthalate to verify that contaminant levels are not persistent.

    Bromodichloromethane and chloroform were detected in the Floridan aquifer, but were not detected in the surficial aquifer. Bromodichloromethane was detected on one onsite Floridan well and one offsite Floridan well. Since there is no reason to suspect bromodichloromethane contamination is Site-related, EPA recommends that it be monitored rather than setting a remediation goal. Chloroform was detected in four Floridan wells and may be related to the Site; however, since the risk due to chloroform was less than 1×10^{-6}, a RG was not established for chloroform.

24. The remediation goals for aldrin, alpha-BHC, atrazine, beta-BHC, dieldrin, and EPTC in groundwater from Table 1 of the fact sheet are inconsistent with the table presented on page 3 of EPA's memorandum (amendment to the Final FS). According to the information presented on page 3, the RAOs should be 0.007, 0.017, 0.47, 0.059, 0.007, and 94 ug/l, respectively.

    Response: The table on page 3 of EPA's memorandum (amendment to the Final FS) should reflect goals determined on Table 3-5, page A-13 of EPA's amendment to the Final FS. RAOs should be 0.007, 0.017, 0.47, 0.059, 0.007, and 940 ug/l for aldrin, alpha-BHC, atrazine, beta-BHC, dieldrin, and EPTC, respectively. This error has been corrected in EPA's November 27, 1995 FS Revision Memo.

25. Table 3-5 from EPA's amendment to the Final FS shows a groundwater RAO for bis(2-ethylhexyl)phthalate; however, this is not reflected in Table 1 of the Fact Sheet or page 3 of EPA's amendment to the Final FS. This should be clarified.

    Response: Bis(2-ethylhexyl)phthalate should be crossed out on Table 3-5, as is reflected in EPA's November 27, 1995 FS Revision Memo.

Concerns about Remediation Goals for Subsurface Soils:

26. On commentor questioned inconsistencies between the proposed plan and EPA's amendment to the Final FS. The remediation goals for aldrin, alpha-BHC, atrazine, beta-BHC, and dieldrin in subsurface soil presented in Table 1 of the Fact Sheet are inconsistent with Table 2 from Attachment B of EPA's amendment to the Final FS (EPA's Soil Remedial Action Objectives Determination). According to the information presented in Table 2, the remedial action objectives (RAOS) for aldrin, alpha-BHC, beta-BHC, and dieldrin should be 0.1, 0.0038, 0.456, 0.0084, and 0.101 mg/kg, respectively.

    Response: The Remedial Action Performance Standards for subsurface soils in Table 1 of the Fact Sheet and Table 3 on page B-12 of EPA's amendment to the Final FS (EPA's Soil Remedial Action Objectives Determination) should reflect goals calculated on Table 2 of EPA's amendment to the Final FS. This error has been corrected in EPA's November 27, 1995 FS Revision Memo. The change will be noted in Section 11 (Significant Changes) in the Record of Decision (ROD). However, it should be noted that the preferred remedy does not require subsurface soil remediation.

27. One commentor asked how remediation goals for subsurface soil were calculated. EPA selected concentrations based on the lowest dilution factors evaluated. There appears to be inconsistency in numbers from Table 2 in

Appendix B (EPA Soil Remedial Action Objectives Determination) and Table 4 in Appendix B, which presents the final remediation goals. Remediation goals for aldrin, alpha-BHC, atrazine, beta-BHC, and dieldrin presented in Table 4 do not coincide with those in Table 2, and appear much too low based on EPA's modeling analysis. Please clarify or provide sample calculations.

Response: The low dilution factor was considered the most reasonable value because it was based on the hydraulic conductivity determined by CDM during onsite slug tests. Refer to response for comment 18 for further clarification of other issues.

Concerns about the Baseline Risk Assessment:

28. One commentor asked what studies show is a safe amount of time (hours) to be in the general area.

    Response: There is no limit to the amount of time that it is safe to be in the general area near the Site. The risk from the Site is relevant only to a person or persons who are onsite for a long period of time (long-term exposure). EPA's risk evaluation is based on an onsite worker being exposed 8 hours per day, 5 days per week, and 50 weeks per year for 25 years. The Site should be remediated before long term exposure occurs to onsite workers. There are very few onsite workers because the facility is closed; those workers who do go onsite are being monitored for health effects.

29. One commentor asked if pesticides could have bioaccumulated in vegetables, cattle, etc., grown on soil contaminated in the 1950s or 1960s.

    Response: Pesticides can bioaccumulate in the food chain. Therefore, it is possible that biota and wildlife at the Site have bioaccumulated pesticides.

30. One commentor asked how many years a person would have to be exposed to contaminated ground water or soils to develop cancer or non-carcinogenic effects?

    Response: Toxicologist are divided on the length of exposure required to cause cancer. Typically one exposure to a carcinogen EPA's risk assessment evaluates the probability that a dose will cause cancer during the lifetime of the exposed individual. It should be noted that each person has a one in four chance of developing cancer in his/her lifetime. If 10,000 onsite workers are exposed to site contaminants at current concentrations, two additional incidents of cancer are expected to occur.

31. One commentor asked if property owners south of the Helena Site have been made aware that sulfur and other pesticides may have flowed in drainage structures to their properties in the past.

Response: Property owners have been made aware that the SMC Site and the Helena Chemical Company Site are being remediated. They have been made aware of the results of the investigations through pubic fact sheets. They have been made aware that detailed information is available at the information repository near the sites.

Concerns About The Proposed Remedy:

32. One commentor requested that the EPA allow a performance-based standard for remediating soils in lieu of specifying a specific soil remediation technology.

Response: The purpose of the Feasibility Study performed by the Potentially Responsible Parties (PRPs) was to evaluate available technologies for remediating contamination at the Site. The purpose of the Record of Decision (ROD) is to make a decision regarding performance standards and the preferred remediation technology based on the Feasibility Study. At the Stauffer Management Company Site, EPA has proposed a remediation technology and a contingency remediation technology; the contingency remediation technology is to be executed if the preferred remediation technology cannot achieve performance standards or is not cost effective. If during subsequent pilot studies or during Remedial Design (RD), an alternative technology is identified that is technically sound and cost effective, the PRPs may request a review by EPA. However, if a technology other than the preferred technology or the contingency technology is proposed and approved, a ROD amendment would be necessary.

33. One commentor requested that EPA add a one-year ground water monitoring phase (four quarterly sampling events) as a component of Remedial Design (RD), since the ground water sampling in the Remedial Investigation was conducted very soon after the source removal was complete. The commentor suggested that contaminant levels in ground water will be lower when resampled due to source removal.

Response: Specific details regarding RD are typically determined after the ROD is approved. Most ground water remediations require that additional ground water sampling be performed as the initial phase of design. If there are compelling reasons why an extended ground water monitoring program would be beneficial, it will be determined during remedial design, but not in the Record of Decision.

34. One commentor identified several inconsistences in background documents and Table 1 in the Proposed Plan.

Response: These errors have been corrected in EPA's November 27, 1995 FS Revision Memo and have been described, when necessary, in Section 11 of the ROD.

35. One commentor asked if the monitoring well network would be expanded to areas that he indicted may be a continuing source.

Response: The monitoring well network will be expanded as necessary to ensure that the extent on contamination is known and is being controlled to protect human health and the environment. The current network is adequate to define contamination; as contaminants migrate, the network will have to be expanded.

36. One commentor asked why EPA would select a remedy (such as thermal desorption) which could make contaminants airborne.

Response: EPA will require that adequate engineering controls are in place to ensure that workers and the surrounding community are protected during the execution of any remedy at a Site. EPA will only select a remedy if it reduces the overall risk to human health and the environment. If the remedy itself were to increase the risk, EPA would not agree to execution of the remedy.

37. One commentor asked when excavation of soils would begin at the Site and if people who live or work around the Site should leave the area when the excavation is being done.

Response: Excavation of soils will not begin until the remedial design is complete (at least 18 to 24 months from approval of the ROD). Engineering controls will be utilized to ensure no hazardous conditions exist for those who live and work near the Site. There will be no need to leave the area during performance of work at the Site.

38. One commentor asked if the PRPs have selected a consultant to do the remediation.

Response: EPA is not aware of any consultants selected by the PRPs for performance of the work.

39. On commentor asked if Helena and Stauffer PRPs are working together, since contaminants and remedies are similar.

Response: EPA understands that the Helena and Stauffer PRPs have met on occasion, but no agreement has been reached to work together to remediate these sites.

40. On commentor asked if EPA is contributing to the development costs of the technology being developed by the Stauffer PRPs.

Response: The Stauffer PRPs are paying for development of technology to bioremediate pesticides at the Site.

41. One commentor asked if proposed cleanup goals for residential use would be more appropriate because Hillsborough County has expressed interest in expanding the jail onto the Stauffer Site.

Response: EPA toxicologists have determined that although a correctional facility could be considered short-term residential use, outdoor exposure of inmates is restricted. With institutional controls to prevent gardening or excessive outdoor activity in the areas where residual pesticides are found, industrial cleanup standards are considered protective of the health of inmates.

42. One commentor asked if EPA's preferred remediation alternative will remediate deep contaminated subsurface soil such that the subsurface soil is no longer a potential source of ground water contamination on the Site.

Response: EPA's preferred alternative is to remediate surface soils and ground water. In theory, subsurface soil contamination will be remediated as the ground water is remediated. EPA and FDEP encourage the PRPs to remediate subsurface soils in order to reduce the ground water remediation timeframe required; however, the proposed remedy does not require subsurface soil remediation.

43. One commentor recommended air monitoring and air emission controls be used during excavation of soils onsite because of the numerous complaints received about methyl mercaptan odors during the previous removal action at the Site.

Response: EPA will ensure that odor problems are anticipated and dealt with promptly during excavation. EPA will require that reasonable air emissions controls are installed.