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Agency

Office of
Emergency and
Remedial Response

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August 1993

EPA

Superfund Record of Decision:

Peak Oil/Bay Drum (Operable Unit 2), FL

50272-101

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12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. Type of Report & Period Covered 800/800 14.

15. Supplementary Notes

PB94-964032

16. Abstract (Limit: 200 words)

The 18.8-acre Peak Oil/Bay Drum (Operable Unit 2) site is a former used oil refinery in Brandon, Hillsborough County, Florida. Land use in the area is predominantly industrial and undeveloped, with three wetlands areas located adjacent to the site. The nearest residential area is located 0.3 miles east of the site. Although not utilized currently, onsite ground water is classified as a class II aquifer; and therefore, is a viable source of ground water for future consumption. From 1954 to 1980, the 4-acre Peak Oil facility used an acid/clay purification and filtration process to purify and re-refine waste oil and lubrication fluids. Waste oil accepted at the facility for re-refining consisted primarily of used auto and truck crankcase oil, with some hydraulic oil, transformer oil and other waste oil. The process generated a low-pH sludge and oil saturated clay, which was stored over the life of the site in three impoundment areas (lagoons 1, 2, and 3); lagoons 1 and 3 were later backfilled. In 1980, the company discontinued the re-refining process and shifted to filtering and blending the waste oil for resale. Several company employees reported onsite leaks and spills and that waste continued to be stored onsite. From 1962 to 1982 the Bay Drums facility was operated as a drum reconditioning facility. Approximately 2

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Peak Oil/Bay Drum (Operable Unit 2), FL
Third Remedial Action
Contaminated Medium: gw
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (PAHs), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 76
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

acres of the 14.8-acre site were used for drum reclaiming activities; however, almost the entire site was used for drum storage. A one-acre wetland that originally existed on the southern portion of the site was partially dried from berms and used for storage of drums and discharge of waste over the years. From 1974 to 1978, the site was owned and operated by Tampa Steel Drums, during which period the volume of drums reconditioned increased. In 1975, storage of drums was observed along the edge of the onsite wetland, and by 1977, the wetland had been backfilled, presumably with soil from an area of the site where a new pond was visible. Drainage from the sites was diverted to the larger offsite wetland. In 1978, the filled wetland area was developed into a wash water holding pond, which is known to have received waste from drum reconditioning activities. In 1982, drum reconditioning activities ceased. From 1984 to 1986, the Bay Drums site was operated by Resource Recovery Associates, during which time waste roofing shingles were deposited on the ground over most of the site to heights ranging from three to nineteen feet. In 1989, EPA removed, and deposited offsite 70,000 yd^3 of shingles; the pile currently lies on Hillsborough County property. In 1990, EPA conducted another removal action for the contaminated soil, drums, and bags of pesticides from the site. Two other RODs signed in 1993 address source remediation at the Peak Oil/Bay Drums sites, as OUs 1 and 3, respectively. This ROD addresses ground water contamination at both sites to meet State and Federal drinking water standards, as OU2. A future ROD will address wetlands contaminated by the Peak Oil/Bay Drums site, as OU4. The primary contaminants of concern affecting the ground water are VOCs, including benzene, PCE, TCE, toluene, and xylenes; other organics, including PAHs; and metals, including arsenic, chromium, and lead.

The selected remedial action for this site includes decommissioning two production wells; extracting and pretreating ground water, as necessary, with an oil/water separator; air stripping onsite to remove VOCs; carbon polishing onsite by activated liquid phase carbon to remove SVOCs and other organics; discharging treated water that is not returned to the Peak Oil site for use in the OU1 soil flushing/bioremediation system to a POTW; and monitoring ground water. The selected remedial action is contingent upon the ability of the air stripping and carbon polishing to meet pretreatment requirements for a local POTW; if the requirements are not met, chemical precipitation for the treatment of metals and discharge by spray irrigation, recharge, or surface water may be employed. The estimated present worth cost for this remedial action is $5,632,000, which does not include the contingency cost.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific ground water cleanup goals are based on State and Federal MCLs and health-based standards, and include arsenic 50 ug/l; benzene 1 ug/l; chromium 100 ug/l; lead 15 ug/l; naphthalene 100 ug/l; PCE 3 ug/l; toluene 1,000 ug/l; total xylenes 20 ug/l.

RECORD OF DECISION
OPERABLE UNIT 2
AREA-WIDE GROUNDWATER

PEAK OIL/BAY DRUMS SITE

Brandon, Hillsborough County, Florida

Prepared By:

Environmental Protection Agency

Region IV

Atlanta, Georgia

RECORD OF DECISION
PEAK OIL/BAY DRUMS GROUNDWATER
OPERABLE UNIT TWO
PEAK OIL/BAY DRUMS NPL SITE

DECLARATION

SITE NAME AND LOCATION

Peak Oil/Bay Drums Superfund Site
Brandon, Hillsborough County, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit Two at the Peak Oil/Bay Drums Site in Brandon, Hillsborough County, Florida, which was chosen in accordance with the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for this site.

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 process for the Peak Oil/Bay Drums Site. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided input during this process and although a formal letter of concurrence has not yet been received, concurrence is expected.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE REMEDY

The remedy selected by EPA for the Peak Oil/Bay Drums Site will be conducted in four separate operable units. Operable Unit One will address the source of contamination at the Peak Oil Site through the treatment of contaminated soils and the ash pile located on the site. Operable Unit Two, which is addressed in this Record of Decision, will address the appropriate remediation for the groundwater of the southern surficial aquifer and the Upper Floridan Aquifer at the Peak Oil and Bay Drums Sites. Operable Unit Three will address the source of contamination at the Bay

Drums Site through the treatment of contaminated soils on the site. Operable Unit Four will address the appropriate remediation for the surrounding wetlands at the Peak Oil, Bay Drums and Reeves Southeastern Sites.

The goal of the Operable Unit Two remedial action is to restore groundwater at the Peak Oil/Bay Drums Site to meet Federal and State drinking water standards. Both the southern surficial aquifer and the Upper Floridan Aquifer are included in the state-wide classification of potential future sources of drinking water. Based upon information obtained during the remedial investigation, and the careful analysis of all alternatives, EPA believes that the selected remedy will achieve this goal.

Prior to implementing the groundwater remedy, as the first phase of remedial design, the two production wells located on the Peak Oil and Bay Drums sites, Wells F2 and F3, will be decommissioned. The two production wells will be decommissioned and two new Floridan monitor wells will be installed near the locations of F2 and F3. Upon completion of the new monitor wells, all Floridan aquifer wells at the sites will be sampled on a quarterly basis to evaluate the level of contamination in the Upper Floridan aquifer.

9.1.1 The major components of the groundwater remedy for the southern surficial aquifer and the Upper Floridan Aquifer include:

- Groundwater extraction of both the surficial and Upper Floridan aquifer via extraction wells.
- Implementation of the Peak Oil source control remedy outlined in the **Peak Oil/Bay Drums Record of Decision - Operable Unit 1**.
- Air stripping for removal of VOCs.
- Carbon polishing for removal of semi-volatiles and other organic materials.
- Discharge to POTW. Groundwater will be treated to meet Federal and State drinking water standards and/or pollutant limits set by the local publicly owned treatment works (POTW) prior to discharge. The treated water will be conveyed via discharge piping to connect to a manhole for ultimate discharge to the POTW. A permit from the POTW will have to be obtained in order to discharge the treated groundwater into its system.
- Groundwater monitoring.

As a contingency, if necessary, chemical precipitation for the treatment of metals and alternate discharge methods are outlined in the Selected Remedy section of this ROD.

The total present worth cost of the selected remedy, Alternative 3D for the surficial aquifer and a modified Alternative 2 for the Upper Floridan aquifer, as presented in the Feasibility Study, is estimated at $4,132,000. This cost does not reflect contingency costs and the cost of discharging treated water from the Upper Floridan aquifer to the POTW. In the event that the contingency plan must be implemented, the overall cost of the remedy is estimated to increase by $500,000. The cost of discharging treated Upper Floridan water to the POTW is estimated to increase the cost of the remedy as much as $1,500,000, bringing the total estimated cost of the remedy (without contingencies) to $5,632,000.

STATUTORY DETERMINATION

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

August 9, 1993
Date

Patrick M. Tobin
Patrick M. Tobin
Acting Regional Administrator
U.S. EPA Region IV

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Peak Oil/Bay Drums Superfund Site
Brandon, Hillsborough County, Florida

1.0 Site Name, Location, and Description

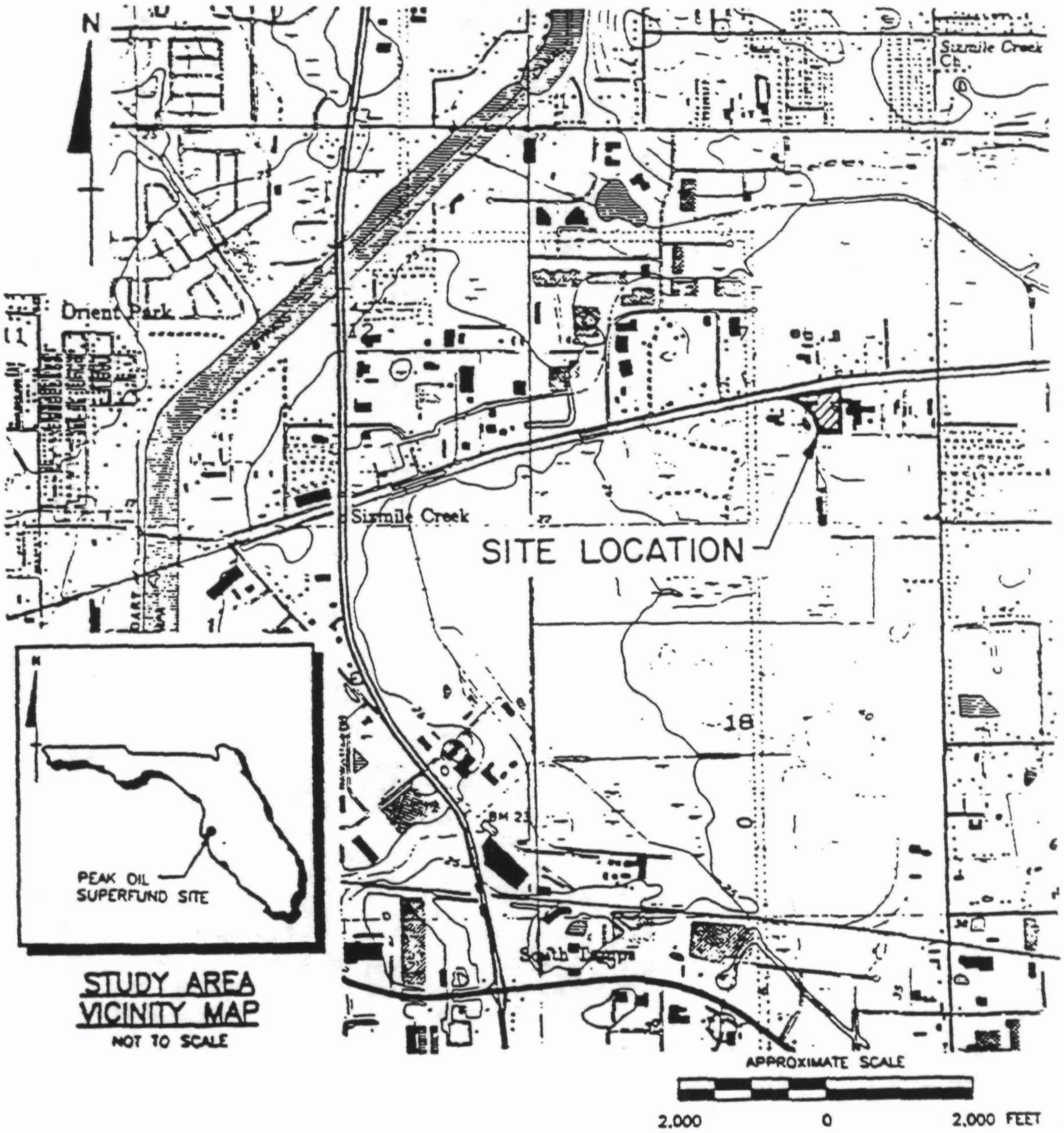
The Peak Oil/Bay Drums Site ("the Site") is located in north central Hillsborough County, Florida within the southeast quarter of Section 7, Township 29 South, Range 20 East (see Figure 1.1). The site is located on State Road 574 (SR 574), approximately 0.25 miles west of Faulkenburg Road.

As shown on Figure 1.2, the Peak Oil facility is approximately four acres in area and the Bay Drums facility is approximately 14.8 acres. The site is flanked on the east by the Reeves Southeastern Wire Facility. Just south of the site are Peoples Gas Company's natural gas distribution center and a soil and construction debris pile referred to as the Shingle Pile, which was moved by EPA to its present location from the Bay Drums Site during an EPA removal action in 1989. The Consolidated Bag Company is located southwest of the Shingle Pile.

An abandoned CSX Railroad spur runs south between the Peak Oil and Bay Drums facilities. This spur once serviced the Tampa Bay Sunshine Skyway Bridge painting site. Owned by Hillsborough County, the area south of the Bay Drums Facility is undeveloped and includes a portion of the Central Wetland. South of the Central Wetland is an area which was historically used as a sprayfield for the Hillsborough County Wastewater Treatment Plant.

The Peak Oil Site currently has two warehouse-type buildings, a concrete block office building, a small storage shed, a small lagoon from which waste oil sludges were excavated during a previous EPA removal action, a 6,000 cubic-yard ash pile lined and covered with plastic liners (also from the previous EPA removal action), and a 400 cubic-yard soil pile. A concrete pad, 90 feet by 110 feet, is also located in the southeast corner of the site.

The Bay Drums Site currently contains three small ponds. The Bay Drums pond comprises the southern tip of the original on-site wetland and is now considered to be a portion of the Central Wetland. The one-acre eastern wetland was backfilled with material excavated from the site. There is one building located on the site.

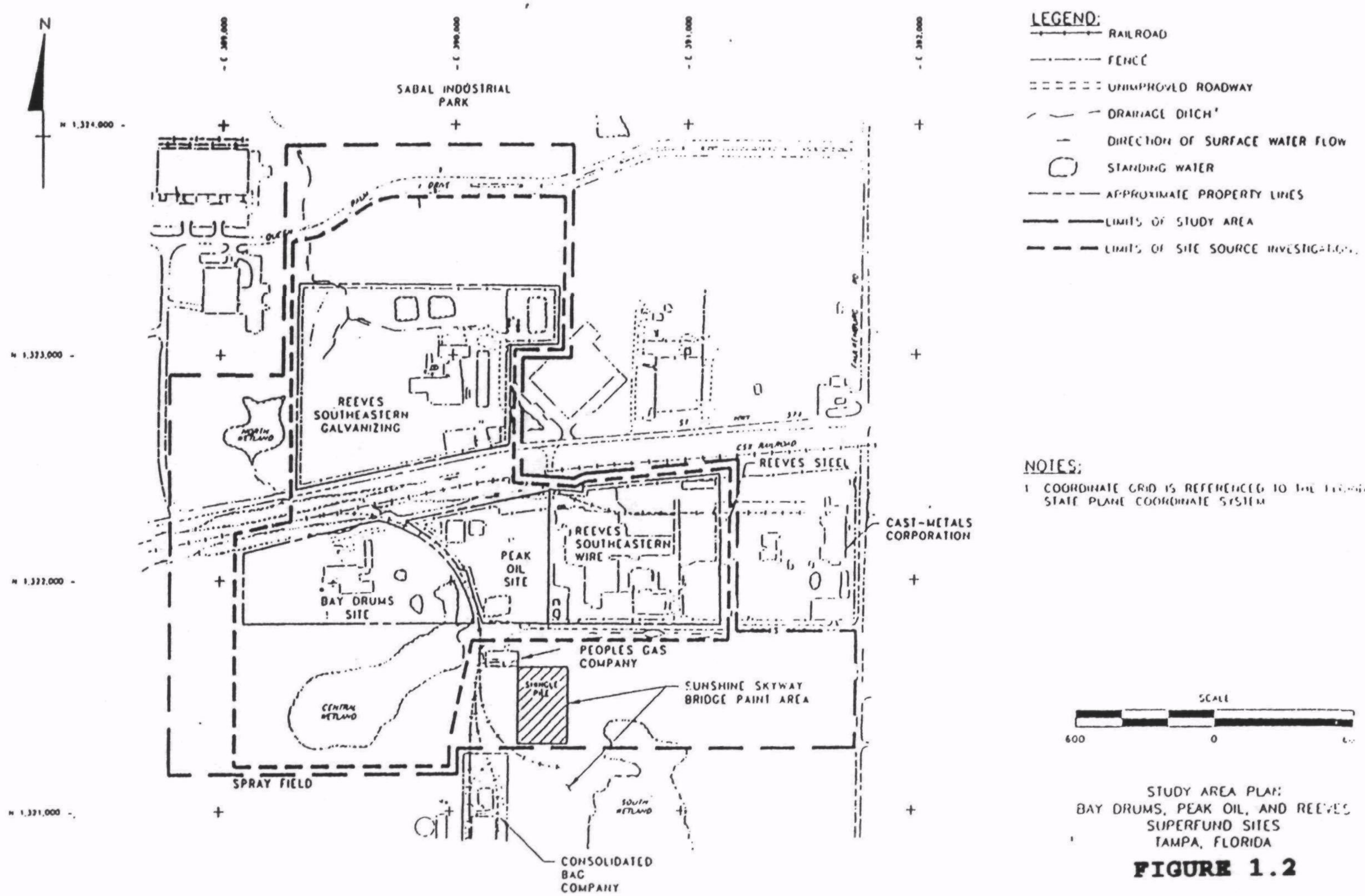


REFERENCES:

- USGS, 7.5 MIN. SERIES, BRANDON QUADRANGLE, FLORIDA-HILLSBOROUGH CO., 1956, PHOTOREVISED 1987.

SITE LOCATION PLAN
SITE SOURCE CHARACTERIZATION
PEAK OIL SUPERFUND SITE
TAMPA, FLORIDA

FIGURE 1.1



STUDY AREA PLAN:
BAY DRUMS, PEAK OIL, AND REEVES
SUPERFUND SITES
TAMPA, FLORIDA

FIGURE 1.2

POOR QUALITY ORIGINAL

The closest residential areas to the site are single-family houses and mobile homes, located approximately 0.3 miles east of the Site across Faulkenburg Road. Other residential areas include single-family homes, approximately 0.75 miles north of the site across SR 574 on Martin Luther King Avenue; single-family houses in an area approximately 1.2 miles west of the site near the intersection of U.S. Highway 301 and SR 574; and single-family residences and mobile homes in an area approximately 1.8 miles northeast of the property on Six Mile Road.

Three wetlands are adjacent to the site, to the southwest, southeast, and northwest. Stormwater runoff drains primarily to the west, but a small part of the site drains off to the southeast. The southwest corner of the site is subject to inundation during wet seasons due to the high groundwater table, but it is not within any drainage flood plain.

2.0 Site History and Enforcement Activities

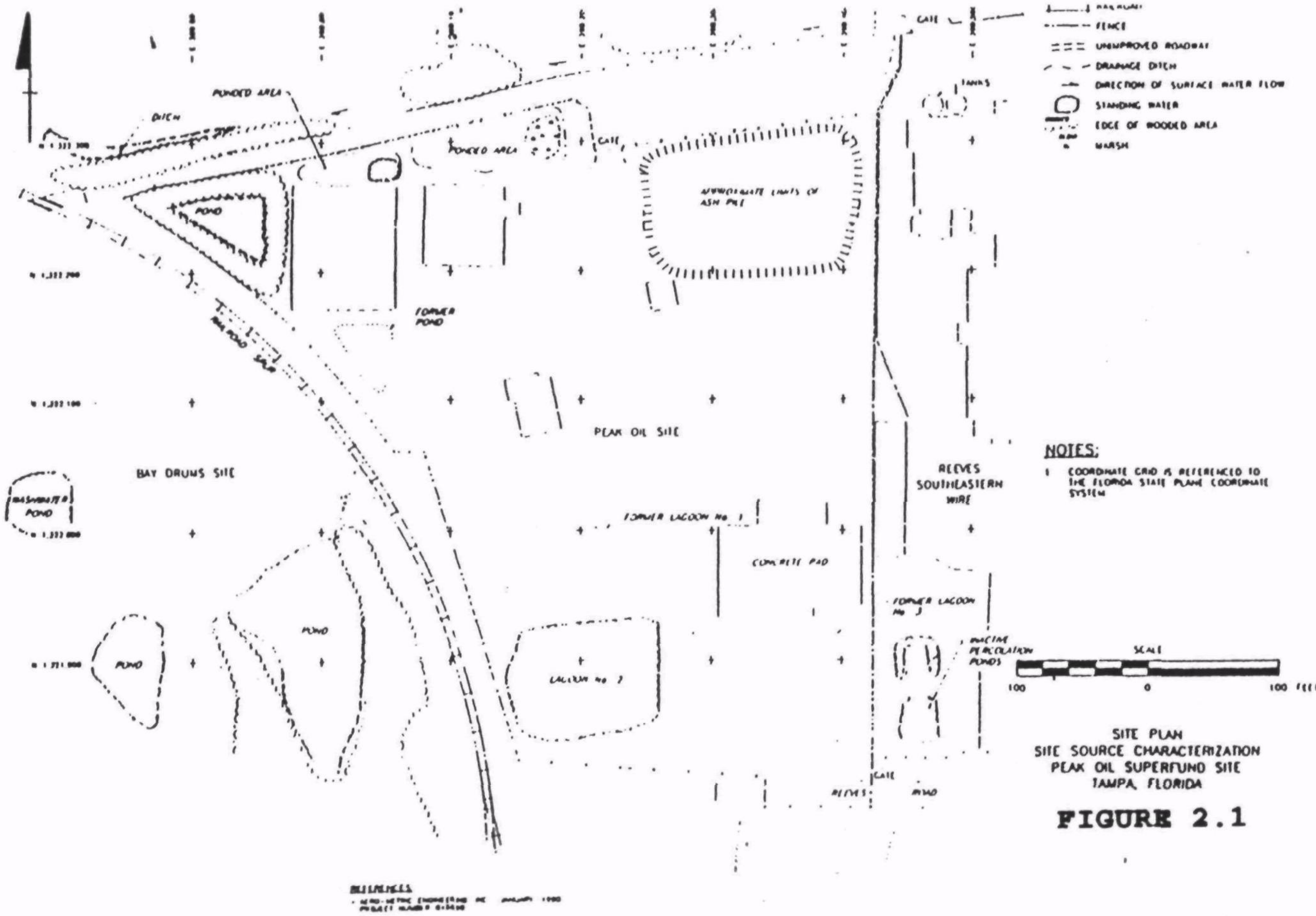
2.1 The Peak Oil Site

The Peak Oil Facility was constructed and began operation as a waste oil re-refinery in August 1954, under the ownership of Mr. John Shroter. Ownership of the company was transferred in 1975 to Mr. Robert Morris. Mr. Morris and his sons continued the operation of the business as a waste oil re-refinery. After 1979, operations reportedly were limited to the resale of used oils as fuel and flotation oil and repackaging of virgin material.

Facility operations involved the use of a waste re-refining process to purify waste oils and lubrication fluids. Waste oils accepted at the facility for re-refining consisted primarily of used auto and truck crankcase oil, with some hydraulic oil, transformer oil and other waste oils.

An acid/clay purification and filtration process was used to re-refine the oil. This process generated a low pH sludge and oil-saturated clay, which were stored over the life of the facility in three separate impoundment areas (Lagoons No. 1, No. 2 and No. 3). Two impoundments, Lagoons Nos. 2 and 3, were connected by an oil/water separator. The locations of the lagoons are shown on Figure 2.1.

In 1979 or 1980, the company discontinued the re-refining process and shifted to filtering and blending the waste oil for resale as burner fuel or flotation oil. Several company employees have reported that spills and leaks continued to occur from on-site storage tanks, tanker trucks, oil/water separators, and other on-site equipment after the company shifted its operations from



SITE PLAN
SITE SOURCE CHARACTERIZATION
PEAK OIL SUPERFUND SITE
TAMPA, FLORIDA

FIGURE 2.1

re-refining to filtering and blending. The former employees also reported that some wastes continued to be stored in the on-site lagoons after the shift to filtering and blending operations.

Lagoon No. 1 and Lagoon No. 3 were backfilled. However, the exact dates of backfilling are unknown. Lagoon No. 2 is the only impoundment on the site that was not backfilled. This lagoon originally contained up to 12 feet of sludge. Overflow from Lagoon No. 2 was apparently directed to the oil/water separator to remove free oil, and the aqueous phase was discharged into Lagoon No. 3, to the east. EPA and the FDEP conducted inspections at the Peak Oil and Bay Drums Sites and reported that various chemical constituents were present in site soils, including heavy metals, petroleum hydrocarbons, trace concentrations of polychlorinated biphenyls (PCBs), and solvent-type chemical compounds.

In 1984, the Peak Oil and Bay Drums Sites were jointly evaluated according to the Hazard Ranking System and proposed for listing on the National Priority List (NPL) with a score of 58.15. On June 10, 1986, the Peak Oil Site, combined with the adjacent Bay Drums Site, was placed on the NPL. EPA initiated a removal action utilizing a mobile incinerator to treat sludge found in Lagoon No. 2 in 1986. In 1989, members of the Peak Oil Generators Group entered into a Consent Order with the EPA to conduct a remedial investigation/feasibility study (RI/FS) at the Peak Oil Site.

For the Peak Oil/Bay Drums groundwater operable unit, some 3200 potentially responsible parties (PRPs) have been identified. All PRPs will be issued notice letters inviting them to participate in the negotiations for the Remedial Design/Remedial Action.

2.2 The Bay Drums Site

Prior to development of the Bay Drums property in 1962, the property was an open field with some small trees. A one-acre wetland on the east side of the site drained to the Central Wetland, about 300 feet to the southwest.

The Bay Drums Facility was historically operated as a drum reconditioning facility, however, it is no longer operational. During operation, drum reconditioning activities occurred within the building on the eastern portion of the site. Although nearly the entire property has been used for drum storage, only approximately two acres in the northeast corner of the site were considered an active drum reclaiming area.

A berm was constructed between 1962 and 1965 that crossed the southern one-third of the one-acre wetland, which at that time existed on the eastern portion of the Bay Drums Site. This effectively dried out the southern portion of this wetland. The northern portion of this wetland was reported to be hydraulically connected to the Peak Oil Site by means of a culvert beneath the CSX Railroad spur, allowing water to drain from the Peak Oil Site to the northern portion of the wetland. The northeast and south portions of the Bay Drums Site were purchased by Mr. Bennie Genuardi, the owner of the Bay Drums facility, from the Shroters and the Atlantic Coastline Railroad in 1967 and 1968, respectively.

The volume of drums reconditioned at the site increased from 1974 to 1978 under the ownership of Tampa Steel Drums. Drums were located along the western edge of the wetland in 1975. In a 1977 aerial photograph, the wetland had been backfilled. Presumably, soil from a new pond on the southeast corner of the Bay Drums Site had been used to backfill the wetland. Drainage from the Peak Oil Site was reportedly diverted by ditch to the Central Wetland. In 1978, the western portion of the previously filled wetland was developed into a washwater holding pond which is known to have received waste from drum reconditioning activities. Drum reconditioning activities ceased in 1982.

In 1984, the Peak Oil and Bay Drums Sites were jointly evaluated according to the Hazard Ranking System and proposed for the NPL with a score of 58.15.

For approximately two and one-half years beginning in 1984, the Bay Drums Site was operated as Resource Recovery Association, Inc. During this time waste roofing shingles were deposited on most of the site to depths ranging from three to more that nineteen feet. In 1989, the EPA removed approximately 70,000 cubic yards of shingles in order to effectively evaluate the extent of soil contamination at the site. The pile currently lies on Hillsborough County. EPA conducted another removal action at the site in 1990 and removed contaminated soils, drums of hazardous waste, and bags of pesticides from the site.

3.0 Highlights of Community Participation

In accordance with Sections 113 and 117 of CERCLA, EPA has conducted community relations activities at the Peak Oil Site to ensure that the public remains informed concerning activities at the site, EPA issued press releases to keep the public informed. There was some local press coverage at EPA's activities, and EPA held meetings with local (county) and state officials to advise them of the progress at the site.

A community relations plan (CRP) was developed in 1988 and revised in 1989 to establish EPA's plan for community participation during remedial activities. Following completion of the RI/FS, a Proposed Plan fact sheet was mailed to local residents and public officials on February 18, 1993. The fact sheet detailed EPA's preferred alternative for addressing the groundwater contamination (Operable Unit Two) at the Peak Oil/Bay Drums Site. Additionally, the Administrative Record for the site, which contains site related documents including the RI and FS reports and the Proposed Plan, was made available for public review at the information repository in the Brandon Public Library. A notice of the availability of the Administrative Record for the Peak Oil/Bay Drums Site was published in the Tampa Tribune on February 18, 1993 and again on February 23, 1993.

A 60-day public comment period was held from February 20, 1993 to April 21, 1993 to solicit public input on EPA's preferred alternative for Operable Unit Two. EPA had a public meeting on February 24, 1993 at the Brandon Regional Library to discuss the remedial alternatives under consideration and to answer any questions concerning the proposed plan for the Site. EPA's response to each of the comments received at the public meeting or during the public comment period is presented in the Responsiveness Summary which is provided as Appendix A of this ROD.

This decision document presents the selected remedial action for Operable Unit Two of the Peak Oil/Bay Drums Site in Brandon, Florida, chosen in accordance with CERCLA, as amended by SARA, and to the extend practicable, the NCP. This decision is based on the Administrative Record for the site.

4.0 Scope and Role of Operable Unit

As with many Superfund sites, the problems at the Peak Oil/Bay Drums Site are complex. As a result, EPA has divided the remedy for the site into four operable units (OUs). These are:

- OU One: Contamination in the soils and sediments at the Peak Oil Site;
- OU Two: Contamination in the groundwater and surface water at the Peak Oil and Bay Drums Sites;
- OU Three: Contamination in the soils and sediments at the Bay Drums Site;
- OU Four: Contamination in the wetlands at the Peak Oil, Bay Drums, and Reeves Southeastern Sites.

The remedial actions for OUs One, Three and Four will be addressed in separate RODs.

OU Two is addressed in this ROD. Thus, the purpose of the selected remedy is to remediate contaminated groundwater and surface water. Potential ingestion of groundwater contaminated above Maximum Contaminant Levels (MCLs) poses the principle threat to human health at the Peak Oil/Bay Drums Site. The purpose of the remedy selected in this ROD is to remove contamination above MCLs in both aquifers and Secondary Maximum Contaminant Levels (SMCLs) in the Upper Floridan aquifer.

5.0 Summary of Site Characteristics

The climate in the Tampa area is characterized by mild winters and relatively long, humid, and warm summers. Spring and fall tend to be dry, with the majority of the rainfall occurring in the summer.

5.1 Site Topography and Surface Features

Topographically, ground surface elevations at the site and surrounding areas range in elevation from about 25 feet above mean sea level (MSL) at the northwestern boundary to 45 feet above MSL towards the eastern boundary. Due to the study area's elevation above MSL, tidal surges will not impact the area. The area south of SR 574 demonstrates only minor changes in elevation. The southern portion of the Bay Drums and Peak Oil Facilities slopes gradually toward the south and southwest toward small wetland areas (referred to as the South Wetland and the Central Wetland). The ground surface elevation at the Peak Oil Facility varies slightly from about 39 to 42 feet above MSL.

Two wetland areas exist within and adjacent to the site. The Central Wetland, which is south of the Bay Drums property and within the study area, has no surficial outlet, except during periods of heavy rainfall when the water from the wetland flows overland to the ditch north of the Bay Drums property. This wetland, which was formerly distinct from the Bay Drums Facility, is presently connected hydrologically aboveground with the Bay Drums pond, which is the southern tip of the original on-site Bay Drums wetland.

The South Wetland is located south of the study area between Reeves Road and Columbus Avenue. It is the larger of the two wetlands and is also the further from the site than the Central Wetland.

The Peak Oil Site currently contains one lagoon and several ponds or ponded areas. As shown on Figure 2.1, Lagoon No. 2 is located in the southwest portion of the Peak Oil Facility. There are three ponded areas in the northwest sector of the property, adjacent to the two large warehouse buildings. The two ponded areas along the northern boundary of the property were formerly one continuous depression that had been divided at its midpoint by an earthen berm. This northern depression retains standing water only during the rainy seasons or after events of heavy rainfall. The pond in the northwest corner of the property is surrounded by thick vegetation. Generally, surface water exists in this pond on a continuous basis with the water depth primarily dependent upon the groundwater level.

Currently, an ash pile of approximately 6,000 cubic yards is located in the northeast portion of the Peak Oil Facility. This ash was generated during EPA's 1985 to 1987 on-site incineration of waste sludges and is sitting on and covered with a plastic liner. EPA also constructed a concrete pad on the southeastern portion of the site as part of the incineration removal action. Although the southern part was later removed, approximately 7,000 square feet of the original pad still remain. Approximately 400 cubic yards of soil which were stockpiled on the Peak Oil Site during EPA's 1990 and 1991 Bay Drums and Peak Oil removal actions currently remain south of the large warehouse building.

Prior to development in 1962, the Bay Drums Site consisted of an open field sparsely populated with small trees with an approximately one-acre wetland on the eastern portion of the site. This wetland drained into the Central Wetland (approximately five acres) 300 feet to the southwest of the site. Surface drainage on the northern portion of the site flows north to a ditch along the southern side of the CSX Railroad and then through culverts under the railroad and SR 574 to the North Wetland, located next to the Reeves Southeastern Galvanizing Facility. The southern portion of the site drains to the Central Wetland area south of the site. The Central Wetland has no surficial outlet.

The one-acre eastern wetland has been backfilled, possibly with material excavated from the southeast corner of the site. After the backfilling, the eastern wetland is now termed the backfilled wetland and the Bay Drums pond. The site also has a waste holding area just south of the Bay Drums Facility (Building). This holding area is known to have received wastes from the drum reconditioning activities, but its date of construction is unknown.

Land use in the area is generally industrial or undeveloped, with the nearest single family residential area being 0.3 miles east of the site. It is anticipated that the primarily industrial character of the area surrounding the site will be maintained in the future.

5.2 Regional Geology

The geology of the Tampa area consists of a series of sedimentary sequences of rock and unconsolidated sediments overlying a basement of crystalline igneous or metamorphic rock. The basement rock is of Paleozoic age, and the sedimentary rocks range in age from Mesozoic era through the Pleistocene epoch of the Cenozoic era.

The upper rock and sediment sequences include the Tampa limestone member of the Hawthorn Group (referred to as the Upper Floridan Aquifer), the Arcadia formation and Peace River formation of the Hawthorn Group (referred to as the low-permeability unit or low-permeability layer) and undifferentiated Pliocene, Pleistocene and Holocene deposits (referred to as the surficial aquifer). The limestone layer is approximately 80 feet to 400 feet thick, varying throughout the area, the Hawthorn clay layer is 15 feet to 40 feet, and finally the surficial sand ranges from 9 feet up to 37 feet in some areas. (See Figure 5.1)

Sedimentary rocks and unconsolidated deposits in the Tampa area consist of limestones, sand, clay and silt. The variability of rock and sediment types suggests environments of deposition ranging from open ocean to shoreline to lagoons and tidal marshes. The rock sequence consists of sand, fine-grained carbonate rocks and fine-grained clay or shale.

Rocks of the Miocene age underlie most of the Tampa area, and these strata are mostly clastic, with the exception of (1) sandy limestone that comprises the Tampa member and its equivalents and (2) dolomite beds that commonly make up the lower part of the Arcadia formation.

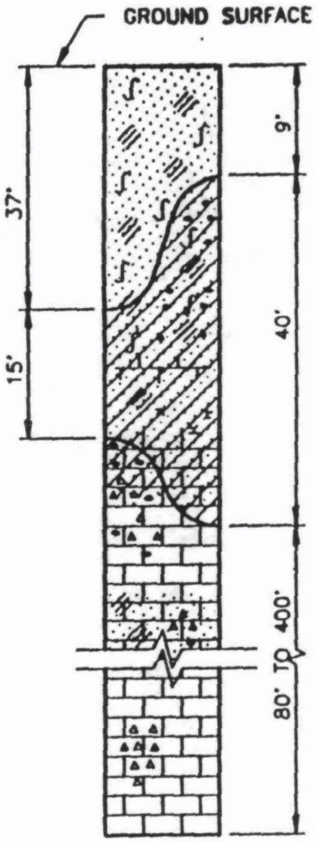
The Suwannee Limestone formation and the overlying Tampa Limestone member comprise the upper portion of the Upper Floridan Aquifer. The Suwannee Limestone formation consists of white, yellow and light-brown, soft to hard, dense, fine-grained limestone with chert lenses to 25 feet thick.

The Hawthorn Group consists of highly variable sequences, mostly of clay, silt and sand beds, all of which contain scarce to abundant phosphate. The clays are characterized by swelling when hydrated and have the ability to absorb and retain certain ions in an exchangeable state.

The Hawthorn generally consists of a basal calcareous unit and a middle clastic unit known as the Arcadia formation, and an upper unit that is a highly variable mixture of clastic and carbonate rocks, known as the Peace River Formation. The middle and upper parts of the Hawthorn everywhere contain more phosphate than the lower calcareous unit. Because of its heterogeneity and the predominantly fine-textured nature of both the clastic and the carbonate beds within the Hawthorn, the entire group constitutes a low-permeability rock unit except for the Tampa limestone member.

5.3 Regional Hydrogeology

The groundwater system beneath the study area consists of two major water-bearing units: a class II surficial aquifer (the term surficial aquifer refers to permeable material that is



FORMATION	GENERAL LITHOLOGY
UNDIFFERENTIATED SAND DEPOSITS	PREDOMINANTLY FINE SAND; INTERBEDDED CLAY, MARL, SHELL, LIMESTONE, PHOSPHORITE
HAWTHORN	GREEN, BLUE, AND GRAY CLAYEY SAND AND CLAY. LIMESTONE NEAR BOTTOM OF FORMATION IS WHITE TO GRAY, SOFT, SANDY, AND POROUS. FORMATION GENERALLY CONSISTS OF A BASAL CALCAREOUS UNIT, A MIDDLE CLASTIC UNIT, AND AN UPPER UNIT OF CLASTIC AND CARBONATE ROCK AND SOIL. MIDDLE AND UPPER PARTS CONTAIN MORE PHOSPHATE THAN LOWER CALCAREOUS UNIT (NOTE. UPPER PART OF TAMPA FORMATION IS RELATIVELY HIGH IN CLAY CONTENT MAKING CONTACT BETWEEN TAMPA AND HAWTHORN DIFFICULT TO DETERMINE.)
TAMPA LIMESTONE OVERLYING	WHITE, CREAM, AND GRAY, HARD TO SOFT, SANDY LIMESTONE; SANDY, PHOSPHATIC, FOSSILIFEROUS WITH CHERT LENSES; SAND AND CLAY IN LOWER PART IN SOME SECTIONS; MANY MOLDS OF PELECYPODS AND GASTROPODS.
SUWANNEE LIMESTONE	WHITE, YELLOW AND LIGHT BROWN, SOFT TO HARD DENSE, FINE-GRAINED LIMESTONE WITH CHERT LENSES TO 25 FEET THICK, FOSSILIFEROUS

LEGEND:

- SAND
- CLAY
- CLAYEY
- SILT
- LIMESTONE
- PHOSPHATIC NODULES
- CHERT
- CALCAREOUS UNIT

TYPICAL GEOLOGIC PROFILE
SITE SOURCE CHARACTERIZATION
PEAK OIL SUPERFUND SITE
TAMPA, FLORIDA
FIGURE 5.1

exposed at land surface and that contains water under unconfined conditions) and the class I Floridan Aquifer system. A low-permeability unit comprised of a low-permeability sequence of rocks separates the Floridan from the upper surficial aquifer.

The Floridan Aquifer system consists of a thick sequence of carbonate rocks of the Tertiary age. The unit is comprised of white to light-gray, sandy, hard to soft, locally clayey, fossiliferous (pelecypod and gastropod casts and molds) limestone that contains phosphate and chert in places.

The phosphate content of the Tampa limestone is low, however, in comparison with that of the overlying Arcadia and Peace River Formation. Much of the Tampa member contains soft lime muds and solution cavities. Therefore, the Tampa limestone is highly porous in some zones, and its porous nature permits large volumes of water to flow through it. The upper part of the Tampa limestone is relatively high in clay content, making the contact between it and the clayey Arcadia formation difficult to determine.

Rainfall infiltrates the permeable surficial materials and, after percolating downward to the water table, generally moves laterally to points where it is discharged into surface streams and wetlands. Water levels within the surficial aquifer fluctuate seasonally and change rapidly in response to rainfall and other natural stresses such as evapotranspiration or the stages of streams. The groundwater flow patterns also change due to the increased rainfall during the summer months which raises the surface water elevation in the wetlands and lagoons, changing them into recharge basins for the surficial aquifer.

The thickness and lithologic character of the low-permeability layer that separates the surficial aquifer from the Upper Floridan Aquifer system determine the degree of hydraulic interconnection between the two. Where the low-permeability unit is thick or where it contains a high concentration of clay, there is essentially no interconnection between the surficial and Floridan aquifers. In these thick or clay-rich areas, water in the surficial aquifer moves laterally as opposed to vertically and does not breach the low-permeability unit. The low-permeability unit is breached in some locations, such as uncased boreholes, that serve to reduce the hydraulic separation between the aquifers.

The regional groundwater flow pattern within the Upper Floridan Aquifer is based upon the USGS potentiometric surface map. The contour map and review of the water level plots indicate the regional groundwater flow is in a southwesterly direction in this area. The Tampa Bypass Canal divides the regions and forces the flow direction to shift northwesterly near the site. Reportedly, the canal excavation cut into the low-permeability layer and breached the Upper Floridan Aquifer in several places. In the vicinity of the site, the general groundwater flow direction is northwesterly.

Approximately 70 percent of the annual precipitation in the Tampa area is lost through evapotranspiration and about nine inches of the 47 inches of annual precipitation is available for groundwater recharge.

The surficial aquifer is composed of undifferentiated Pliocene and Pleistocene age deposits. The groundwater is suitable for domestic and small-quantity municipal supplies, although in some areas there is a high iron content and near the bays there is a high chloride content. The surficial aquifer underlies both the Peak Oil/Bay Drums Site and the Reeves Southeastern Site. EPA has divided the aquifer into two sections, the northern section is located under the Reeves Southeastern Site and the southern section is located under the Peak Oil/Bay Drums Site; and thus is discussed in this ROD. The remediation of one section of the aquifer will have little or no effect on the remediation of the other section.

5.4 Sampling Results

The RI included sampling of groundwater, surface water and sediment. Samples from each of these media were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organochlorine pesticides (OCPs) and PCBs, and various inorganic parameters. The analytical results for groundwater samples are discussed in the following section.

5.4.1 Groundwater

The RI included sampling of groundwater from monitoring wells completed in the surficial aquifer and from monitoring and production wells completed in the Upper Floridan Aquifer. The analytical results for groundwater samples are discussed below in Sections 5.4.1.1 and 5.4.1.2.

5.4.1.1 Southern Surficial Aquifer

The Baseline Risk Assessment includes the sampling results from the surficial groundwater monitoring wells. Table 5-1 shows the average and maximum concentrations in the surficial aquifer for each chemical of concern.

Volatile Organic Compounds

Volatile organics are present in the surficial aquifer in the area of the Bay Drums Site, and to a lesser extent at the Peak Oil Site. However, despite the relatively large areal distribution of VOCs, the area of concentrations greater than

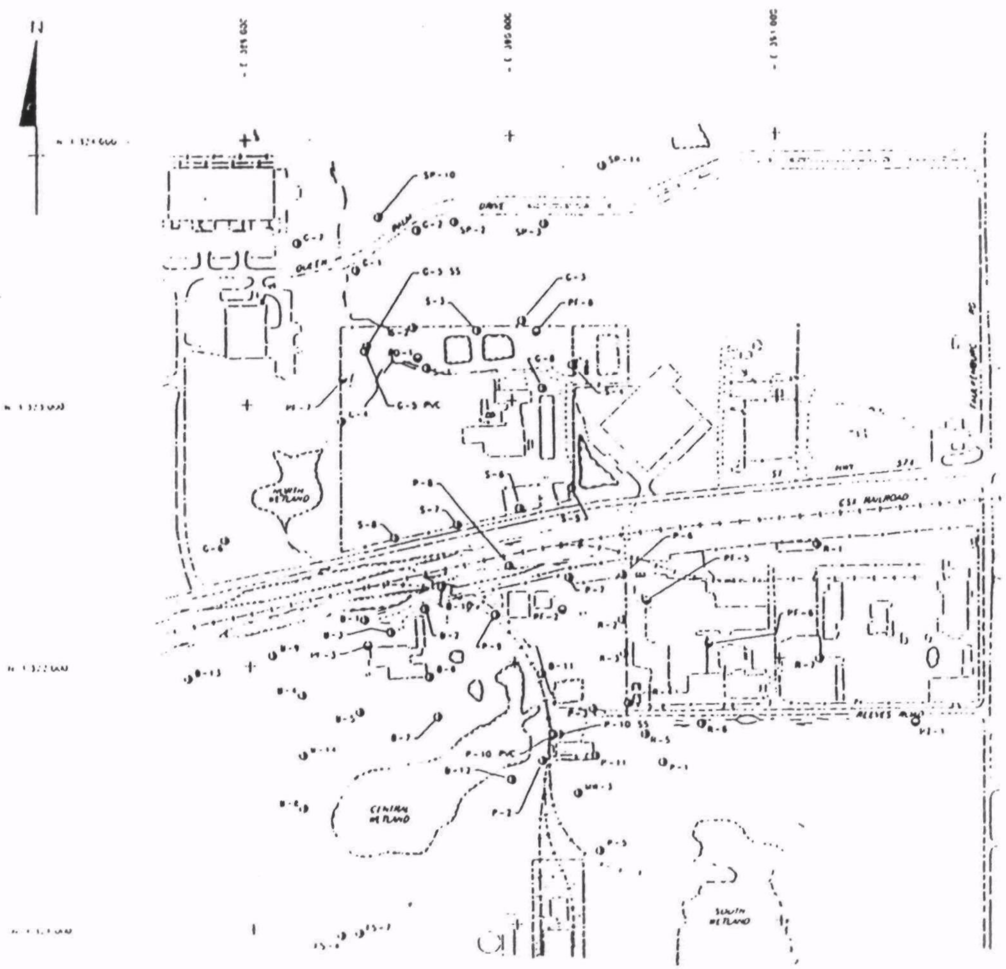
Table 5-1
Surficial Aquifer Sampling Results

Contaminant of Concern	Highest Concentration	Average Concentration
Aluminum	58.7	6.27
Antimony	0.0276	0.0223
Arsenic	0.0950	0.0086
Benzene	0.150	0.0226
Bis(2-chloroethyl)ether	0.0410	0.0098
Bis(2-ethylhexyl)phthalate	0.0220	0.0076
Chromium	0.780	0.0404
1,1-Dichloroethane	5.40	0.280
1,1-Dichloroethylene	43.0	1.37
Total-1,2-Dichloroethylene	2.50	0.141
Ethylbenzene	4.00	0.178
Iron	506	18.1
Lead	0.180	0.0134
Manganese	4.30	0.298
Methylene Chloride	6.80	0.285
Naphthalene	2.10	.0178
Sodium	8,490	311
Tetrachloroethylene	0.014	0.0029
Toluene	170	6.04
Total Xylenes	12.0	0.598
1,1,1-Trichloroethane	75.0	2.35
1,1,2-Trichloroethane	0.160	0.0071
1,1-Trichloroethylene	0.180	0.0118
Vanadium	0.120	0.0356
Vinyl Chloride	0.110	0.0098
Zinc	337	17.5

federal and state of Florida MCLs is limited. Most of the concentrations greater than MCLs are found in wells at the Bay Drums Site, as can be seen in the following list of contaminants present in surficial aquifer wells. The list illustrates wells in which promulgated or proposed federal MCLs and Florida MCLs are exceeded. The locations of the wells are shown on Figure 5.2. It should be noted that all wells beginning with "B" are located on the Bay Drums Site and those beginning with "P" are located on the Peak Oil Site.

Chemical	Well
Benzene	B-2, B-3, B-5, B-6, B-7, B-10, B-11, P-7, P-8, P-9
1,2-DCA	B-5,B-10
1,1-DCE	B-5, B-7, B-9, B-10, P-3
1,2-Dichloropropane	B-10
Ethylbenzene	B-1, B-7
Methylene Chloride	B-1, B-2, B-5, B-7, B-9, P-3, P-7, P-9
1,1,1-TCA	B-7
1,1,2-TCA	B-7
TCE	B-7, B-9, P-3, P-7
Tetrachloroethylene	B-1, B-9
Toluene	B-1, B-7, P-3
Vinyl Chloride	B-1, B-2, B-3, B-5, B-9, B-10, P-3, P-8, P-9
Total Xylenes	B-1

The area most heavily impacted with VOCs is on the south side of the Bay Drums site. In this area, concentrations of benzene, 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethane (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), trichloroethane (TCE), methylene chloride, ethylbenzene, toluene, 1,1,2-trichloroethane (1,1,2-TCA), and vinyl chloride are present at concentrations above MCLs. Near the railroad tracks and drainage ditch, north of the Bay Drums site, benzene, 1,2-DCA, vinyl chloride and 1,1-DCE are also found at concentrations above MCLs.



LEGEND:

- RAILROAD
- FENCE
- UNIMPROVED ROADWAY
- DRAINAGE DITCH
- DIRECTION OF SURFACE WATER FLOW
- STANDING WATER
- SURFICIAL AQUIFER MONITORING WELL
- SURFICIAL AQUIFER PIEZOMETER

NOTES:

1. COORDINATE GRID IS REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM.

SCALE

600 0 600 FT

SURFICIAL AQUIFER
WELL LOCATION PLAN
BAY DRUMS, PEAK OIL, AND REEVES
SUPERFUND SITES
TAMPA, FLORIDA

FIGURE 5.2

REFERENCES:
- AERO-METRIC ENGINEERING, INC. JANUARY 1990.
PROJECT NUMBER 018660

Concentrations of VOCs above MCLs are also present throughout much of the central Bay Drums area and the northern and southern boundary areas of the Peak Oil Site.

Semi-Volatile Organic Compounds

Concentrations of SVOCs in the surficial aquifer are generally much lower than concentrations of VOCs. SVOCs were detected in wells at both the Bay Drums and Peak Oil Sites, notably Wells P-3 and B-1.

Organochlorine Pesticides and Polychlorinated Biphenyls

Six OCPs were detected in surficial aquifer monitoring wells. Five were detected in Bay Drums wells, and the highest detected concentration was 0.0019 ppm of gamma chlordane in Well B-1.

No PCBs were detected in surficial aquifer groundwater samples.

Inorganic Compounds

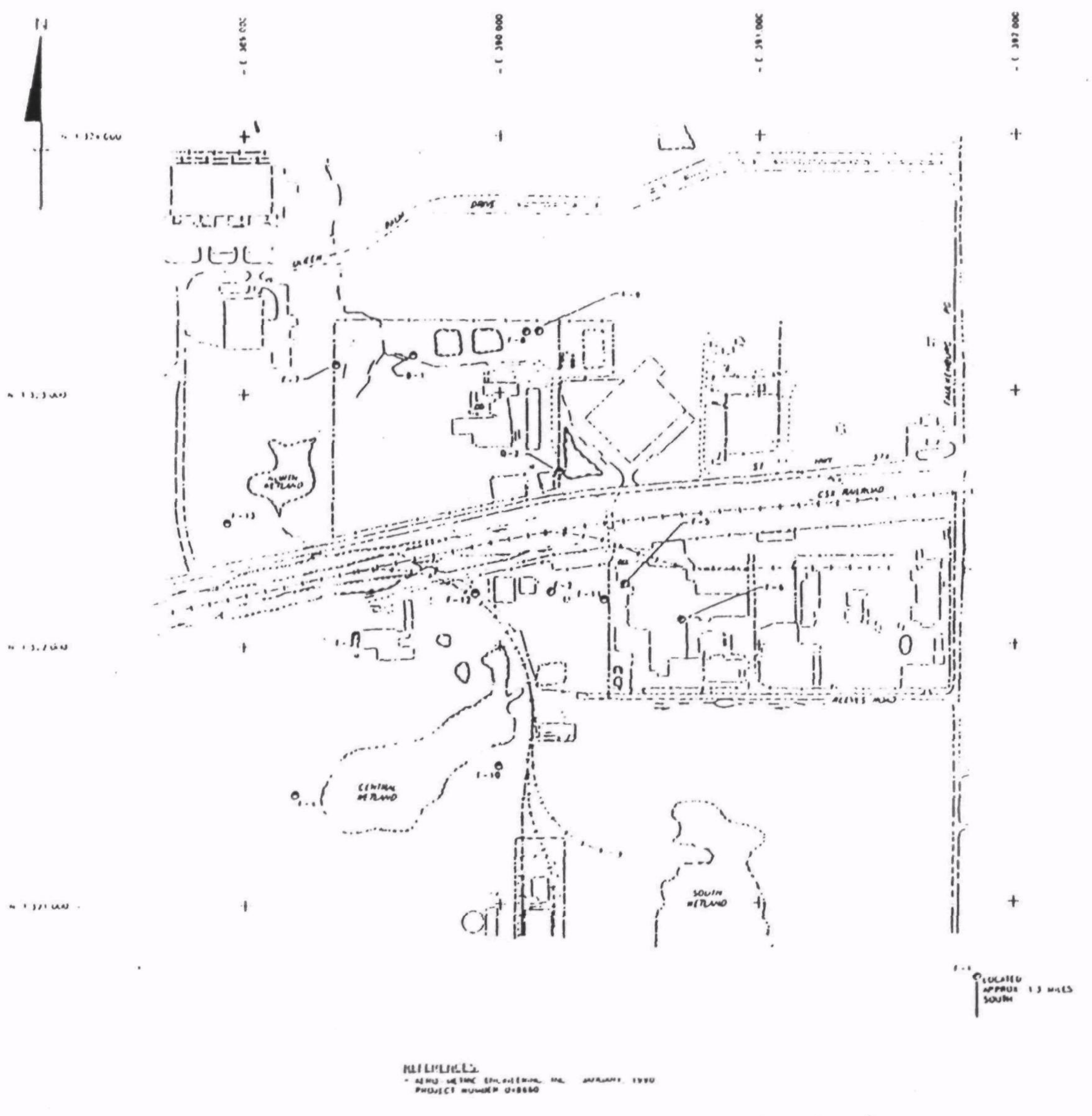
Inorganic compounds were detected in surficial wells throughout the Site. Of the 23 constituents detected, eight are found at concentrations above MCLs. These compounds are antimony, arsenic, beryllium, cadmium, chromium, lead, nickel and sodium. Well P-3 which is located at the south edge of the Peak Oil Site contains elevated concentrations of several metals. Concentrations of inorganic compounds exceeding MCLs are also found downgradient from the site.

5.4.1.2 Upper Floridan Aquifer

The Area-Wide RI included sampling eight monitoring wells and six production wells in the Upper Floridan Aquifer (See Figure 5.3 for well locations). The samples were analyzed for VOCs, SVOCs, OCPs/PCBs and various inorganic parameters.

The groundwater quality and water level data obtained during the RI suggests that Wells F-2 (Peak Oil Production Well) and F-3 (Bay Drums Production Well) acted as conduits for the vertical migration of contaminated groundwater from the surficial aquifer to the Upper Floridan Aquifer. Chemical concentrations detected in the two production wells are similar to concentrations found in the surficial aquifer and much higher than concentrations detected in other adjacent Floridan Aquifer wells. During a borehole video investigation, groundwater from the surficial aquifer was observed flowing into the casing of Well F-3.

PCBs were not detected in the Upper Floridan Aquifer wells and only one pesticide was detected in the surficial aquifer. Detections of VOCs, SVOCs and inorganic constituents are presented in the following sections.



LEGEND:

- RAILROAD
- FENCE
- UNIMPROVED ROADWAY
- DRAINAGE DITCH
- DIRECTION OF SURFACE WATER FLOW
- STANDING WATER
- UPPER FLORIDAN AQUIFER MONITORING
- UPPER FLORIDAN AQUIFER PRODUCTION

NOTES:

1. COORDINATE GRID IS REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM.

SCALE

600 0

UPPER FLORIDAN AQUIFER
WELL LOCATION PLAN
BAY DRUMS, PEAK OIL, AND REEVE
SUPERFUND SITES
TAMPA, FLORIDA

FIGURE 5.3

19

POOR QUALITY ORIGINAL

Impacts were primarily found in two wells, Well F-2 and Well F-3. Of the 21 volatiles detected in the aquifer, two of the maximum volatiles concentrations were detected in wells other than F-2 and F-3. Of the 56 constituents detected in the aquifer, concentrations of chemicals exceeding MCLs occurred 17 times in wells other than F-2 and F-3.

Table 5-2 illustrates the highest concentration detected and the average concentration of each chemical of concern in the sampling results from the Upper Floridan Aquifer.

Volatile Organic Compounds

Chemical concentrations detected in samples from Wells F-2 and F-3 are generally higher than other adjacent Floridan Aquifer wells. Thirteen VOCs were detected in Well F-2, of which six were reported at concentrations above the MCL. Fifteen VOCs were detected in Well F-3, of which five were reported at concentrations above the MCL. Many of the same constituents detected in wells F-2 and F-3 were also detected in the surficial aquifer near the wells. Other monitoring wells where VOCs were detected above federal and/or state MCLs include Wells F-8, F-9, F-11 and F-12. In each of these wells, one chemical was detected at concentrations higher than MCLs. Trichloroethylene (TCE) was detected in Wells F-8 (0.008 ppm) and F-9 (0.004 ppm) above the state MCL of 0.003 ppm. Well F-12 also contained TCE (0.011 ppm) and methylene chloride at concentrations above the MCLs. The only chemical detected in Well F-11 above the MCL was 1,1 dichloroethylene, which was detected at 0.013 ppm.

Semi-Volatile Organic Compounds

Sixteen SVOCs were also observed at low concentrations in Wells F-2 and/or F-3. Seven VOCs including ethylbenzene and toluene were above MCLs in Well F-3. Well F-12 had two VOCs that were above MCLs; methylene chloride and TCE.

Inorganic Compounds

Fourteen inorganic constituents were present at concentrations below MCLs in the samples collected from Wells F-2 and F-3. Nine of these inorganic compounds were also present in the Upper Floridan Aquifer background sample from Well F-1, located 1.5 miles from the site.

Arsenic, beryllium, and lead were detected slightly above MCLs in scattered locations in the Upper Floridan aquifer. However, in most cases, inorganics in wells other than Well F-2 or F-3 were below MCLs.

Table 5-2
Upper Floridan Aquifer Sampling Results

Chemical of Concern	Highest Concentration	Average Concentration
Aluminum	0.600	0.185
Arsenic	0.130	0.0186
Benzene	0.0130	0.0022
1,1-Dichloroethane	1.20	0.112
1,1-Dichloroethylene	1.50	0.128
total-1,2-Dichloroethylene	0.130	0.016
Ethylbenzene	0.390	0.034
Iron	6.90	1.69
Lead	0.0059	0.0018
Magnesium	10.1	3.765
Methylene Chloride	0.440	0.041
Naphthalene	0.140	0.025
Sodium	52.0	19.82
Tetrachloroethylene	0.0005	0.0002
Toluene	10.0	0.837
1,1,1-Trichloroethane	0.160	0.0135
1,1,2-Trichloroethane	0.0220	0.0020
Trichloroethylene	0.0210	0.0045
Vanadium	0.0339	0.0259
Total Xylenes	1.60	0.135
Zinc	5.99	0.637

6.0 Baseline Risk Assessment Summary

A risk assessment provides a systematic means for organizing, analyzing, and presenting information on the nature and magnitude of risks posed by chemical exposures. Nevertheless, uncertainties and limitations are present in all risk assessments because of the quality of available data and the need to make assumptions and develop inferences based on incomplete information about existing conditions and future circumstances. These uncertainties and limitations should be recognized and considered when discussing quantitative risk estimates.

In general, the uncertainties and limitations in the risk assessment can be classified in the following categories:

- environmental sampling and laboratory measurement;
- mathematical fate and transport modeling;
- receptor exposure assessment; and
- toxicological assessment.

Some areas of uncertainty in the exposure assessment of the Peak Oil/Bay Drums Site include:

- There is no reasonable likelihood that the sites will be developed for residential uses in the future, as it is currently zoned for industrial use only.
- It is unlikely that either aquifer will be used as a source of drinking water in the future.
- Soil ingestion rates of 50 mg/day and 100 mg/day were considered in this assessment.

6.1 Human Health Risks

A baseline risk assessment (RA) was conducted as part of the RI to estimate the health or environmental problems that could result if the Bay Drums/Peak Oil site was not remediated. A baseline risk assessment represents an evaluation of the "No Action" alternative in that it identifies the risk present if no remedial action is taken. The assessment considers environmental media and exposure pathways that could result in unacceptable levels of exposure now or in the foreseeable future.

Data collected and analyzed during the RI provided the basis for the risk evaluation. The risk assessment process can be divided into four components: contaminants of concern, exposure assessment, toxicity assessment, and risk characterization.

6.1.1 Contaminants of Concern

The groundwater RA was conducted as an area-wide study involving the Peak/Bay and Reeves sites. The procedure conducted for determining the groundwater exposure point concentrations (EPCs) was averaging groundwater concentrations over the three site area. The major concern was that by averaging over the entire three-site area, the EPCs would be diluted which would have the effect of decreasing the cumulative risk level and could allow certain chemicals with unacceptable hotspot concentrations to drop out of the risk assessment. A concentration-toxicity screen was used to determine the site contaminants of potential concern (COPC). This screening procedure eliminated chemicals from the COPC list which were contributing less than 1% to the overall site risk.

Since both the use of an areawide EPC and the results of the concentration-toxicity screen could serve to eliminate chemicals which should be included in the site remediation, it was decided that the risk assessment staff would provide the PRPs with a list of chemicals which had been eliminated as COPCs from the risk assessment but which would be included as site contaminants requiring remediation. A discussion of these chemicals was added to the risk assessment and remediation goals were also calculated for them. For this reason, the Selected Remedy section (Section 9.0) may contain additional chemicals not contained in the Baseline Risk Assessment Summary section (Section 6.0).

The use of an averaged area-wide EPC, as opposed to being calculated based on the site plume, tends to lower the EPC. Organics were either detected at low concentrations or generally not at all on the Reeves site, thus the effect of using an areawide average is to lower the EPCs for Peak Oil/Bay Drums. However, this contribution does not affect the content of the risk assessment since the risk associated with organic chemicals greatly exceeds the upper end of the acceptable risk range. Concerning the following inorganics; arsenic, chromium, lead and nickel, although the EPC represents input from both sites, there are wells on all three sites with concentrations exceeding MCLs and which will require remediation based on individual concentrations.

Generally, the contaminants that are of the most concern are the volatile organic compounds and the semi-volatile organic compounds. The chemicals which contribute most significantly to the risks associated with groundwater ingestion include 1,1,-dichloroethane, vinyl chloride, arsenic, zinc and naphthalene.

In the surficial aquifer, the VOCs with the highest concentrations are benzene, 1,2-dichloroethane, 1,1-dichloroethene, 1,1,1-trichloroethane, trichloroethane, and vinyl chloride. The inorganics with the highest concentrations are antimony, arsenic, beryllium, cadmium, chromium, lead, nickel, and sodium. Table 6-1 lists the Potential Contaminants of Concern and their Exposure Points for the surficial aquifer.

In the Upper Floridan Aquifer, the two most contaminated areas of groundwater are at the production wells of each site. The chemicals of concern are arsenic, beryllium, lead, vinyl chloride and methylene chloride. Table 6-2 lists the Potential Contaminants of Concern and their Exposure Points for the Floridan Aquifer.

6.1.2 Exposure Assessment

The future potential exposure pathways for the groundwater at the Peak Oil/Bay Drums site are divided into two sections; future use conditions for an onsite worker and future use conditions for an onsite resident. These pathways are summarized in Table 6-3.

The most likely future use of the sites is industrial development, which is consistent with the current zoning and the land use. The future potential exposure pathways are direct ingestion by onsite workers of the groundwater from both the surficial and Upper Floridan aquifers which could be used as a source of drinking water.

The future exposure pathways for onsite residents include direct ingestion of the groundwater from both the surficial aquifer and the Upper Floridan Aquifer when they are used for domestic water supplies, and also dermal absorption of contaminants in shower/bath water. Exposure to chemicals volatilizing from water during showering is considered a potentially significant route of exposure.

The assumptions used to estimate exposure via ingestion of groundwater are listed in Table 6-4.

6.1.3 Toxicity Assessment

Slope factors (SFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to the potentially carcinogenic contaminant(s) of concern. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results

Table 6-1
Potential Contaminants of Concern
Surficial Aquifer

Chemical	Exposure Point (ppm)	Chemical	Exposure Point (ppm)
Aluminum	8.99	Lead	.0134*
Antimony	0.0291	Manganese	0.522
Arsenic	0.012	Mercury	0.00017
Bis(2-chloroethyl)ether	0.0126	Methylene Chloride	0.648
Bis(2-ethylhexyl)phthalate	0.01	Naphthalene	0.342
Cadmium	0.0050	Sodium	605
Chromium	0.0676	Toluene	14.5
1,1-Dichloroethane	0.599	Total Xylenes	1.25
1,1-Dichloroethylene	3.64	1,1,1-Trichloroethane	0.0156
total-1,2-Dichloroethylene	0.298	1,1,2-Trichloroethane	0.0156
Ethylbenzene	0.380	Vanadium	0.0454
gamma Chlordane	0.0001	Vinyl Chloride	0.0167
Iron	36.6	Zinc	33.8

* The exposure point for lead is the arithmetic average as opposed to the 95% upper confidence limit concentration as is recommended for the lead uptake/biokinetic model.

Table 6-2
Potential Contaminants of Concern
Upper Floridan Aquifer

Chemical	Exposure Point (ppm)	Chemical	Exposure Point (ppm)
Aluminum	0.294	Naphthalene	0.0740
Arsenic	0.0418	Sodium	29.91
1,1-Dichloroethane	0.292	Toluene	2.35
1,1-Dichloroethylene	0.354	1,1,1-Trichloroethane	0.0377
1,2-Dichloroethylene	0.0348	1,1,2-Trichloroethane	0.0053
Ethylbenzene	0.0923	Vanadium	0.0275
Iron	3.09	Vinyl Chloride	0.0302
Lead	0.0027	Total Xylenes	0.377
Manganese	0.0619	Zinc	1.74
Methylene Chloride	0.106		

TABLE 6-3 SUMMARY OF EXPOSURE PATHWAYS FOR THE GROUNDWATER	
Future Use Condition/Onsite Worker	
o	Ingestion of groundwater from the surficial aquifer
o	Ingestion of groundwater from Upper Floridan aquifer
Future Use Conditions/Onsite Resident	
o	Ingestion of groundwater from the surficial aquifer
o	Ingestion of groundwater from Upper Floridan aquifer
o	Dermal contact with surficial aquifer water while showering
o	Dermal contact with Upper Floridan aquifer water while showering
o	Inhalation of surficial aquifer contaminants while showering
o	Inhalation of Upper Floridan aquifer contaminants while showering

TABLE 6-4 **Assumptions Used to Estimate Exposure via Ingestion of Groundwater**		
Parameter	Future Use Worker	Future Use Resident
Chemical Concentrations in Water	see Table 9, Page p-72, Appendix P, Areawide Groundwater Remedial Investigation/Risk Assessment (4/92)	
Ingestion Rate (L/day)	1	2
Exposure Frequency (days/year)	250	365
Exposure Duration (years)	30	30
Body Weight (kg)	70	70
Average Time (days) Noncarcinogens Carcinogens	 10,950 25,550	 10,950 25,550

of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminant(s) of concern exhibiting noncarcinogenic effects. RfDs, expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminant(s) of concern ingested from contaminated drinking water can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

The applicable route-specific slope factors and reference doses for the chemicals of concern can be found in Tables 6-5 and 6-6.

As an interim procedure, until more definitive EPA guidance is established, Region IV has adopted a toxicity equivalency approach (TEF) methodology for evaluating polynuclear aromatic hydrocarbons (PAHs). This methodology is based on each compound's relative potency to the potency of benzo(a)pyrene. The TEFs used to evaluate the carcinogenic PAHs are:

Compound	TEF
Benzo(a)pyrene	1.0
Benzo(a)anthracene	0.1
Benzo(b)flouranthene	0.1
Benzo(k)flouranthene	0.1
Chrysene	0.01
Dibenzo(a,h)anthracene	1.0
Ideno(1,2,3-c,d)pyrene	0.1

6.1.4 Risk Characterization

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Excess life-time cancer risk is calculated from the following equation:

Risk = CDI x SF where:

risk = a unit less probability (e.g., 2×10^{-5}) of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years (mg/kg-day);

SF = slope-factor, expressed as $(mg/kg\text{-}day)^{-1}$

TABLE 6-5 Summary of Chronic RfDs and Slope Factors			
Chemical of Concern	Reference	Oral Toxicity	
		RfD (mg/kg/ day)	SF (1/mg/kg/ day)
Antimony	IRIS	4E-4	NA
Arsenic	IRIS	3E-4	1.75
Beryllium	IRIS	5E-3	4.3
Bis(2-chloroethyl)ether	IRIS	NA	1.1
Bis(2-ethylhexyl)phthalate	IRIS	2E-2	1.4E-2
Cadmium	IRIS	5E-4	NA
Chromium	IRIS	5E-3	NA
1,1-Dichloroethane	HEAST	1E-1	NA
1,1-Dichloroethene	IRIS	9E-3	6E-1
1,2-Dichloroethene	HEAST	2E-2	NA
gamma Chlordane	IRIS	6E-5	1.3E-1
Manganese	IRIS	1E-1	NA
Methylene chloride	IRIS	6E-2	7.5E-3
Naphthalene		4E-3	NA
Toluene	IRIS	2E-1	NA
1,1,1-Trichloroethane	HEAST	9E-2	NA
1,1,2-Trichloroethane	IRIS	4E-3	5.7E-2
Vanadium	HEAST	7E-3	NA
Vinyl Chloride	HEAST	NA	1.9
Zinc	HEAST	3E-1	NA

TABLE 6-6 Summary of Chronic RfDs and Slope Factors				
Chemical of Concern	Reference	Inhalation Toxicity		
		RfD (mg/m3)	RfD (ug/m3)	SF 1/(ug/m3)
Bis(2-chloroethyl) ether	IRIS	NA	NA	0.00033
Bis(2-ethylhexyl) phthalate	IRIS	7E-02	7E+01	0.000004
1,1-Dichloroethane	HEAST	5E-01	5E+02	NA
1,1-Dichloroethene	IRIS	1E-01	1E+02	NA
1,2-Dichloroethene	HEAST	1.2E-01	1.2E+02	NA
Methylene Chloride	HEAST	3E+00	3E+03	0.00000047*
Naphthalene		2.4E-02	2.4E+01	NA
1,1,1-Trichloroethane	HEAST	1E+00	1E+03	NA
1,1,2-Trichloroethane	IRIS	1.4E-02	1.4E+01	0.000016
Toluene	HEAST	2E+00	2E+03	NA
Vinyl Chloride	HEAST	NA	NA	0.000084

* The slope factor for Methylene Chloride is referenced to IRIS, whereas the RfDs are referenced to HEAST.

These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or $1E^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 additional chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The National Contingency Plan (NCP) states that sites should be remediated to chemical concentrations that correspond to an upper-bound cancer risk to an individual not exceeding $1x10^{-6}$ to $1x10^{-4}$ excess lifetime risk.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). By adding the HQs for all contaminant(s) of concern that affects the same target organ (e.g., liver) within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD where:

CDI = Chronic Daily Intake

RfD = reference dose; and

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

The level of confidence that one has in the information produced by the risk characterization process is dependent on the validity of the information used in previous stages of the risk assessment. Although uncertainties are inherent in all four stages of a risk assessment, the most significant uncertainty in this assessment is probably associated with the toxicity assessment for carcinogenic PAHs and arsenic and the evaluation of the dermal absorption exposure route.

Lifetime cancer risks were estimated for all of the carcinogenic chemicals of potential concern at the Peak Oil/Bay Drums Site. The only significant risks as defined by the U.S. EPA (1990), e.g. risk $\geq 10^{-6}$, that were found associated with groundwater contamination at this site in the future use scenarios were to onsite workers and residents. The pathway that poses risk to the future onsite workers is the ingestion of groundwater from the surficial and Upper Floridan aquifers. For the future onsite residents, however, there are more pathways; ingestion of groundwater from both the surficial and Upper Floridan aquifers, as well as dermal absorption and inhalation while showering with groundwater from the surficial and/or Upper Floridan aquifers.

These receptors, chemicals, and resultant cancer risks are summarized in Table 6-7.

The hazard indices due to ingestion of surficial aquifer and Uppers Floridan water for both future use scenarios are greater than 1.0. Additionally, the hazard indices due to inhalation and dermal absorption while showering with surficial aquifer water are also greater than 1.0. The results can be seen in Table 6-8.

The area-wide groundwater risk assessment did not address current exposure since onsite groundwater is not currently being used. However, the risks associated with possible future exposure for workers or residents exceeds the risk range for both the shallow aquifer and deeper Floridan Aquifer, the current source of municipal water supplies in the area. For this reason, actual or threatened releases of hazardous substances from the groundwater, if not addressed by implementing the response action selected in this ROD, will continue to contaminate the groundwater and may present an imminent and substantial endangerment to the public health, welfare or the environment.

6.2 Environmental Risks

The environmental risks at this site will be addressed in a separate study (Area-wide Wetlands Impact Study). This study evaluates the ecological status of the wetlands associated with the Bay Drums, Peak Oil and Reeves Southeastern Sites. The results of this study will be contained in the Area-Wide Wetlands Impact Study Report. The wetlands associated with these three sites will be addressed in a separate Record of Decision.

7.0 Description of Remedial Alternatives

This section of the ROD presents an analysis of the different options which are available to achieve the remedial objectives at the site. The developed alternatives are specific to the southern surficial aquifer and the Upper Floridan Aquifer. The northern surficial aquifer underlies the Reeves Superfund Site and since the contamination in the northern surficial aquifer is different from the contamination in the southern surficial aquifer, it will be addressed in a separate ROD. This ROD addresses the southern surficial and the Upper Floridan aquifers. This section of the ROD presents a summary of each alternative described in the FS report.

Southern Surficial Aquifer

Alternative No. 1 - No Action
Alternative No. 2 - Containment
Alternative No. 3 - Active Restoration

TABLE 6-7 CANCER RISK BY INDIVIDUAL PATHWAY			
SCENARIO/EXPOSED POPULATION	RISK FOR PATHWAY	CHEMICAL OF CONCERN	RISK FOR CHEMICAL
FUTURE USE - ONSITE WORKERS			
Ingestion, surficial aquifer	9.46E-03	1,1-Dichloroethene Vinyl Chloride Arsenic Bis(2-chloroethyl)ether Methylene chloride 1,1,2-Trichloroethane	9.16E-03 1.33E-04 8.81E-05 5.81E-05 2.04E-05 3.73E-06
Ingestion, Floridan aquifer	1.44E-03	1,1-Dichloroethene Vinyl Chloride Arsenic Methylene chloride 1,1,2-Trichloroethane	8.91E-04 2.41E-04 3.07E-04 3.33E-06 1.27E-06
FUTURE USE - ONSITE RESIDENT			
Ingestion, surficial aquifer	2.76E-02	1,1-Dichloroethene Vinyl Chloride Arsenic Bis(2-chloroethyl)ether Methylene chloride 1,1,2-Trichloroethane Bis(2-ethylhexyl)phthalate gamma Chlordane	2.67E-02 3.89E-04 2.57E-04 1.70E-04 5.95E-05 1.09E-05 1.71E-06 1.59E-06
Ingestion, Floridan aquifer	4.21E-03	1,1-Dichloroethene Vinyl Chloride Arsenic Methylene chloride 1,1,2-Trichloroethane	2.6E-03 7.03E-04 8.96E-04 9.73E-06 3.7E-06

TABLE 6-7 (CONT.)
CANCER RISK BY INDIVIDUAL PATHWAY

SCENARIO/EXPOSED POPULATION	RISK FOR PATHWAY	CHEMICAL OF CONCERN	RISK FOR CHEMICAL
Inhalation while showering, surficial aquifer	5.03E-03	1,1-Dichloroethene Vinyl Chloride Bis(2-chloroethyl)ether Methylene chloride 1,1,2-Trichloroethane	4.97E-03 4.48E-05 6.04E-06 8.26E-06 5.22E-06
Inhalation while showering, Floridan aquifer	5.67E-04	1,1-Dichloroethene Vinyl Chloride Methylene chloride 1,1,2-Trichloroethane	4.83E-04 8.11E-05 1.35E-06 1.77E-06
Dermal absorption while showering, surficial aquifer	8.2E-04	1,1-Dichloroethene Vinyl Chloride Bis(2-chloroethyl)ether	8.09E-04 5.84E-06 3.08E-06
Dermal absorption while showering, Floridan aquifer	9.17E-05	1,1-Dichloroethene Vinyl Chloride Arsenic	7.86E-05 1.06E-05 2.03E-06

TABLE 6-8
HAZARD INDEX BY INDIVIDUAL PATHWAY

SCENARIO/EXPOSED POPULATION	RISK OF PATHWAY	CHEMICAL*	RISK OF CHEMICAL
FUTURE USE - ONSITE WORKERS			
Ingestion, surficial aquifer	9.2	Antimony Arsenic Chromium 1,1-Dichloroethene 1,2-Dichloroethene Methylene chloride Naphthalene Toluene 1,1,1-Trichloroethane Zinc	5.45E-01 3.91E-01 1.32E-01 3.96 2.92E-01 1.06E-01 8.37E-01 7.09E-01 6.87E-01 1.1
Ingestion, Floridan aquifer	2.3	Arsenic 1,1-Dichloroethane Naphthalene Toluene	1.36 3.85E-01 1.81E-01 1.15E-01
FUTURE USE - ONSITE RESIDENT			
Ingestion, surficial aquifer	26.8	1,1-Dichloroethene 1,2-Dichloroethene 1,1-Dichloroethane Zinc Naphthalene Toluene 1,1,2-Trichloroethane Antimony Arsenic Cadmium Chromium Manganese Mercury Methylene chloride 1,1,1-Trichloroethane Vanadium	1.16E+01 8.51E-01 1.70E-01 3.22 2.44 2.07 1.11E-01 1.59 1.14 2.86E-01 3.86E-01 1.49E-01 1.62E-01 3.09E-01 2.01 1.85E-01
Ingestion, Floridan aquifer	6.6	1,1-Dichloroethene Arsenic Naphthalene Toluene Vanadium Zinc	1.12 3.98 5.29E-01 3.36E-01 1.12E-01 1.66E-01

TABLE 6-8 (CONT.) HAZARD INDEX BY INDIVIDUAL PATHWAY			
SCENARIO/EXPOSED POPULATION	RISK OF PATHWAY	CHEMICAL*	RISK OF CHEMICAL
Inhalation while showering, surficial aquifer	4	1,1-Dichloroethene 1,2-Dichloroethene Naphthalene 1,1,1-Trichloroethane Toluene	2.32 1.55E-01 5.77E-01 3.55E-01 4.60E-01
Inhalation while showering, Floridan aquifer	0.5		
Dermal absorption while showering, surficial aquifer	5.1	Toluene 1,1-Dichloroethene Naphthalene 1,1,1-Trichloroethane	3.8 3.49E-01 6.29E-01 1.4E-01
Dermal absorption while showering, Floridan aquifer	0.81		

* Chemicals are ranked in descending order according to risk presented. Only chemicals with hazard indices greater than 0.1 are presented.

Upper Floridan Aquifer

Alternative No. 1 - No Action
Alternative No. 2 - Active Restoration

Southern Surficial Aquifer

7.1 Alternative No. 1: No Action

In the No Action alternative, no further remedial action on the groundwater would be taken. While EPA guidance allows environmental monitoring in the no action alternative, no measures may be taken to reduce the potential for exposure through the use of institutional controls, containment, treatment, or removal of contaminated groundwater. This alternative does not meet the remedial action objectives for preventing dermal contact or ingestion. As required by SARA, the no action alternative provides a baseline for comparison with other alternatives that provide a greater level of response.

The no action alternative does not include the treatment of groundwater, but purely groundwater monitoring and five-year reviews. The major components of this alternative include:

- Groundwater monitoring
- Five-year reviews

The primary applicable or relevant and appropriate requirement (ARAR) for this alternative is the treatment technique action level for contaminants in groundwater from the Safe Drinking Water Act (SDWA). If no action is taken to treat the groundwater, both organic and inorganic compounds in the groundwater would continue to exceed MCLs and/or FMCLs. For this reason, Alternative No. 1 does not meet ARARs.

The total present worth cost of this alternative is $153,000.

7.2 Alternative No. 2: Containment

This alternative includes construction of a slurry wall around the Bay Drums Site in conjunction with a slurry wall which would encompass the Peak Oil Site as designated in the selected remedy chosen in the Peak Oil Site Source ROD, Operable Unit 1. The slurry wall around the Peak Oil Site will already be in place at this time. The containment alternative proposes dewatering the areas contained within the Peak Oil and Bay Drums slurry walls. Groundwater extracted from the aquifer would be treated by air stripping and carbon polishing and then discharged to a local POTW. The main components of this alternative include:

- Construction of a slurry wall around the Bay Drums Site.
- Extraction of groundwater within the two slurry walls.
- On site treatment of extracted groundwater by air stripping and carbon polishing.
- Discharge to local POTW.

The proposed slurry wall would not contain all of the contaminated groundwater, thus three additional wells would be necessary outside the slurry walls.

Summary of Remedial Action Alternative

Alternative 2 would not be totally protective of human health and the environment because only the impacted groundwater within the slurry walls is removed and treated. The dewatering scenarios for the two southern surficial aquifer areas would maintain a net inward hydraulic gradient into the slurry wall area. Therefore, groundwater would not migrate out of the slurry wall area. However, there may be impacted groundwater outside the slurry walls which would not be extracted and treated.

Because the area within the slurry walls cannot by completely dewatered, immediate compliance with chemical-specific groundwater quality ARARs may not be attained. However, the removal of all extractable groundwater minimizes potential exposure pathways. Emissions of VOCs from the air stripper process would be required to comply with action-specific ARARs.

The long-term effectiveness of this alternative would be achieved by dewatering the area within the slurry wall. Five year reviews of the site would be conducted for at least a 10-year period.

The short-term effectiveness of this alternative would be achieved by emissions from the air stripping process meeting permit requirements. Some hazards are present to workers who are associated with the treatment system operations, but these are typical hazards that can be guarded against by compliance with health and safety precautions. Environmental risks would not increase.

Alternative 2 would be easily implemented. The administrative implementability would be dependent upon the ability to obtain necessary access agreements and appropriate POTW discharge approvals. An air permit would not be required but the air stripper must meet the substantive air requirements. All technologies and services are readily available.

The total present worth cost of this alternative is $2,779,000.

7.3 Alternative No. 3: Active Restoration

The active restoration alternative is divided into four subalternatives which provide a variety of treatment and discharge options for the impacted groundwater.

7.3.1 Alternative No. 3A

This alternative would include construction of a slurry wall around the Bay Drums Site in conjunction with a slurry wall which will encompass the Peak Oil Site as designated in the selected remedy chosen in the Peak Oil Site Source ROD, Operable Unit 1. The extracted water would be treated for heavy metals by chemical precipitation and for VOCs by air stripping and activated liquid-phase carbon polishing. Treated groundwater would be discharged by on-site spray irrigation and/or recharge into the surficial aquifer at both sites. As in Alternative 2, three extra extraction wells would be necessary so that all of the contaminated groundwater can be treated. The main components of this alternative include:

- o Construction of a slurry wall around the Bay Drums site.
- o Groundwater extraction via extraction wells.
- o Chemical precipitation process for removal of heavy metals.
- o Air stripping for removal of VOCs.
- o Carbon polishing for removal of semi-volatiles and remaining organic compounds.
- o Discharge by on-site spray irrigation/recharge.
- o Groundwater monitoring.

Summary of Remedial Action Alternative

Alternative 3A would be protective of human health and the environment because the impacted groundwater would be extracted and treated. Also, the slurry wall would contain most of the contaminants, and thus migration of the contained contaminants would be minimal.

In order for the treatment system to produce effluent which would comply with chemical-specific groundwater quality ARARs, a treatability study must be conducted during the remedial design. Emissions of VOCs from the air stripping process would be required to comply with action-specific ARARs.

This alternative would achieve high long-term effectiveness because low residual risk remains after remedial action is complete. Five-year reviews of the area would be conducted for at least a 10-year period.

The reduction of toxicity, mobility and volume would be accomplished by treating the groundwater by a chemical precipitation process, air stripping and activated liquid-phase carbon. Following treatment of the impacted water, the residual sludge produced would be required to be disposed at an off-site facility. Also produced are air emissions which will contain VOCs. This alternative satisfies the statutory preferences for treatment by SARA.

This alternative would achieve high short-term effectiveness. Annual monitoring throughout the treatment period would be conducted to verify chemical concentrations exceeding cleanup goals are not migrating. Emissions from the air stripping process would be required to meet permit requirements.

Alternative 3A would be easily implemented.

The total present worth cost of the alternative is $4,691,000.

7.3.2 Alternative No. 3B

This alternative involves implementation of a groundwater extraction and treatment system. Groundwater would be treated for heavy metals and VOCs by chemical precipitation and air stripping. Following initial treatment, a wetlands would be constructed to remove trace concentrations of volatiles, semi-volatiles and heavy metals for subsequent discharge by either on-site spray irrigation/recharge or to on-site surface waters. The main components of this alternative include:

- Groundwater extraction via extraction wells.
- Implementation of Peak Oil site source ex-situ alternative (Operable Unit 1). Includes a below-ground groundwater extraction system and infiltration system within the Peak Oil slurry wall.
- Chemical precipitation process for removal of heavy metals.
- Air stripping for removal of VOCs.
- Constructed wetlands for polishing of trace heavy metals and organic compounds.
- Discharge by on-site spray irrigation/recharge/surface water.

- Implementation of groundwater monitoring program.

Summary of Remedial Action Evaluation

Alternative 3B would be protective of human health and the environment because the impacted groundwater would be pumped and treated, thus reducing the risk from contact with and/or ingestion of the groundwater.

This alternative may comply with chemical-specific groundwater quality ARARs at completion of the remedial action. In order for the treatment system to produce effluent which would comply with chemical-specific groundwater quality ARARs, a treatability study must be conducted during the remedial design. Water discharged by spray irrigation, groundwater recharge and surface water discharge must comply with applicable surface and groundwater standards. Emissions of VOCs from the air stripping process would be required to comply with action-specific ARARs.

This alternative would achieve high long-term effectiveness because little residual risks remain after the remedial action is complete. Five year reviews would be conducted for at least a 10-year period.

The reduction of toxicity, mobility and volume would be accomplished by installing a groundwater extraction and treatment system. The concentrations of VOCs, SVOCs and metals would be reduced. The residual sludge produced in the treatment of the impacted water would require disposal at an off-site facility. Also produced are emissions which would contain VOCs. This alternative satisfies the statutory preference for treatment by SARA.

This alternative would achieve high short-term effectiveness. Annual monitoring would be performed to keep track of the contaminant levels in the effluent. Environmental and human risks would not increase. Remediation would continue until remedial action cleanup goals are achieved.

The alternative would be technically implementable. Chemical precipitation and air stripping are standard techniques, but the constructed wetland is less common and may involve some startup time. All technologies and services are readily available.

The total present worth cost of the alternative is $3,901,000.

7.3.3 Alternative No. 3C

Alternative 3C is identical to Alternative 3B except that, following the removal of volatiles by air stripping, the water would be polished for VOCs by liquid-phase carbon followed by ion exchange for heavy metals polishing. Groundwater extracted from the Peak Oil Site would be pretreated for oil if necessary by an oil/water separator. The treated water would be either discharged by spray irrigation/recharge or discharged to surface water. Groundwater from monitoring wells and influent/effluent from the treatment system would be sampled throughout the active treatment period. The main components of this alternative include:

- Groundwater extraction via extraction wells.
- Implementation of Peak Oil site source ex-situ alternative (Operable Unit 1). Includes a below-ground groundwater extraction system and infiltration system within the Peak Oil slurry wall.
- Chemical precipitation process for removal of heavy metals.
- Carbon polishing for removal of semi-volatiles and other organic compounds.
- Ion exchange for heavy metals polishing.
- Discharge by on-site spray irrigation/recharge.
- Implementation of groundwater monitoring program.

Summary of Remedial Alternative Evaluation

Similar to Alternatives 3A and 3B, this alternative would be protective of human health and the environment because the impacted groundwater would be pumped and treated, reducing risk to humans from potential ingestion of and/or contact with the contamination.

Compliance with ARARs for this alternative is the same as Alternative 3B. A treatability study would be performed to formulate a treatment system in which the effluent meets the applicable discharge standards. Compliance with groundwater and surface water standards must be demonstrated. Emissions of VOCs from the air stripping process would be required to comply with action-specific ARARs.

The reduction of toxicity, mobility and volume would be accomplished by groundwater extraction and treatment as discussed in Alternative 3A. Extracted groundwater would be treated by a chemical precipitation process, air stripping, activated liquid-phase carbon and ion exchange. Following treatment of the impacted water, a residual sludge would be produced which will contain VOCs. This alternative satisfies the statutory preference for treatment by SARA.

The short term effectiveness of this alternative is the same as Alternative 3A. Groundwater modeling indicated that, with the proposed groundwater extraction system, contaminants can be controlled and removed from the aquifer. The estimated remediation time for this alternative is 10 years.

Alternative 3C would be easily implemented, and all technologies and services are readily available. The administrative implementability would be dependent upon the ability to obtain necessary access agreements and approval for discharge options.

The present net worth cost of this alternative is $5,026,000.

7.3.4 Alternative No. 3D

This alternative includes extraction of groundwater followed by air stripping and carbon polishing. Groundwater from the Peak Oil Site will be pretreated for oil by an oil/water separator, if necessary. Treated water that is not returned to the Peak Oil Site for recharge would be discharged to the POTW. Groundwater monitoring wells and influent/effluent from the treatment system will be sampled throughout the active treatment period. The major components of the alternative include:

- Groundwater extraction via extraction wells.
- Implementation of Peak Oil Site Source in-situ alternative (Operable Unit 1).
- Air stripping for removal of VOCs.
- Carbon polishing for removal of semi-volatiles and other organic compounds.
- Discharge to local POTW.
- Implementation of groundwater monitoring program.

Summary of Remedial Action Evaluation

Similar to the other subalternatives (3A, 3B, and 3C), this alternative would be protective of human health and the environment because the impacted groundwater would be pumped and treated, minimizing the risk of potential ingestion of and/or contact with contaminated groundwater.

Compliance with ARARs for this alternative is the same as Alternative 3A. A treatability study must demonstrate that the effluent meets applicable discharge standards. Treated water effluent would comply with pollutant discharge criteria established by the POTW. Any emissions of VOCs would comply with action-specific ARARs.

The reduction of toxicity, mobility and volume would be accomplished by extraction and treatment of the groundwater. The treatment system would significantly reduce the concentrations of VOCs and SVOCs currently in the aquifer by air stripping and activated liquid-phase carbon. This alternative satisfies the statutory preference for treatment by SARA.

The short-term effectiveness of this alternative is the same as Alternative 3A. Chemical fate and transport modeling demonstrates that, with the groundwater extraction system, chemicals of concern can be controlled and removed from the aquifer. The remediation period for this alternative is estimated to be approximately 10 years.

This alternative would be easily implemented, all technologies and services are readily available. The administrative implementability would be dependent upon the ability to obtain access agreements and appropriate approval to discharge to a POTW.

The total present worth cost of the alternative is $2,613,000.

Upper Floridan Aquifer

7.4 Alternative No. 1: No Action

In the No Action alternative, no further remedial action on the groundwater in the Upper Floridan Aquifer would be taken. While EPA guidance allows environmental monitoring in the no action alternative, no measures may be taken to reduce the potential for exposure through the use of institutional controls, containment, treatment, or removal of contaminated groundwater. This alternative does not meet the remedial action objectives for preventing dermal contact or ingestion. As required by SARA, the no action alternative provides a baseline for comparison with other alternatives that provide a greater level of response.

The no action alternative does not include the treatment of groundwater, but purely groundwater monitoring and five-year reviews. The major components of this alternative include:

- Groundwater monitoring
- Five-year reviews

Summary of Remedial Action Evaluation

Without treatment of the groundwater in the aquifer, protection of human health and/or the environment would not be achieved.

The primary applicable or relevant and appropriate requirement

(ARAR) for this alternative is the treatment technique action level for contaminants in groundwater from the Safe Drinking Water Act (SDWA). If no action is taken to treat the groundwater, both organic and inorganic compounds in the groundwater would continue to exceed MCLs and/or FMCLs. For this reason, Alternative No. 1 does not meet ARARs.

The total present worth cost of this alternative is $183,000.

7.5 Alternative No. 2: Active Restoration

In this alternative a groundwater extraction system would be installed and implemented, and extracted groundwater would be treated for volatiles by air stripping and carbon polishing. Discharge of the treated water would be to the South Wetland. Groundwater monitoring would ensure that cleanup goals are being met. The main components of this alternative include:

- o Groundwater extraction via extraction wells.
- o Air stripping for removal of VOCs.
- o Carbon polishing for removal of organic compounds.
- o Discharge to surface water (South Wetland).

Summary of Remedial Action Alternative

Alternative 2 would provide protection of human health and the environment by pumping and treating impacted groundwater, thus reducing potential risk of ingestion of and/or contact with contaminated groundwater.

At the completion of remedial action, Alternative 2 would comply with ARARs. An air stripping/carbon polishing treatability study would be conducted to demonstrate that effluent would meet discharge criteria. Groundwater effluent must comply with applicable surface water discharge standards since it would be discharged to the South Wetland.

This alternative would achieve adequate long-term effectiveness because low residual risk remains after the remedial action is complete.

The reduction of toxicity, mobility and volume would be accomplished by pumping and treating the impacted groundwater. This alternative satisfies the statutory preference for treatment by SARA.

The alternative would achieve high short-term effectiveness because the chemical plume would be controlled and chemical concentrations would be reduced. Annual monitoring would be conducted to ensure that the contaminant plume would not migrate. Remediation of the aquifer would continue until cleanup goals are achieved.

This alternative would be easily implemented. The technologies involved are standard processes which are readily available.

The total present worth cost of the alternative is $1,519,000.

8.0 Comparative Analysis of Remedial Alternatives

A detailed comparative analysis was performed on the remedial alternatives developed during the FS and the modifications submitted during the public comment period using the nine evaluation criteria set forth in the NCP. The advantages and disadvantages of each alternative were compared to identify the alternative with the best balance among the nine criteria. A glossary of the evaluation criteria is provided in Table 8-1. According to the NCP, the first two criteria are labeled "Threshold Criteria", relating to statutory requirements that each alternative must satisfy in order to be eligible for selection. The next five criteria are labeled "Primary Balancing Criteria", the technical criteria upon which the detailed analysis is based. The final two criteria are known as "Modifying Criteria", assessing the public's and State agency's acceptance of the alternative. Based on these final two criteria, EPA may modify aspects of the specific alternative.

A summary of the relative performance of each alternative with respect to the nine evaluation criteria is provided in the following subsections. A comparison is made between each of the alternatives for achievement of a specific criterion.

Southern Surficial Aquifer

8.1 Overall Protection of Human Health and the Environment

The first criterion against which each of the remedial alternatives is analyzed in detail is that of overall protection of human health and the environment. CERCLA mandates that remedial actions provide this protection. Each remedial alternative is analyzed to determine whether it will eliminate, reduce, or control the risks identified in the Baseline RA. The remedial alternatives are also evaluated to determine whether unacceptable short-term or cross-media impacts will result from implementation. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

Table 8-1
GLOSSARY OF EVALUATION CRITERIA

THRESHOLD CRITERIA:

Overall Protection of Human Health and the Environment - Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

Compliance with ARARs - addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and/or provides grounds for invoking a waiver.

PRIMARY BALANCING CRITERIA:

Long-Term Effectiveness and Permanence - refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

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

Short-Term Effectiveness - refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Implementability - the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost - includes capital and operation and maintenance costs.

MODIFYING CRITERIA:

State Acceptance - indicates whether the State concurs with, opposes, or has no comment on the Proposed Plan.

Community Acceptance - the Responsiveness Summary in the appendix of the Record of Decision responds to public comments received from the Proposed Plan public meeting and the public comment period and shows how the Agency used these comments to make the remedy selection.

Protection of human health and the environment is provided by the active restoration alternatives, Alternatives 3A, 3B, 3C, and 3D, by extracting and treating the groundwater, thus reducing or eliminating the contaminants.

The containment alternative, Alternative 2, provides a lesser degree of protection of human health and the environment since the extraction system may not recover all areas of impacted groundwater.

The no action alternative, Alternative 1, would not provide adequate protection to human health and the environment.

8.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The second evaluation criterion in the detailed analysis of alternatives is compliance with ARARs. Each remedial alternative is assessed to determine whether it will meet the requirements that are applicable, or relevant and appropriate, under the federal and state environmental laws. Unless a waiver is justified, the remedial alternative must be in compliance with all chemical-specific, location-specific, or action-specific ARARs.

The active restoration alternatives are expected to result in compliance with chemical-specific ARARs at the completion of remedial activities. All active restoration alternatives are expected to meet action-specific ARARs for discharge of treated water.

Alternative 2 would not meet chemical-specific ARARs because residual groundwater in dewatered containment areas would not comply with chemical-specific ARARs.

The no action alternative would not result in compliance with chemical-specific ARARs. Since the no action alternative does not meet the two "threshold criteria", it is not carried through the remaining seven criteria.

8.3 Long-term Effectiveness and Permanence

The third evaluation criterion for the detailed analysis is the long-term effectiveness and permanence of the remedial action. The degree to which each remedial alternative provides a long-term, effective, and permanent remedy is assessed, and the degree of certainty that the alternative will be successful in achieving the response objectives is evaluated. This assessment includes factors such as an evaluation of the magnitude of the risks remaining at the conclusion of remedial activities, the degree to which treated residuals remain hazardous (considering volume, toxicity, mobility, and propensity to bioaccumulate), the adequacy and reliability of controls, and the potential exposure pathways and risks posed should the remedial action require replacement.

The active restoration alternatives provide long-term effectiveness and permanence. At the completion of remediation risks will be substantially reduced with the removal of chemicals.

Long-term effectiveness of the containment alternative is provided by constructing permanent slurry walls around the sites and dewatering the surficial aquifer within the slurry walls.

8.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

The fourth evaluation criterion for the detailed analysis is the reduction of toxicity, mobility, or volume through treatment. Each alternative is evaluated against this criterion to assess the anticipated performance of the treatment technologies used in the alternative to achieve the reduction in toxicity, mobility, and/or volume of the principal threats. CERCLA requires that a preference be given to treatment alternatives which reduce the toxicity, mobility, or volume of hazardous constituents.

For the active restoration alternative, the reduction of toxicity, mobility, and volume is accomplished by extracting and treating contaminated groundwater. Alternatives 3B and 3C are expected to achieve lower effluent concentrations; however, they would generate larger quantities of sludge than Alternatives 3A and 3D as a result of additional treatment processes needed in order to meet surface water discharge standards.

Reduction of toxicity and volume of chemicals constituents for the containment alternative is achieved by removing and treating the surficial groundwater within the slurry walls. However, the extraction system may not recover all areas of impacted groundwater outside of the slurry walls.

8.5 Short-Term Effectiveness

The fifty criterion, short-term effectiveness, addresses the effectiveness of the alternative during construction and operation of the remedial action. Alternatives are evaluated with respect to their effects on human health and the environment, including risks to the community posed by implementation of the action, protection of the workers during implementation and the reliability and effectiveness of protective measures available to the workers, potential impacts to the environment caused by the remedial alternative and the effectiveness and reliability of mitigative measures which could be employed during implementation, and the time required to achieve the final response objectives.

The short-term effectiveness for the active restoration and containment alternatives is high. Some minimal hazard to workers are present due to treatment system operations. The off-site migration of impacted groundwater is not expected to occur for any of the active restoration alternatives.

8.6 Implementability

The sixth criterion upon which the detailed analysis of remedial alternatives is based is implementability. This criterion involves analysis of ease or difficulty of implementation, considering the following factors:

1. Technical feasibility, that is, the feasibility to reliably construct, operate, and monitor the effectiveness of a remedial action, as well as potential technical difficulties or unknowns associated with construction or operation;

2. Administrative feasibility, that is, the feasibility of obtaining permits or rights-of-way for construction or operation, and coordinating interagency approval or activities;

3. Availability of services and materials for a treatment method or technology, such as the availability of disposal capacity, off-site treatment or storage capacity, availability of equipment or specialists, and availability of special resources.

Alternatives 2 and 3A through 3D are technically and feasibly implementable. These alternatiyes would be required to meet air permit emissions requirements for the air stripper. Access agreements may be required for the construction of the proposed slurry wall in Alternatives 2 and 3A and for the groundwater extraction systems outlined in the active restoration alternatives. Also, approval to discharge treated groundwater would be required for the active restoration alternatives.

8.7 Cost

The seventh criterion for detailed analysis of alternatives is cost. Both capital and operational and maintenance (O&M) costs are considered. The accuracy of cost estimates is generally within the range of -30 percent to +50 percent. To facilitate comparison of alternatives with expenditures occurring over different time periods, all costs are presented in terms of present worth.

The costs for the alternatives are:

No Action	- Alternative 1	- $153,000.
Containment	- Alternative 2	- $2,779,000.
Active Restoration	- Alternative 3A	- $4,691,000.
	- Alternative 3B	- $3,901,000.
	- Alternative 3C	- $5,026,000.
	- Alternative 3D	- $2,613,000.

8.8 State Acceptance

This criterion assesses the technical and administrative issues and concerns the state may have regarding each of the remedial alternatives. Many of these concerns are addressed through compliance with applicable ARARs.

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 process for the Area-Wide Hydrological Study. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided input during this process. Based upon comments received from FDEP, it is expected that concurrence will be forthcoming; however, a formal letter of concurrence has not yet been received.

8.9 Community Acceptance

This criterion assesses the issues and concerns the public may have regarding each of the remedial alternatives.

This criterion is addressed in the Responsiveness Summary, Appendix A, of this document.

Upper Floridan Aquifer

8.10 Protection of Human Health and the Environment

If Alternative 2 is implemented, protection of human health and the environment is provided by extracting and treating groundwater. Chemicals of concern will be reduced or eliminated. Thus, the risk to human health and the environment is substantially reduced.

The no action alternative does not provide protection to human health and the environment.

8.11 Compliance with ARARs

The active restoration alternative are expected to result in compliance with chemical-specific ARARs at the completion of remedial activities. This alternative would be required to meet ARARs for surface water discharge into the South Wetland.

The no action alternative would not result in compliance with chemical-specific ARARs. Since the no action alternative does not meet the two "threshold criteria", it is not carried through the remaining seven criteria.

8.12 Long-Term Effectiveness and Permanence

Alternative 2 provides long-term effectiveness and permanence. Risks at the completion of remediation will be substantially reduced because chemicals are removed.

8.13 Reduction of Toxicity, Mobility or Volume

For the active restoration alternative, the reduction of toxicity, mobility and volume is accomplished by extracting and treating impacted groundwater.

8.14 Short-Term Effectiveness

The short-term effectiveness for the active restoration alternative is high. However, VOC emissions will result from air stripping and minimal hazards to workers may occur during treatment system operations.

8.15 Implementability

Alternative 2 will be required to meet the emissions requirements of an air permit for the air stripper, an appropriate discharge permit, and access agreements for discharge piping.

8.16 Cost

Costs for the Upper Floridan Aquifer alternatives are listed below.

No Action	- Alternative 1 - $183,000.
Active Restoration	- Alternative 2 - $1,519,000.

8.17 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 process for the Area-Wide Hydrological Study. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided input during this process. Based upon comments received from FDEP, it is expected that concurrence will be forthcoming; however, a formal letter of concurrence has not yet been received.

8.18 Community Acceptance

This criterion is addressed in the Responsiveness Summary, Appendix A, of this document.

9.0 Selected Remedy

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and public and state comments, EPA has selected Alternative 3D, with two components of 3C (chemical precipitation for removal of heavy metals and discharge by on-site spray irrigation/recharge) as contingencies, as a groundwater remedy for the surficial aquifer and a modified Alternative 2 as a groundwater remedy for the Upper Floridan aquifer. The modification to Upper Floridan Alternative 2 is that the treated groundwater from the Upper Floridan aquifer will be discharged by the same means as treated groundwater from the surficial aquifer.

At the completion of this remedy, the risk associated with the groundwater at this site will be within EPA's acceptable risk range of 1×10^{-6} to 1×10^{-4}. EPA has determined that this risk range is protective of human health and the environment.

The total present worth cost of the selected remedy, Alternative 3D for the surficial aquifer and a modified Alternative 2 for the Upper Floridan aquifer, as presented in the Feasibility Study, is estimated at $4,132,000. This cost does not reflect contingency costs and the cost of discharging treated water from the Upper Floridan aquifer to the POTW. In the event that the contingency plan must be implemented, the overall cost of the remedy is estimated to increase by $500,000. The cost of discharging treated Upper Floridan water to the POTW is estimated to increase the cost of the remedy as much as $1,500,000, bringing the total estimated cost of the remedy (without contingencies) to $5,632,000.

9.1 Groundwater Remediation

The goal of this remedial action is to restore groundwater to meet Federal and State drinking water standards. Both the southern surficial aquifer and the Upper Floridan Aquifer are included in the state-wide classification of potential future sources of drinking water. Based upon information obtained during the remedial investigation, and the careful analysis of all alternatives, EPA believes that the selected remedy will achieve this goal.

Prior to implementing the groundwater remedy, as the first phase of remedial design, the two production wells, Wells F2 and F3, will be decommissioned and two new Floridan monitor wells will be installed near the locations of F2 and F3. Upon completion of the new monitor wells, all Floridan aquifer wells at the sites will be sampled on a quarterly basis to evaluate the level of contamination in the Upper Floridan aquifer.

9.1.1 The major components of the groundwater remedy for the southern surficial aquifer and the Upper Floridan Aquifer include:

- o Groundwater extraction of both the surficial and Upper Floridan aquifer via extraction wells.
- o Implementation of the Peak Oil source control remedy outlined in the **Peak Oil/Bay Drums Record of Decision - Operable Unit 1**.
- o Air stripping for removal of VOCs.
- o Carbon polishing for removal of semi-volatiles and other organic materials.
- o Discharge to POTW. Groundwater will be treated to meet Federal and State drinking water standards and/or pollutant limits set by the local publicly owned treatment works (POTW) prior to discharge. The treated water will be conveyed via discharge piping to connect to a manhole for ultimate discharge to the POTW. A permit from the POTW will have to be obtained in order to discharge the treated groundwater into its system.
- o Groundwater monitoring.

As a contingency, if necessary, chemical precipitation for the treatment of metals and discharge by either spray irrigation, recharge, or surface water as outlined in Alternative 3C of the Feasibility Study will be added to the remedy. For instance, if Alternative 3D fails to meet the pretreatment requirements of the local POTW for metals, the chemical precipitation component will be added to the remedy. Also, in the event that a POTW permit cannot be obtained, EPA will select an alternative discharge method. If this occurs, the treatment system will be required to meet the appropriate discharge standards for the selected method.

9.1.2 Extraction, Treatment and Discharge of Contaminated Groundwater

Groundwater in the Southern Surficial and Upper Floridan aquifers at the Bay Drums and Peak Oil Sites will be extracted, followed by air stripping and carbon polishing. The actual extraction system design and installation requirements will be determined during the remedial design phase. The groundwater extraction system for this alternative is based on the assumption that there will be no slurry wall around the Bay Drums Site and that the Peak Oil source control remedy outlined in the **Peak Oil/Bay Drums Record of Decision - Operable Unit 1** will be fully implemented. Treated water that is not returned to the Peak Oil Site for use in the Operable Unit 1 soil flushing/bioremediation system will be discharged to a POTW. All water discharged to the POTW will be required to comply with applicable Federal, State, and local standards set by the POTW.

9.1.3 Performance Standards

Because certain performance standards may not be determined until the Remedial Design phase, the list of performance standards outlined in this section is not exclusive and may be subject to addition and/or modification by the Agency in the RD/RA phase.

a) Extraction Standards

A groundwater extraction rate that includes both the southern surficial aquifer and the Upper Floridan Aquifer will be determined during the remedial design. Groundwater extracted from the Peak Oil site will be pretreated for oil, if necessary, by an oil/water separator.

b) Treatment Standards

Violations of secondary standards occur in the surficial and Upper Floridan aquifers at the Peak Oil/Bay Drums site. These violations are present inside as well as outside the property boundaries. The RI/FS data indicates that no vertical migration of contaminants through the low permeability layer between the surficial and the Floridan aquifer is occurring at the site. However, secondary standards are exceeded in on-site Floridan wells. The mode of contaminant migration to the Floridan is posited to be via faulty well casings of on-site production wells F2 and F3.

In considering how these violations might impact current or future potential use of the aquifers, EPA and FDEP evaluated the following information:

1. A preliminary private well survey performed during the area-wide groundwater RI/FS did not locate or identify any potable water wells in the surficial aquifer within a one-mile radius of the site; however, Floridan wells used as a potable water source were identified within the one-mile radius.

2. Southwest Florida Water Management District (SWFWMD) publications indicate that the surficial aquifer system is currently being used to a limited extent for lawn

irrigation and stock water ("Groundwater Resource Availability Inventory: Hillsborough County, Florida" and "Groundwater Quality of the Southwest Floridan Water Management District"). The Floridan aquifer, however, is identified as a potable water source.

3. The Hillsborough County Comprehensive Plan, Future Land Use. Development of new residential homes within the area of the site is unlikely due to zoning restrictions ("Future of Hillsborough County, Florida", dated July 1989).

4. The Hillsborough County Ordinance 90-35 indicates that, with certain limited exceptions (such as financial hardship), anyone constructing new or modifying existing residential, commercial or industrial buildings within 500 feet of a County main water line must use the public water supply system.

On the basis of the above information regarding current or potential future use of the surficial aquifer, cleanup of the surficial aquifer to meet secondary standards at the Peak Oil/Bay Drums site may not be necessary. EPA and FDEP recommend not applying secondary standards in the surficial aquifer at the site under the following conditions:

<u>CONDITION 1</u> A thorough door-to-door private well survey shall be performed as a task in the OU2 Remedial Design. The information to be gathered in the well survey includes: (1) size of private well; and (2) depth of private well. The in-depth well survey shall cover the same territory that was covered for the preliminary well survey done for the Area-Wide Groundwater RI/FS. Private wells that are in use and are discovered in this well survey shall be sampled for the contaminants of concern. If the levels in the private well samples are above the remediation goals and it is determined that the private well contamination is related to the Peak Oil/Bay Drums site, the users of that well must be offered the opportunity to be connected to the public water system at no charge.

<u>CONDITION 2</u> Monitoring of replacement Floridan aquifer wells must indicate that plugging and abandonment of the on-site Floridan production wells (F2 and F3) is effective in preventing continued vertical migration of contaminants into the Floridan aquifer where secondary standards must be met.

The treatment standards (remediation goals) selected for the chemicals of concern in the surficial aquifer are listed in Table 9-1.

If during the RD phase, these conditions are not met or a showing is made that the southern surficial aquifer is a likely potable drinking water source, then the treatment standards (remediation goals) for the surficial aquifer will be the same as the treatment standards for the chemicals of concern in the Upper Floridan aquifer. Groundwater in the Upper Floridan aquifer is required to be remediated to MCLs and Florida Secondary Maximum Contaminant Levels (SMCLs (FL)) for ethylbenzene, toluene, total xylenes, aluminum, iron, manganese, and zinc. The remediation goals selected for the Upper Floridan aquifer are listed in Table 9-2.

If it can be demonstrated that concentrations of certain constituents in the surficial and Floridan aquifers reflect background conditions and are not a direct result from operations at the sites, remediation of groundwater to below background levels will not be required.

c) Discharge Standards

Discharged water from the groundwater treatment system shall comply with pollutant discharge criteria established by the POTW. Failure to obtain a discharge permit to the local POTW will result in a discharge by alternative methods.

If EPA determines that alternative treatment is necessary, the treatment system will be required to meet all ARARs, potentially 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. Alternative methods, determined by EPA, may include discharge by either spray irrigation, recharge, or surface water, as outlined in Alternative 3C of the FS.

d) Design Standards

The design, construction and operation of the groundwater 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).

9.1.4 Compliance Testing

The treatment system's performance will be carefully monitored on a regular basis. After demonstration of compliance with performance standards, the Peak Oil/Bay Drums groundwater shall be monitored for a minimum of five years. If monitoring

TABLE 9-1
SURFICIAL AQUIFER REMEDIATION GOALS

Chemical	**Cleanup Level (ppb)**	***Level Basis**
Volatiles		
Acetone	3000	RfD
Benzene	1	MCL (FL)
1,1-Dichloroethane	2400	RfD
1,2-Dichloroethane	3	MCL (FL)
1,1-Dichloroethylene	7	MCL
1,2-Dichloroethylene (total)	70	MCL
Ethylbenzene	700	MCLG
Methylene Chloride	5	MCL
Tetrachloroethylene	3	MCL (FL)
Toluene	1000	MCLG
Vinyl Chloride	1	MCL (FL)
Xylenes (total)	10,000	MCLG
Semi-volatiles		
Bis(2-chloroethyl)ether	7	CSF
Bis(2-ethylhexyl)phthalate	6	MCL
2-Methylphenol	2000	RfD
Naphthalene	100	F.A.C 17-770
Inorganics		
Antimony	6	MCL
Arsenic	50	MCL
Beryllium	4	MCL
Chromium	100	MCL (FL)
Lead	15	AL
Sodium	160,000	MCL (FL)
Vanadium	240	RfD

*CLEANUP LEVEL BASIS DEFINITIONS

RfD	=	Cleanup level is based on protection of health from the non-cancer reference dose and future residential exposure assumptions from the Baseline Risk Assessment.
MCL (FL)	=	Cleanup level is a Florida primary drinking water MCL.
MCL	=	Cleanup level is a federal primary drinking water MCL.
SMCL (FL)	=	Cleanup level is a Florida secondary drinking water MCL.
CSF	=	Cleanup level is a health-based number derived from the cancer slope factor and the future residential assumptions from the Baseline RA (represents a 10[-4] risk level).
F.A.C.17-770	=	Cleanup level is a petroleum-contaminated site cleanup criteria as listed in the Florida Administrative Code, Chapter 17-770.
AL	=	Cleanup level is the federal action level for lead.

TABLE 9-2
UPPER FLORIDAN AQUIFER REMEDIATION GOALS

Chemical	Cleanup Level (ppb)	*Level Basis
Volatiles		
Acetone	3000	RfD
Benzene	1	MCL (FL)
1,1-Dichloroethane	2400	RfD
1,2-Dichloroethane	3	MCL (FL)
1,1-Dichloroethylene	7	MCL
1,2-Dichloroethylene (total)	70	MCL
Ethylbenzene	30	SMCL (FL)
Methylene Chloride	5	MCL
Tetrachloroethylene	3	MCL (FL)
Toluene	1000	MCLG
Vinyl Chloride	1	MCL (FL)
Xylenes (total)	20	SMCL (FL)
Semi-volatiles		
Bis(2-chloroethyl)ether	7	CSF
Bis(2-ethylhexyl)phthalate	6	MCL
2-Methylphenol	2000	RfD
Naphthalene	100	F.A.C 17-770
Inorganics		
Aluminum	200	SMCL (FL)
Antimony	6	MCL
Arsenic	50	MCL
Beryllium	4	MCL
Chromium	100	MCL (FL)
Iron	300	SMCL (FL)
Lead	15	AL
Manganese	50	SMCL (FL)
Sodium	160,000	MCL (FL)
Vanadium	240	RfD
Zinc	5000	SMCL (FL)

*CLEANUP LEVEL BASIS DEFINITIONS

RfD	=	Cleanup level is based on protection of health from the non-cancer reference dose and future residential exposure assumptions from the Baseline Risk Assessment.
MCL (FL)	=	Cleanup level is a Florida primary drinking water MCL.
MCL	=	Cleanup level is a federal primary drinking water MCL.
SMCL (FL)	=	Cleanup level is a Florida secondary drinking water MCL.
CSF	=	Cleanup level is a health-based number derived from the cancer slope factor and the future residential assumptions from the Baseline RA (represents a 10[-4] risk level).
F.A.C.17-770	=	Cleanup level is a petroleum-contaminated site cleanup criteria as listed in the Florida Administrative Code, Chapter 17-770.
AL	=	Cleanup level is the federal action level for lead.

indicates that the performance standards, as set forth in Section 9.1.3, are not being met at any time after pumping has discontinued, extraction and treatment of the groundwater will resume and operate until the performance standards are achieved. However, if it becomes apparent that during the operation of the groundwater treatment system that contaminant levels have ceased to decline and are remaining constant at a level higher than the treatment standards, the performance standards may be reevaluated.

10.0 Statutory Determinations

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

10.1 Protective of Human Health and the Environment

The selected remedy protects human health and the environment by removing the chemicals of concern from the impacted groundwater and treating it by air stripping and carbon polishing. The selected remedy also reduces the risks outlined in the Baseline RA.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The selected remedy of extracting the impacted groundwater of the Southern Surficial Aquifer and the Upper Floridan Aquifer and treating it through means of air stripping and carbon polishing before discharging it to the local POTW will be required to comply with all applicable or relevant and appropriate requirements (ARARs). The ARARs are presented below:

Federal ARARs

- Safe Drinking Water Act, 40 CFR 141.11-141.16, 141.50-141.51. The Primary Drinking Water Standards are **relevant and appropriate** and were considered in the development of alternatives.

- Endangered Species Act, 50 CFR Part 402. Regulations regarding activities in critical habitats of threatened or endangered species are **applicable** and were considered in the development of alternatives if a site is located in a critical area.

- Clean Air Act, National Ambient Air Quality Standards (NAAQS), 40 CFR Part 50. The maximum primary and secondary 24-hour concentrations are **relevant and appropriate** and were considered in the development of alternatives.

- Clean Water Act, 40 CFR 122-125, 307, 402 (a)(1), 403. All of these regulations and requirements are **applicable** and were considered in the various alternatives that are required to meet water quality standards.

State ARARs

- Florida Drinking Water Standards, F.A.C. 17-550. The drinking water standards for Class G-I and G-II aquifers are **applicable** and were considered in the development of groundwater cleanup levels.

- Florida Ambient Air Quality Standards, F.A.C. 17-2.1 and 17-2.3. Standards for ambient air quality are **relevant and appropriate** and were considered in the development of remedial alternatives.

- Florida Water Quality Standards, F.A.C. 17-3. Minimum water quality standards are **relevant and appropriate** and were considered in the development of the remedial alternatives.

- Warning Signs at Contaminated Sites, F.A.C. 17-736. Regulations regarding the use of appropriate warning signs are **applicable** and may be required at the entrances and perimeter of the site.

- Groundwater Classes, Standards and Exemptions, F.A.C. 17-520. Classifications of aquifers and the cleanup standards set for those different classes are **applicable** and were considered in the development of groundwater cleanup levels.

- Florida Surface Water Quality Standards, F.A.C. 17-302. Surface water quality standards are relevant and appropriate and were considered in the development of groundwater cleanup levels.

10.3 Cost Effectiveness

EPA believes that the selected remedy will reduce the risk to human health and the environment from the groundwater at a cost of $5,632,000. Of the alternatives evaluated which provide a high level of long-term effectiveness, Alternative 3D for the surficial aquifer and a modified Alternative 2 for the Upper Floridan aquifer are the most cost effective. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that this selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principle element and considering state and community acceptance.

The selected remedy will effectively reduce or immobilize the contaminants in the groundwater and prevent and further direct risk to human health.

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 groundwater operable unit at the Peak Oil/Bay Drums site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that this selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principle element and considering state and community acceptance.

The selected remedy will effectively reduce or immobilize the contaminants in the groundwater and prevent further direct risk to human health.

10.5 Preference for Treatment as a Principle Element

Both organic and inorganic constituents were identified at the site. The selected remedy will achieve substantial risk reduction by permanently treating and containing the contamination. This alternative will be protective of human health and the environment, is cost effective, and will meet all Federal and State requirements.

The remedy selected in this ROD provides the best balance of the evaluation of the nine criteria EPA applies to every alternative. Remediation is expected to continue for approximately 10 years.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Peak Oil/Bay Drums Site, which was released for public comment in February 1993, identified one alternative, southern surficial alternative 3D, as the preferred alternative to treat the impacted groundwater from both the southern surficial aquifer and the Upper Floridan Aquifer. The Proposed Plan also identified secondary drinking water standards for ethylbenzene, toluene, total xylenes, aluminum, iron, manganese, and zinc as cleanup goals/performance standards for groundwater in both aquifers. Based on comments received during the public comment period, and further discussions with FDEP, EPA determined that the ROD should clarify the selection of Alternative 3D, with two components of 3C as contingencies, as a groundwater remedy for the surficial aquifer and the selection of a modified Alternative 2 as a groundwater remedy for the Upper Floridan aquifer. In addition, EPA determined that prior to implementing the groundwater remedy, the two production wells, Wells F2 and F3, should be decommissioned as the first phase of remedial design. These had not been outlined in the Proposed Plan. These modifications and the justifications and conditions for waiving the secondary standards in the southern surficial aquifer are presented in more detail in the remainder of this section.

Currently, groundwater data indicates that there is contamination above remediation goals in both the southern surficial and Upper Floridan aquifers. The goal of remedial action at the sites is to restore groundwater to meet Federal and State drinking water standards. Both the southern surficial aquifer and the Upper Floridan Aquifer are included in the state-wide classification of potential future sources of drinking water. Based upon information obtained during the remedial investigation, and the careful analysis of all alternatives, EPA believes that the selected remedy will achieve this goal. The Proposed Plan did not include the selection of Alternative 2 for remediation of the Upper Floridan aquifer, but based on additional consideration developed during the public comment period and discussions with FDEP, EPA has selected a modified Alternative 2. Hence, it has been clarified in this Record of Decision.

In addition to active groundwater restoration, prior to implementation of the groundwater remedy, the two production wells, Wells F2 and F3, will be decommissioned. As the first phase of remedial design, the two production wells will be decommissioned and two new Floridan monitor wells will be installed near the locations of F2 and F3. The RI/FS data suggests that no vertical migration of contaminants through the low permeability layer between the surficial and the Floridan aquifer is occurring at the site. However, primary and secondary drinking water standards are exceeded in on-site Floridan wells. The mode of contaminant migration to the Floridan is posited to be via faulty well casings of on-site production wells F2 and F3. Therefore, upon completion of the new monitor wells, all Floridan aquifer wells at the sites will be sampled on a quarterly basis to evaluate the level of contamination in the Upper Floridan aquifer.

The Proposed Plan identified Florida's secondary drinking water standards for ethylbenzene, toluene, total xylenes, aluminum, iron, manganese, and zinc as remediation goals in both the surficial and Upper Floridan aquifers. In the final Area-Wide Hydrologic Feasibility Study dated October 1992, secondary drinking water standards were excluded as ARARs. Therefore, secondary drinking water standards were not identified as remediation goals for the contaminants of concern in the southern surficial and Upper Floridan aquifers. In December 1992, FDEP identified State regulations that would require the application of Florida secondary drinking water standards as State ARARs. These regulations are included in the Florida Administrative Code (F.A.C) Chapters 17-520 and 17-550. After receiving and reviewing information from FDEP, EPA agreed that these regulations were State ARARs. These regulations required lowering and/or including remediation goals for ethylbenzene, toluene, total xylenes, aluminum, iron, manganese, and zinc. Remediation goals for these compounds were listed in the February 1993 Proposed Plan.

During the public comment period, FDEP submitted a letter dated April 26, 1993 clarifying its position regarding the use of secondary drinking water standards as State ARARs. In that letter, FDEP states that:

> "Florida secondary drinking water standards, as defined in Chapter 17-550, F.A.C., and as they apply to Class G-II groundwater, as defined in Chapter 17-520 F.A.C., are applicable or relevant appropriate requirements (ARARs) at NPL sites. The criteria and standards in these rules fulfill the initial requirements as ARARs pursuant to CERCLA 121(d)(2)(A)."

> "Under the FDEP's administrative rules, an existing installation is exempt from compliance with secondary standards "... unless the Department determines that compliance with one or more secondary standards by such installation is necessary to protect groundwater used or reasonably likely to be used as a potable water source"

(17-520.520, F.A.C.). While such an exemption is probable at the Peak Oil/Bay Drums site under 17-520, F.A.C., the secondary standards specified in 17-550, F.A.C., are relevant and appropriate. In other words, FDEP must consider exceedances of secondary standards and make further determination as to whether those exceedances are violations which require cleanup to the standards as part of a CERCLA remedial action."

Violations of secondary standards occur in the surficial and Upper Floridan aquifers at the Peak Oil/Bay Drums site. These violations are present inside as well as outside the property boundaries. In considering how these violations might impact current or future potential use of the aquifers, EPA and FDEP evaluated the following information:

1. A preliminary private wells survey performed during the area-wide groundwater RI/FS did not locate or identify any potable water wells in the surficial aquifer within a one-mile radius of the site. Floridan wells used as a potable water source were identified.

2. Southwest Florida Water Management District (SWFWMD) publications indicate that the surficial aquifer system is currently being used to a limited extent for lawn irrigation and stock water ("Groundwater Resource Availability Inventory: Hillsborough County, Florida" and "Groundwater Quality of the Southwest Floridan Water Management District"). The Floridan aquifer, however, is identified as a potable water source.

3. The Hillsborough County Comprehensive Plan, Future Land Use. Development of new residential homes within the area of the site is unlikely due to zoning restrictions ("Future of Hillsborough County, Florida", July 1989).

4. The Hillsborough County Ordinance 90-35 indicates that, with certain limited exceptions (such as financial hardship), anyone constructing new or modifying existing residential, commercial or industrial buildings within 500 feet of a County main water line must use the public water supply system.

On the basis of the above information regarding current or potential future use of the surficial aquifer, cleanup of the surficial aquifer to meet secondary standards at the Peak Oil/Bay Drums site may not be necessary. However, because the Floridan aquifer is used as a potable drinking water supply, secondary standards are required to be met in the Floridan aquifer. EPA and FDEP will waive secondary standards in the surficial aquifer at the site under the following conditions:

CONDITION 1 A thorough door-to-door private well survey shall be performed as a task in the OU2 Remedial Design. The information to be gathered in the well survey is as follows: (1) size of private well; and (2) depth of private well. The in-depth well survey shall cover the same territory that was covered for the preliminary well survey done for the Area-Wide Groundwater RI/FS. Private wells that are in use and are discovered in this well survey shall be sampled for the contaminants of concern. If the levels in the private well samples are above the remediation goals and it is determined that the private well contamination is related to the Peak Oil/Bay Drums site, the users of that well must be offered the opportunity to be connected to the public water system at no charge.

CONDITION 2 Monitoring of replacement Floridan aquifer wells must indicate that plugging and abandonment of the on-site Floridan production wells (F2 and F3) is effective in preventing continued vertical migration of contaminants into the Floridan aquifer where secondary standards must be met.

Finally, the estimated cost included in the Proposed Plan did not reflect the treatment of both aquifers, but solely the southern surficial aquifer. The total estimated cost of treating both aquifers has been outlined in this Record of Decision. The total present worth cost of the selected remedy, Alternative 3D for the surficial aquifer and a modified Alternative 2 for the Upper Floridan aquifer, as presented in the Feasibility Study, is estimated at $4,132,000. This cost does not reflect contingency costs and the cost of discharging treated water from the Upper Floridan aquifer to the POTW. In the event that the contingency plan must be implemented, the overall cost of the remedy is estimated to increase by $500,000. The cost of discharging treated Upper Floridan water to the POTW is estimated to increase the cost of the remedy as much as $1,500,000, bringing the total estimated cost of the remedy (without contingencies) to $5,632,000.