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United States Environmental Protection Agency
Office of Emergency and Remedial Response
EPA/ROD/R04-92/113
June 1992

EPA

Superfund Record of Decision:

Whitehouse Waste Oil Pits (Amendment), FL

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

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PB93-964008

16. Abstract (Limit: 200 words)

The 7-acre Whitehouse Waste Oil Pits site was used by Allied Petroleum Products (Allied) to dispose of acidic waste oil sludges from its oil reclamation process in Whitehouse, Duval County, Florida. A cypress swamp system and residential area are immediately adjacent to the site. The northeast tributary of McGirts Creek traverses the north site boundary. The Floridian surficial aquifer underlies the site and is the drinking water source for local residents. In Allied's reclamation process, contaminants were removed from waste oil treatment with concentrated sulfuric acid, which precipitated most of the additives and sediment as well as a large portion of the metals and other contaminants in the waste oil. The acid sludge produced in the first step and clay used to decolorize the oil were dumped into the unlined pits at the site. In 1976, following a 200,000-gallon waste oil spill that occurred during dike wall reconstruction, a treatment system to drain the liquid portion of the pits was constructed. In 1979, under the supervision of the state and city, the pits were capped with clay and top soil. A 1985 ROD addressed source control as a containment remedy consisting of a slurry wall construction, soil cap, and a ground water recovery and treatment system; however, EPA has re-evaluated the 1985 ROD selection and

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Whitehouse Waste Oil Pits (Amendment), FL
First Remedial Action - Final
Contaminated Media: soil, sludge, gw, sw
Key Contaminants: VOCs (benzene, toluene, xylenes) organics (PCBs, phenols), 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 106
	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)

determined that the containment remedy failed to meet the requirements of SARA. As a result, this ROD Amendment focuses on an alternative for treating Whitehouse wastes by eliminating direct contact risk associated with pit soil/sludge wastes and preventing contaminated ground water in the surficial aquifer from migrating laterally. The primary contaminants of concern that affect the soil, sediment, surface water, and ground water are VOCs, including benzene, toluene, and xylenes; organics, including PCBs and phenols; and metals, including arsenic, chromium, and lead.

The amended remedial action for this site includes excavating and treating 56,930 cubic yards of waste within seven waste pits. A treatment train consisting of soil washing, biotreatment, and solidification/stabilization (S/S) technologies will be used to treat the waste pits. Included in the clean-up activities are onsite deposition of washed soils and S/S of contaminated fines and sludges; contaminated ground water recovery, ground water analysis and treatment by onsite granular activated carbon (GAC) adsorption and chemical precipitation units before discharge to McGirts Creek; installation and maintenance of a 6-inch vegetative cover over the excavated area; and installation and maintenance of a fence around the site during remedial activities. A pilot-scale treatability study will be initiated to further develop the treatment train. If the ground water treatment system is not capable of achieving the clean-up goals at the end of any 5-year period, the following contingencies will apply: containment measures to prevent further migration of the ground water plume; consideration of a waiver of chemical-specific ARARs for the aquifer; and institutional controls to restrict access to certain portions of the aquifer and onsite and offsite well monitoring. The estimated present worth for this remedial action is $15,500,00 with O&M costs of $3,400,000 calculated for a 30-year period.

PERFORMANCE STANDARDS OR GOALS: Soil clean-up levels are based on a direct contact exposure pathway (risk-based). Chemical-specific goals for soils include PCBs 1 mg/kg; phenols 47,467 mg/kg; benzene 0.4 mg/kg; toluene 2,000 mg/kg; arsenic 32 mg/kg; hexavalent chromium 526 mg/kg; and lead 500 mg/kg. The ground water clean-up levels are in accordance with the Florida Water Quality Standards. Chemical-specific goals for ground water include phenols 10,000 ug/l (risk-based); benzene 1 ug/l (ARAR-based); toluene 24 ug/l (ARAR-based); xylenes 50 ug/l (ARAR-based); arsenic 50 ug/l (ARAR-based); chromium 100 ug/l (ARAR-based); and lead 15 ug/l (ARAR-based).

AMENDED RECORD OF DECISION

Declaration

SITE NAME AND LOCATION

Whitehouse Waste Oil Pits Site
Duval County
Jacksonville, Florida

STATEMENT OF BASIS AND PURPOSE

This Amended Record of Decision (AROD) presents the U.S. Environmental Protection Agency's (EPA) selected Remedial Action (RA) alternative for the Whitehouse Waste Oil Pits (Whitehouse) Site. This AROD was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Section 105 of CERCLA), Fed. Reg. 1990. This AROD documents the fundamental changes to EPA's previous 1985 Record of Decision (ROD). This decision is based on the updated Whitehouse Site Administrative Record file.

The Florida Department of Environmental Regulation's (FDER) verbal concurrence on this AROD will be followed by written concurrence.

SITE ASSESSMENT

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

AROD EXPLANATION

In the MAY 3, 1985 ROD, EPA selected a "containment" remedy consisting of a slurry wall construction, soil cap and a groundwater recovery and treatment system. Section 121(b) of SARA directs EPA to develop clean-up alternatives for Superfund Sites that provide treatment which permanently and significantly reduces the mobility, toxicity and volume of hazardous substances. Pursuant to this statutory mandate, EPA re-evaluated the 1985 ROD selection and has determined that the "containment" remedy fails to meet the requirements of SARA.

In 1990, EPA conducted a Treatability Study (TS) to examine a treatment train consisting of Soil Washing, Biotreatment and Solidification/Stabilization (S/S) as viable technologies for the Whitehouse Site. TS results confirmed that this treatment train would be an effective overall source control remedy and would be consistent with SARA's goals of a more permanent remedy. This treatment train was evaluated as Alternative 3 in EPA's 1991 Feasibility Study (FS) and was found to be the most effective overall alternative for treating Whitehouse wastes. Based on such finding, EPA has selected Alternative 3 as the remedy of choice for the Whitehouse Site. Since Alternative 3 is significantly different than the previously selected 1985 ROD remedy, EPA is required to ammend the Record of Decision.

Alternative 3 will produce an effective solution to remediation of contaminants present at the Whitehouse Site, and will require only minimal removal of hazardous constituents off-site for disposal in the form of GAC filters spent during groundwater recovery and treatment. Also, Alternative 3 will meet all Applicable, Relevant and Appropriate Requirements (ARARs).

AROD DESCRIPTION

The remedy selected in this AROD consists of, among other things, treating the contaminant source, preventing contaminated groundwater in the surficial aquifer from migrating laterally contaminants

- S/S of Biotreated contaminant fines and sludges exceeding clean-up criteria
- on-site deposition of washed soils and S/S of contaminant fines and sludges
- contaminated groundwater recovery, groundwater analysis and treatment by on-site GAC adsorption and chemical precipitation units to acceptable levels; clean-up levels would be in accordance with Florida Water Quality Standards Chapter 17-3.061.3(m) of the Florida Administrative Code before discharge to McGirts Creek
- Installation and maintenance of a 6 inch vegetative cover over the excavated area.
- Installation and maintenance of a fence around the site during remedial activities
- Institutional controls including deed restrictions

The estimated present worth capital cost for the AROD remedy is $15,500,000 with Operation and Maintenance (O & M) costs of $3,400,00 calculated for a period of 30 years.

STATUTORY DETERMINATIONS

This AROD is protective of human health and the environment, complies with Federal and State ARARs directly associated with this action, and is cost-effective. This AROD utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This AROD also satisfies the statutory off-site and preventing potential vertical migration downward into the Floridan aquifer. The surficial aquifer is the source of drinking water for local residents, and contamination presents a threat to human health and the environment.

Soil contaminants of concern include organic compounds (Benzene, Benzo(a)pyrene, Bis (2-Ethyl Hexyl) Phthalate, Chlorobenzene, 1,4 Dichlorochlorobenzene, Di-N-Butyl Phthalate, Methylene Chloride, Polychlorinated Biphenyls (PCB) 1260, 2-Methylnaphthalene, Naphthalene, Phenol, Tetrachloroethene, Toluene and Trichloroethene) and inorganic compounds (Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead and Nickel). Groundwater contaminants of concern include organic compounds (Acetone, Benzene, Benzo(a)pyrene, Bis (2-Ehtyl Hexyl) Phthalate, Carbon Disulfide, Di-N-Butyl Phthalate, Ethylbenzene, Methyl Ethly Ketone, 3/4 Methylphenol, Naphthalene, 2-Methylnaphthalene, Phenol, Toluene, Trichloroethene and Xylene) and inorganic compounds (Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, Selenium, Vanadium and Zinc). These contaminants exceed both state and federal drinking water standards in varying degrees.

1992 AROD REMEDY

Major components of the remedy contained in this AROD include:

- excavation of contaminated waste pits
- separation of construction debris, stumps, etc. from contaminated soils and steam cleaning prior to off-site disposal
- volume reduction by Soil Washing to free contaminants from soils by suspension in wash-water
- Biotreatment to biologically degrade wash-water

preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the water table may limit the depth of excavation, some hazardous substances above health-based levels may remain on-site. The groundwater recovery and treatment system will address any leachate from substances left behind. A review of the remedy will be conducted at least every five years after commencement of the RA to ensure that this remedy continues to provide adequate protection of human health and the environment. Groundwater contingencies are provided if treatment is found to be ineffective at any five year interval. Contingencies include the use of the groundwater recovery and treatment system to contain the groundwater plume.

6-16-92
DATE

Patrick M Tobin
for Greer C. Tidwell
Regional Administrator

AMENDMENT TO THE RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

WHITEHOUSE WASTE OIL PITS SITE
DUVAL COUNTY, WHITEHOUSE, FLORIDA

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

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WHITEHOUSE WASTE OIL PITS SITE
DUVAL COUNTY, WHITEHOUSE, FLORIDA

1.0 INTRODUCTION

This Amended Record of Decision (AROD) presents the selected remedial alternative for the Whitehouse Waste Oil Pits (Whitehouse) Site. This AROD was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Contingency Plan (NCP). This AROD is based on the Whitehouse Waste Oil Pits Site Administrative Record.

Section 121(b) of SARA directs EPA to develop remedial alternatives for Superfund Sites that provide treatment which permanently and significantly reduces the mobility, toxicity and volume of hazardous substances. Pursuant to this statutory mandate, EPA began re-evaluating the 1985 ROD selection and found the "containment" remedy to be inadequate.

In 1990, EPA conducted a Treatability Study (TS) to examine a treatment train consisting of Soil Washing, Biotreatment and Solidification/Stabilization (S/S) as viable technologies for the Whitehouse Site. This treatment train was evaluated as Alternative 3 in EPA's 1991 Feasibility Study (FS) and was found to be the most effective overall alternative for treating Whitehouse wastes. Since Alternative 3 is significantly different than the previously selected 1985 ROD remedy (Appendix A), EPA is required to amend the Record of Decision (ROD).

2.0 SITE LOCATION AND DESCRIPTION

The Whitehouse Site is located in the community of Whitehouse, Duval County, Florida, approximately 10 miles west of Jacksonville on U.S. Highway 90 (Figure 1). The site occupies seven acres of upland area immediately adjacent to a cypress swamp system and residential area. The northeast tributary of McGirts Creek traverses the north site boundary.

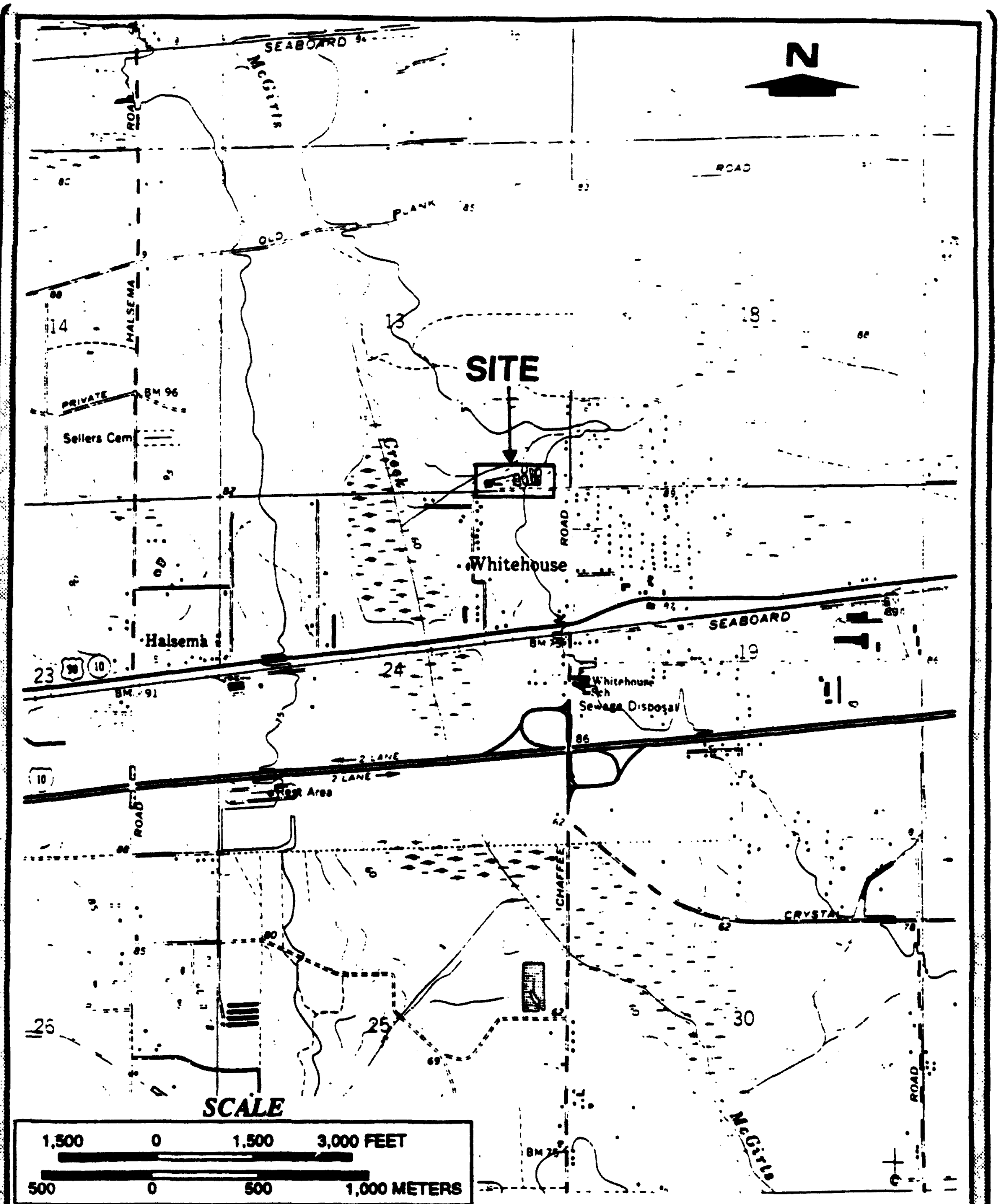
3.0 SITE HISTORY

The Whitehouse Site was used by Allied Petroleum Products (Allied), a waste oil re-refinery, for the disposal of acidic waste oil sludges from its oil reclamation process. In the reclamation process, contaminants were removed from waste oil by treatment with concentrated sulfuric acid which precipitated most of the additives and sediment as well as a large portion of the metals and other contaminants in the waste oil.

The oil was then typically vacuum-distilled and finished by decolorizing with clay. The acid sludge produced in the first step and the clay used to finish the oil were then dumped into the unlined pits at the site.

Between 1958 and 1968, Allied constructed and filled seven pits at the site (Figure 2). In 1968, Allied filed for bankruptcy and ceased re-refinery operations. In the 1970s, the City of Jacksonville and others acquired portions of the site as a result of the nonpayment of back taxes.

In 1968, Pit 7 ruptured, spilling its contents into McGirts Creek. The Jacksonville Mosquito Control Branch, in an attempt to control future spills from other pits, began building an oil water separator. This project was never completed.



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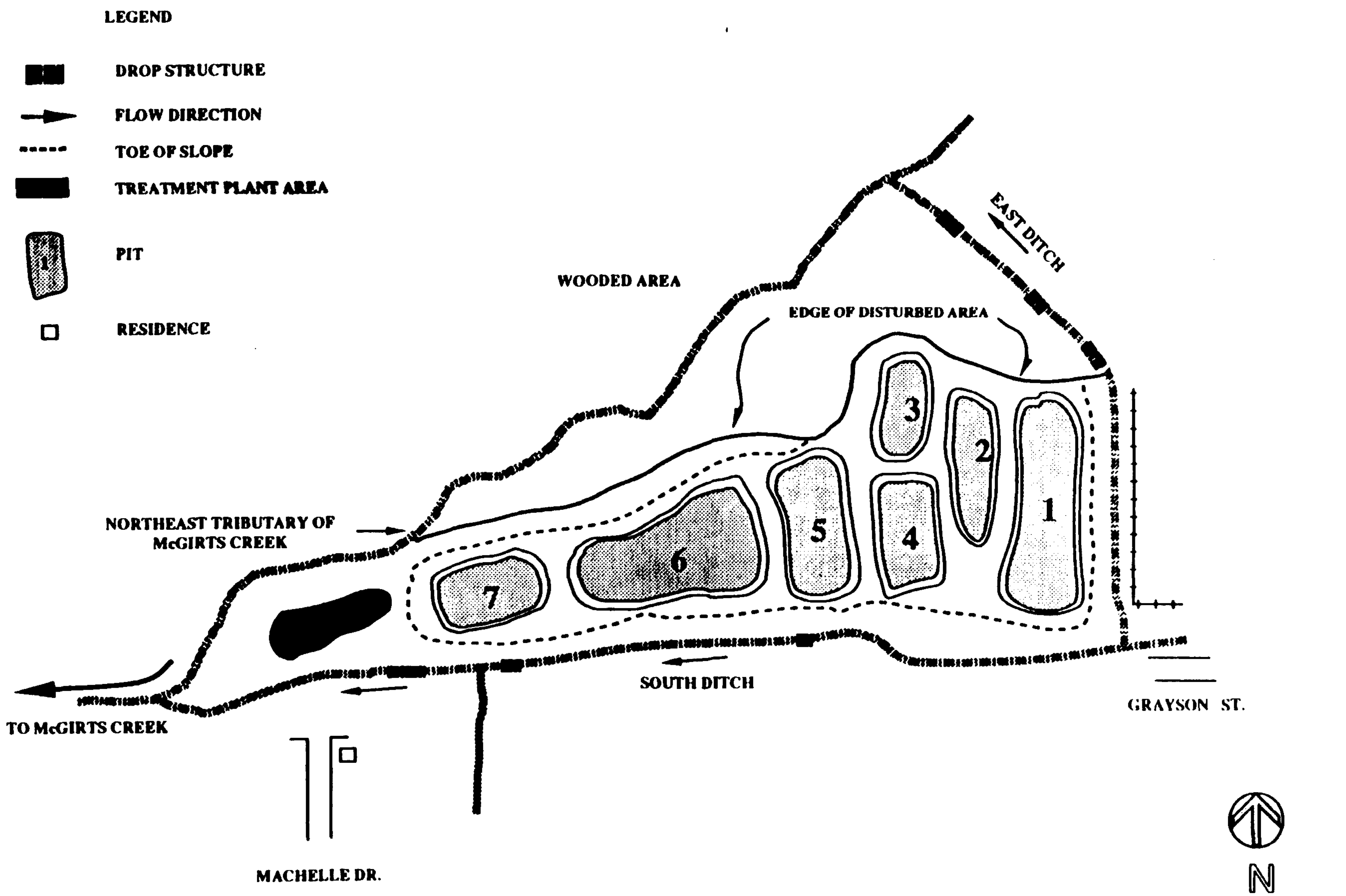
SITE LOCATION MAP
WHITEHOUSE WASTE OIL PITS SITE
DUVAL COUNTY, FLORIDA

FIGURE 1

POOR QUALITY ORIGINAL



ADOPTED FROM: FINAL REPORT,
THE WHITEHOUSE OIL PITS, DUVAL Co. FLA.,
SITE ASSESSMENT
BUREAU OF OPERATIONS, FDER, DEC. 1983

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SITE CHARACTERISTICS MAP
WHITEHOUSE WASTE OIL PITS SITE
DUVAL COUNTY, FLORIDA

FIGURE 2

In 1976, following a 200,000 gallon waste oil spill which occurred during dike wall reconstruction by the Jacksonville Mosquito Control Branch, EPA's Region IV Emergency Response Branch became involved at the site. With the City of Jacksonville's assistance, EPA constructed a treatment system to drain the liquid portion of the pits. Following the pit draining, the City of Jacksonville attempted to stabilize the pits with construction debris, automobile shredder waste, scrap lumber, trees, wood chips, etc. The automobile shredder waste layer was then covered with a Fullers Earth/Oil Sludge mixture. The pits were then capped with Fullers Earth and local clay. Surface water diversion ditches which included limestone neutralization pits were constructed.

In 1979, under the supervision of the Florida Department of Environmental Regulations (FDER), the City of Jacksonville capped the pits with clay and topsoil. Diversion ditches were modified following vandalism.

In 1982, the site was placed on the National Priorities List (NPL). Following the NPL listing, EPA conducted a search for Potentially Responsible Parties (PRPs). However, viable PRPs were not located at that time due to the scarcity of site operating records.

In 1983, FDER completed a "Remedial" Site Investigation (RI) under a cooperative agreement with EPA. The RI characterized site wastes and the extent of contamination.

In 1985, EPA conducted a FS which evaluated remedial alternatives for the site. Based on the findings of the RI/FS, EPA signed a Record of Decision in 1985 which selected a remedial alternative consisting of Slurry Wall construction, Surface Capping, and Surface and Groundwater Recovery and Treatment as the most effective overall source control remedy.

In 1988, EPA initiated Remedial Design (RD) activities. A Preliminary Design Analysis of the RD was conducted under contract with the U.S. Army Corps of Engineers. Subsequent to the Design Analysis, activities were discontinued. Pursuant to SARA, EPA re-evaluated the 1985 ROD "containment" selection in search of alternatives that provide treatment which permanently and significantly reduces the mobility, toxicity and volume of hazardous substances.

In 1989, EPA renewed its search for PRPs and was able to identify a group of PRPs.

In 1990, EPA conducted a Risk Assesment to provide an updated assessment of risks to human health and the environment. In 1990 and 1991, General Notice Letters were issued to a number of PRPs.

In 1991, EPA conducted a TS to examine a treatment train consisting of Soil Washing, Biotreatment and S/S as viable technologies for the Whitehouse Site. EPA also conducted a FS to evaluate present RA alternatives.

In July or August of 1992, EPA will issue Special Notice Letters to PRPs.

4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Minimal community involvement has occurred since 1985, despite EPA's efforts to keep the community informed of activities at the site.

The Risk Assessment, TS and FS documents were released to the public on January 3, 1992. The documents were added to the Administrative Record (AR) and made available for public review at the following locations:

- EPA Region IV (Docket Room)

o Whitehouse Elementary School (Site Repository)

EPA published a notice in the Florida Times Union newspaper on January 16, 1992 notifying the public of EPA's upcoming Proposed Plan Public Meeting on the site, the availability of the Administrative Record and the thirty day public comment period. A public meeting was held at the Whitehouse Elementary School on January 30, 1992. At this meeting representatives from FDER and EPA answered questions and addressed community concerns. Responses to comments received during the public comment period are included in Appendix B (Responsiveness Summary).

A thirty (30) day public comment period was established from January 29, 1992 to February 28, 1992. Upon request from several Potentially Responsible Parties, the public comment period was extended an additional 30 days, ending on March 29, 1992.

5.0 SCOPE AND ROLE OF AROD WITHIN SITE STRATEGY

The major goal of the remedy selected in this AROD is to treat as much of the contaminant source as possible to prevent contaminated groundwater in the surficial aquifer from migrating laterally off-site and to prevent the potential of vertical migration downward into the Floridan aquifer. The surficial aquifer under the site is contaminated with heavy metals, primarily lead, which exceed both State and Federal drinking water standards. The surficial aquifer is the source of drinking water for local residents and contamination presents a threat to human health. The clean-up objectives for this AROD are to prevent current or future exposure to the contaminated groundwater.

6.0 SITE CHARACTERIZATION

6.1 Surface Drainage

The Whitehouse Site is located in the McGirts Creek drainage basin. Local surface drainage flows toward the northwest tributary of McGirts Creek approximately 1,200 feet away. Past berming and capping operations raised the site 5-7 feet. The present elevation surface drainage flows toward the northeast into the northeast tributary of McGirts Creek and southwest into a man-made drinage ditch. The soil cap over Pits 1 and 7 are presently deteriorating allowing waste oil sludges to reach the surface.

6.2 Hydro-Geology

The Whitehouse Site is underlain by a shallow aquifer system which flows southwest and a deeper Floridan aquifer system which flows south. The total thickness of the shallow aquifer system is approximately 500 feet. The total thickness of the Floridan aquifer system is greater than 2,000 feet.

The shallow aquifer system is comprised of un-differentiated Holocene and Pleistocene age sediments deposited during the formation of marine terraces and beach ridges. Holocene and Pleistocene deposits primarily consist of fine to medium grained loose quartz sands, iron oxides and sandy clay beds containing mollusk shell material. Underlying Pliocene and upper Miocene deposits consist of sand, shell, sandy clay and limestone. A limestone deposit at a depth of approximately 112 to 140 feet is the major water-yielding zone. Most private wells obtain water from this system. Middle to lower Miocene deposits consist of sand, sandy silt, clayey sand, clay and sandy limestone, all of which contain moderate to large amounts of phosphate sand, granules and pebbles.

The Floridan aquifer system is comprised of limestone deposits.

7.0 RISK ASSESSMENT

CERCLA as amended by SARA establishes a national program for responding to releases of hazardous substances into the environment. The NCP, which is the regulation that implements CERCLA, establishes the overall approach for determining appropriate remedial actions at Superfund sites. The overall mandate of the Superfund program is to protect human health and the environment from current and future threats posed by uncontrolled hazardous substance releases.

As part of EPA's re-evaluation of the 1985 ROD and in order to assess current and future exposure risks for the Whitehouse Site, a Risk Assessment was conducted as part of the RI/FS process. This section summarizes the exposure risks associated with the site's environmental media.

7.1 Contaminants of Concern

Sampling data from the site's media (soils, sediments, surface water and groundwater) were examined and compiled to produce a list of all contaminants. This list was reduced according to the Risk Assessment Guidance for Superfund: Volume 1; Human Health Evaluation Manual (RAGS: EPA/540/1-89/002) methodologies (grouped by chemical class and screened using frequency of detection in each media, essential nutrient information, anthropogenic comparison, association with site activities, background comparison, and a concentration-toxicity screen). The resulting list of contaminants, deemed "chemicals of concern", include contaminants that are the most toxic and represents 99 percent of the risk thus being carried into the risk calculation procedure.

EPA's Risk Assessment also took into consideration sampling data from exposed wastes. "Exposed wastes" by definition are areas of waste seepage or boils which are located primarily at the northeastern end of the site. The media along with the contaminants of concern are listed in Appendix C: Table 1.

Hazardous substances detected at the site can be placed into two broad categories (carcinogens and non-carcinogens). The carcinogens associated with the site are not numerous. Soil localized carcinogens include 1,4-Dichlorobenzene, Methylene Chloride, 1,1,2,2-Tetrachloroethane, and Tetrachloroethene. There are no surface water carcinogens. PCB 1260 was the only carcinogen in the exposed wastes. Trichloroethene and Isophorone, also carcinogens, were localized to surficial groundwater while no carcinogens were found in deeper groundwater.

The noncarcinogens associated with the site include Chlorobenzene, 1,4-Dichlorobenzene, Methylene Chloride, Naphthalene, Tetrachloroethene, Toluene, 1,1,1-Trichloroethane, Acetone, and Methylisobutyl Ketone in soils. The surface water noncarcinogens were Carbon Disulfide and Manganese. Exposed wastes contained non-carcinogens Antimony, Barium, Copper, Lead, 2-Methylnaphthalene, 3,4-Methylphenol, Naphthalene, and Zinc.

Shallow groundwater contained non-carcinogens Carbon Disulfide, Acetone, Toluene, Xylene, Antimony, Barium, Chromium, Copper, Manganese, Nickel, Selenium, Vanadium, Zinc, 3,4-Methylphenol, and Naphthalene. Deep groundwater noncarcinogenic contaminants include Antimony, Barium, Chromium, Copper, Manganese, Nickel, Zinc, 1,4-Dichlorobenzene, and Naphthalene.

The exposure concentrations developed based on the range of contaminant concentrations are called the "Reasonable Maximum Exposure" (RME). RME determination will be discussed in Section 7.2.

7.2 Exposure Assessment

The exposure assessment characterizes potential routes or pathways of exposure for contaminants of concern to reach receptors. The exposure pathways used in risk prediction encompass current and future scenarios which include:

Current:

1) Ingestion and dermal absorption of soils and exposed wastes
2) dermal absorption of contaminants in surface water
3) ingestion of vegetables grown in contaminated soils

Future:

1) Ingestion and dermal contact with soils
2) ingestion of vegetables grown in contaminated soils
3) inhalation of volatiles while irrigating vegetable crops
4) ingestion of vegetables contaminated by groundwater
5) ingestion of groundwater
6) inhalation of volatiles during showering
7) dermal absorption of contaminants while showering
8) exposure to contaminants released from landfill waste

The populations to be examined include nearby residents and trespassers as well as future residents.

The exposure point concentrations for each contaminant in each medium were calculated using the 95% upper confidence limit on the arithmetic average. This value is deduced by comparing the 95% upper confidence limit of the arithmetic average to the maximum concentration and the lower of the two is selected. This will be the RME concentration to be carried into the Risk

Assessment. The RMEs for the contaminants per media are listed in Appendix C: Table 1.

Modelling was used to predict exposure concentrations for groundwater to air mass discharge rates. First the air columetric flow rate was determined to be 133 m^3/sec which was then used to calculate the concentration in air (as described in the Superfund Exposure Assessment Manual: EPA/540/1-88/001). Root uptake factors which were used to predict vegetable uptake of contaminants from soil were calculated using the method from Baes et al., (1984). Ground water contaminant concentration used in irrigating homegrown vegetables involved a simple conversion based on the total predicted amount of irrigation water used per land area (3100 l/m^2). This water amount was then factored with the contaminant concentration in ground-water and corrected for the amount of water that would actually reach the root zone (top 20 cms). EPA's Uptake Biokinetic Model was used to predict blood lead levels (in various age groups) from lead concentrations in various media.

A model was also used as a tool to predict future increases in groundwater contamination from pit waste. The first step in this two part model involved the use of a dilution equation to predict chemical concentrations in the infiltrate that upon reaching groundwater might result concentrations which exceed acceptable health-based or ARAR-based groundwater limits. Total rainfall was 51.47 inches/year (NOAA 30-year average), evapotranspiration was 41.41 inches/year (thornthwaite potential-based), runoff was 0 inches/year, and infiltration was 9.96 inches/year. Chronic daily intakes were calculated using the methods specified in RAGS. All pathways were developed for ages 0 through 75 years. If assumptions differed from that of the guidance manual (i.e., values drawn from other agency developed documents), such values are listed in Appendix C: Tables 2 through 4.

Present and future soil ingestion scenario assumptions (Appendix C: Table 2) which include standard ingestion values of 100 and 200 mg/day for children and adults respectively. Soil exposure frequencies ranged from 180 to 365 days/year which corresponded to age ranges 0-1 to 18-75. Ingestion absorption factors were applied at 50% for semivolatiles and metals while 100% was used for volatile organics. Dermal absorption factors of 1.2%, 5%, and 1% for semivolatile organics, volatile organics, and metals respectively were used. Skin surface areas ranged from 1700 to 2000 cm^2/event according to the age groups employed (0-1 through 18-75).

The exposure parameters used in surface water exposure are listed in Appendix C: Table 3. This route focused on age groups 7-11 and 12-17. The duration of dermal exposure ranged from 5 years (ages 7-11) to 6 years (ages 12-17) while the frequency of exposure ranged from 52 days/year (ages 7-11) to 10 days/year (age 12-17). Skin surface areas of 3800 cm^2 and 5900 cm^2 were used for ages 7-11 and 12-17 respectively.

The exposure assumptions for groundwater ingestion are listed in Appendix C: Table 4. Ingestion volumes of 1 liter for age groups up to 11 years were used while 2 liters were utilized for the 12 to 75 age groups. Ingestion exposure frequencies were 365 days/year. In the inhalation route (during irrigation) the 0-1 age group was not examined. Inhalation frequencies of exposures of 122 days/year were used in all remaining age instances. Inhalation rates ranged from 0.83 m^3/hr (ages 2-6) to 2.50 m^3/hr (ages 18-75). In both ingestion and in inhalation, absorption factors of 1 were used.

Vegetable ingestion scenarios were not carried through the Risk Assessment because the contaminant concentrations predicted to be available in soils for uptake by root crops, leafy crops, and non-leafy crops did not exceed background concentrations.

7.3 Toxicity Assessment

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)-1 are multiplied by the estimated intake of a potential carcinogen, to provide an upper-bound estimate of the excess lifetime cancer risks associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes under-estimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

References doses (RfDs) have been developed by EPA for predicting the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects.

RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals that are thought to be without adverse affects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical 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). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

The CPFs and RfDs for the contaminants of concern are listed in Appendix C: Tables 5 and 6 respectively. Both sets of numbers were extracted from either Integrated Risk Information System (IRIS) or Health Effects Assessment Summary Tables (HEAST).

Toxicity information for each chemical of concern are also listed in Appendix C: Tables 5 and 6. Overall, the target organs that exhibit increased cancers include the liver by oral route and the lungs which are the inhalation route's primary target organ. The target organs/systems that might possibly be affected by the site's noncarcinogens are diverse. These range from the liver and kidney to skin, muscle, central nervous system (CNS), and blood. The liver and kidneys are primarily affected by the site's organic volatile constituents such as Methylene Chloride, Acetone, 1,2-Dichloroethene, 4-Methyl-2-Pentanone, Tetrachloroethene, and Chlorobenzene.

Note that fetotoxicity can be a problematic consequence of exposure to either Phenol or Carbon Disulfide. Inhalation toxicities range from simple irritation in the upper respiratory tract (Xylenes and Toluene) to liver, kidney, CNS, and cardiac affects (1,4-Dichlorobenzene, 4-Methyl-2-Pentanone, Manganese, and Cobalt).

7.4 Risk Characterization

Excess lifetime cancer risks are determined by multiplying the intake level by the cancer potency factor. 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 plausible upper bound, an individual has a one in one million 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 Agency considers individual excess cancer risks in the range of 10^{-4} to 10^{-6} as protective; however the 10^{-6} risk level is generally used as the point of departure for setting cleanup levels at Superfund sites. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The chemical specific risk quantification results and hazard indices per media are listed in Appendix C: Tables 7 through 13. When combined (per media and across pathways) the resulting carcinogenic risk for all current scenarios is $3.5X10^{-5}$ which falls within EPA's acceptable risk range (10^{-4} through 10^{-6}). The total risk for the future scenario is $2.0X10^{-6}$ which is also acceptable. The hazard indices for the current scenarios total 0.16 while the total for the future scenarios equals 16.9 both of which are unacceptable (>1). This summary information is located in Appendix C: Table 14. Lastly, it is noted that the hazard index for the 0-1 years age group was slightly higher than the 2-6 years group. While risk managers should be aware of this fact, it is important to know that said pathway is extremely conservative thus the 2-6 group's values are probably more realistic while also providing a suitable cleanup level that would be protective of all age groups reported herein.

As predicted by the Uptake Biokinetic Model, lead levels in groundwater and exposed wastes are unacceptable. Said model is used in the absence of chronic toxicity values (RfDs) to predict blood lead levels in sensitive age group populations. The concentrations per media applied in this application included 0.33 ug/day (from surface soils), 56 ug/day (from exposed wastes), 8.1 ug/day (from vegetables), and 306 ug/day (from ground-water). Said model predicted blood lead levels ranging from 127 ug/dl (ingestion of shallow drinking water) to 23.2

ug/dl (incidental ingestion of exposed wastes). Predicted levels that fall outside the acceptable range of 10 ug/dl are suggested to be associated with neurological effects and nervous system damage in children.

7.5 Environmental Evaluation

An environmental evaluation was performed as part of the Risk Assessment. This evaluation procedure included: 1) a review of the chemical concentrations in various media to establish the presence, concentration, and spacial variability of specific toxic chemicals, 2) an ecological survey to establish current impacts to flora/fauna, and 3) toxicity comparisons to establish a link between toxicity of the wastes and adverse ecological effects.

The Ecological system of primary concern is the McGirts Creek tributary which is located two-hundred feet north of the site. A cypress swamp tributary system surrounds the site and empties into this creek. This system was reportedly impacted according to past sampling and observation primarily from releases along the northeast branch tributary. In 1980, samples demonstrated that Chromium, Lead, Zinc, Iron, and Cadmium were present in waters around the site's tributary ditch system. No macro-invertebrate populations could be located 100 yards downstream of the oil pits in the northeast tributary. Also during that year, FDER conducted a biological survey downstream in McGirts Creek which revealed that the system was under stress. In 1982 inspectors noted dense vegetation and the presence of small fish along the stream bank which indicated that the system was improving.

During EPA's 1990 site investigation, EPA observed that the stream adjacent to the site was half dry with a brownish tinge. No fish or amphibians were observed. No stressed vegetation was observed. Sediment samples were devoid of contaminants while surface water samples indicated the presence of Aluminum, Barium, Lead, Manganese, Zinc, and Carbon Disulfide.

Appendix C: Table 15 qualitatively compares various ARARs (including State of Florida Surface Water Quality Classifications) to the sampled concentrations. Note that Aluminum, Manganese, Zinc and Carbon Disulfide exceed listed ARARs.

Threatened and endangered species localized to the entire state of Florida include the Florida Panther, Bald Eagle, Bachman's Warbler, Ivory-billed Woodpecker, Red-cockaded Woodpecker, American Alligator, and the Eastern Indigo Snake. Duval county is a critical habitat for the Florida Manatee. Though none of these species have been observed at the site, the possibility for such an association on or near the site remains possible.

8.0 AROD ALTERNATIVES CONSIDERED

Remedial Alternative Development

The 1985 ROD remedy was based on an estimated contamination area volume of 127,000 cubic yards. This estimate is based on the entire site (pits and surrounding area). The 1985 ROD remedy has been re-evaluated in the FS and this AROD as Alternative 2. Alternative 2 uses the same volume estimate found in the 1985 ROD.

As part of EPA's 1991 FS, waste volumes estimates were re-calculated to establish a basis for comparison of remedial Alternatives 3 and 4 in the treatment of only the pit wastes. TS field trenching data (Ebasco 1990) in conjunction with previous investigation survey maps were used in the pit waste calculations. Calculations assumed straight wall pits. The earth cap was not part of this estimate. The FS concluded that approximately 56,660 total cubic yards of waste exists within the seven pits. To allow for imprecise excavation, 56,930 cubic yards of pit waste would require remediation. FS alternatives 3 and 4 are based on this estimate.

The FS also includes cost estimate break-down tables on present worth Capital and Operation and Maintenance (O&M) costs for alternatives 1-4. O&M costs were calculated for a period of 30 years although the RA is not expected to take that long.

Remedial Alternatives

The following remedial alternatives were evaluated in the 1991 FS and this AROD:

- o Alternative 1 - No Action
- o Alternative 2 - Slurry Wall, Surface Cap and Groundwater Recovery & Treatment (1985 ROD)
- o Alternative 3 - Soil Washing, Biotreatment, S/S and Groundwater Recovery & Treatment
- o Alternative 4 - S/S and Groundwater Recovery & Treatment

8.1 Alternative 1 - No Action

The No Action alternative is required by Section 300.430(e) of the NCP to be considered in the detailed analysis of this AROD. It provides a baseline for comparison of other alternatives.

Under Alternative 1, no source control remedial measures would be undertaken at the site and no further effort would be made to restrict potential human exposure to contaminants. Given the nature of the contaminant source, natural soil flushing is not expected to reduce soil contamination to below clean-up criteria.

The present worth cost estimate for Alternative 1 is as follows:

Capital:	$	62,000
(O&M):	$	0
		62,000

8.2 Alternative 2 - Slurry Wall, Surface Cap and Groundwater Recovery & Treatment (1985 ROD)

Under Alternative 2, a slurry wall would be constructed around the entire site. The slurry wall would be keyed into the aquitard. The area within the slurry wall would be capped to control drainage and to eliminate direct exposure of the soil / sludge wastes.

Groundwater extraction wells would be installed around the site. Groundwater would be recovered from these wells and treated prior to discharge to an on-site drainage ditch which flows into the northeast tributary of McGirts Creek.

The present worth cost estimate for Alternative 2 is as follows:

Capital:	$	5,300,000
O&M:	$	6,200,000
		11,500,000

8.3 Alternative 3 - Soil Washing, Biotreatment, S/S and Groundwater Recovery & Treatment

Under Alternative 3, all seven pits would be subject to excavation. Pit soil/sludge wastes would be excavated to varying depths according to the confines of each pit. Excavation depths would be limited by the groundwater table at the time of excavation. Excavation would be performed during a seasonal low water table period to maximize excavation depths.

Excavated soil/sludge wastes would then be screened to remove coarse material (construction debris, stumps, etc.). Coarse material would be steam cleaned prior to off-site disposal.

Screened soil/sludge wastes would then be slurried with water and/or surfactants in a soil washing unit to suspend contaminant fines in the wash-water. The coarse soil (> 200 mesh) would be separated from the wash-water and suspended fines (< 200 mesh). Screened coarse soils below clean-up goals would be placed back on-site into the excavated area. Screened coarse soils above clean-up goals would be subject to S/S prior to backfilling on-site.

Suspended contaminant fines (< 200 mesh) would then be subjected to biotreatment to remove contaminants from the waste stream through microbial degradation.

Biotreated effluent would then be treated prior to discharge to an on-site drainage ditch.

S/S would then be used to treat contaminant fines which biotreatment could not adequately treat.

Groundwater extraction wells would be installed around the site. Groundwater would be recovered from these wells and treated prior to discharge to an on-site drainage ditch which flows into the northeast tributary of McGirts Creek.

The present worth cost estimate for Alternative 3 is as follows:

Capital:	$	15,500,000
O&M:	$	3,400,000
		18,900,000

8.4 Alternative 4 - S/S and Groundwater Recovery & Treatment

All seven pits would be subject to excavation. Pit soil/sludge wastes would be excavated to varying depths according to the confines of each pit. Excavation depths would be limited by the groundwater table at the time of excavation. Excavation would be performed during a seasonal low water table period to maximize excavation depths.

Excavated soil/sludge wastes would then be screened to remove coarse material (construction debris, stumps, etc.). Coarse material would be steam cleaned prior to off-site disposal.

Screened soil/sludge wastes would then be S/S and placed back on-site into the excavated area.

Groundwater extraction wells would be installed around the site. Groundwater would be recovered from these wells and treated prior to discharge to an on-site drainage ditch.

The present worth cost estimate for Alternative 4 is as follows:

Capital:	$	20,900,000
O&M:	$	3,400,000
		24,300,000

9.0 COMPARATIVE ANALYSIS

This section provides the basis for determining which alternative (i) meets the threshold criteria for overall protection of human health and the environment and has compliance with ARARs (ii) provides the "best balance" between effectiveness and reduction of mobility, toxicity or volume through treatment, implementability and cost (iii) has state and community acceptance. A glossary of the evaluation criteria is provided in Appendix C: Table 16.

9.1 Overall Protection of Human Health and Environment

Alternative 1 would not be protective of human health and the environment because it would not reduce the level of risk. Exposure pathways would not be removed nor would contaminant migration be eliminated. Therefore, Alternative 1 will not be considered further in this comparative analysis as a remedial alternative option.

Alternatives 2, 3 and 4 would be protective of human health and the environment. Alternatives 2, 3 and 4 would reduce the level of risk via removal of the direct contact exposure pathway and the groundwater ingestion pathway. Alternatives 3 and 4 would reduce contaminant migration.

9.2 ARAR Compliance

Alternatives 2, 3 and 4 would effectively meet all respective ARARs. However, Alternatives 3 and 4 might require treatability variances if S/S admixture formulations do not meet TCLP standards.

9.3 Short-Term Effectiveness and Permanence

Alternatives 2, 3 and 4 would achieve short-term effectiveness and permanence. Alternative 2 would remove the direct contact exposure pathway via surface capping. Alternatives 3 and 4 would remove the direct contact exposure pathway via excavation and treatment of pit wastes. Alternatives 2, 3 and 4 would also remove the groundwater ingestion exposure pathway via groundwater recovery and treatment.

9.4 Long-Term Effectiveness and Permanence

Alternatives 2, 3 and 4 would achieve long-term effectiveness and permanence. Alternative 2 would remove the direct contact exposure pathway via a long-term containment system consisting of slurry wall construction and surface capping but would leave the contaminant source in place. Alternatives 3 and 4 would remove direct contact exposure via excavation and treatment of pit wastes. Alternatives 2, 3 and 4 would also remove the groundwater ingestion exposure pathway via long-term monitoring of groundwater recovery and treatment.

9.5 Mobility, Toxicity and Volume (MTV) Reduction

Alternatives 2, 3 and 4 would reduce MTV in varying degrees. Alternative 2 would reduce Mobility via slurry wall construction, Toxicity via groundwater recovery and treatment but would not reduce Volume. Alternatives 3 and 4 would reduce Mobility via treatment of pit wastes, Toxicity via treatment of pit wastes and groundwater recovery and treatment and Volume via treatment of pit wastes although some volume increase would occur as a result of stabilization activities.

9.6 Implementability

Alternatives 2, 3 and 4 would be technically and administratively feasible to implement in varying degrees. Alternative 2 would be technically and administratively feasible to implement because slurry wall construction and surface capping are proven technologies. Alternative 3 would require technical design considerations due to the intricacies of the treatment train but it is administratively feasible. While proven technologies on other sites, these technologies are still undergoing evaluation on site-specific wastes. TS results are favorable on Whitehouse wastes but will need further studies in the RD to fine tune the technology train. Alternative 4 would be technically and administratively feasible. S/S is a proven technology.

9.7 Cost Effectiveness

Alternatives 2,. 3 and 4 would be cost effective in varying degrees. Alternative 2 would be cost effective with Capital, and O&M costs totaling $11,500,000. Alternative 3 would be more costly with Capital and O&M costs totaling $18,900,000. Alternative 4 would be the most costly with Capital and O&M costs totaling $24,300,000.

9.8 State Concurrence

FDER concurs with Alternative 3 because it offers maximum protection of human health and the environment by treatment of pit soil/waste sludges through Soil Washing, Biotreatment, S/S and Goundwater Rcovery and Treatment.

9.9 Community Acceptance

While Alternatives 2, 3 and 4 offer protection of contamination to the Whitehouse community via groundwater recovery and treatment, Alternatives 3 and 4 offer maximum protection by treatment of pit soil/waste sludges. Based on comments made by citizens at the public meeting held on January 30, 1992 and those received during the public comment period, EPA perceives that the community believes Alternative 3 would offer adequate protection to human health and the environment.

10.0 AMENDED REMEDY SELECTION

Alternative 3 is the 1991 AROD selected remedial alternative. The Soil Washing, Bioremediation, S/S and Groundwater Recovery and Treatment (Figure 3) technology train are described in further detail below:

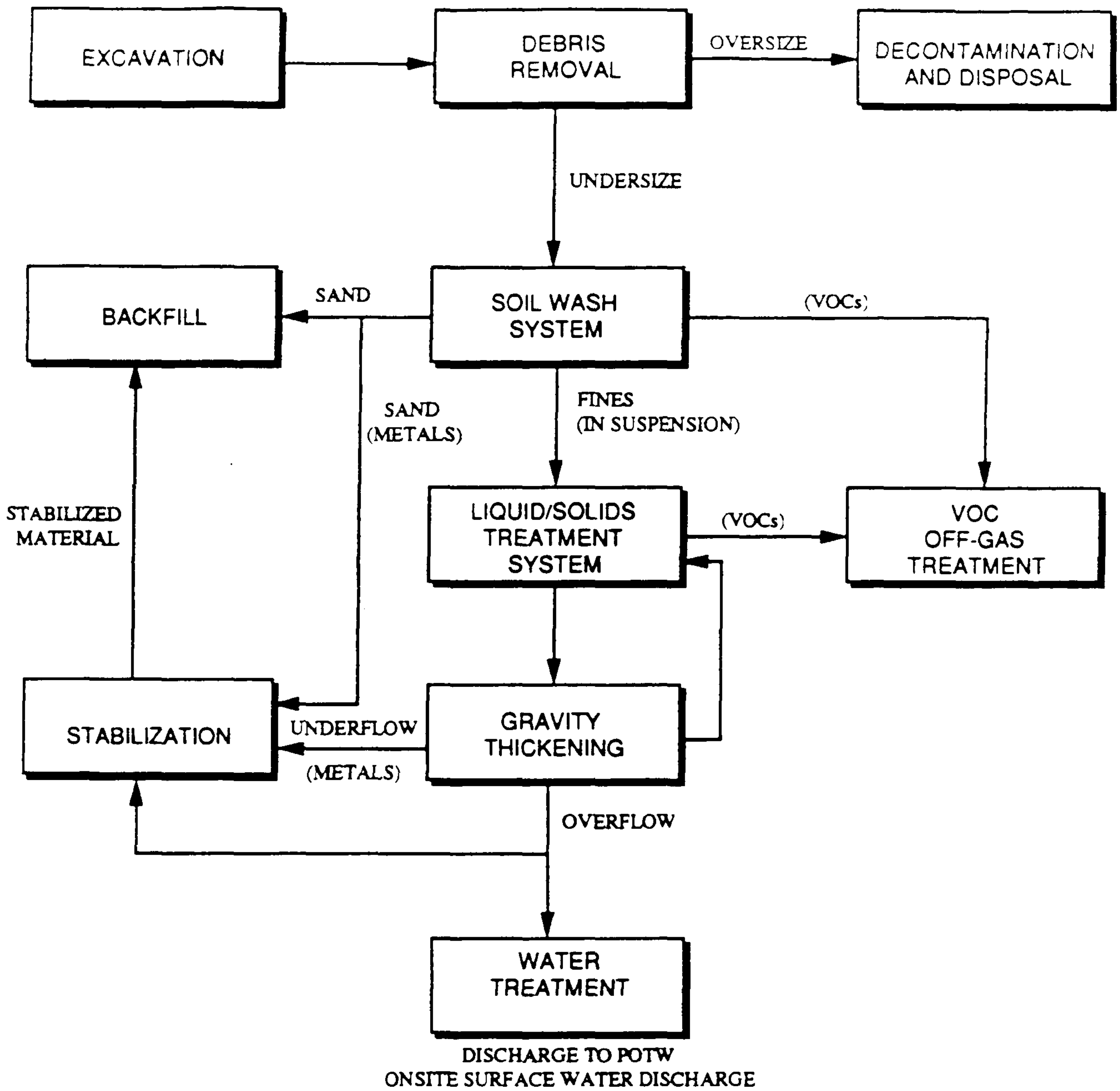


FIGURE 3

BIOREMEDIATION CONCEPTUAL PROCESS FLOW DIAGRAM

WHITEHOUSE WASTE OIL PITS SITE TREATABILITY STUDY

All seven pits will be subject to excavation and treatment. Estimated pit depths range from 6 to 14 feet. The purpose of treatment is to eliminate the direct contact risk associated with exposed pit soil/sludge wastes which occurs through soil cover erosion. Treatment also reduces the leachability of waste contaminants to the groundwater thus reducing the Groundwater Recovery and Treatment time.

Clean-up levels have been established (Table 17). The entire contents of each pit exceeding soil clean-up levels will be excavated. Residual soils below the pit contents which are contaminated above clean-up levels will be excavated. Excavated soil/sludge wastes will be treated to clean-up levels prior to placement back into the excavated area. Groundwater will be recovered and treated to clean-up levels prior to discharge to an on-site drainage ditch. Further sampling in the RD will determine whether Pit 6 will be excavated due to low contamination levels. Excavated pits will be sampled during RA activities for quality control.

The RA will be performed during a low water table period to maximize excavation depths. At the point where dewatering is required to continue excavation as a result of groundwater table influence, the excavation will cease. If the groundwater table allows the entire excavation of all seven pits, the estimated volume of wastes to be excavated will be 56,930 cubic yards.

Excavated wastes will be screened to remove coarse debris (construction materials, stumps, etc.) from soils. Coarse debris not amenable to treatment (Biotreatment or S/S) will be steam cleaned prior to disposal. It is anticipated that such debris will be disposed off-site.

Screened soils will then be slurried with water and/or surfactants in a soil washing unit to suspend contaminant fines in the wash-water. Coarse soils (> 200 mesh) will be separated from the wash-water and suspended contaminant fines (< 200 mesh). Screened coarse soils below clean-up levels will be placed back on-site into the excavated area. Screened coarse soils above clean-up levels will be subject to further soil washing and/or S/S prior to backfilling on-site. The purpose of soil washing is to reduce the volume of wastes requiring biotreatment.

Soil wash water and suspended contaminant fines will then be biotreated to remove organic contaminants from the waste stream through microbial degradation. The best demonstrated biotreatment process for this site is a slurry-phase bioreactor. Biotreated effluent below Florida surface water discharge standards (Florida Water Quality Standards, Chapter 17-302) will be discharged to an on-site drainage ditch. Biotreated effluent above surface water discharge standards will be subject to further biotreatment and/or treatment by the on-site groundwater treatment system prior to discharge to an on-site drainage ditch. The purpose of biotreatment is to reduce the volume of wastes requiring S/S.

The groundwater treatment system will be designed to reduce contaminants to below Florida surface water discharge standards. The groundwater treatment system will also be designed with sufficient capacity to accept Biotreated effluent without modification. The groundwater treatment system will consist of GAC adsorption and chemical precipitation units. The GAC adsorption unit will be used to remove organic contaminants while the chemical precipitation unit will be used to remove metals and suspended solids.

S/S will then be used to bind contaminant fines (ie. heavy metals) which biotreatment could not adequately treat. The S/S monolith will be placed back into the excavated area. The purpose of S/S is to retard migration of contaminants by binding them in a stabilized matrix. Stabilization reagents might include cement, pozzolans, organophylic clays, asphalt/bitumen and thermoplacizers. TS results reveal that stabilized products met specified strength parameters for Whitehouse wastes. S/S formulations will be optimized in the RD to achieve the best TCLP results.

A pilot-scale TS will be performed to further develop this treatment train. A conceptual model of the treatment train is included (Figure 3).

During remedial activities, provisions will be made to ensure that McGirts Creek is protected from surface water runoff. A 6 inch vegetative cover will be placed over the excavated area after remediation.

The EPA's Emergency Response Group is presently reviewing the possibility of placing a fence around the site. Site fencing will eliminate the possibility of direct contact to exposed wastes by tresspassers. Any fencing placed on the site prior to the RA may need modification during RA activities.

One goal of the RA is to restore the groundwater to its beneficial use as a drinking water aquifer. Based on information obtained during the RI and the analysis of all FS remedial alternatives, EPA believes that the groundwater portion of the 1985 ROD selected remedy will be able to achieve present clean-up goals with the exception of some heavy metals. Both GAC adsorption and chemical precipitation units will be used in the groundwater treatment system.

It is estimated that the groundwater recovery and treatment system will need to be operated for a period of 23 years in five (5) year intervals. The effectiveness of the treatment system will be carefully monitored on a regular basis and modified as warranted by performance data collected during operation. Modifications may include any or all of the following:

- groundwater pumping may be discontinued at individual wells where clean-up levels have been obtained with continued monitoring

- alternate wells may be pumped to eliminate stagnation

- wells may be pulse pumped to allow aquifer equilibration and encourage adsorbed contaminants to partition into groundwater

- additional recovery wells may be installed to facilitate or accelerate contaminant plume clean-up

Based on performance data, at the end of 5 years, if it is determined that the treatment system is adequately reducing contaminant levels toward the clean-up goals, the system will continue for consecutive five (5) year periods. The effectiveness of the treatment system in each 5 year period will be determined in the same manner as the first 5 year period.

The selected remedy's ability to achieve this clean-up goal cannot be fully determined until the groundwater recovery and treatment system has been implemented and the groundwater plume response monitored. Groundwater contamination may be especially persistent in the immediate vicinity of the pits, therefore, the effectiveness of the treatment system will need monitoring over time.

In the event that the groundwater portion of the selected remedy cannot meet all or a portion of the clean-up goals, the contingency measures described in this section may replace the groundwater portion of the selected remedy. Such contingency measures will at a minimum, prevent further migration of the groundwater plume and include a combination of containment and institutional controls. The contingency measures are considered to be protective of human health and the environment and are technically practicable.

Based on performance data, at the end of any 5 year period, if it is determined that the treatment system is not capable of adequately achieving all or a portion of clean-up goals, one or more of the following contingency measures involving long-term management may occur for an indefinite period of time:

- containment measures would be implemented involving engineering controls such as physical barriers or long-term gradient control through low level pumping

- consideration may be given to a waiver of chemical-specific ARARs for the aquifer based on the technical impracticability of achieving further contaminant reduction

- institutional controls would be implemented and maintained to restrict access to those portions of the aquifer which remain above clean-up goals

- on-site and off-site wells would be continually monitored to ensure non-migration of contaminants

Alternative 3 will meet or exceed all ARARs. The bench-scale TS suggested further modification of S/S reagent admixtures to prevent leaching of Cadmium, Chromium and Lead. A pilot-scale TS will be necessary as part of the RD to evaluate the ability of the modified admixtures in reaching effective TCLP levels.

The decision to invoke any or all of these contingency measures will be in accordance with CERCLA Section 121 (c).

In addition, as part of the RD, the northeast tributary of McGirts Creek will be further sampled. Tributary sampling performed as part of the the TS/Risk Assessment revealed a decrease in contaminants from previous sampling data collected. Additional sampling will be performed to verify these findings.

11.0 Clean-up Goals

A range of organic and inorganic contaminants exist in varying concentrations in pit soil/sludge wastes. Past releases of these contaminants have presented and continue to present an imminent and substantial endangerment to public health and the environment. As a result, clean-up levels have been established for soils (pit soil/sludge wastes) and groundwater.

Soil clean-up levels established in the Risk Assessment were based on groundwater protection modelling. This modelling was found to be overly conservative therefore, new soil clean-up levels were established based on a direct contact exposure pathway. These clean-up levels are applied to depth to reduce contaminants available for migration to groundwater thereby reducing the Groundwater Recovery and Treatment process time. Whitehouse clean-up levels are listed in Appendix C: Table 17. Groundwater clean-up levels established in the Risk Assessment were based on human health risks (Risk-based) and ARARs (ARAR-based).

12.0 STATUTORY REQUIREMENTS

EPA has determined and FDER concurs that the selected remedy will satisfy statutory requirements of Section 121 of CERCLA in that it:

- o provides protection of human health and the environment
- o utilizes permanent solutions and alternative treatment or resource recovery technologies to the

maximum extent possible

- o meets ARARs
- o is cost effective

Sections 11.1 thru 11.6 below summarize the statutory requirements for this site.

12.1 Overall Protection of Human Health and Environment

Remedial Acrtions performed under CERCLA must be protective of human health and the environment. The selected remedy would meet this requirement due to contaminant reduction in all media and the removal of exposure pathways.

12.2 Applicable, Relevent and Appropriate Requirements Compliance

Remedial Actions performed under CERCLA must comply with all ARARs. All alternatives considered for the Whitehouse Site were evaluated on the basis of ARAR compliance. The selected remedy would meet or exceed all ARARs. A pilot-scale TS may be necessary as part of the RD to evaluate the ability of modified admixtures in reaching effective TCLP levels if Whitehouse wastes are found to be RCRA characteristic wastes (D004 - D017).

FEDERAL REQUIREMENTS

<u>Resource Conservation and Recovery Act (RCRA)</u>

40 Code of Federal Regulations (C.F.R.) Part 261, Land Ban - The RCRA Land Disposal Restrictions (LDRs) re-enacted in the 1984 Hazardous and Solid Waste Amendments (HSWA) require that RCRA hazardous wastes be treated to Best Demonstrated Achievable

Technology (BDAT) standards prior to placement into the land. At present, not enough information exists to make a determination on whether Whitehouse wastes are RCRA listed wastes. If Whitehouse wastes are found to be RCRA listed wastes (D004 - D017), LDRs will directly apply.

Clean Water Act (CWA) / Safe Drinking Water Act (SDWA)

EPA's determination of appropriate groundwater clean-up criteria involved an evaluation of contaminant concentrations relative to available Risk-based standards. Such limits, including ARAR-based Maximum Concentration Limits (MCLs) and Maximum Concentration Limit Goals (MCLGs), and Section 304 of the CWA used as prescribed in Section 121(d)(2)(b)(i) of CERCLA also defined in the SDWA.

Federal Clean Air Act (CAA)

The CAA identifies and regulates pollutants that could be released during earth-moving activities associated with the excavation of on-site soils. Section 112 of the CAA identifies substances regulated under the Federal National Emission Standards for Hazardous Pollutants for which there are no applicable Ambient Air Quality Standards (AAQS). The CAA is considered an ARAR.

Endangered Species Act (ESA)

The selected remedy is believed to be protective of species listed as endangered or threatened under the ESA. Requirements of the Interagency Section 7 Consultation Process, 50 CFR Part 402 will be met. The U.S. Department of Interior (DOI) and the U.S. Fish and Wildlife Service will be consulted during the RD to ensure that endangered or threatened species are not adversely impacted by implementation of this remedy. There is currently no information to indicate that the site is visited by or contains such species.

National Historical Preservation Act (NHPA)

The NHPA requires that action be taken to preserve or recover historical or archaeological data which might be destroyed as a result of site activities. No information exists to indicate that the Whitehouse Site has any historic or archaeological significance.

Federal Occupational Safety and Health Administration Act (OSHA)

The selected remedial contractor would develop and implement a health and safety program for its workers. All on-site workers would meet the minimum training and medical monitoring requirements outlined in 40 CFR 1910.

STATE REQUIREMENTS

Florida Administrative Code Chapter 17-3

Water quality standards for surface water and groundwater affected by leachate and storm runoff from the site would be met.

Florida Administrative Code Chapter 17-6

Effluent limitations and operating requirements for surface water discharge would be met.

12.3 Long/Short Term Effectiveness & Permanence

Alternative 3 would be the most appropriate clean-up solution for the Whitehouse Site and would provide the best balance in remedial alternative evaluation criteria. This remedy would provide long/short-term effectiveness in the protection of potential human health and environmental receptors.

Soil washing, biotreatment and S/S represents a permanent solution (through treatment) which effectively reduces and/or eliminates mobility, toxicity and volume of hazardous wastes and substances from the environment.

12.4 Cost Effectiveness

Cost effectiveness is determined by comparing the costs of all alternatives being considered with their overall effectiveness to determine whether the costs are proportional to the effectiveness achieved. Overall effectiveness for the purpose of this determination includes long/short-term effectiveness, permanence and mobility, toxicity and volume reduction.

The present worth cost estimate for Alternative 3 is as follows:

Present Worth:	$ 15,500,000
O&M:	$ 3,400,000
	$ 18,900,000

The selected remedy affords overall effectiveness proportional to its cost such that the remedy represents value for the money. When the relationship between the cost and overall effectiveness of the selected remedy is viewed in light of other remedies, the selected remedy would be the most cost effective.

12.5 Utilization of Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

The objectives for this AROD are to treat pit soil/sludge wastes and prevent current or future exposure to the contaminated groundwater in the surficial aquifer, through treatment and containment, and to reduce the migration of contaminants. Recovery and treatment of contaminants in the surficial aquifer would achieve significant reduction in contamination at the Whitehouse Site. The EPA will continue to evaluate long-term effectiveness and permanence as part of the RA.

12.6 Preference for Treatment as a Principal Element

Bench-scale TS results indicate that Alternative 3 would effectively treat Whitehouse soils contamination.

Soil Washing and Biotreatment have been demonstrated to effectively reduce petroleum hydrocarbon contamination at other Superfund sites. S/S is a widely used means for effectively reducing metals contamination. Groundwater Recovery and Treatment systems have been widely used in the treatment of groundwater and the containment of groundwater plumes.

Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

12.7 Documentation of Significant Changes

The Proposed Plan for the Whitehouse Site was released for public comment on January 3, 1991. The Proposed Plan identified Alternative 3 as the preferred remedial alternative for the Whitehouse Site.

Based upon the requirements of CERCLA Section 117(b), EPA has determined that a significant change has been made to the Risk Assessment from the time of the Proposed Plan public comment period. This change is an Addendum to the Risk Assessment in the Administrative Record. The Addendum provides a basis for remediation clean-up levels.

EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

APPENDIX A

1985 RECORD OF DECISION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY Other: ______

DATE MAY 29 1985

SUBJECT Whitehouse Waste Oil Pits - Selection of Remedy, Authorization for Design of Remedy

FROM Superfund Coordinator

TO Thomas W. Devine
Director, WD

Jack E. Ravan
Regional Administrator

The attached Record of Decision (ROD), when signed by you, will constitute the Agency's official selection of a remedy for the Whitehouse Waste Oil Pits Site. The recommended alternative (C-1) includes:

- Construction of a slurry wall around the entire site;
- Recovery and treatment of contaminated groundwater;
- Removal of contaminated sediments from the northeast tributary of McGirts Creek; and
- Surface cap entire site.

This memorandum will authorize us to obligate $600,000 to the Corps of Engineers (COE) for design of this remedy. We also expect to have the COE manage the eventual construction of the remedy. The State of Florida agrees with this course of action.

I recommend that you approve this memorandum to obligate design money to the COE, and also the attached ROD officially selecting alternative C-1 as the remedy for the Whitehouse Waste Oil Pits.

Al J. Smith

Concur: Thomas W. Devine, ~~Director~~, WD

NPL date 10/81

Approve: Jack E. Ravan

Disapprove: ______

Date: May 30, 1985

EPA Form 1320-6 (Rev. 3-76)

RECORD OF DECISION
Remedial Alternative Selection

Documents Reviewed

I am basing my decision on the following documents describing the analysis of the cost-effectiveness and feasibility of remedial alternatives for the Whitehouse Waste Oil Pits Site:

- Remedial Action Master Plan, Whitehouse Site - Ecology & Environment, Inc.
- Remedial Investigations: Phase I - FDER/USGS, Phase II - Ecology & Environment, Inc. (Appendix 1 & 2)
- Focused Feasibility Study, Whitehouse Waste Oil Pits Site, Ecology & Environment, Inc. January 1985. (Appendix 3)
- Responsiveness Summary and Recommendations
- Summary of Remedial Alternative Selection
- State's position statement and O&M commitment

Description of Selected Alternative

After a thorough review of all options, I have determined that alternative (C1) as detailed in the Feasibility Study and outlined below is the appropriate remedy for this site. Alternative (C1) - containment of the wastes - includes:

- Construction of a slurry wall around the entire site, keyed into the aquitard, isolating the waste;
- Recovery and treatment of contaminated groundwater within the walled area, thus contributing to waste isolation
- Removal of contaminated sediments from the northeast tributory of McGirts Creek and placing within the isolation area; and
- Surface cap entire site to reduce the inflow of water into the walled area.

Declarations

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the on-site containment alternative (C-1) at the Whitehouse Waste Oil Pits Site is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of Florida has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period of one year.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

May 30, 1985
Date

Jack E. Ravan
Jack E. Ravan
Regional Administrator
EPA Region IV

06C004

Summary of Remedial Alternative Selection
Whitehouse Waste Oil Pits
May 1985

SITE LOCATION AND DESCRIPTION

The community of Whitehouse, Florida (population approximately 6,000) is located within 0.25 miles east and southeast of the site. The community is composed primarily of two-bedroom houses and mobile homes on one-half to one-acre lots. Two major east-west highways, U.S. Highway 90 and Interstate 10, are approximately 0.5 miles south of the site (Fig. 2-1, 2-2). A low-density residential area is located west and northwest of the site, and several miles northwest of the site is the Cecil Field U.S Naval Air Station. The area north and northeast of the site is largely undeveloped land comprised of pine forests and cypress swamp.

The Whitehouse Waste Oil Pits occupy approximately seven acres on an upland area immediately adjacent to a cypress swamp system (Fig. 2-3). The southern side of the site is bordered by open grassland, with the exception of the southwestern corner, which is a private residence. The nearest home is approximately 300 feet from the dike around the pits and a small backyard garden at that home is approximately 30 feet from the south ditch.

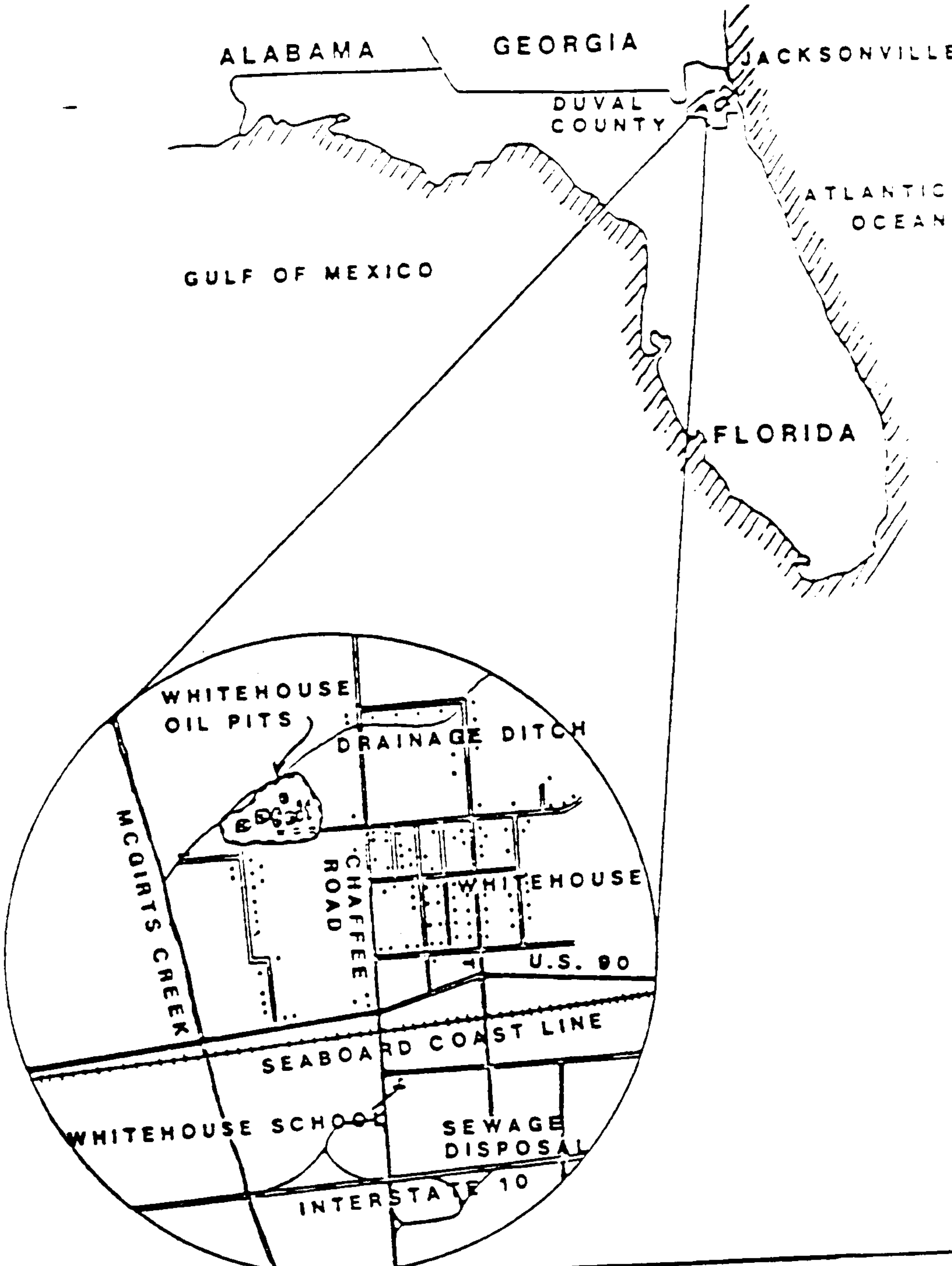
The northern and western sides of the site border a swamp system through which the Northeast Tributary runs. The stream originates from a 220-acre cypress swamp located approximately 0.5 miles upstream from the site.

The surficial and the Floridan are the two aquifer systems which supply drinking water in this area. The Floridan is at a depth of approximately 525 feet below the surface and supplies large water users. It is separated from the surficial aquifer system by the confining Hawthorn Formation which is about 350 feet thick in this area. The surficial aquifer system can be subdivided into 3 parts: the water table zone, a semi-confining (aquitard) zone, and the limestone unit (Fig. 2-4). The water table zone begins at 1.5 to 5 feet below land surface and is approximately 20 feet thick. The semi-confining zone exhibits a hydraulic conductivity in the 10^{-5} to 10^{-6} cm/sec. range and is about 60 feet thick. The final zone in the surficial system is the limestone unit, locally known as the "rock" aquifer. Local residents obtain their water from individual wells drilled into this zone.

The shallow groundwater contributes to local streams through a series of man-made ditches and natural drainage ways such as the Northeast Tributary of McGirts Creek.

060005

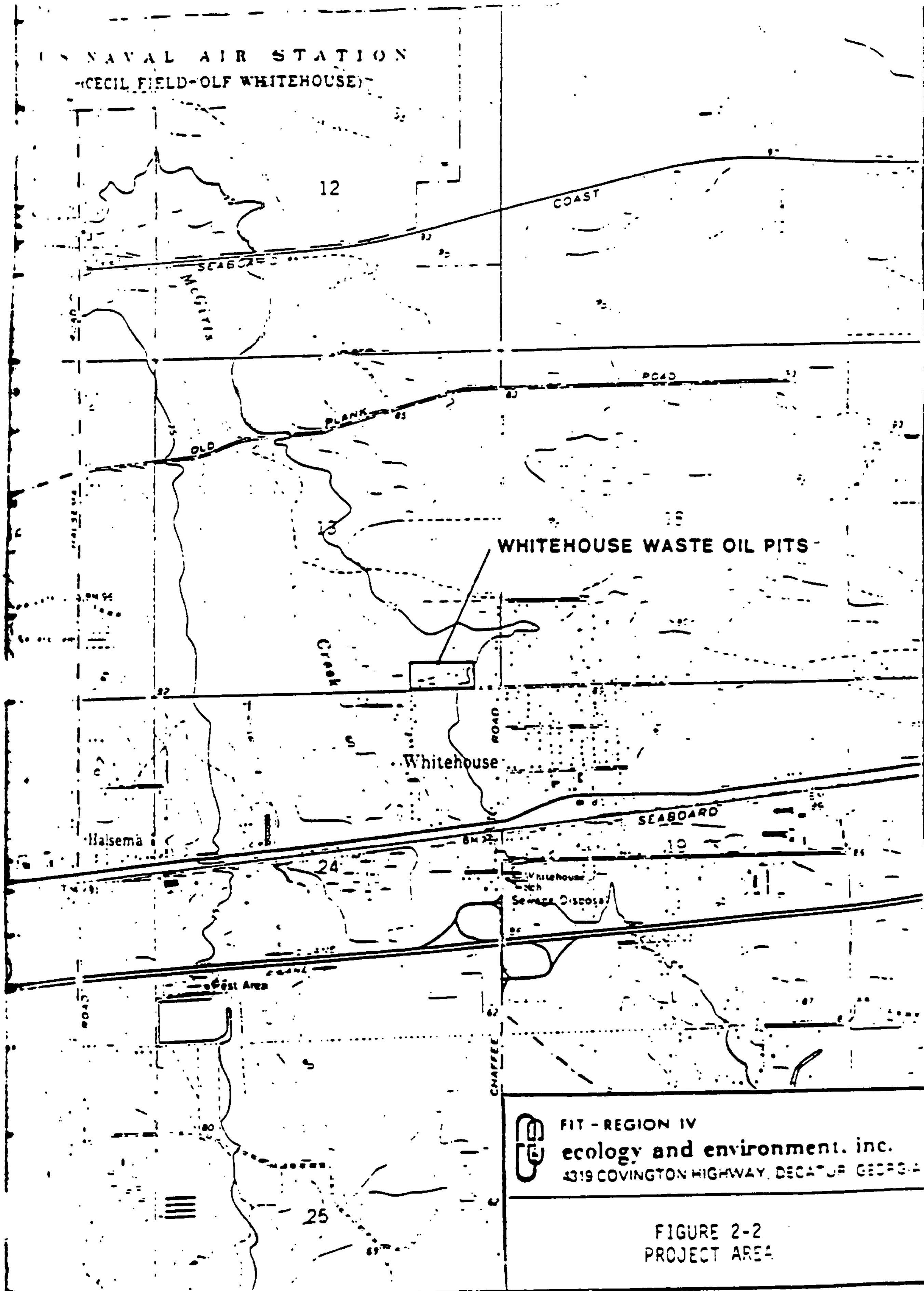
WHITEHOUSE SITE PROJECT AREA



FIT - REGION IV
ecology and environment, inc.
4319 COVINGTON HIGHWAY, DECATUR, GEORGIA

FIGURE 2-1
LOCATION MAP

POOR QUALITY ORIGINAL



POOR QUALITY ORIGINAL

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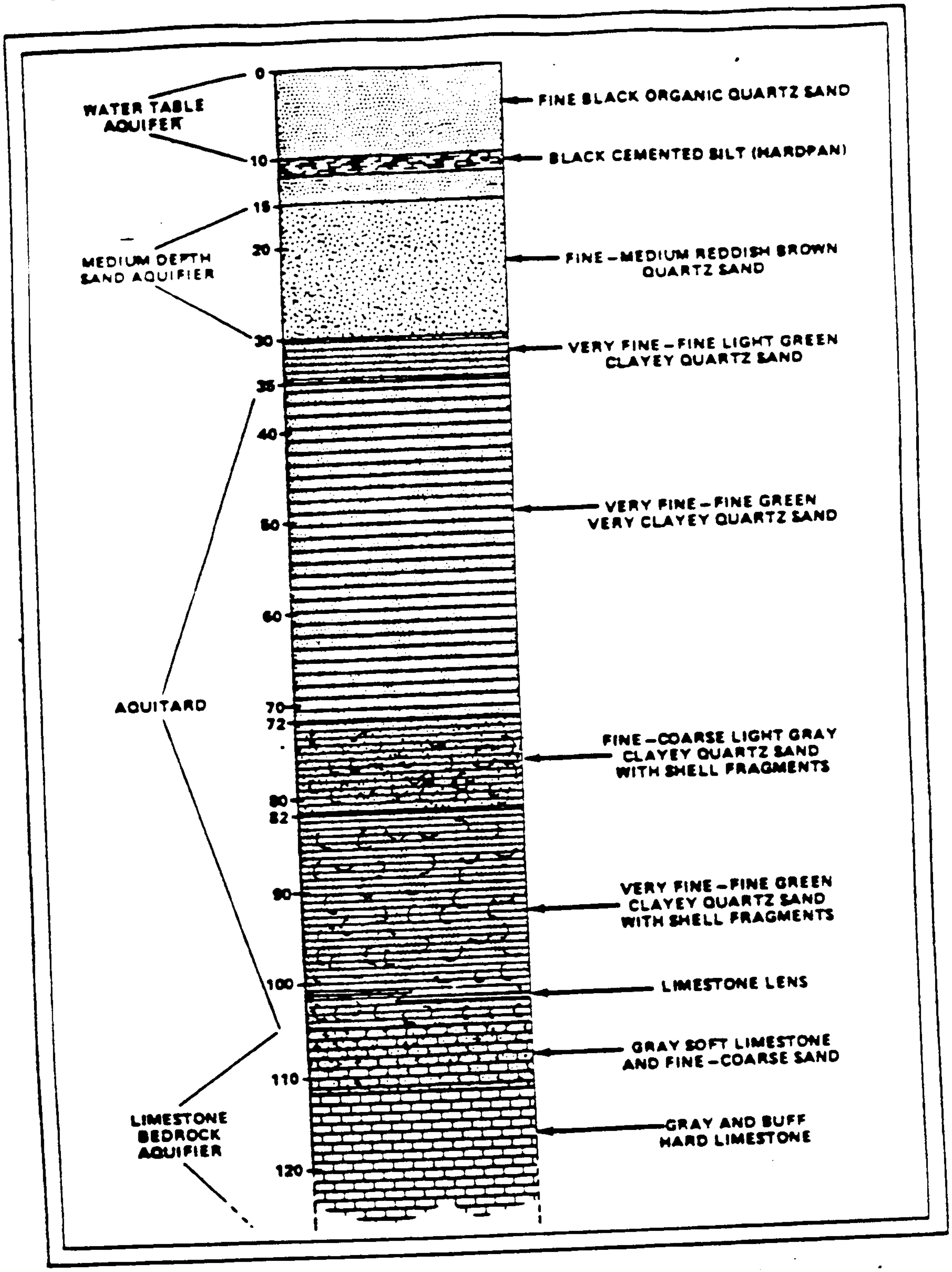


Fig. 2-4 TYPICAL SUBSURFACE LITHOLOGY AT WHITEHOUSE OIL PITS

The site itself consists of seven unlined pits where waste oil sludge, acid and contaminated waste oil from an oil reclaiming process were disposed.

SITE HISTORY

Allied Petroleum constructed the pits to dispose of waste oil sludge and acid from its oil reclaiming process. The first pits were constructed in 1958, and by 1968 the company had constructed and filled seven pits. Allied Petroleum then went bankrupt, and most of the property transferred to the City of Jacksonville for nonpayment of taxes. After they were abandoned by Allied Petroleum, the pits remained an "open dump" for several years. It is reasonable to assume that indiscriminant dumping occurred on during that time.

In 1968 the dike surrounding Pit No. 7 ruptured, and the contents spilled onto adjacent private property and into McGirts Creek. Pit No. 7 was backfilled with soil after this incident. Recognizing the need to control the water level in the other pits to prevent further discharge, the City of Jacksonville Mosquito Control Branch began building a two-cell oil-water separator in series with a limestone filter to dewater the pits. The project was never completed because of budget problems.

On June 29, 1976, the EPA Region IV Environmental Emergency Branch became involved following a 200,000-gallon oil spill from one of the remaining six pits. The spill resulted when the Jacksonville Mosquito Control Branch was attempting to repair a dike wall. EPA took control of the spill assessment and the cleanup of McGirts Creek and spent about $200,000 under provisions of Section 311 of the Clean Water Act. EPA also recognized the potential hazard posed by the remaining five pits, and with the assistance of the City of Jacksonville, constructed a treatment system in order to drain the pits.

After draining the water from the pits, the Mosquito Control Branch took measures to stabilize the ponds. Since the remaining viscous waste oil sludge would not support heavy construction equipment, the ponds were backfilled with selected construction debris, scrap lumber, trees, wood chips, and non-degradable wastes. A three-inch layer of automobile shredder waste was placed on top of this matrix. The more liquid portion of the waste oil sludge was pumped off, mixed with Fuller's earth, and then used as a backfill/sealer over the automobile shredder waste. This layer of Fuller's earth and oil was relatively impervious and should have prevented vertical percolation of rainwater. The Fuller's earth mixture was covered with eight

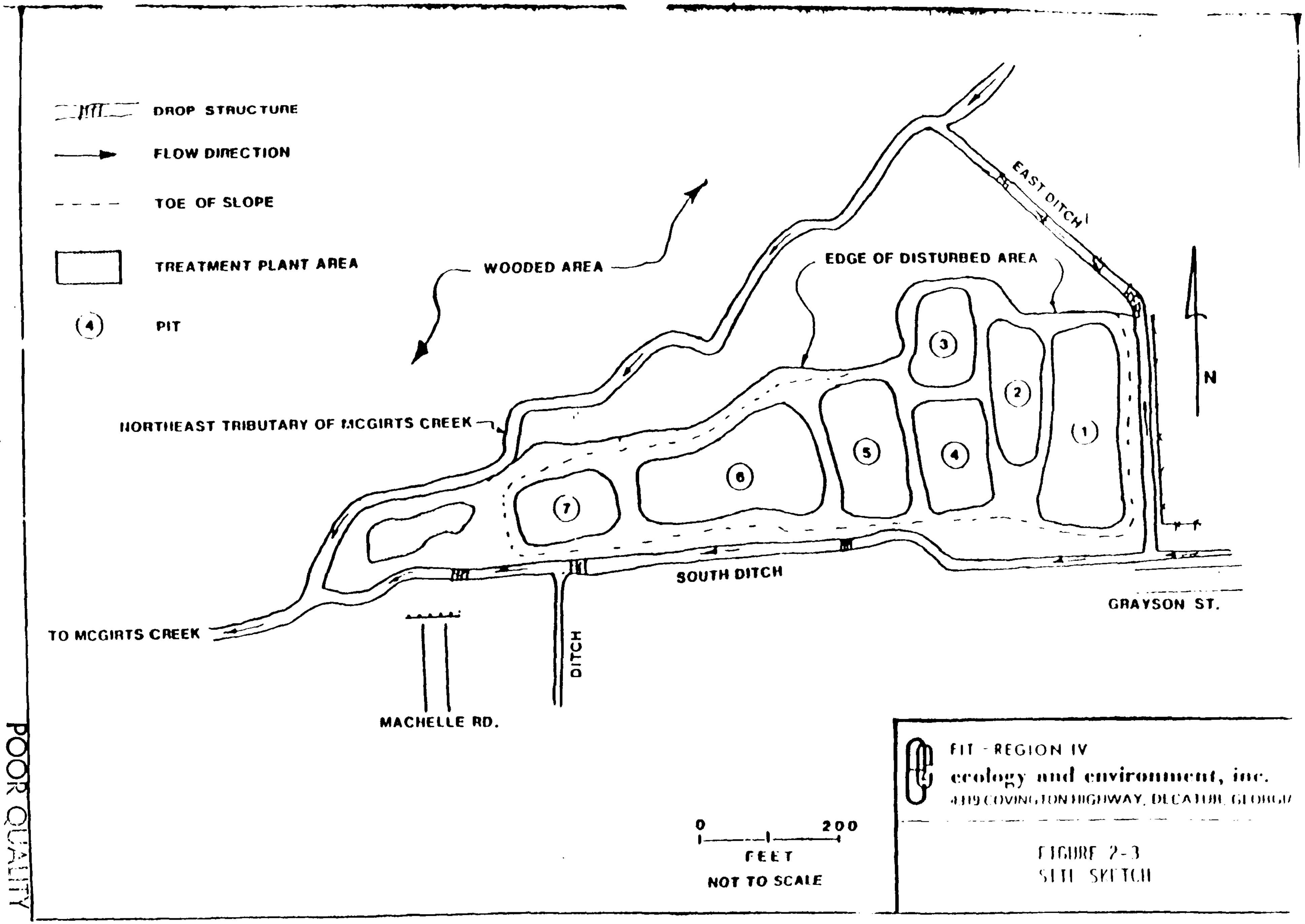


FIGURE 2-3
SITE SKETCH

to twelve inches of clean earth (mostly sand). After the project ran out of Fuller's earth, local clay was substituted as a landfill capping material for the Fuller's earth and oil mixture. A theoretical cross-section of the oil pit stabilization plan is presented in Figure 2-5.

After stabilization was completed, the site was planted in local grasses and ditches were constructed to control drainage. This system was destroyed by vandals, and subsequent monitoring in 1979 showed the continuing release of pollutants to surface water and groundwater.

Following this monitoring, the City of Jacksonville covered the surface and sides of the pits and dikes with six inches of low-permeability local clay, followed by twelve inches of topsoil. This cover was revegetated using local grasses. The drainage system was again modified and lined with clay to keep leachate out of the surface water and drop structures were constructed to control flow velocity and erosion. This arrangement diverted surface water away from the landfill, thus reducing the mechanism for pollutant transport. This second stabilization project was completed in the summer of 1980. As an initial remedial action, drainage was further modified to control leachate seepage into the ditches along with steps to strengthen the dikes around the pits.

CURRENT SITE STATUS

The waste oil recovery process used by Allied Petro Products was the Acid-Clay Process. This process forms as by-products a waste-acid tar and spent acidic clays which are corrosive. The seven unlined pits contained an estimated 127,000 cubic yards of waste. Stabilization activities have increased the volume of contaminated material to an estimated 240,000 cubic yards.

Contaminants Detected

Major contaminants at the site include hexavalent chromium, arsenic, lead, phenols, benzene and PAH, (fluoranthene, phenanthrene, pyrene).

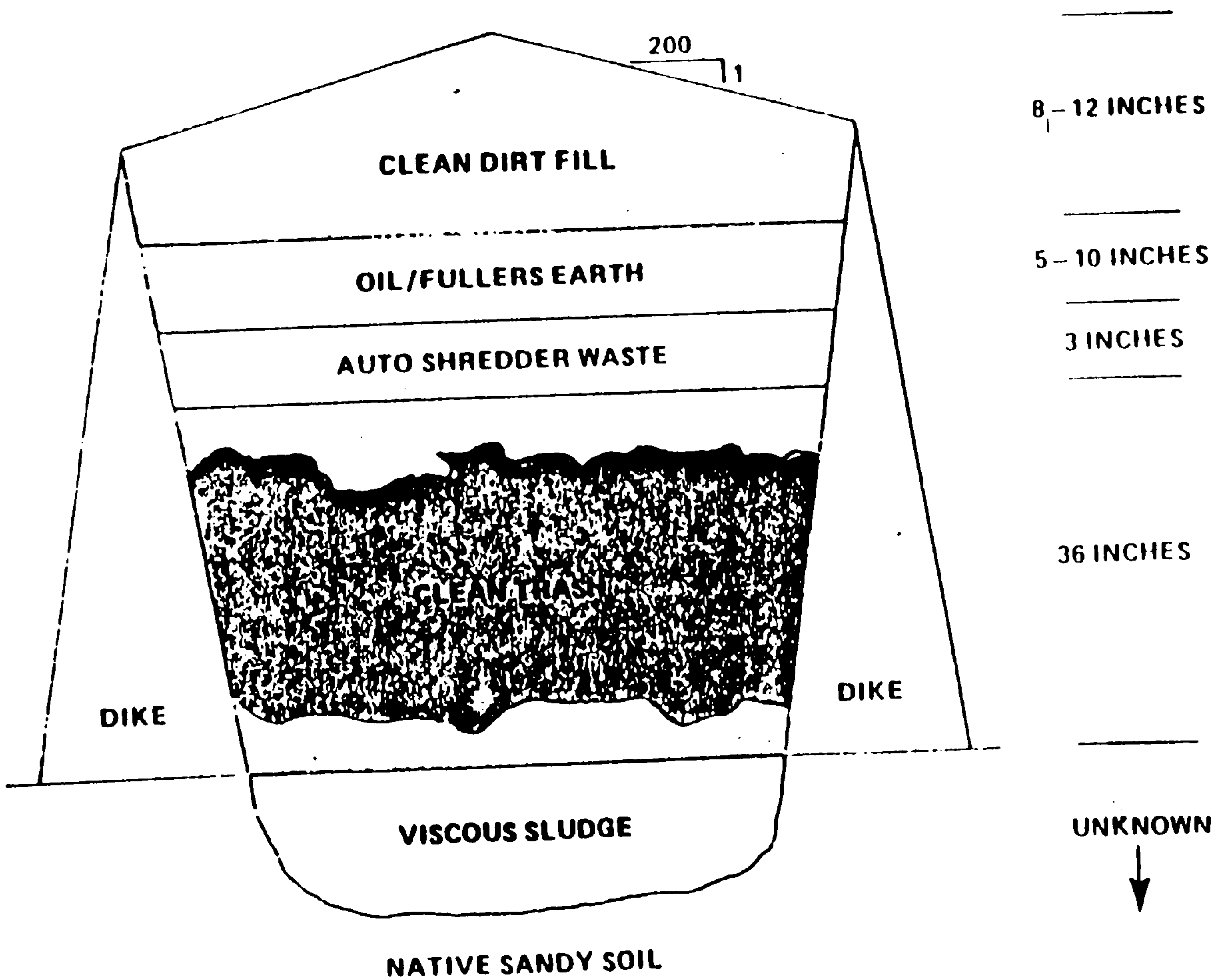
Groundwater data showed arsenic (10ppb), chromium (68,000ppb), lead (376ppb), benzene (9ppb), and phenols (330ppb) in the shallow water table aquifer beneath the site.

Off-site groundwater data showed metals contamination with a maximum concentration of chromium at 10ppb.

Phenanthyrene was found at 710ppb at the 10' depth at one location in soil.

Adjacent off-site surficial soils showed 7ppb chromium at the 10' depth.

Fig. 2-5 THEORETICAL CROSS-SECTION OF THE FILLED OIL PITS



POOR QUALITY ORIGINAL

Surface water samples showed significantly lowered pH.

Improvements made to the site by the City of Jacksonvile in 1980 and the initial remedial measures (IRM) done under cooperative agreement with the State have significantly reduced the hazards at the site and ensured that no large-scale spills would occur again. Erosion continues to be a problem at the site. Testing by the State indicated that heavy rains and eroding dike walls have allowed pollutants to slowly seep into surface water. As expected, soil samples from beneath the clay cap of the pits show gross contamination by heavy metals and low levels of a few organic compounds. The only soils beyond the pits which are badly contaminated are the soils in the swamp or floodplain north of the pits, between the pits and the northeast tributary (Fig. 2-3).

The quality of surface water was tested at five sampling stations in the drainage basin. These samples show that the surface water quality in McGirts Creek significantly improved since 1977. This improvement is directly related to the work done by the local, state and federal agencies which prevented further large scale contamination. However, the effect of the pits is still evident since the surface water contains heavy metals and a lowered pH. The water quality of the creek is also threatened by the seepage which has polluted the soil in the flood plain north of the pits.

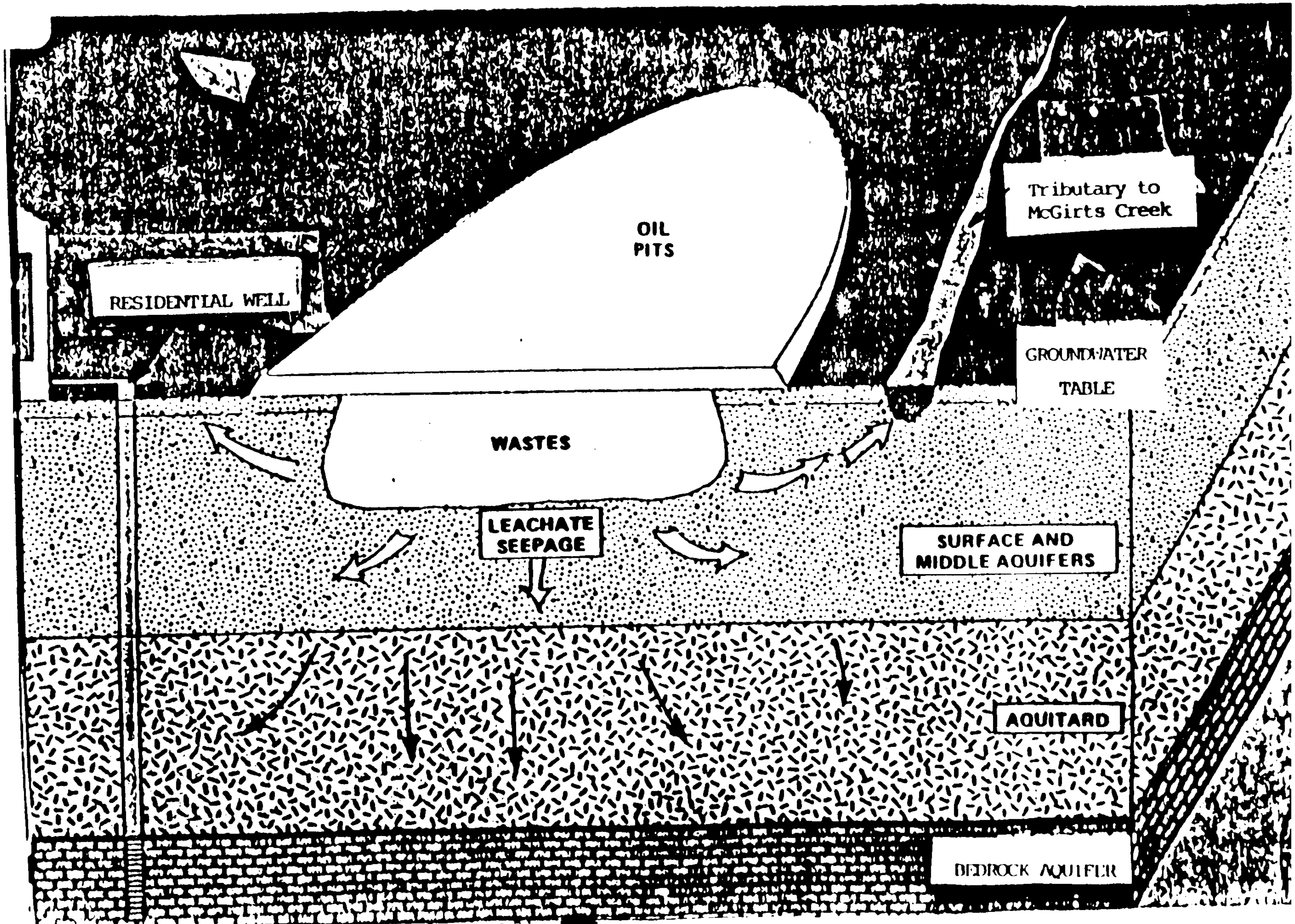
Areas of potential groundwater contamination were located by conductivity tests. Thirty-six wells at a variety of depths were installed to sample groundwater. The shallow groundwater (7-15 ft) between the pits and the northeast tributary is grossly contaminated by heavy metals and organic compounds. Only low levels of organic compounds were detected across the northeast tributary and beyond the south drainage ditch. Thus, shallow groundwater contamination seems to be localized close to the site (Fig. 2-6).

Vertical migration has reached into the aquitard (35'-60'). The deeper wells (100-125 ft) close to the site show low levels of heavy metals and organic compounds. This is of special concern since these wells are in the same aquifer used by many residents. All the residential wells near the site that were downgradient of the pits were tested during the remedial investigation. No contamination from the pits was detected in any of the wells. The State will continue to monitor quality of the residential wells.

Potential Pathways/and Receptors

Pathway	Release	Receptor
Ingestion/contact	Surface Water	McGirt's Creek
Ingestion/contact	Groundwater (lateral)	Surface streams

Fig. 2-6 CONTAMINANT MIGRATION



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Ingestion	Groundwater (vertical)	Bedrock aquifer (domestic wells)
Direct contact	Waste on site	Humans and animals
Inhalation	Air Emissions (waste)	Local population

The eventual receptor for surface runoff is McGirt's creek which empties into the St. John's River approximately 10 miles downstream. Neither of these bodies of water supply drinking water, but are areas of environmental concern.

As late as 1983 (prior to completion of the IRM) seepage of contaminated leachate through the dike walls was observed. State bioassays using a weak concentration of the leachate showed it to be very toxic. Direct contact with leachate and leachate contaminated surface water is a concern.

The domestic water supply aquifer beneath the site is protected by a fairly consistent aquitard. Sampling has shown contamination in the shallow aquifer and evidence of contamination moving down into the aquitard (permeability about 10^{-5} cm/sec). Groundwater degradation is an immediate concern and a reason for taking preventative action.

Although the IRM was constructed as an attempt to reinforce the dike walls and prevent further spread of contamination, this measure is not adequate for long term containment of the waste. To compound site problems, erosion caused by motorcycles, dirt buggies, heavy rainfall and hurricanes pose additional risks to all population groups surrounding the site.

The Whitehouse community has approximately 6,000 residents. Almost all depend on groundwater from the 110'-160' deep "rock" aquifer. In the area of the site there are approximately 255 users of water from the "rock" aquifer.

<u>ENFORCEMENT</u>

The Whitehouse Waste Oil Pits Site was established by Allied Petro-Products, Inc. (APP) in the late 1950's for receiving waste oil and acid clay sludges. The potentially responsible parties known at the site are APP, Richard Peters - current property owner, and the City of Jacksonville. However, both the Office of Regional Counsel (ORC) and the program office recommended not to identify the City of Jacksonville as a responsible party because the city was an incidental owner by tax default.

Mr. Peters and APP were sent notice letters on March 5, 1982. The letter to APP was returned unclaimed. Mr. Peters responded to the notice letter by correspondence dated June 5, 1982. He does not appear to be a viable PRP at this time.

APP has been defunct for almost 18 years. In addition, investigation by the ORC indicated that almost all of the corporate principals have passed away and there are no facts

Problem | **Remedial Technology**

Waste (Source Control)

1. Excavation and disposal in a secure landfill off-site
2. Excavation and disposal in a secure landfill or vault on-site
3. Excavation and thermal destruction on-site or off-site
   - fluidized bed
   - liquid injection
   - wet air oxidation
   - molten salt
   - starved air pyrolysis
   - rotary kiln
   - multiple hearth furnace
4. No action

Groundwater Contamination

1. Permeable treatment beds
2. Bioreclamation
3. Impermeable barriers
   - slurry wall
   - grout curtain
   - sheet piling
4. Groundwater pumping and treatment
   - biological (activated sludge, anaerobic, aerobic, facultative lagoons, support growth reactors)
   - chemical (chlorination, photolysis, oxidation, neutralization, precipitation)
   - physical (precipitation, carbon adsorption, ion exchange, liquid ion exchange, reverse osmosis, wet air oxidation, ultrafiltration, stripping)
5. No action

Problem | **Remedial Technology**

Surface Water and Soil Contamination

1. Surface seals

presently available that would suggest that the government could reach the principals either by penetrating the corporate entity or as joint tort-feasors. We have discovered no information linking the waste disposal to any presently existing corporate entities either as generators or as successors to APP.

ALTERNATIVES EVALUATION

Response Objectives

Groundwater

Objective: To prevent further migration of contaminated groundwater into the underlying aquitard; to prevent contamination of the local drinking water supply.

Criteria: Groundwater quality to meet FDER Primary Drinking Water Standards. Pollutants with no standards are to be kept to existing background concentrations or minimal risk levels.

Surface Water

Objective: To reduce or eliminate migration of contamination to surface water.

Criteria: Surface water quality to meet the State water quality standards.

Waste Sludges

Objective: To eliminate the source, treat the source to a less hazardous or non-hazardous state, or contain the release of hazardous pollutants off-site.

Criteria: Surface water quality to meet the State water quality standards.

Contaminated Soil and Sediment

Objective: To reduce or eliminate migration of contaminated soil and sediments.

Criteria: Acceptable concentrations of contaminants migrating from soils and sediments off-site to meet background concentrations in adjacent soils or minimal risk levels.

Initial List of Alternatives

The following initial list of alternatives were evaluated for this site:

	2. Diversion/collection structures
	3. Regrading and revegetation
	4. No action
Air Pollution	1. Thermal oxidation
	2. Vapor phase adsorption
	3. No action
Contaminated Sediment/PCB's	1. Hydraulic dredging
	2. Mechanical dredging
	3. No action

Detailed Evaluation of Alternatives

The draft feasibility study included a detailed description of 17 alternative remedial actions. The 17 alternatives involve different combinations of actions that fall within three main options: 1) no action, 2) excavation, and 3) containment.

In addition to handling the pit waste, some alternatives include strategies to deal with contaminated groundwater and residual contamination in the stream sediment left from the pit overflows that took place in the last decade. To insure that rainfall will not increase the movement of contaminants through percolation or stormwater runoff, some alternatives include placing a clay cap over the site. A complete list of alternatives for the excavation and containment options can be found in Table I and Table II. A summary of these options follows.

No Action Option - the site is left as is and monitored every six months.

Excavation Options - The ten excavation options involve digging up specific areas of the site and disposing of the contaminated material in some fashion. The excavation options differ primarily by the area to be excavated and the disposal method used.

Three disposal methods were considered, the vault method, the landfill method and the incineration method. The vault method requires construction of an on-site cement lined cavity that would be filled with excavated material. The off-site landfill method requires that excavated material by hauled to a federally

TABLE I

OPTION B

EXCAVATION

	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10
AREA TO BE EXCAVATED										
Entire Site			x							
Pits Only	x	x		x	x	x	x	x	x	x
Creek Sediments	x	x	x	x	x	x	x	x	x	x
DISPOSAL METHOD										
Vault				x						
Landfill On-site	x									
Landfill Off-site		x	x							
Incineration On-site					x	x	x	x		
Incineration Off-site									x	x
Incineration Of Sludges Only					x	x			x	
Incineration Of Entire Pit							x	x		x
Ash Disposal On-site					x		x			
Ash Disposal Off-site						x		x	x	x
GROUND WATER TREATMENT										
Ground Water Treatment On-site	x	x	x	x	x	x	x	x	x	x
Construction Dewatering (temporary)	x	x	x	x	x	x	x	x	x	x
Permanent Extraction Wells	x	x		x	x	x	x	x	x	x
SURFACE CAP										
Surface Cap Entire Site		x				x		x	x	x
Surface Cap Partial Site	x			x	x		x			
COST (present worth)	$12,611,000	$66,594,000	$224,824,000	$17,973,000	$87,184,000	$110,122,000	$126,262,000	$117,603,000	$71,390,000	$84,258,000

TABLE II

OPTION C

CONTAINMENT

	C-1	C-2	C-3	C-4	C-5	C-6
SLURRY WALL						
Slurry Wall Around Entire Site	x	x			x	
Slurry Wall Around Pits Only			x	x		x
EXCAVATION						
Excavation Selected Areas Other Than Pits			x	x		
Excavation Of Creek Sediments	x	x	x	x		
GROUND WATER TREATMENT						
On-site Treatment Facility	x		x			
Construction Dewatering (temporary)	x	x	x	x	x	x
Permanent Extraction Wells	x		x			
SURFACE CAP						
Surface Cap Entire Site	x	x			x	
Surface Cap Partial Site			x	x		x
COST (present worth)	$3,049,000	$2,447,000	$2,722,000	$2,120,000	$2,338,000	$1,991,000

approved hazardous waste landfill. The on-site landfill requires disposal of excavated materials in a double lined facility constructed on-site. The incineration method involves burning the excavated materials in a rotary kiln or multiple hearth furnace. The by-product of incineration is an ash that would require disposal in a landfill.

In addition to the disposal methods, the excavation options vary with the area covered by a surface cap and the use of groundwater treatment.

Containment Options - the six containment options are designed to prevent movement of contaminants off-site. The containment options involve the placement of a slurry wall around the contaminated area.

This option can be very effective in eliminating movement of contaminated groundwater when used in conjunction with a groundwater recovery and treatment system.

The containment options differ primarily in the area contained and the use of groundwater treatment. The options also consider excavation of certain areas and surface caps.

RECOMMENDED REMEDIAL ACTION

An important part of the feasibility study was to evaluate the remedial alternatives and identify the most appropriate cost effective alternative which meets the objectives. In addition to the response objectives, other factors were used to evaluate the alternatives. These factors included: capital cost, operation and maintenance cost, level of cleanup, reliability, special engineering considerations, implementability, environmental effects (air, surface water, groundwater, soil/sediments), legal constraints, and time required for implementation. A detailed evaluation was conducted by the engineering consultant and is presented in the feasibility study. This evaluation is summarized in Table III.

Tal II

Alternative	Cost ($1,000) Capital	O & M*	Present Worth	Public Health Considerations	Environmental Effects	Technical Considerations
A-1	0	24.6	269	Does not meet any remedial response objectives. Probable contamination of residential water supply. Present public health threat below reference risk level. However, future worst-case situation indicates unacceptable level of risk.	Continued migration of contaminated groundwater off-site, leading to possible future contamination of drinking water supplies of area residents. Continued leachate generation from source (pits). Leachate plume migrating north from the site will eventually intersect the tributary creating, in turn, a long-term threat to water quality of McGirts Creek.	--
B-1	11,714	94.1 52.9	12,611	Totally meets remedial response objectives. Reduces public health threat to acceptable levels. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges and cover materials). Alleviates problem of contaminant migration in groundwater and surface water. Permanent disruption of area environment by on-site landfill; may effect property values and area development potential.	Relies on widely-used technologies. O & M requirements for landfill, cap, and groundwater treatment facility will be substantial.
B-2	66,069	56.3 15.1	66,594	Totally meets remedial response objectives. Reduces public health threat to acceptable levels. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges and cover materials). Alleviates problem of contaminant migration in groundwater and surface water. Temporary disruption of area environment during remedial activities.	Relies on widely-used technologies. O & M requirements for groundwater treatment facility and cap will be substantial.

*Where two figures are given, the first number represents O & M costs for the period 0 to 25 years (including groundwater treatment); the second number represents costs for 26 to 50 years.

Table (cont.)

Alternative	Cost ($1,000) Capital	O & M*	Present Worth	Public Health Considerations	Environmental Effects	Technical Considerations
B-3	224,604	9.3	224,824	Totally meets remedial response objectives. Reduces public health threat completely. High risk to remedial workers during excavation of pits.	Removes source of contamination and all secondary on-site contamination. Temporary disruption of area environment during remedial work.	Relies on straight-forward construction technology.
B-4	17,456	55.1 13.9	17,973	Totally meets remedial response objectives. Reduces public health threat to acceptable level. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges and cover materials). Alleviates problem of migration of contaminants in groundwater and surface water. Permanent disruption of existing area environment by on-site vault; visually not aesthetic; may affect property values and area development potential.	Relies on widely-used technologies. O & M requirements for vault and groundwater treatment facility will be substantial.
B-5	86,471	75.4 34.2	87,104	Totally meets remedial response objectives. Reduces public health threat to acceptable level. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges). Alleviates problem of contaminant migration in groundwater and surface water. Air quality affected by on-site incineration. Permanent disruption of existing area environment by on-site landfill; may affect property values and area development potential.	Relies on state-of-the-art technology (mobile incineration); high operation and maintenance requirements. Provides ultimate disposal of source contaminants.
B-6	109,506	57.4 16.1	110,122	Totally meets remedial response objectives. Reduces public health threat to acceptable level. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges). Alleviates problem of contaminant migration in groundwater and surface water. Air quality affected by on-site incineration. Temporary disruption of area environment during remedial activities.	Relies on state-of-the-art technology (mobile incineration); high operation and maintenance requirements. Provides ultimate disposal of source contaminants.

Table III (cont.)

Alternative	Cost ($1,000) Capital	O & M*	Present Worth	Public Health Considerations	Environmental Effects	Technical Considerations
B-7	125,599	70.2 29.1	126,262	Totally meets the remedial response objectives. Reduces public health threat to acceptable limits. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges and cover materials). Alleviates problem of contaminant migration in groundwater and surface water. Air quality affected by on-site incineration. Temporary disruption of area environment during remedial activities.	Relies on state-of-the-art technology (mobile incineration); high operation and maintenance requirements. Provides ultimate disposal of source contaminants.
B-8	137,068	57.4 16.2	137,603	Totally meets the remedial response objectives. Reduces public health threat to acceptable limits. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges and cover materials). Alleviates problem of contaminant migration in groundwater and surface water. Air quality affected by on-site incineration. Temporary disruption of area environment during remedial activities.	Relies on state-of-the-art technology (mobile incineration); high operation and maintenance requirements. Provides ultimate disposal of source contaminants.
B-9	70,854	57.4 16.2	71,390	Totally meets the remedial response objectives. Reduces public health threat to acceptable limits. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges). Alleviates problem of contaminant migration in groundwater and surface water. Temporary disruption of area environment during remedial activities.	Provides ultimate disposal of source contaminants by off-site thermal destruction.
B-10	83,722	57.4 16.2	84,250	Totally meets the remedial response objectives. Reduces public health threat to acceptable limits. High risk to remedial workers during excavation of pits.	Removes contamination source (sludges and cover materials). Alleviates problem of contaminant migration in groundwater and surface water. Temporary disruption of area environment during remedial activities.	Provides ultimate disposal of source contaminants by off-site thermal destruction.

Table III (cont.)

Alternative	Cost ($1,000) Capital	O & M*	Present Worth	Public Health Considerations	Environmental Effects	Technical Considerations
C-1	2,302	82.0 40.8	3,049	Totally meets the remedial response objectives. Reduces public health threat to acceptable limits. Low risk to remedial workers.	Isolates waste source from area groundwater and from surface water infiltration. Temporary disruption of area environment during remedial activities.	Relies on well-established technologies. Will require long-term monitoring of the containment system to check effectiveness.
C-2	2,072	40.8	2,447	Partially meets the remedial response objectives. Does not reduce public health threat to acceptable limits. Low risk to remedial workers.	Isolates waste source from area groundwater and from surface water infiltration. Existing contaminated groundwater will migrate off-site. Temporary disruption of area environment during remedial activities.	Relies on well-established technologies. Will require long-term monitoring of the containment system to check effectiveness.
C-3	1,985	81.0 39.8	2,722	Totally meets the remedial response objectives. Reduces public health threat to acceptable limits. Moderate risk to remedial workers during installation of slurry wall in contaminated zone.	Isolates waste source from area groundwater and from surface water infiltration. Provides partial removal (soils north of pits) of secondary contamination. Temporary disruption of area environment during remedial activities.	Relies on well-established technologies. Slurry wall placement in contaminated zone increases potential for failure. Will require long-term monitoring of the containment system to check effectiveness.
C-4	1,754	39.8	2,120	Partially meets the remedial response objectives. Does not reduce public health threat to acceptable limits. Moderate risk to remedial workers during installation of slurry wall in contaminated zone.	Isolates waste source from area groundwater and from surface water infiltration. Provides partial removal (soils north of pits) of secondary contamination. Existing contaminated groundwater will migrate off-site. Temporary disruption of area environment during remedial activities.	Relies on well-established technologies. Slurry wall placement in contaminated zone increases potential for failure. Will require long-term monitoring of the containment system to check effectiveness.

Table III (cont.)

Alternative	Cost ($1,000) Capital	O & M*	Present Worth	Public Health Considerations	Environmental Effects	Technical Considerations
C-5	1,978	39.2	2,338	Partially meets the remedial response objectives. Does not reduce public health threat to acceptable limits. Low risk to remedial workers.	Isolates waste source from area groundwater and from surface water infiltration. Existing contaminated groundwater will migrate off-site. Temporary disruption of area environment during remedial activities.	Relies on well-established technologies. Will require long-term monitoring of the containment system to check effectiveness.
C-6	1,640	38.3	1,991	Partially meets the remedial response objectives. Does not reduce public health threat to acceptable limits. Moderate risk to remedial workers during installation of slurry wall in contaminated zone.	Isolates waste source from area groundwater and from surface water infiltration. Contaminated soils north of pits will remain. Existing contaminated groundwater will migrate off-site. Temporary disruption of area environment during remedial activities.	Relies on well-established technologies. Slurry wall placement in contaminated zone increases potential for failure. Will require long-term monitoring of the containment system to check effectiveness.

This evaluation revealed the following:

The "no-action" alternative is an unacceptable solution to the problems at the Whitehouse site, since it does not meet any of the objectives. The potential for the heavily contaminated shallow aquifer just beneath the site to seep into the drinking water supply classifies the site, according to risk calculations, as a site at which remedial action must be taken. Additional concern is the lateral movement of contaminants to groundwater via the surface streams. Boyles (FDER-RI Report) strongly suggests that the streams and nearby creek are intercepting contaminated water from the site.

Alternatives B-1 and B-4 involve removal of the most concentrated waste products and storage in an on-site landfill or vault. These actions do not provide total source cleanup and create additional technical, environmental, and health problems associated with their implementation. Specific concerns are addressed in the feasibility study and include limited space, higher health hazards to workers and residents, and permanent disruption of the area environment by the on-site landfill or vault. The remaining excavation options involve incineration or disposal at an off-site landfill and are cost-prohibitive.

Alternatives C-2, C-4, C-5, and C-6 are unacceptable because they only partially address the remedial objectives.

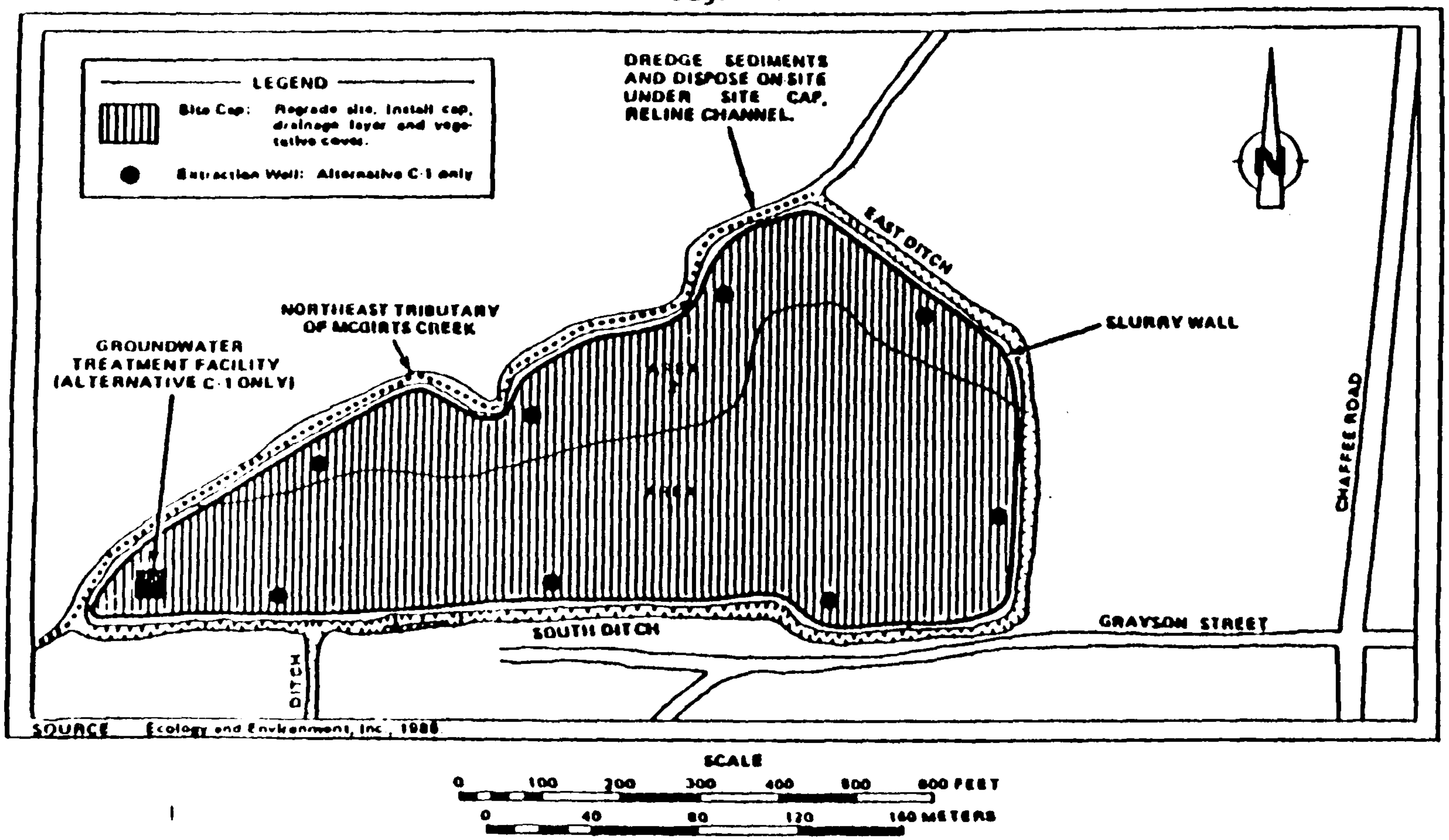
Alternative C-1 appears to be the most reasonable and, further, is recommended by the consultant since it fully meets the objectives at the lowest cost. The recommended alternative C-1 consists of: (See Fig. 2-7)

- Construction of a slurry wall around the entire site;
- Recovery and treatment of contaminated groundwater;
- Removal of contaminated sediments from the Northeast Tributary of McGirts Creek; and
- Surface cap entire site.

The slurry wall will be effective in preventing horizontal movement of contaminated groundwater. By placing a cap over the site, the amount of groundwater and surface water seeping into the contaminated area will be greatly reduced.

An integral part of the alternative is the groundwater pumping/treatment system. The removal of contaminated groundwater from the area enclosed by the slurry wall will create an upward flow into the area through the aquitard which will effectively prevent any downward migration of contaminants. An additional advantage of this upward flow is that the influx of clean water will create a "flushing" action which will provide for some removal of the soluble contaminants. The FS consultant believes that the 25 year period proposed will accomplish sufficient flushing to allow shutdown of the groundwater recovery system.

Fig. 2-7



ALTERNATIVE C-1 SLURRY WALL AND GROUNDWATER TREATMENT

COMMUNITY RELATIONS

Three public meetings were held to inform the public of activities at the site. Fact sheets and press releases were prepared for all meetings. The press and television covered the meetings extensively. The third meeting was to present the draft feasibility study and allow for public comment. A responsiveness summary outlining the results of public comment is enclosed. An information repository was established at the elementary school in Whitehouse. When approved, this record of decision will be sent to the repository.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

Alternative C-1 would result in the discharge of treated water. We anticipate meeting the technical requirements of NPDES for this discharge. While PCB's have been found at the site, concentrations are well below those that trigger action under TSCA. The RCRA program has commented on the remedy and their comments can be addressed during the remedial design phase. We do not see, nor do we anticipate, any conflict with other environmental laws. Table III summarizes the evaluation of alternatives with respect to environmental concerns, among others.

OPERATION AND MAINTENANCE (O&M)

Alternative C-1 includes recovery and treatment of contaminated groundwater. The conceptual design suggests a maximum flow-through capacity of approximately 80,000 gallons per day. A groundwater monitoring program will be initiated consisting of eight new monitoring wells. Six wells will be set into the middle aquifer and two into the aquitard. Existing well D4 will be included in this system to monitor the bedrock aquifer. The estimated annual O&M cost is 96,630, projected for a 25 year period. A letter is included with this ROD confirming the State's committment to funding these continuing costs.

SCHEDULE

The Corps of Engineers (COE) has advertised for firms to conduct the remedial design. Review and selection of a contractor is scheduled for June 1985 with remedial design complete in June 1986. Construction should proceed immediately thereafter with construction complete in June 1987.

FUTURE ACTIONS

Oak Ridge National Laboratory has been tasked through an IAG to provide guidance on design of the groundwater recovery system to maximize its effectiveness for flushing soluble wastes from the pits. This may allow us to reduce the time that the groundwater recovery system operates.

APPENDIX C

TABLES 1 - 17

Table 1

SUMMARY OF CONTAMINANTS OF CONCERN BY MEDIUM
WHITEHOUSE WASTE OIL PITS SITE

	Frequency	RME
Surface Soil		
Semivolatile Organics (ug/kg)		
1,4-Dichlorobenzene	2/8	328
Naphthalene	1/8	301
Volatile Organics (ug/kg)		
Methylene Chloride	2/8	11.8
1,1,2,2-Tetrachlorethane	1/8	2.9
Tetrachloroethene	1/8	10.6
Chlorobenzene	1/8	4
Toluene	5/8	38
Exposed Wastes		
Inorganics (mg/kg)		
Barium	4/4	5445
Copper	4/4	269
Lead	4/4	29604
Antimony	1/4	31.9
Zinc	4/4	941
Semivolatile organics (mg/kg)		
Napthalene	3/4	87
2-Methylnaphthalene	4/4	76
3-and/or4-Methylphenol	2/4	87
Pesticides (mg/kg)		
PCB 1260 (Aroclor 1260)	2/4	48
Surface Water		
Inorganics (ug/l)		
Manganese	4/4	14
Volatile Organics (ug/l)		
Carbon Disulfide	2/5	35.3

Table 1 (con't)

	Frequency	RME
Groundwater		
Inoragnics (ug/l)		
Barium	11/16	61
Chromium	13/16	67
Copper	3/16	12.2
Nickel	9/16	65
Lead	13/16	313
Antimony	1/16	30
Selenium	2/16	11
Vanadium	10/16	32
Zinc	2/16	52
Manganese	14/16	93
Volatile Organics (ug/l)		
Trichloroethene	2/18	3
Acetone	2/18	5
Carbon Disulfide	6/18	11
Methyl Ethyl Ketone	1/18	114
Methyl Isobutyl Ketone	1/18	26
Methylbutyl Ketone	1/19	12
Toluene	1/18	5
Xylene	3/18	4
Semivolatiles (ug/l)		
Isophorone	1/18	5
Phenol	1/18	48
3-and/or 4-Methylphenol	1/18	35
Naphthalene	2/18	9
Trenches		
Inorganics (mg/kg)		
Cadmium	5/8	6.8
Copper	7/8	83
Lead	8/8	12751.1
Zinc	7/8	1882
Semivolatile Organics (ug/kg)		
Napthalene	2/8	24
Bis(2-ethylhexyl)phthalate	1/8	89
2-Methylnaphthalene	1/8	23

Table 1 (con't)

	Frequency	RME
Volatiles (ug/kg)		
Toluene	3/8	3.8
Total Xylenes	3/8	16.6
Ethylbenzene	3/8	2.6
Pesticides (ug/kg)		
PCB 1260 (Aroclor 1260)	1/8	23

* RME = Reasonable Maximum Exposure values are the exposure point concentrations used in the determination of average daily exposure levels and are derived according to Agency guidance (EPA/540/1-89/002).

Table 2

EXPOSURE AND INTAKE ASSUMPTIONS: DERMAL CONTACT AND ACCIDENTAL INGESTION OF SURFACE SOIL AND EXPOSED WASTE WHITEHOUSE WASTE OIL PITS SITE (PRESENT AND FUTURE)

	LOCAL RESIDENCES-AGE GROUPS (Years)				
	0-1	2-6	7-11	12-17	18-75
Exposure Frequency (Soil) (days/year)*	180	365	365	365	365
Exposure Frequency (Wastes) (days/year)*	0	5	10	10	0
Body Weight (kg)	10	17	30	55	72
Duration of Exposure (Years)	2	5	5	6	30
Soil to Skin Adheherence Factor (mg/cm^2)	1.4	1.4	1.4	1.4	1.4
Skin Surface Area Exposed (cm^2/event)	1700	2200	3800	5900	2000
Dermal Absorption Factors:					
Semi-volatile Organics	1.2%	1.2%	1.2%	1.2%	1.2%
Volatile Organics	5%	5%	5%	5%	5%
Metals	1%	1%	1%	1%	1%
Ingestion Absorption Factors:					
Semi-volatile Organics/ Metals	50%	50%	50%	50%	50%
Volatile Organics	100%	100%	100%	100%	100%
Soil Ingestion (mg/day)	100	200	100	100	100

* Only the frequency of dermal exposure changes from the soil pathway model to the exposed wastes pathway model, all other model parameters remain the same.

Sources: Skin surface areas exposed are from USEPA Exposure Factors Handbook (1990); other parameter values were derived as described in the text.

Table 3

EXPOSURE AND INTAKE ASSUMPTIONS: SURFACE WATER DERMAL CONTACT
WHITEHOUSE WASTE OILS PITS SITE

	AGE GROUP (YEARS)				
	0-1	2-6	7-11	12-17	18-75
Duration of Exposure (years)	2	5	5	6	30
Frequency of Exposure (days/year)	0	0	52	10	0
Length of Exposure (hours/day)	0	0	1.0	0.5	0
Skin Surface Area Exposed (cm^2)	0	0	3800	5900	0

Permeation Constants (PC) for Surface Water Contaminants

Contaminant	PC (cm^2 hour)
Carbon Disulfide	5.5×10^{-2}
Manganese	8.4×10^{-4}

Table 4

EXPOSURE AND INTAKE ASSUMPTIONS FOR GROUNDWATER INGESTION WHITEHOUSE, WASTE OIL PITS SITE

	AGE GROUPS				
	0-1	2-6	7-11	12-17	18-75
Duration of Exposure (years)	2	5	5	6	30
Groundwater Ingestion (1/day)	1	1	1	2	2
Ingestion Absorption Factor (all contaminants)	1.0	1.0	1.0	1.0	1.0
Frequency of Exposure (Ingestion (days/year)	365	365	365	365	365
Frequency of Exposure (Irrigation)	122	122	122	122	122
Inhalation Rate (m^3/hr)	--	0.83	1.17	1.63	2.50
Length of Exposure (hours/ day, irrigation)	--	4	4	4	4
Inhalation Absorbtion Factor (all contaminants)	1.0	1.0	1.0	1.0	1.0

Table 5

TOXICOLOGIC CRITERIA VALUES:
CANCER HEALTH EFFECTS
WHITEHOUSE WASTE OIL PITS SITE

SUBSTANCE	WEIGHT OF EVIDENCE CLASSIFICATION	ORGAN(S) AFFECTED	CANCER POTENCY FACTOR (SLOPE FACTOR) $(mg/kg/day)^{-1}$ ORAL 1/	INHALATION	SOURCE
Cadmium	B1	Lung, Respiratory Tract	*	6.1	IRIS
Chromium	A2/	Lung	*	41 2/	IRIS
Nickel	A3/	Respiratory Tract	*	0.84 3/	HEAST
Methylene Chloride	B2	Lung, Liver	0.0063	0.0063	HEAST
Bromodichloromethane	B2	Liver	0.13	NA	HEAST
Tetrachloroethene	B2	Leukemia, Liver	0.051	0.0033	HEAST
Trichloroethene	B2	Lung, Liver	.011	.017	HEAST
1,4-Dichlorobenzene	B2	Liver	0.024	NA	HEAST
Bis(2-ethylhexyl)phthalate	B2	Liver	.014	NA	HEAST
PCBs	B2	Liver	7.7	NA	IRIS

Notes: 1/ * = Not carcinogenic by this route
2/ Values given are for hexavalent chromium
3/ Value given is for Nickel refinery dust

NA = Not Available

TABLE 6

TOXICOLOGIC CRITERIA VALUES: NONCANCER HEALTH EFFECTS FOR COCs WHITEHOUSE WASTE OIL PITS SITE

SUBSTANCE	RfD (mg/kg/day)	ORAL EXPOSURE UNCERTAINTY FACTOR	ORGAN(S) AFFECTED
Antimony	4.0x10^{-4}	1000	Hematopetic
System			
Barium	5x10^{-2}	100	Blood
Cadmium	5x10^{-4} 1/	10	Kidney
Chromium	5x10^{-3} 2/	500	Not Defined
Cobalt	NA	NA	NA
Copper	3.7x10^{-2}	None	Gastric
Irritation			
Lead	NA	NA	Developmental
Manganese	2x10^{-1}	100	Central Nervous
System			
Mercury	3x10^{-4}	10	Central Nervous
System			
Nickel	2x10^{-2} 3/	300	Reduced Organ
Weight			
Selenium	3x10^{-3}	1000	Skin, Muscles
Vanadium	9x10^{-3}	100	?
Zinc	2x10^{-1}	10	Anemia
Methylene Chloride	6x10^{-2}	100	Liver
Acetone	0.10	1000	Liver, Kidney
Carbon Disulfide	0.10	100	Fetotoxicity
1,2-Dichloroethene	2x10^{-2}	1000	Liver
4-methyl-2-pentanone	5x10^{-1}	100	Liver, Kidney
Tetrachloroethene	1x10^{-2}	100	Liver
Toluene	3x10^{-1}	100	Eye and Nose
Irritation			
Chlorobenzene	2x10^{-2}	1000	Liver, Kidney
Xylenes, Total	2	100	Hyperactivity,
Decreased			
			Body Weight,
Increased			
			Mortality
Phenol	0.60	100	Fetotoxicity
1,4-dichlorobenzene	NA	NA	NA
Benzoic Acid	4.0	1	Irritation
Di-n-butylphthalate	1.0	100	Mortality
Bis-(2-ethylhexyl)-phthalate	2x10^{-2}	1000	Liver
Naphthalene/2-methyl-naphthalene	4x10^{-3}	1000	Ocular

Notes:
1/ Value given is for ingestion of groundwater.
2/ Value given is for hexavalent chromium
3/ Value given is for nickel refinery dust.
4/ Values for toluene and xylene are based on inhalation RfD concentrations from HEAST.
NA = Not Available

TABLE 6 (con't)

TOXICOLOGIC CRITERIA VALUES: NONCANCER HEALTH EFFECTS FOR COCs
WHITEHOUSE WASTE OIL PITS SITE

SUBSTANCE	RfD (mg/kg/day)	INHALATION EXPOSURE UNCERTAINTY FACTOR	ORGAN(S) AFFECTED
SOURCE			
Antimony	NA	NA	NAIRIS
Barium	$1x10^{-4}$	1000	
Fetotoxicity	IRIS		
Cadmium	NA	NA	NAIRIS
Chromium	NA	NA	NAIRIS
Cobalt	$3.4x10^{-5}$	100	CardiacOSHA
TLV			
Copper	NA	NA	NAMCL
Lead	NA	NA	NAEbasco
Based			
			on PMCL
Manganese	$3x10^{-9}$	100	Central
Nervous System	IRIS		
Mercury	NA	NA	NAIRIS
Nickel	NA	NA	NAIRIS
Selenium	$1x10^{-3}$	1000	Skin, GI
Tract	HEAST		
Vanadium	NA	NA	NAHEAST
Zinc	NA	NA	NAHEAST
Hethylene Chloride	NA	NA	NAHEAST
Acetone	NA	NA	NAHEAST
Carbon Disulfide	NA	NA	NAIRIS
1,2-Dichloroethene	NA	NA	NAHEAST
4-methyl-2-pentanone	$2x10^{-1}$	100	Liver,
Kidney	HEAST		
Tetrachloroethene	NA	NA	NAHEAST
Toluene	$6x10^{-1}$ 4/	100	Nose/Throat
Irritation	HEAST		
Chlorobenzene	$5x10^{-3}$	10,000	Liver,
Kidney	HEAST		
Xylenes, Total	$1x10^{-1}$ 4/	100	Nose/Throat
Irritation			
Phenol	NA	NA	NAHEAST
1,4-dichlorobenzene	$7x^{-1}$	100	Liver,
Kidney	HEAST		
Benzoic Acid	NA	NA	NAHEAST
Di-n-butylphthalate	NA	NA	NAHEAST
Bis-(2-ethylhexyl)-phthalate	NA	NA	NAHEAST
Naphthalene/2-methyl-naphthalene	NA	NA	NAIRIS

Notes: 1/ Value given is for ingestion of groundwater.
2/ Value given is for hexavalent chromium
3/ Value given is for nickel refinery dust.
4/ Values for toluene and xylene are based on inhalation RfD concentrations from HEAST.
NA = Not available

Table 7 (a)

CANCER RISKS AND NONCANCER HAZARD INDICES: SURFACE SOIL EXPOSURES WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	RME SOIL CONCENTRATION (mg/kg)	LIFETIME CANCER RISK
Carcinogenic Risks		
1,4-Dichlorobenzene	0.33	1.2×10^{-8}
Methylene Chloride	0.012	3.9×10^{-10}
1,1,2,2-Tetrachloroethane	0.004	3.5×10^{-9}
Tetrachloroethene	0.013	2.9×10^{-9}
	Total Cancer Risk:	1.9×10^{-8}
Noncarcinogenic Effects		
Chlorobenzene	0.003	2.9×10^{-6}
1,4-Dichlorobenzene	0.33	3.2×10^{-6}
Methylene Chloride	0.013	3.7×10^{-6}
Naphthalene	0.30	5.3×10^{-4}
Tetrachloroethene	0.011	2.0×10^{-5}
Toluene	0.038	2.3×10^{-6}
1,1,1-Trichloroethane	0.003	5.9×10^{-7}
Acetone	0.020	3.7×10^{-6}
Methylisobutyl Ketone	0.006	2.2×10^{-6}
	Total Hazard Index: (ages 2-6)	5.7×10^{-4}

Table 7 (b)

CANCER RISKS AND NONCANCER HAZARD
INDICES: EXPOSURE TO HOME-GROWN VEGETABLES
(SURFACE SOIL CONTAMINANTS)
WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	RME CONCENTRATION IN SOIL (mg/kg)	LIFETIME CANCER RISK
1. Carcinogenic Effects		
1,4-Dichlorobenzene	0.33	2.7×10^{-5}
2. Noncarcinogenic Effects		CDI/RFD Ratio
1,4-Dichlorobenzene	0.33	3.4×10^{-3}
Naphthalene	0.30	1.3×10^{-1}
	Total Hazard Index: (Adults)	1.3×10^{-1}

RME = Reasonable Maximum Exposure

Table 8

CANCER RISKS AND NONCANCER HAZARD INDICES: EXPOSURE TO EXPOSED WASTE WHITEHOUSE WASTE OILS PITS SITE

CONTAMINANT	RME CONCENTRATION IN WASTE (mg/kg)	LIFETIME CANCER RISK
1. Carcinogenic Effects		
PCB 1260	4.8	7.6×10^{-6}
2. Noncarcinogenic Effects		CDI/RFD Ratio (2-6 year-olds)
Antimony	23	8.4×10^{-3}
Barium	5400	1.1×10^{-2}
Copper	270	7.7×10^{-4}
Lead	30000	
2-Methylnaphthalene	76	2.1×10^{-3}
3,4-Methylphenol	87	1.9×10^{-4}
Naphthalene	87	2.4×10^{-3}
Zinc	94	5.0×10^{-4}
	Total Hazard Index:	2.6×10^{-2}

RME = Reasonable Maximum Exposure

Table 9

CANCER RISKS AND NONCANCER HAZARD INDICES: EXPOSURE TO SURFACE WATER WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	RME CONCENTRATION IN WATER (mg/l)	LIFETIME CANCER RISK
1. Carcinogenic Effects	---	---
(None)		
2. Noncarcinogenic Effects		CDI/RFD Ratio
Carbon Disulfide	0.035	3.5×10^{-4}
Manganese	1.469	1.1×10^{-6}
	Total Hazard Index: (ages 7-11)	3.5×10^{-4}

RME = Reasonable Maximum Exposure

Table 10

CANCER RISKS AND NONCANCER HAZARD
INDICES: INHALATION EXPOSURE
DURING IRRIGATION (SHALLOW GROUNDWATER)
WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	RME CONCENTRATION IN WATER (mg/l)	LIFETIME CANCER RISK
1. Carcinogenic Effects		
Trichloroethene	0.003	$3.7x10^{-9}$
2. Noncarcinogenic Effects		CDI/RFD Ratio (2-6 year-olds)
Carbon Disulfide	0.011	$1.7x10^{-5}$
Acetone	0.005	$7.9x10^{-6}$
Toluene	0.005	$1.3x10^{-6}$
Xylene	0.004	$6.3x10^{-6}$
	Total Hazard Index:	$3.3x10^{-5}$

RME = Reasonable Maximum Exposure

Table 11

CANCER RISKS AND NONCANCER HAZARD INDICES:
FUTURE CONSUMPTION OF HOME-GROWN VEGETABLES
(IRRIGATION WITH SHALLOW GROUNDWATER)
WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	RME CONCENTRATION IN SOIL (mg/l)(1)	LIFETIME CANCER RISK
1. Carcinogenic Effects	--	--
(None)		
2. Noncarcinogenic Effects		CDI/RFD Ratio (2-6 year-olds)
Naphthalene	0.41	1.8×10^{-1}
3,4-Methylphenol	0.72	5.6×10^{-4}
	Total Hazard Index:	1.8×10^{-1}

(1) Concentrations Resulting From Irrigation Water Application (See Table 5-4).

RME = Reasonable Maximum Exposure

Table 12

**NONCANCER HAZARD
INDICES: EXPOSURE THROUGH
DOMESTIC USE OF DEEP GROUNDWATER
WHITEHOUSE WASTE OIL PITS SITE**

CONTAMINANT Noncarcinogenic Effects	CONCENTRATION IN WATER (ug/l)	CDI/RFD RATIO	
Antimony	69	$1.0x10^{-1}$	
Barium	36	$4.2x10^{-2}$	
Chromium	120	$1.4x10^{-0}$	Copper
43	$6.8x10^{-2}$		
Manganese	270	$7.9x10^{-2}$	
Nickel	120	$3.5x10^{-1}$	
Zinc	200	$5.9x10^{-2}$	
	Total Hazard Index (ages 2-6):	$1.2x10^{-1}$	

Table 13

CANCER RISKS AND NONCANCER HAZARD INDICES: FUTURE EXPOSURE THROUGH DOMESTIC USE OF SHALLOW GROUNDWATER WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	RME CONCENTRATION IN WATER (ug/l)	LIFETIME CANCER RISK
1. Carcinogenic Effects		
Trichloroethene (ingest.)	3	$7.9x10^{-7}$
Trichloroethene (inhal.)	3	$1.2x10^{-6}$
Isophorone	5	$2.2x10^{-7}$
	Total Cancer Risk:	$2.0x10^{-6}$
2. Noncarcinogenic Effects		CDI/RFD Ratio
Antimony	21	$3.1x10^{-0}$
Barium	61	$7.2x10^{-2}$
Chromium	67	$7.8x10^{-1}$
Copper	12	$1.9x10^{-2}$
Manganese	92	$2.7x10^{-2}$
Nickel	64	$1.9x10^{-1}$
Selenium	11	$2.2x10^{-1}$
Vanadium	32	$2.1x10^{-1}$
Zinc	52	$1.5x10^{-2}$
Acetone	5	$2.9x10^{-3}$
Carbon Disulfide	11	$6.5x10^{-3}$
Toluene	5	$1.5x10^{-3}$
Xylene	4	$1.2x10^{-4}$
3,4-Methylphenol	6	$7.1x10^{-2}$
Naphthalene	9	$1.3x10^{-1}$
	Total Hazard Index (ages 2-6):	$4.8x10^{-0}$

RME = Reasonable Maximum Exposure

Table 14

RISKS ASSOCIATED WITH COMBINED EXPOSURE PATHWAYS WHITEHOUSE WASTE OIL PITS SITE

EXPOSURE ROUTE	LIFETIME CANCER RISK	MAJOR CONTRIBUTORS TO RISK	HAZARD INDEX	MAJOR CONTRIBUTORS TO HAZARD INDEX
1. Current Lard Use				
Surface Soil	$1.7x10^{-8}$	1,4-Dichlorobenzene (80%)	$8.2x10^{-5}$	Naphthalene (94%)
Exposed Waste	$7.6x10^{-6}$	Pcss (100%)	0.026	Antimony (32%) Barium (42%)
Surface Water	0	(None)	$3.5x10^{-4}$	Carbon Disulfide (99%)
Home-Grown Vegetables (Soil Contaminants)	$2.7x10^{-5}$	1,4-Dichlorobenzene (100%)	0.13	Naphthalene (99%)
Total Current Use	$3.5x10^{-5}$	-----	0.16	---
2. Future Land list				
Irrigation Water (Inhalation)	$6.3x10^{-10}$	Trichloroethene (100%)	$1.8x10^{-5}$	Methylethyl Ketone (50%)
Home-Grown Vegetables (Irrigation)	0	(None)	0.14	Naphthalene (99%)
Groundwater Consumption	$2.0x10^{-6}$	Trichloroethene (100%)	4.8	Antimony (65%) Chromium (16%)
Deep Groundwater Consumption	-----	-----	12	Antimony (83%) Chromium (12%)
Total Future Use	$2.0x10^{-6}$	-----	16.9	-----

Table 15 (a)

COMPARISON OF SURFACE WATER CONTAMINANT LEVELS TO STANDARDS
WHITEHOUSE WASTE OIL PITS SITE

STATE OF FLORIDA SURFACE WATER QUALITY CLASSIFICATIONS

COMPOUND	RME (mg/l)	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION FISH & WILDLIFE CLASS III-FRESH	AGRICULTURAL WATER SUPPLIES CLASS IV
Inorganics					
Aluminum	49.4		≤1.5 mg/l		
Barium	0.031	≤1mg/l			
Lead	0.011	≤0.03 mg/l	≤0.05mg/l	≤ 0.03mg/l	≤ 0.05mg/l
Manganese	0.206		≤ 0.1 mg/l		
Zinc	0.358	≤ 0.03 mg/l	≤ 1 mg/l	≤ 0.03 mg/l	≤ mg/l
Volatile Organics					
Carbon Disulfide	0.025				

(1) The value given is a secondary drinking water standard. Secondary drinking water standards are unenforceable federal guidelines regarding the taste, odor, color and certain other aesthetic effects of drinking water. EPA recommends them to the States as reasonable goals, but Federal law does not require water systems to comply with them. States may, however, adopt their own enforceable regulations governing these concerns.

* RME = Reasonable Maximum Exposure; see Section 6.2 for description of calculation methodology.

Table 15 (b)

COMPARISON OF SURFACE WATER CONTAMINANT LEVELS TO STANDARDS
WHITEHOUSE WASTE OIL PITS SITE

COMPOUND LEVELS	STATE OF FLORIDA SURFACE WATER QUALITY CLASSIFICATIONS DRINKING WATER	USEPA DRINKING WATER STANDARDS MCL	USEPA AMBIENT WATER QUALITY CRITERIA (AWQC) SUGGESTED
Inorganics			
Aluminum			
Barium		1mg/1	
Lead	≤ 0.05 mg/1	0.05 mg/1	0.05 mg/1
Manganese	≤ 0.05 mg/1	0.05 mg/1(1)	
Zinc	≤ 5 mg/1	5 mg/1(1)	
Volatile Organics			
Carbon Disulfide	0.025		

(1) The value given is a secondary drinking water standard. Secondary drinking water standards are unenforceable federal guidelines regarding the taste, odor, color and certain other aesthetic effects of drinking water. EPA recommends them to the States as reasonable goals, but Federal law does not require water systems to comply with them. States may, however, adopt their own enforceable regulations governing these concerns.

* RME = Reasonable Maximum Exposure; see Section 6.2 for description of calculation methodology.

TABLE 16

GLOSSARY OF EVALUATION CRITERIA

Overall Protection of Human Health and 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 provide grounds for invoking a waiver.

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 - is 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 - is 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.

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 reviews the public comments received from the Proposed Plan public meeting.

TABLE 17

RISK-BASED AND ARAR-BASED CLEANUP GOALS WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	ARAR-BASED	RISK-BASED	
SOILS (mg/kg)			
Inorganics			
Antimony		42	
Arsenic		32	
Barium		5,262	
Cadmium		53	
Chromium VI		526	
Copper		3905	
Lead		500	(**)
Nickel		2,105	
Organics			
Benzene		0.4	(*)
Benzo(a)pyrene		0.1	
Bis(2-ethylhexyl)-phthalate		61.5	
Chlorobenzene		42	(*)
1,4-Dichlorobenzene		36	
Di-N-Butyl Phthalate		7,911	
Methylene Chloride		115	
PCB 1260		1	
2-Methyl Naphthalene		NTD	
Naphthalene		317	
Phenol		47,467	
Tetrachloroethene		4	(*)
Toluene		2,000	(*)
Trichloroethene		0.7	(*)

Note: (*) includes inhalation pathway (IR = 20 m3, BW = 70 kg, VF = OSWER 9285.7-01B, Target Risk = 10-6)

(**) OSWER directive (9355.4-02) lead soil clean-up level

NTD no toxicity data available to calculate

TABLE 17 (con't)

RISK-BASED AND ARAR-BASED
CLEANUP GOALS
WHITEHOUSE WASTE OIL PITS SITE

CONTAMINANT	ARAR-BASED		RISK-BASED	
GROUNDWATER (ug/l)				
Inorganics				
Antimony	5	(PMCL)		
Arsenic	50	(MCL)		
Barium	1,000	(MCL)		
Cadmium	5	(MCL)		
Chromium	100	(MCL)		
Copper	1,300	(MCLG)		
Lead	15	(*)		
Manganese	50	(MCL)		
Nickel	100	(PMCL)		
Selenium	50	(MCL)		
Vanadium			150	(A)
Zinc	5,000	(MCL)		
Organics				
Acetone			1,700	(A)
Benzene	1	(**)		
Benzo(a)pyrene	0.2	(PMCL)		
Bis(2-ethylhexyl)-phthalate	4	(PMCL)		
Carbon Disulfide			1,640	(A)
Ethylbenzene	2	(**)		
Methylethyl Ketone			8,460	(A)
3/4-Methylphenol			850	(A)
Naphthalene	10	(**g)		
2-Methylnaphthalene			67	(A)
Phenol			10,000	(A)
Toluene	24	(**g)		
Trichloroethene	3	(**)		
Xylene	50	(**p)		

Note: (A) Risk Assessment Table 8-1
(MCL) Maximum Contaminant Level
(MCLG) Maximum Contaminant Level Goal
(PMCL) Proposed Maximum Contaminant Level
(*) Action Level (6/21/90 Memorandum from the office of Emergency and Remedial Response and the office of Waste Program)
(**) FDER Standard
(**p) FDER Proposed Standard
(**g) FDER Proposed Guidance

APPENDIX D

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
CONCURRENCE LETTER

Tony waste
Dick

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

October 30, 1992

RECEIVED
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EPA - REGION IV
ATLANTA, GA.

Mr. Greer Tidwell, Regional Administrator
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Tidwell:

The Florida Department of Environmental Regulation agrees with the amended selected alternative to address contaminated soils and groundwater at the Whitehouse Oil Pits Site in Duval County.

The remedial action for soils includes soil washing to remove the coarse clean soil fraction followed by biological treatment of the slurry phase with solidification/stabilization of the residual fine grained contaminated fraction. Bulk materials will be decontaminated and disposed of off-site. Contaminated groundwater and waste from the soil treatment facility will be treated by chemical precipitation and granular activated charcoal adsorption. The treated water will be discharged to the McGirt's Creek tributary.

The capital cost for construction is estimated to be $15,500,000 with an annual operation and maintenance cost of $204,000. The estimated present worth over a period of thirty years is $18,900,000. We understand that EPA is negotiating a Consent Decree with potentially responsible parties (PRPs) and that State cost share will not be required.

We look forward to completion of site remediation.

Sincerely,

Carol M. Browner
Secretary

CMB:khh

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