United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R04-90/059
March 1990

EPA

Superfund Record of Decision:

City Industries, FL

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R04-90/059	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION City Industries, FL First Remedial Action - Final			5. Report Date 03/29/90
			6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No.
			11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000
			14.
15. Supplementary Notes			

16. Abstract (Limit: 200 words)

The City Industries site is a former hazardous waste recycling and transfer facility in Goldenrod Township, Orange County, Florida, near the cities of Winter Park and Orlando. The city of Winter Park's water supply well field is located approximately 1,900 feet west of the site. These wells draw from the deep Floridan aquifer, which is separated from a surficial aquifer by a 140-foot-thick confining layer. In 1971, a former fuel oil business at the site was developed into a waste-handling facility. Activities at the site included receiving, handling, storing, reclaiming, and disposing of various waste chemicals. Improper disposal practices and intentional dumping led to onsite soil and surficial ground water contamination. In 1983, after the State ordered the business closed, the site was abandoned. The State subsequently removed the onsite waste drums, some contaminated soil, and waste sludge. In 1984, EPA removed and thermally treated 1,670 tons of contaminated soil and disposed of the residuals onsite. Additionally, EPA removed 180 cubic yards of highly contaminated soil and transported the soil to an offsite hazardous waste landfill. This Record of Decision (ROD) addresses contaminated ground water, which is migrating through the surficial aquifer, a potential drinking

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - City Industries, FL
First Remedial Action - Final
Contaminated Medium: gw
Key Contaminants: VOCs (benzene, PCE, TCE, toluene)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 71
	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)

water source, and prevention of contaminant migration to the deeper Floridan aquifer. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene.

The selected remedial action for this site includes pumping and treatment of ground water using air stripping, followed by offsite discharge to a publicly owned treatment works (POTW), if treatability studies show the discharged water meets pretreatment standards; and ground water monitoring. If a local POTW will not accept the treated effluent, a contingency remedy will be instituted, which includes ground water pumping and treatment using air stripping followed by precipitation, filtration, carbon adsorption, and possibly biological oxidation; conducting treatability studies to ensure compliance with surface water discharge criteria; and discharging the treated effluent offsite to a nearby drainage canal. Both the selected and contingency remedies include implementation of institutional controls, including land use and deed restrictions, and securing construction rights-of-way and easements at the site. The estimated present worth cost for the selected remedial action is $4,575,632, which includes an annual O&M cost of $292,500 for 15 years. The estimated present worth cost for the contingency remedy is $4,262,101, which includes present worth O&M costs of $2,849,191 for 15 years.

PERFORMANCE STANDARDS OR GOALS: The surficial aquifer is a potential source of drinking water, therefore, contaminant levels must be reduced to drinking water standards, including benzene 1.0 ug/l (State drinking water standard), PCE 3.0 ug/l (State drinking water standard), TCE 3.0 ug/l (State drinking water standard), and toluene 2,000 ug/l (Proposed MCLG).

RECORD OF DECISION

SITE NAME AND LOCATION

City Industries (City Chemical)
Winter Park, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the City Industries Site in Winter Park, Florida chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of Florida concurs on the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE REMEDY

This remedy is the final action for the site. It addresses the ground-water contamination, which is the principal threat remaining at the site. This is accomplished by pumping and treating the contaminated ground-water. The treated ground-water will be discharged to a publicly-owned treatment works (POTW).

The major components of the selected remedy include:

- Institutional Controls or Other Land Use Restrictions;
- Ground-water Monitoring of Surficial and Floridan Aquifers;
- Ground-water Recovery via Wells;
- Ground-water Treatment by Aeration to Pre-treatment Standards;
- Discharge of Treated Effluent to the Iron Bridge POTW or other local POTW;
- Treatability Studies to Ensure Compliance with POTW Pre-treatment Standards
- Backup Discharge Plan; and
- Review of Ground Water Use for Surficial Aquifer Every Five Years.

EPA has also selected a contingency alternative, in the event that the POTW does not agree to accept the discharge.

The major components of the contingency remedy include:

- Institutional Controls or Other Land Use Restrictions;
- Ground water Monitoring of Surficial and Floridan Aquifers;
- Ground water Recovery via Wells;
- Ground water Treatment by Aeration, Precipitation, Filtration, and Carbon Adsorption; and
- Surface Water Discharge of Treated Effluent.
- Treatability Studies to Ensure Compliance with Surface Water Discharge Criteria
- Review of Ground Water Use for Surficial Aquifer Every Five Years.

STATUTORY DETERMINATIONS

The selected and contingency remedies are protective of human health and the environment, comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and are cost-effective. These remedies utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because these remedies will not result in hazardous substances remaining on-site above health-based levels, the five-year review will not apply to this action.

Lee A. DeHihns III, for

Greer C. Tidwell, Regional Administrator

MAR 29 1990

Date

Record of Decision

Summary of Remedial Alternative Selection

City Industries (City Chemical) Site

Winter Park, Florida

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

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1.0 SITE LOCATION & DESCRIPTION

The City Industries (City Chemical) - Forsyth Road site is located at 3920 Forsyth Road, Winter Park, Florida. It should be noted that while the mailing address for the site is Winter Park, it is actually located in the unincorporated township of Goldenrod. The City Chemical Company operated a waste storage, disposal, and recycling facility at the Forsyth Road site from 1971 until August 1983. The one acre site is situated in a light industrial area in the eastern section of Orange County, Florida, approximately 1.2 miles east of Winter Park and 2.2 miles northeast of Orlando. A map showing the site vicinity is provided in Figure 1-1.

The site is bounded by Cato Steel, a metal fabricator, to the north, Top-gun Gunite to the west, Forsyth Road to the east, and a wooded area to the south. A site location map showing the City Chemical site and adjacent properties is presented in Figure 1-2. Activities at the facility included the receipt, handling, storage, reclamation, and disposal of various waste chemicals. General classes of wastes handled included chlorinated and nonchlorinated organic solvents, paint and varnish wastes, acid/alkaline plating wastes, and waste ink.

2.0 SITE HISTORY

In 1971, City Industries, Inc., purchased the fuel oil business previously owned and operated by Charles Blackburn. Mr. Blackburn retained ownership of the property at Forsyth Road. In 1977, it developed into a recycling and transfer facility for hazardous wastes. Due to inadequate plant practices and intentional dumping, soil and ground water at the site became contaminated. From 1981 through 1983, EPA and Orange County found the company to be out of compliance with safety and Resource Conservation and Recovery Act (RCRA) requirements, and ordered the business to be closed in July, 1983.

In August 1983, the site was abandoned by the owner/operator of City Industries, Arthur Greer, leaving approximately 1,200 drums of hazardous waste and thousands of gallons of sludge in a number of large holding tanks on the site. A removal of these wastes, funded by the Florida Department of Environmental Regulation (FDER), was conducted during August and September 1983. In early 1984, EPA issued an Administrative Order under CERCLA requiring City Industries to clean sludge from holding tanks, remove contaminated soils, and treat contaminated ground water. The company did not comply with the EPA order. Beginning in February 1984, the remaining sludge and storage tanks were removed by the EPA. In May 1984, the EPA removed 1,670 tons of contaminated soil, heat treated it, and returned it to the site. Additionally, 180 cubic yards of highly contaminated soil were removed and transported to a hazardous waste landfill. The City Chemical site was proposed for the National Priorities List (NPL) in August 1984. EPA notified approximately 250 potentially responsible parties (PRPs), primarily waste generators, of their potential liability for remediation of the site and demanded payment for cost incurred during the removal of wastes. A settlement with approximately 163 PRPs for $520,722 was obtained in July, 1988.

FIGURE 1-1

VICINITY MAP

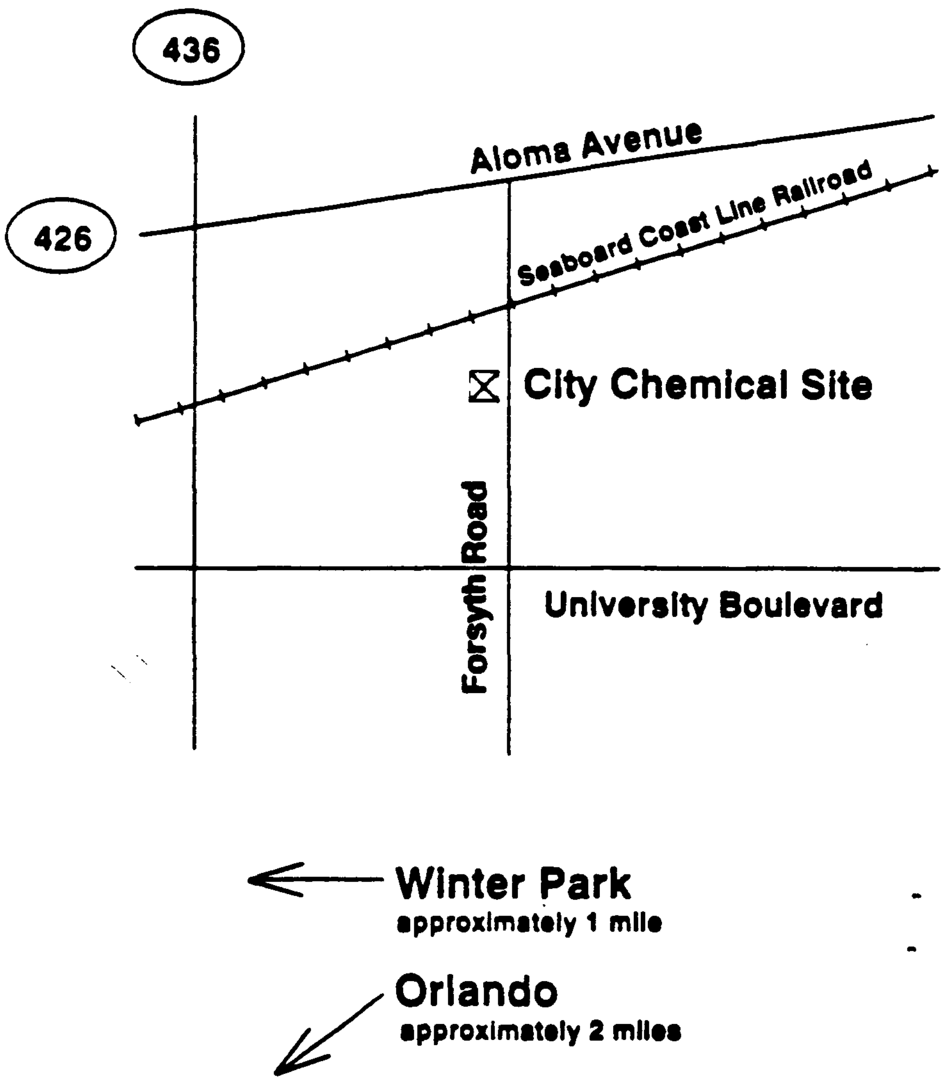
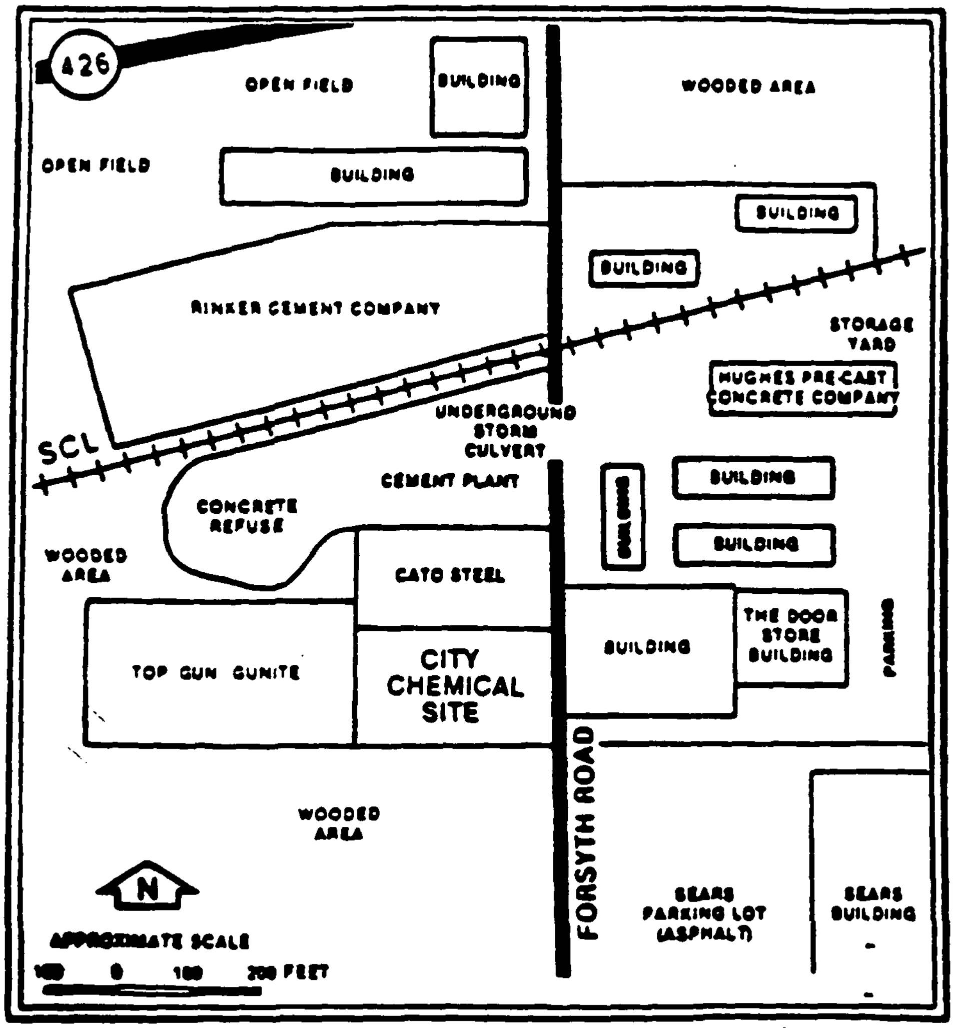


FIGURE 1-2

SITE LOCATION MAP



SOURCE: ESE, 1984

In December 1985, Arthur Greer was indicted on thirty-three counts involving mail fraud and environmental crimes. In June 1986, he was convicted on seventeen counts involving fraud and RCRA violations and received a jail sentence.

In 1984, the FDER contracted with Environmental Science and Engineering (ESE) to conduct a Contaminant Assessment (CA) study, or Remedial Investigation (RI) of the site. ESE completed a multi-phased Contamination Assessment in May 1986. The final CA concluded that a contaminant plume in the surficial aquifer had migrated to the east, approximately 600 feet. A surface depression was discovered in close proximity to the site, causing concern that a sinkhole had developed and formed a connection between the surficial and Floridan aquifers. ESE completed an investigation of the area in October 1986. This study recommended monitoring of the Floridan aquifer, which is the primary source of drinking water in the area. Installation of a Floridan Aquifer monitoring well was completed in July 1988, and sampling results from this well indicated that the Floridan Aquifer has not been contaminated by the City Industries Site. Approximately thirty-two of the 250 PRPs identified by EPA formed a Steering Committee and entered into a consent agreement with FDER to perform the Feasibility Study. A draft Feasibility Study (FS) report was submitted by the Potentially Responsible Parties (PRP) contractor in December 1988. Efforts to modify the FS were unsuccessful. In March 1989 at the State's request, the lead management role for the site was transferred from FDER to EPA. Revised FS reports were submitted to EPA by the PRPs in June and December 1989.

3.0 COMMUNITY RELATIONS HISTORY

The City Industries Site has come to be associated with the town of Winter Park, as it has a Winter Park mailing address. It is situated, however, outside the city limits in the unincorporated township of Goldenrod, which is where the majority of community interest is centered.

In 1983, the community of Goldenrod held meetings for the purpose of establishing emergency evacuation procedures. These meetings included representatives from FDER, Orange County, Seminole County, neighborhood watch and homeowners associations, apartment complexes, private citizens, and various media personnel. The threat at the time was considered to be that of explosion or fire. In addition, a concern was voiced that City Industries trucks traveling through the streets carrying drums might have an accident, or the drums might fall from the truck, spilling contaminants. On one occasion, evacuation procedures were begun in the immediate area in response to an onsite spill, but were later determined to be unnecessary.

When onsite investigative activities began, the protective suits worn by the workers alarmed the people both in the immediate vicinity, where they questioned why they were allowed to be so close if the suits were necessary. Those who were a little further away but close enough to be affected should an emergency situation arise, were also concerned.

Citizens who own private wells in the surficial aquifer voiced concern about the quality of their water. None of these wells have been used for drinking water, but the concern was mentioned that pets or children playing in water from lawn sprinklers - or possibly drinking some of the water - may have been at risk, or that someone walking through freshly watered grass may have absorbed contaminants through the skin.

Several of the well owners stated that they had never received information regarding the results of samples collected from their wells. The question was raised by one individual whether a number of deaths attributed to cancer were related to possible contaminants in the water. It was suggested that a health survey be conducted to assess the possibility, and be used as a learning opportunity should a connection exist.

One businessperson found monitoring wells installed on his property without his permission, and attempts by FDER to rectify the installation deficiencies had been unsatisfactory. (These wells were among the ones installed in early attempts to monitor the movement of contaminants in the ground water).

The question of effect of the site on property values was raised, predominantly by residential property owners. In the business area, property seems to be at a high enough premium for values not to be significantly affected, although some businesses contacted expressed concern about the possibility. The problem for the business sector seems to be that property ownership may be nontransferable until the property is declared clear of contamination.

Virtually everyone interviewed expressed extreme dissatisfaction with the nominal sentence received by Arthur Greer, the owner/operator of City Industries, Inc.

Recently, the site is mentioned only when reference is made to pollution or contamination in general. The Environmental Health Division of Orange County Health Department reported that no recent comments or concerns had been voiced to that Department. Most people indicated that the critical issue now is to expedite the implementation of the final remedial efforts.

In the course of investigative and remedial activities at the site, federal response to community needs and concerns has been perceived as sufficient. Criticism regarding the response by officials usually pertained to difficulty in locating the correct contact. Inquiries were always referred elsewhere.

The primary concerns of people in the vicinity of the site are that the necessary remedial actions at the site be completed as soon as possible, and that the community be kept informed of the status of the site or any potential threat resulting from site conditions. For those who do not feel their health may be threatened, the main concern is property devaluation. The leniency of punishment sustained by Mr. Greer is also a focal point in the minds of many of the citizens interviewed.

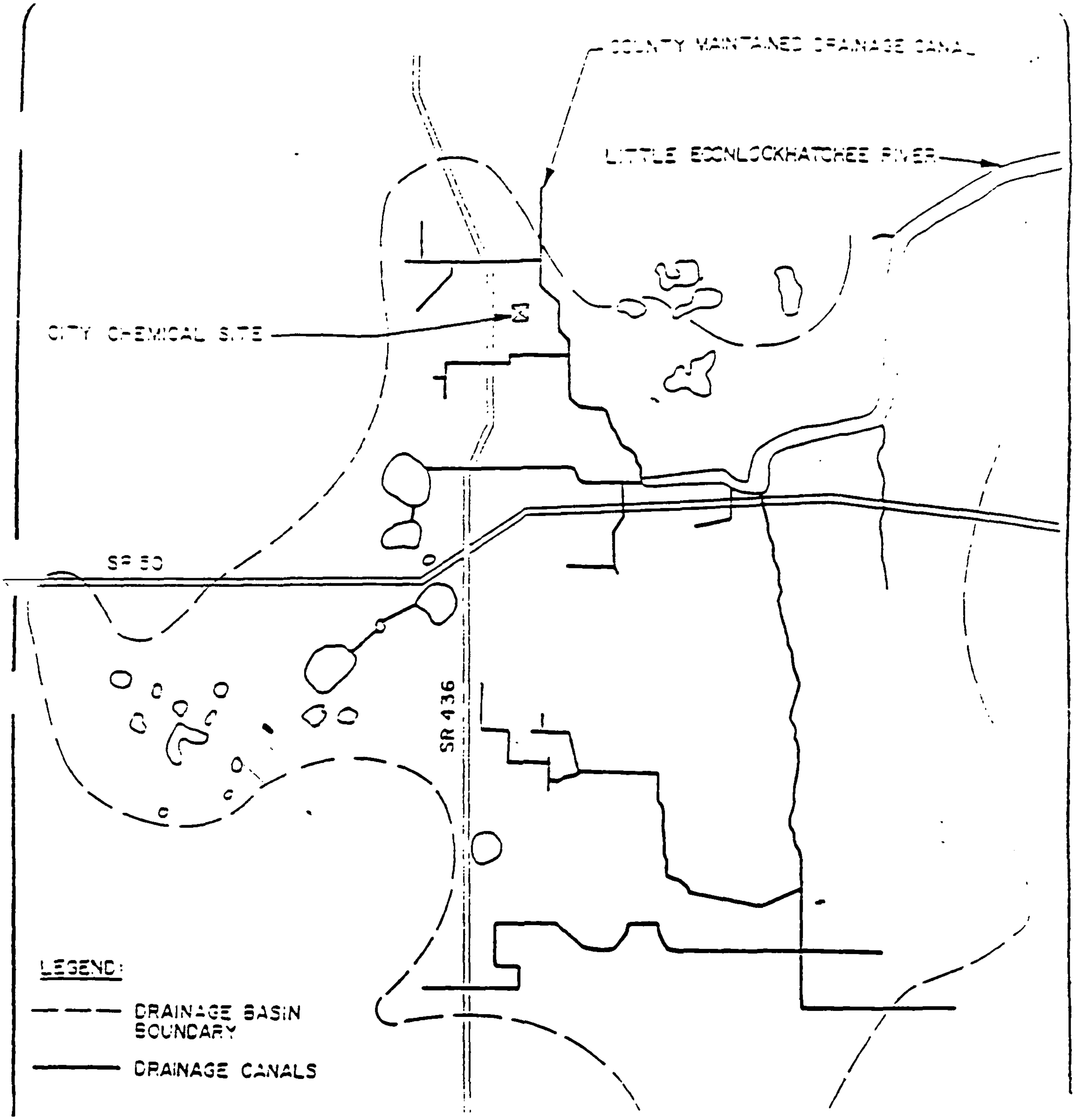
The RI/FS and Proposed Plan for the City Chemical Site were released to the public in January 1990. These two documents were made available in both the administrative record and an information repository maintained at the EPA Records Center in Region IV and at the Winter Park Public Library. The notice of availability for these two documents was published in the Orlando Sentinel on January 23 and January 31, 1990. A public comment period was held from February 6, 1990 through March 8, 1990. In addition, a public meeting was held on February 6, 1990. A press release was issued February 2, 1990 announcing the public meeting, comment period, and availability of documents at the repository. At the public meeting, representatives from EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) answered questions about the findings of the RI/FS and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for the City Chemical Site, in Winter Park, Florida, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the administrative record.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses the final response action for the City Chemical Site, which consists of extraction and treatment of contaminated ground water. This remedy is being implemented to protect public health and the environment by controlling the migration of contaminated ground water in the surficial aquifer, which is a potential source of drinking water in the future for area residents and businesses. It will also prevent migration to the deeper Floridan Aquifer, which is the current drinking water source. The response actions are consistent with the NCP (40 CFR 300.68).

5.0 SUMMARY OF SITE CHARACTERISTICS

The major surface-water features in the area of the site are the Crane Strand wetland directly to the north, which is being developed; various small wetland areas to the south and east; the Little Econlockhatchee River approximately 2.5 miles to the southeast; and a series of county maintained drainage canals traversing the Little Econlockhatchee Drainage Basin. Figure 5-1 shows the drainage canal system in the vicinity of the City Chemical Site. The closest major lakes are Lake Waunatta, Lake Nan, and Perch Lake, located less than one mile east of the site (ESE, 1985). Primary surface drainage across the site is by overland flow from west to east. Discharge to a ditch along Forsyth Road occurs along the east side of the property. The Forsyth Road ditch drains to the north past Cato Steel and then to the east under Forsyth Road to a storm-water catch basin. The basin discharges to the north through an underground storm culvert and an open ditch to a large, county maintained, drainage canal.



IGURE 5-1: LITTLE ECONLOCKHATCHEE DRAINAGE BASIN

The site is underlain by approximately 60 feet of sands, silty sands and clayey sands containing variable amounts of unconsolidated limerock, chert, and phosphate fragments. Silt and clay content of the soils generally increases with depth. The surficial soils are underlain by the Hawthorn Formation at depths of 60 to 70 feet bls. The Hawthorn is characterized by up to 170 feet of inter-layered clayey gravel, clayey sand, clay, and limestone layers. The karstified, erosional limestone surface of the Ocala Formation is found beneath the Hawthorn at depths ranging from 140 to more than 230 feet below land surface (bls).

The surficial aquifer occurs in the uppermost 60 to 70 feet of permeable sands and is reportedly separated into an upper unconfined zone and a lower, semi-confined zone. The water table is encountered at depths of 3 to 5 feet bls. Ground water flow is to the east at flow velocities ranging from about 10 to 145 feet per year. Flow rates generally decrease with depth and are greater during the summer wet season than during the dry season.

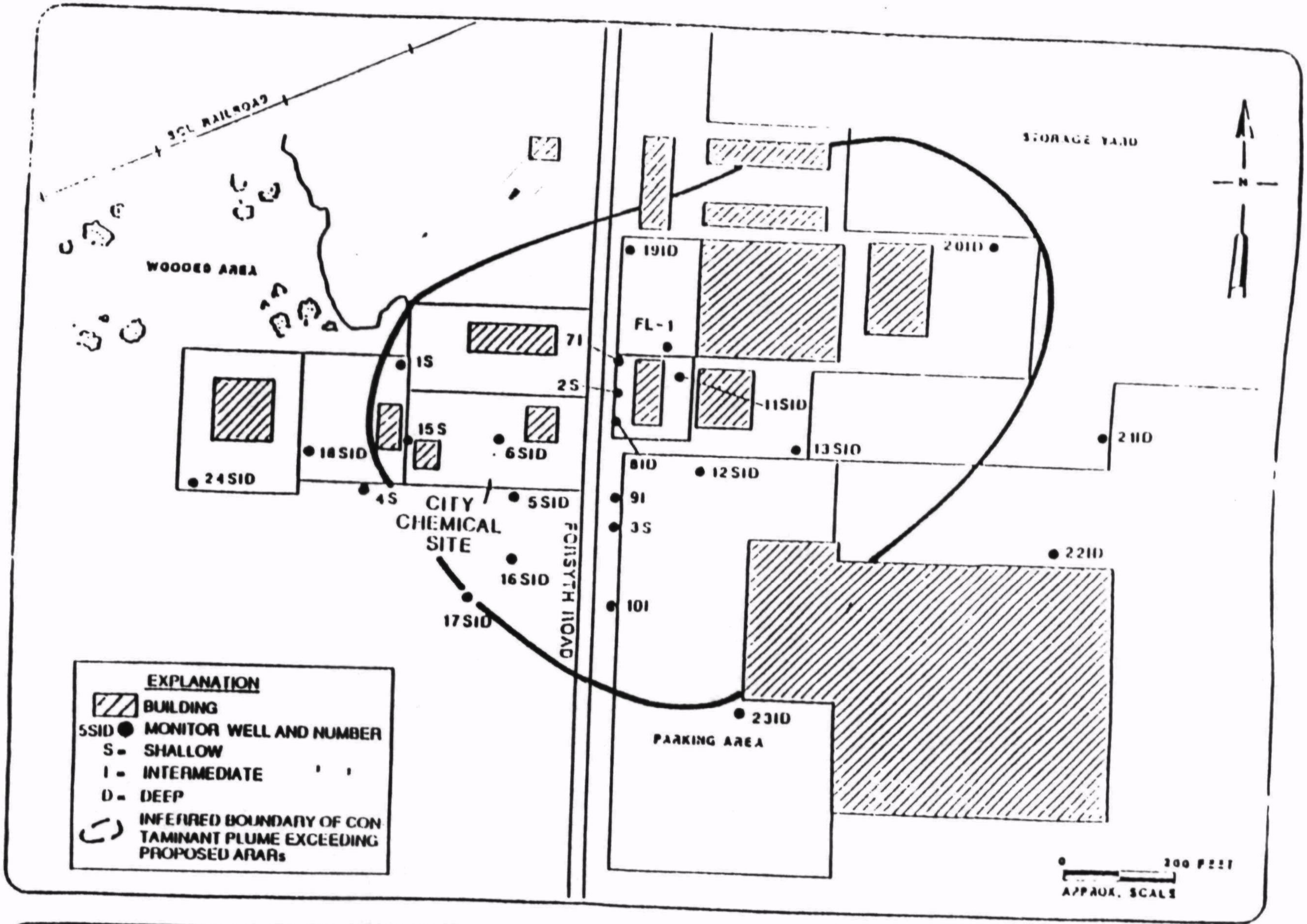
The Floridan aquifer, widely used as a source of potable water in the region, occurs in a thick sequence of limestone units generally encountered at the top of the Ocala Formation. The Ocala was identified at a depth of 237 feet during drilling of the Floridan Aquifer monitor well; however, depth to the Floridan from land surface may vary from about 140 to more than 230 feet in Orange County.

The findings of the RI, September 1986, confirmed the presence of chemical constituents in the shallow ground water aquifer underlying the City Chemical Site. Plume delineation results established that the areal distribution of impacted ground water extended beyond the site property boundaries. A data augmentation program was conducted in 1987 to provide more recent data for constituents previously detected at the site and define the migration of the ground water plume since the RI was performed.

Contaminants of concern identified during these two studies are acetone, benzene, 1,1-dichloroethane, 1,2-dichloreothane, 1,1-dichloroethene, ethylbenzene, methylene chloride, methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK), tetrachloroethene, toluene, 1,1,1-trichloroethane, and trichloroethene.

The results of the RI and data augmentation program indicate that several of the target list compounds are present in the shallow aquifer. The data also indicates that the ground water plume identified by ESE has migrated downgradient from the City Chemical Site and is now centered in the vicinity of monitoring well 12. (See Figure 5-2).

Constituents were not detected above detection limits during soil sampling and analysis completed in the data augmentation program. No constituents analyzed during air monitoring exceeded detection limits. RI and Data Augmentation sample analysis results along with corresponding sample locations are provided in Appendix A.



SOURCE: GERAGHTY & MILLER, INC. GROUND WATER SERVICES

FIGURE 5-2: ESTIMATED PLUME BOUNDARY

Ground water is not currently being pumped for use at the City Chemical Site. An inventory of wells within a two-mile radius of the site indicated that 1) existing wells downgradient (east) of the site are open to permeable intermediate units in the Hawthorn Formation or to the Floridan Aquifer and 2) these wells are used for non-potable purposes (e.g. cooling water and irrigation). The well inventory identified several wells located north and south of the site which are open to the surficial aquifer and are being pumped for landscape irrigation and heat pump exchange water. No users of the surficial-aquifer as a source of potable water or for irrigation of edible crops in areas downgradient of the site were identified.

6.0 SUMMARY OF SITE RISKS

The following discussion provides an overview of the baseline public health and environmental risk evaluation for the City Chemical Site. It is based on the "Endangerment Assessment for the City Chemical Company, Forsyth Road Site, Winter Park, Florida", which is Appendix C of the FS. The baseline evaluation helps determine if a remedial action is necessary at the site. It represents an evaluation of the "no-action alternative", in that it identifies the risk present if no remedial action is taken. The baseline assessment also provides the framework for developing the preliminary remediation goals for the City Chemical Site. Field observations and analytical data as presented in the Remedial Investigation and Data Augmentation reports provided the basis for the risk evaluation. The media of concern at the City Chemical Site is the ground water. Risk from dermal exposure from contact with the soil was mitigated by the soil removal conducted in 1984.

The compounds mentioned in Section 5.0, which were detected in the ground water, were selected as indicator compounds for the site. The selection is based on the frequency of detection, the concentrations detected, and the toxicological properties of the contaminants which were detected. Concentrations of the indicator compounds detected during the RI and Data Augmentation Program can be found in Appendix A.

6.1 EXPOSURE ASSESSMENT SUMMARY

Major pathways of potential exposure to these 14 constituents were identified as:

- Contact with, and ingestion of, small quantities of surficial soil;
- Contact with, and ingestion of, drainage-ditch waters; and
- Contact with, and/or ingestion of, ground water pumped for bathing, hypothetical drinking-water usage, landscape irrigation and/or other non-potable usages.

6.11 Surficial Soil Contact

Exposure scenarios for exposure to the soils were evaluated for a worker (i.e., Cato Steel employee) or a child trespasser. The average daily dose (ADD) for reasonable worker exposure was calculated based on the following assumptions: (1) a 70-kg adult body weight; (2) exposure to surficial soils for 120 working days (once per month over a 10-year period); (3) exposed skin surface area of 870 cm^2 (both hands); (4) incidental soil ingestion rate of 100 mg/day; (6) a dermal absorption factor of 0.02; and (7) exposure to average concentrations of constituents detected in the soil.

Worst-case assessment for worker average daily dose from soils would use the parameters listed above with the following exceptions: (1) exposure frequency is doubled to 240 working days; (2) dermal absorption factor is 0.10; and (3) exposure is to the maximum concentrations detected in soils.

The exposure scenario for reasonable child trespasser climbing over the security fence, accessing the site, and being exposed to soils is calculated based on the following assumptions: (1) a 31-kg child (average of age 6 to 12); (2) trespassing 6 times per year over the 6-year age period; (3) incidental ingestion of 100 mg of soil per day; (4) exposed skin surface area of 360 cm^2 (both hands); (5) dust adherence factor of 1.45 mg/cm^2; (6) dermal absorption factor of 0.02; and (7) exposure to average concentrations of constituents detected in soils.

Worst-case exposure for the child trespasser is the same with the exception that: (1) exposure frequency is doubled to 12 times per year over the 6-year period; (2) dermal absorption factor is 0.10; and (3) maximum soil concentrations are used at the exposure point.

6.12 Drainage Ditch Exposure

The drainage ditch is the other point of potential current exposure. Wading and accidental immersion are potential exposure scenarios. The drainage ditch is located along a street with relatively high traffic volume; therefore, the frequency of exposure at this site is assumed to be relatively low. In addition, flow in the ditch is intermittent and throughout most of the year the ditch is dry; therefore, swimming in the ditch is not a reasonable exposure scenario. For this reason, the reasonable exposure scenario for ditch water wading was calculated based on the following assumptions: (1) a 70-kg adult or 31-kg child; (2) wading the ditch 2 hours per day; (3) 4 times per year for 6 years for the child or 1 time per year over a 10-year period for the worker; (4) an exposed skin surface area for one-half the hand and neck, two-thirds of the upper limbs, and one-half of the lower limbs (3,105 cm^2 child and 6,210 cm^2 adult); (5) water flux across skin of 0.5 mg/cm^2-hr; (6) 100 percent dermal absorption of organic constituents; and (7) exposure to maximum concentrations detected in surface water. The maximum concentration data are used due to the limited number of surface-water samples available.

The worst-case scenario assumes that the adult or child falls into the ditch and receives total immersion exposure: (1) with the same frequency of 24 times for the child and 10 times for the adult; (2) for a period of 0.25 hrs/day; but (3) incidental ingestion of 0.01 liters of water per immersion.

Future exposure to the soils or ditch waters are assumed to be comparable to the current exposure scenarios.

6.13 Ground Water Exposure

The other possible future exposure scenarios include exposure to ground water from a potable or non-potable well. There are presently no wells screened in the shallow aquifer identified downgradient of the site, so these scenarios consider a hypothetical well installed downgradient in the future.

For potable well exposure, the reasonable exposure scenario ADDs were calculated based on the following assumptions: (1) a 70-kg adult; (2) ingests 2 liters of water per day; (3) exposure occurs over a 70-year lifetime; and (4) exposure is to average concentrations detected in the ground water. The worst-case exposure scenario assumptions are the same except maximum detected concentrations are used.

Potential non-drinking water exposures considered as hypothetical future exposure scenarios include use of the ground water for bathing (showering), landscape irrigation, or for filling small swimming pools. The bathing exposure is considered independent of the drinking water because some receptors may utilize tap water for bathing but use bottled water for drinking.

To consider the potential exposure if the potable supply is not ingested, the ADDs were calculated using the following assumptions: (1) a 70-kg adult; (2) bathes or showers for 20 minutes per day; (3) every day of the year for 70 years; (4) a skin surface area of 18,150 cm^2; (5) a water flux across the skin of 0.5 mg/cm^2-hr; and (6) average constituent concentrations in ground water. For worst-case bathing exposure, the assumptions are the same except the maximum constituent concentrations are used.

Potential exposure to landscape irrigation water is assumed to occur as a result of accidental dousing of the body and clothing while setting up the sprinklers. The assumptions used to calculate the ADDs are: (1) a 70-kg adult; (2) doused once per week over the 12-week summer period for 10 years; (3) exposure to water or wet clothing for 1 hour per dousing; (4) over a skin surface area of 18,150 cm^2 (total body)); (5) water flux across the skin of 0.5 mg/cm^2-hr; (6) dermal absorption of organics of 100 percent; and (7) average constituent concentrations in ground water. The worst-case exposure assumptions are similar except that: (1) exposure occurs three times per week; and (2) exposure is to the maximum detected constituent concentrations.

Ground water used to fill a child's swimming pool is the other hypothetical non-potable exposure scenario considered. The assumptions used in calculating the reasonable exposure are: (1) a 16-kg child (average age 4, between age 2 and 6); (2) swims in the pool once per week over the 12-week summer period; (3) 1 hour per day; (4) incidental ingestion of 0.05 liters per hour; (5) skin surface area of 7,000 cm^2; (6) cross the skin of 0.5 mg/cm^2-hr; (7) dermal absorption of organics of 100 percent; and (8) exposure to average constituent concentrations detected in the ground water. Worst-case exposure assumptions are similar except: (1) the child swims 5 days per week over the 12-week summer period; (2) the child swims for 2 hours per day; and (3) exposure is to the maximum constituent concentrations detected in the ground water.

Inventories of wells within a two-mile radius identified no potable wells downgradient of the site, or nonpotable wells screened in the shallow aquifer within one mile downgradient of the site. There is one nonpotable well 500 feet north of the site.

The City of Winter Park's well field is located approximately 1,900 feet west of the site; however, these wells draw from a minimum of 700 feet below the ground surface in the Floridan Aquifer, and there is a 140-foot thick confining layer separating the contaminated surficial aquifer from the Floridan Aquifer. The well field serves over 115,300 people in the towns of Winter Park, Maitland, Goldenrod, and Casselberry.

6.2 TOXICITY ASSESSMENT SUMMARY

6.21 Cancer Potency Factors

The discussion of adverse effects for the indicator chemicals is divided into carcinogenic and noncarcinogenic effects. 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 $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation 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. Cancer potency factors for compounds of concern are listed in Table 6-1.

6.22 Reference Doses

Reference doses (RfDs) have been developed by EPA for indicating 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. Estimated intakes of chemicals

Table 6-1 Weight of Evidence and Potency Factors for Suspect Carcinogens Reported at the City Chemical Site

Constituent	EPA Classification [a/]	Level of Evidence [b/] Humans	Level of Evidence [b/] Animals	10^{-6} Cancer Risk [c/] (mg/L)	Potency Factor [d/] $(mg/kg/day)^{-1}$
Benzene	A	S	S	0.0012	0.029
1,1-Dichloroethene	C	I	L	0.000033	0.60
Methylene chloride	B2	I	L/S	0.005	0.0075
Tetrachloroethene	B2	I	L/S	0.0008	0.051
Trichloroethene	B2	I	L/S	0.0027	0.011
Bis(2-ethylhexyl)phthalate	B2	I	L/S	0.003	0.014

a/ A = Human Carcinogen: sufficient epidemeologic evidence
B = Probably Human Carcinogen:
B1 = Limited epidemiologic evidence; sufficient evidence in animals
B2 = Inadequate or no epidemiologic evidence; sufficient evidence in animals
C = Possible Human Carcinogen: absence of human data; limited evidence in animals
D = Not Classifiable as to Human Carcinogenicity: inadequate or no data

b/ S = Sufficient evidence; L = Limited evidence; I = Inadequate evidence

c/ Concentration which could potentially result in 1 additional cancer in 1,000,000 population drinking 2 liters of water per day over a 70-year lifetime.

d/ Potency factor = 95% upper-bound slopes on the linearized multistage model

Sources: USEPA, 1986a
USEPA, 1985a
IRIS, 1989

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. RfDs for indicator compounds are listed in Table 6-2.

Of the 14 indicator chemicals, benzene, 1,1-dichloroethene, methylene chloride, tetrachloroethene, trichloroethene, and bis(2-ethylhexyl)phthalate are classified by the USEPA as suspect carcinogens. Of these suspect carcinogens, benzene is the only one having sufficient evidence that it is carcinogenic in humans. The USEPA classifies methylene chloride, tetrachloroethene, trichloroethene, and bis(2-ethylhexyl)phthalate as having sufficient evidence of carcinogenicity in laboratory animals but insufficient evidence of carcinogenicity in humans. There is only limited evidence of the carcinogenic potential of 1,1-dichloroethene in laboratory animals and no evidence of carcinogenicity in humans.

All of the six carcinogenic constituents discussed in the previous section are also mutagenic, except for bis(2-ethylhexyl)phthalate, and all have elicited teratogenic or adverse reproductive effects in laboratory animals, except for trichloroethene. Ethylbenzene, methyl ethyl ketone, and toluene, have elicited adverse reproductive or teratogenic effects in laboratory animal tests. A summary of toxic responses to all site contaminants is contained in Table 6-3.

6.3 RISK CHARACTERIZATION

6.31 Cancer Risk

Excess lifetime cancer risks are determined by multiplying the intake level with 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.

6.32 Noncarcinogenic Risk

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 reference dose). If the estimated intake is greater than the RfD, the HQ will exceed one. 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

Table 6-2 Indicator Chemical Reference Doses for Short-Term and Chronic Exposure

Constituent	One-Day (mg/kg/day)	Source	Chronic (mg/kg/day)	Source
Acetone	--		0.10	c
Benzene	2.33	a	--	
1,1-Dichloroethane	--		0.12	c
1,1-Dichloroethene	0.10	b	0.009	c
t-1,2-Dichloroethene	0.27	b	0.01	c
Ethylbenzene	20.7	b	0.10	c
Methylene chloride	1.3	b	0.06	c
Methyl ethyl ketone	7.5	b	0.05	c
Methyl isobutyl ketone	--		0.05	c
Tetrachloroethene	3.4	a	0.01	c
Toluene	18	b	0.30	c
1,1,1-Trichloroethane	14	b	0.09	c
Trichloroethene	--		0.00735	c
Total phthalates (as bis-2-ethylhexyl)	--		0.02	c
Xylenes	11.9	b	2.0	c

a = USEPA Office of Drinking Water 10-day Health Advisory (USEPA, 1985b)

b = USEPA Office of Drinking Water 1-day Health Advisory (USEPA, 1985b)

c = IRIS, 1989

TABLE 6-3

Summary of Potential Toxic Responses of Constituents Reported at the City Chemical Site

Constituent	Carcinogenicity a/	Reproductive-Teratogenicity b/	Mutagenicity c/	Acute Toxicity d/	Chronic Effect e/	Domestic Animal Toxicity f/	Environmental Toxicity g/
Acetone							
Benzene	X	X	X		X		
1,1-Dichloroethane							
1,1-Dichloroethene	X	X	X				
t-1,2-Dichloroethene							
Ethylbenzene		X					
Methylene chloride	X		X				
Methyl ethyl ketone		X					
Methyl isobutyl ketone							
Tetrachloroethene	X	X	X				
Toluene		X					X
1,1,1-Trichloroethane							
Trichloroethene	X		X				
Total phthalates	X	X				X	
Xylenes		X					

Adopted from "Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites," Office of Waste Programs Enforcement (OWPE), U. S. EPA, 1985. Criteria presented in this table is that of OWPE. An "X" indicates the chemical meets the criteria outlined by OWPE for the particular toxic effect classification. The lack of an "X" under a classification does not necessarily imply that the chemical cannot have a toxic effect.

a/ A compound is classified as carcinogenic: if it is a known or suspected human carcinogen; if it has been been shown to be carcinogenic at a particular site in more than one species or set in a animal bioassay; or if it has been shown to increase the incidence of site-specific malignant tumors in a single species or sex, and there is a statistically significant dose-response relationship in more than one exposed group. (This classification is not necessarily the same as presented by IARC or CAG in Table 6-3).

b/ Chemicals are classified as teratogens and reproductive toxins if there is suggestive evidence of an effect in humans or if at least one study in whole animals is clearly positive. Unsupported in vitro evidence is considered sufficient to classify a chemical as a reproductive toxicity/teratogenicity hazard.

c/ A chemical is classified as mutagenic if it has given a positive result in at least one of the mammalian in vivo or mammalian cell in vitro assays for mutagenicity.

d/ A compound is considered to be acutely toxic if it has an oral LD50 < or = 100 mg/kg, an inhalation LC50 < or = 400 mg/cubic meter, or a dermal LD50 < or = 400 mg/kg. LD means Lethal Dose, LC means Lethal Concentration.

e/ Chemicals will be considered to cause chronic toxicity if they cause serious irreversible effects other than cancer or reproductive effects after extended exposure to oral doses of less than 100 mg/kg/day, inhalation concentrations 100 mg/kg/day, inhalation concentrations less than 400 mg/cubic meter, or dermal doses less than 100 mg/kg/day.

f/ A chemical will be considerd to be toxic to domestic animals if a demonstrated serious toxic effect has been seen in the field. Also, chemicals that cause reproductive toxicity, teratogenicity, or subchronic toxicity at oral doses of less than 100 mg/kg/day will be considered as domestic animal hazards unless they are unlikely to be present at toxic levels offsite.

g/ A chemical is classified as hazardous to aquatic wildlife if an acute LC50 is < 1000 ug/L or chronic effects at < 100 ug/L; to terrestrial wildlife if toxicity has been seen in the field, if acutely toxic, or causes reproductive toxicity/teratogenicity at oral doses < 100 mg/kg body weight; or are persistent in the environment and are toxic at levels up to 10 times less than those indicated above.

potential significance of multiple contaminant exposures within a single medium or across media.

The risks from exposure to contaminated ground water from the City Chemical site via potable and non-potable wells are included in Tables 6-4 and 6-5, respectively. These tables show that both carcinogenic and non-carcinogenic risks from ingestion of the ground water are unacceptable. Risk from non-carcinogenic effects from dermal exposure to the ground water is also unacceptable.

At the present time, individual exposure via the ingestion of contaminated ground water is not occurring. However, unacceptable risk levels for the baseline assessment indicate that ground water treatment is necessary to prevent the potential human exposure to unacceptable levels of contaminants in the future.

6.4 ENVIRONMENTAL RISK

As the site is located in an urban area with surrounding industrial and commercial land use, it has limited potential for utilization as a terrestrial ecosystem. The site is partially fenced. Movement of animals onto the site is limited but not completely restricted.

Crane Strand Wetlands are located to the north of the site; however, there is no hydrologic connection between the City Chemical site and the wetlands. Drainage-ditch waters from the City Chemical site flow east to an Orange County drainage canal, then south away from the wetlands. Concentrations reported in the drainage-ditch waters at the site do not exceed any USEPA Ambient Water-Quality Criteria established to protect fresh-water aquatic life.

Based on the above information concerning human health and environmental risk, it is concluded that actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

7.0 DESCRIPTION OF ALTERNATIVES

Five alternatives were considered for remediation of the ground water, which contains unacceptable levels of organic compounds.

7.1 Alternative 1

Alternative 1 is the no action alternative retained for baseline comparison purposes in accordance with 40 CFR 300.68 (f)(v). Alternative 1 does not incorporate any remedial actions at the site. It would, however, include monitoring the ground water for up to 30 years. It would allow for continued migration of the contaminant plume in the surficial aquifer. The baseline EA identifies the potential human health and the environmental risks associated with Alternative 1.

TABLE 6-- Cancer Risks and Hazard Indices for Ground-water Exposures at a Hypothetical Potable Well

Carcinogens	Cancer Potency Factor (mg/kg/day)-1	Excess Lifetime Cancer Risk[a]			
		Reasonable		Worst Case	
		Ingestion	Bathing	Ingestion	Bathing
Benzene	0.029	1.7×10^{-5}	2.5×10^{-8}	6.1×10^{-5}	9.3×10^{-8}
1,1-Dichloroethane					
1,1-Dichloroethene	0.58	4.9×10^{-3}	7.3×10^{-6}	3.0×10^{-2}	4.5×10^{-5}
Methylene chloride	0.0075	4.1×10^{-3}	6.0×10^{-6}	2.7×10^{-2}	4.1×10^{-5}
Tetrachloroethene	0.051	3.5×10^{-4}	5.1×10^{-7}	1.6×10^{-3}	2.4×10^{-6}
Trichloroethene	0.011	5.6×10^{-3}	8.4×10^{-6}	4.7×10^{-2}	7.0×10^{-5}
Total Phthalates (as Bis(2-ethylhexyl phthalate)	0.014	1.5×10^{-6}	2.4×10^{-9}	4.1×10^{-6}	6.0×10^{-9}
Total		1.5×10^{-2}	2.2×10^{-5}	1.1×10^{-1}	2.5×10^{-4}

Non-carcinogens	Reference Dose (RfD) (mg/kg/day)	Hazard Index[b]			
		Reasonable		Worst Case	
		Ingestion	Bathing	Ingestion	Bathing
Acetone	0.10	10.2	0.015	75	0.11
trans-1,2-Dichloroethene	0.01	3.3	0.005	21	0.031
Ethylbenzene	0.10	0.04	6.0×10^{-5}	0.11	1.6×10^{-4}
Methyl Ethyl Ketone	0.05	1.1	1.7×10^{-3}	6.2	9.2×10^{-4}
Methyl Isobutyl Ketone	0.05	10.6	0.016	34	0.052
Toluene	0.30	0.24	3.7×10^{-4}	2.5	3.7×10^{-3}
1,1,1-Trichloroethane	0.09	0.53	8.0×10^{-4}	3.2	4.8×10^{-3}
Total		26	0.039	142	0.21

a Excess lifetime cancer risk - cancer potency factor x WADD or DADD-8 (Table 15).
b Hazard Index = WADD or DADD-8 (Table 15)/ reference dose.

TABLE 6-5 Cancer Risks and Hazard Indices for Ground Water Exposure at a Hypothetical Non-Potable Well

Carcinogens	Cancer Potency Factor (mg/kg/day)-1	Excess Lifetime Cancer Risk[a]			
		Reasonable		Worst Case	
		Landscape	Swimming	Landscape	Swimming
Benzene	0.029	3.5×10^{-10}	3.5×10^{-9}	3.3×10^{-9}	7.3×10^{-8}
1,1-Dichloroethane					
1,1-Dichloroethene	0.058	1.0×10^{-7}	1.0×10^{-6}	1.9×10^{-6}	3.5×10^{-5}
Methylene chloride	0.0075	8.3×10^{-8}	9.3×10^{-7}	1.7×10^{-6}	3.2×10^{-5}
Tetrachloroethene	0.051	7.7×10^{-9}	7.7×10^{-8}	1.0×10^{-7}	1.8×10^{-6}
Trichloroethene	0.011	1.2×10^{-7}	1.2×10^{-6}	3.0×10^{-6}	5.5×10^{-5}
Total Phthalates (as Bis(2-ethylhexyl) phthalate)	0.014	3.4×10^{-11}	3.5×10^{-10}	2.5×10^{-10}	4.6×10^{-9}
Total		3.1×10^{-7}	3.2×10^{-6}	6.7×10^{-6}	1.2×10^{-4}

Non-carcinogens	Reference Dose (RfD) (mg/kg/day)	Hazard Index[b]			
		Reasonable		Worst Case	
		Landscape Irrigation	Swimming Pool	Landscape Irrigation	Swimming Pool
Acetone	0.10	1.5×10^{-3}	3.9×10^{-2}	3.3×10^{-2}	1.6
t-(1,2-)Dichloroethene	0.02	4.9×10^{-4}	1.3×10^{-2}	9.2×10^{-3}	0.42
Ethylbenzene	0.10	6.0×10^{-4}	1.5×10^{-4}	4.8×10^{-5}	2.2×10^{-3}
Methyl Ethyl Ketone	0.05	1.7×10^{-4}	4.4×10^{-3}	2.8×10^{-3}	0.13
Methyl Isobutyl Ketone	0.05	1.6×10^{-3}	4.0×10^{-2}	1.5×10^{-2}	0.70
Toluene	0.30	3.7×10^{-5}	9.0×10^{-4}	1.1×10^{-3}	5.3×10^{-2}
1,1,1-Trichloroethane	0.09	8.0×10^{-5}	2.0×10^{-3}	1.4×10^{-3}	6.6×10^{-2}
Total		3.9×10^{-3}	9.9×10^{-2}	6.3×10^{-2}	2.9

a Excess lifetime cancer risk = cancer potency factor x DADD-I or SPADD (Table 15).
b Hazard index = DADD-8 or SPADD (Table 15)/reference dose.

Alternative 2

Alternative 2 consists of implementing the following remedial actions:

- Institutional Controls or Other Land Use Restrictions;
- Ground water Monitoring of Surficial and Floridan Aquifers;
- Ground water Recovery via Wells;
- Ground water Treatment by Aeration to Pre-treatment standards;
- Discharge of Treated Effluent to the Iron Bridge Publicly-Owned Treatment Works (POTW) or other local POTW;
- Treatability Studies to Ensure Compliance with POTW Pre-treatment Standards;
- Backup Discharge Plan; and
- Review of Ground Water Use for Surficial Aquifer Every Five Years.

Alternative 2 was developed for treatment of constituents recovered in ground water to levels suitable for discharge to a POTW. The conceptual design is described in this paragraph. Specific design criteria will be developed during the Remedial Design stage. Recovered ground water would be piped to an on-site treatment system consisting of an equalization tank in series with a forced draft air stripping tower for removal of volatile organic compounds. Other treatment could be added, if necessary, to meet POTW pre-treatment standards. This alternative includes institutional controls or other land use restrictions necessary to prevent adverse effects to the remedy. This may invlove deed restricitons, easements, and other rights of way.

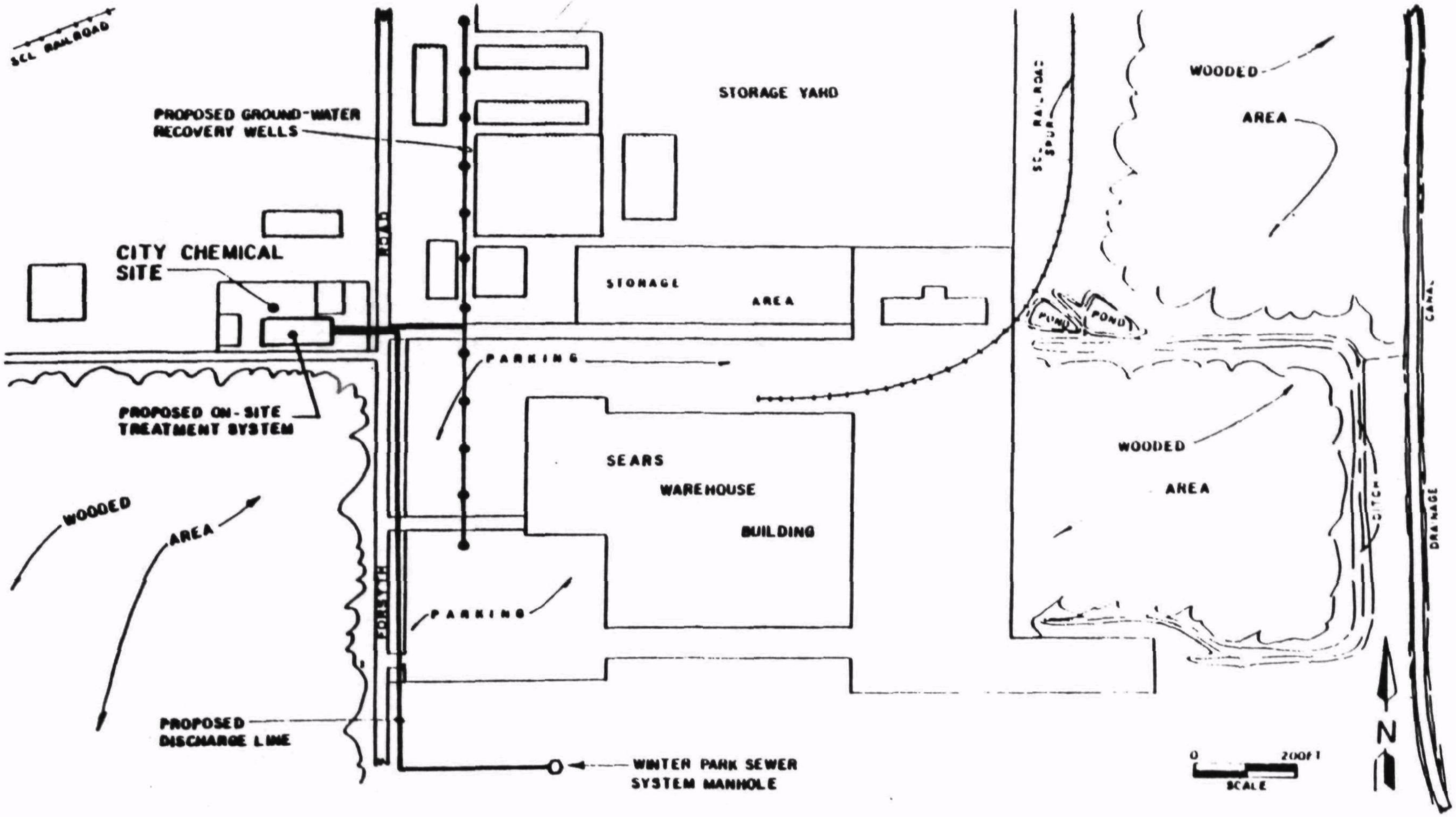
After testing to verify that pre-treatment standards are met, the treated effluent would be piped to a clarifier . From there it would be pumped to the nearest City of Winter Park Sewer System manhole, located east of the site across Forsyth Road and approximately 250 feet south of the Sears Warehouse. Other transport mechanisms may be used if determined feasible during design. Treated ground water discharged to the sewer system would ultimately undergo additional biological treatment at the City of Orlando Iron Bridge Wastewater Treatment Facility. Figure 7-1 illustrates a plan view of the conceptual system layout. Figure 7-2 shows a treatment process schematic.

Implementation of the treatment and discharge scenario proposed for Alternative 2 would require responsible parties to secure the approval of administrative personnel from the city governments of both Winter Park and Orlando. The treated effluent would have to meet pretreatment criteria established by these administrative officials as well as comply with EPA guidelines for discharging of a CERCLA wastewater to a POTW.

Bench-scale treatability studies performed during the FS indicated that aeration would be effective in reducing the concentrations of all the target list compounds to levels that satisfy drinking water criteria except for the highly soluble compounds acetone, MEK, and MIBK. Existing literature indicates that these constituents are biodegradable and exhibit little propensity to bioaccumulate. Thus, it is reasonable to assume that residual concentrations of acetone, MEK, and MIBK not removed by the on-site air stripper system would be readily oxidized by

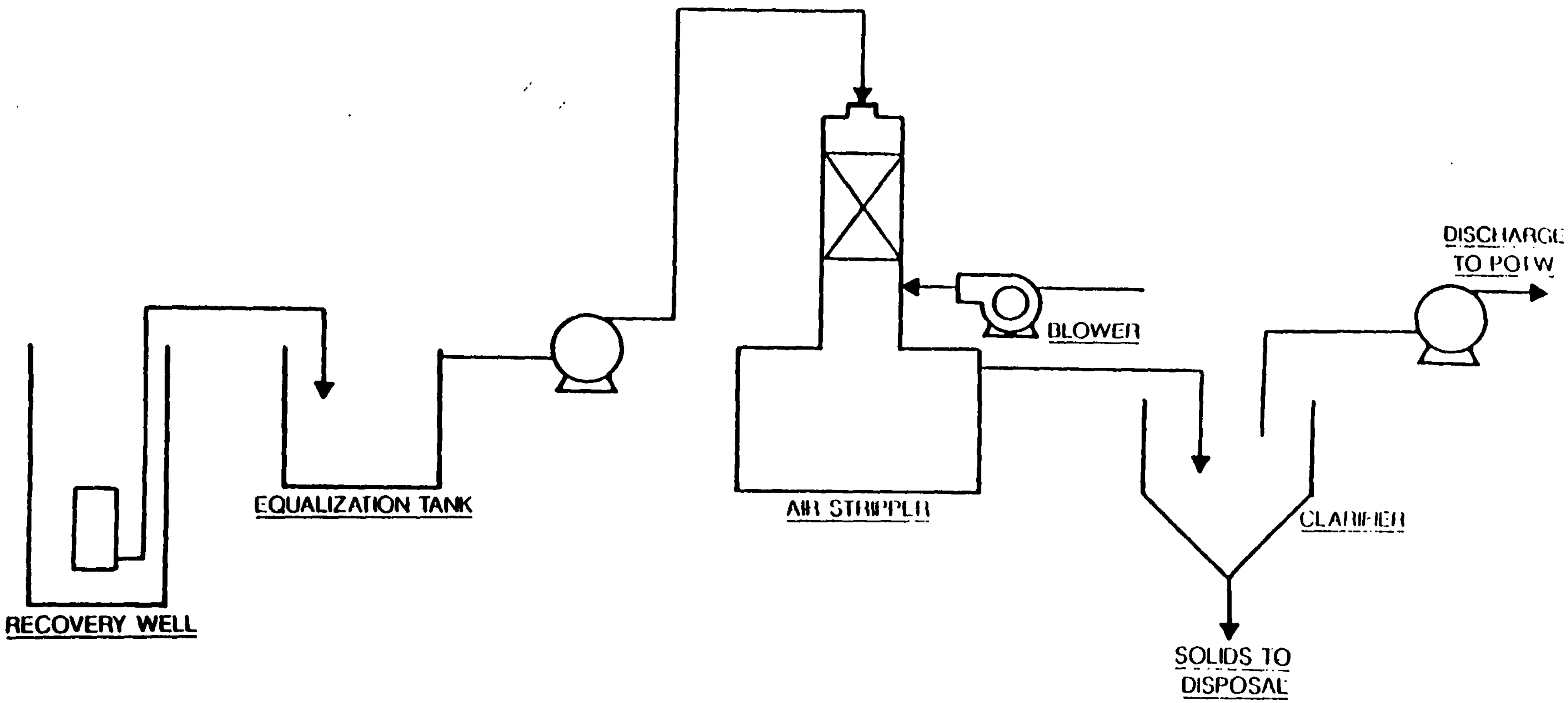
FIGURE 7-1

CONCEPTUAL LAYOUT OF SEWER SYSTEM DISCHARGE ALTERNATIVE



SOURCE: FIGURE 3-1, FEASIBILITY STUDY, CITY CHEMICAL SITE

FIGURE 7-2: PROCESS SCHEMATIC FOR POTW DISCHARGE



SOURCE:

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ENGINEERS, INC.

the rotating biological contact process employed at the Iron Bridge Wastewater Treatment Facility. Additional treatability studies will be performed to demonstrate compliance with the POTW's pre-treatment standards. Nevertheless, a contingency plan will be developed in case these studies show that the pre-treatment standards cannot be met.

The O&M will include monitoring of system controls which will be incorporated to ensure the effluent quality meets established pretreatment criteria prior to discharge to the POTW. The routine O&M procedure would require an operator present on-site to monitor performance of the recovery, aeration, and discharge system components. Efficient operation of an air stripper also requires periodic cleaning or replacement of the tower's packing media to avoid clogging from accumulated biological growth or precipitated matter. Periodic monitoring of the ground water would be performed to assure that the remedy was working.

An emergency backup surface water discharge plan must be developed so that if, at any point during the remediation, the POTW personnel determine that they will no longer accept the discharge from the City Chemical site, extraction and treatment of the ground water can resume in a timely manner. An emergency by-pass pipeline is needed for transmission of the treated effluent to the county maintained drainage canal east of the Sears Warehouse during periods when reinjection is precluded by saturated conditions. The inclusion of the bypass pipeline would necessitate securing an NPDES permit in addition to the UIC permit required for discharge to reinjection wells.

Extraction and treatment of the ground water will continue for an estimated 14 years in order to restore concentrations in the surficial aquifer to the cleanup standards listed in Table 7-1. These standards are either applicable or relevant and appropriate requirements (ARARs) or "to-be-considered" health-based levels (TBCs) which must be achieved to make the ground water safe for drinking. The surficial aquifer is classified by the State of Florida as a Class II aquifer, which means there is potential for it to be utilized for drinking water in the future. Therefore, drinking water standards must be met.

<u>Alternative 3</u>

Alternative 3 consists of implementing the following remedial actions:

- Institutional Controls or Other Land Use Restrictions;
- Ground water Monitoring of Surficial and Floridan Aquifers;
- Ground water Recovery via Wells;
- Ground water Treatment by Aeration, Precipitation, Filtration, and Carbon Adsorption;
- Surface Water Discharge of Treated Effluent;
- Treatability Studies to Ensure Compliance with Surface Water Discharge Criteria; and
- Review of Ground Water Use for Surficial Aquifer Every Five Years.

TABLE 7-1

GROUND-WATER STANDARDS, CRITERIA, AND GUIDELINES FOR CONSTITUENTS DETECTED AT THE CITY CHEMICAL SITE

Constituent	Standards or Criteria [Ug/L]	Source
Acetone	700	a
Benzene	1.0	b
1,1-dichloroethane	5	c
1,1-dichloroethene	7.0	d
t-1,2-Dichloroethene	70	e
Ethyl Benzene	700	e
Methylene Chloride	5	f
Methyl Ethyl Ketone	200	f
Methyl Isobutyl Ketone	350	a
Tetrachloroethene	3.0	b
Toluene	2,000	e
1,1,1-Trichloroethane	200	b
Trichloroethene	3.0	b
Total Phthalates (as bis-2-ethylhexyl)	3.0	a

a Reference Dose Limit; (IRIS, January 1989)

b Florida primary drinking water standard; F.A.C. 17-22.210

c Included at the direction of the USEPA (Letter dated November 20, 1989 from Diane Scott of USEPA to Robert L. Rhodes); value is based on the Federal Primary Drinking Water Standard of 5 µg/L for 1,2-dichloroethane.

d Federal primary drinking water standard; 40 CFR 141.62

e Proposed Federal Maximum Contaminant Level Goal; Fed Reg, Nov 13, 1985

f USEPA Office of Drinking Water Lifetime Health Advisory; USEPA, 1985b, or a 10^{-6} concern risk for carcinogens.

Alternative 3 was developed for treatment of constituents recovered in ground water to levels suitable for surface-water discharge. The system developed is considered to be technically adequate to meet discharge criteria based on existing data. Volatile organics with the exception of the ketones would be removed from the ground water by aeration using a forced draft air stripper system. Oxidation, precipitation, and sedimentation in a conventional gravity settling device would then reduce the ambient concentrations of iron, aluminum, and other metals which may be recovered in the ground water. Although all the target list compounds are organics, the inorganic composition of the treated effluent is pertinent to the feasibility of discharge to surface waters. Filtration is required for further removal of metals and suspended solids which may blind adsorption sites on the activated carbon. Carbon adsorption is included as an additional step prior to surface-water discharge, to remove ketones and provide assurance for compliance with discharge criteria. Should treatability studies show that carbon adsorption is infeasible for meeting surface water discharge criteria, other treatment methods, such as biological treatment, could be implemented.

Bioassay studies would be conducted to verify system performance. The bioassay studies would include testing of influent samples collected from the recovery system as well as effluent samples from each component of the treatment system.

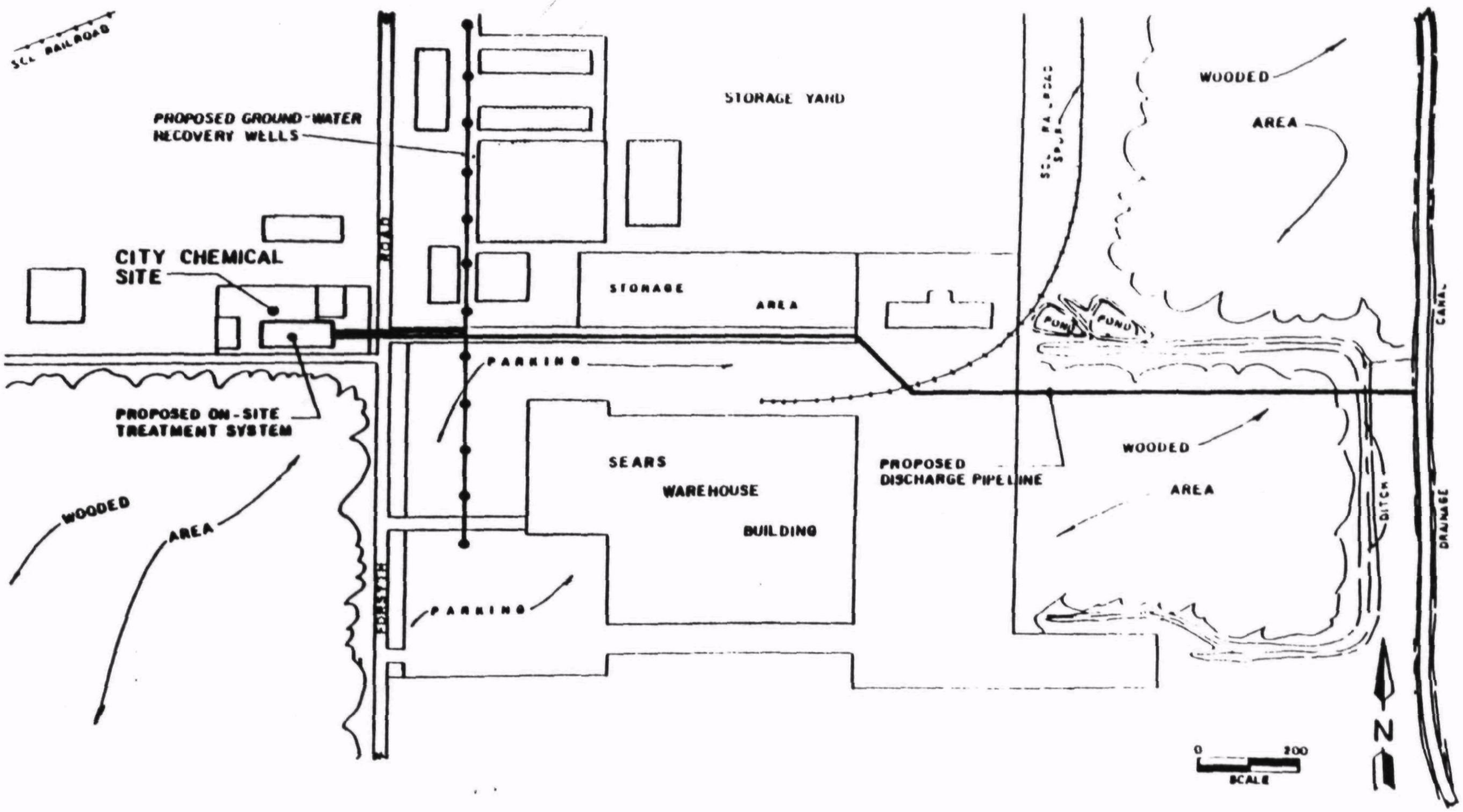
The treated effluent from the process would be discharged to surface waters, via a NPDES permitted outfall in the county maintained drainage canal. This canal is part of the Little Econlockhatchee River Drainage Basin. A 6-inch pipeline, approximately 2,250 feet in length, would transport the treatment plant effluent across Forsyth Road and east to the drainage canal outfall. A plan view of the conceptual system layout is shown in Figure 7-3.

This alternative includes institutional controls or other land use restrictions necessary to prevent adverse effects to the remedy. This may involve deed restrictions, easements, and other rights of way.

ARARs and TBCs for the ground water as described in Alternative 2 must also be achieved under this alternative. Reaching these levels will take an estimated 14 years. Standards for discharge to surface water as incorporated in the NPDES permit must be met as well. Table 7-2 lists fresh-water aquatic life criteria for the contaminants of concern at the City Chemical site. As in Alternative 2, O&M requirements for Alternative 3 would include weekly inspection of the performance of recovery, treatment, and discharge system components and periodic cleaning or replacement of air stripper packing media. Additional O&M required for Alternative 3 would include the collection and stabilization of sludges generated in the precipitation unit and the spent-backwash water sedimentation tank. The supernatant from the backwash water sedimentation tank would be recycled through the treatment system. The carbon adsorption system would require periodic replacement and regeneration of the spent granular activated carbon

FIGURE 7-3

CONCEPTUAL LAYOUT OF SURFACE WATER DISCHARGE ALTERNATIVES



SOURCE: FIGURE 3-3, FEASIBILITY STUDY, CITY CHEMICAL SITE

TABLE 7-2

Fresh-water Aquatic Life Criteria
For Constituents Detected at the City Chemical Site

Constituent	Standards or Criteria (mg/L)	Source
Acetone	88	a[1/]
Benzene	0.053	b[1/]
1,1-dichloroethane	1.16	b
1,1-dichloroethene	0.303	b[2/]
t-1,2-Dichloroethene	1.16	b
Ethyl Benzene	0.453	b[2/]
Methylene Chloride	1.1	b
Methyl Ethyl Ketone	56.4	c[1/]
Methyl Isobutyl Ketone	42.8	d[1/]
Tetrachloroethene	0.084	e[3/]
Toluene	0.175	b[1/]
1,1,1-Trichloroethane	0.530	b[2/]
Trichloroethene	4.5	e[4/]
Total Phthalates (as bis-2-ethylhexyl)	0.0003	e[3/]
Xylenes	0.260	f[1/]

a LC50 for *Daphnia pulex*, 48 hour; concentration divided by a factor of 10 to provide a safety factor because chronic data not available (Sloof et al., 1983).

b Federal Water Quality Criteria; acute criteria have been divided by a factor of 10 to provide a safety factor because chronic criteria was not available (USEPA, 1986).

c LC_{50} for *Lepomis macrochirus*, 48 hours; concentration divided by a factor of 10 to provide a safety factor because chronic data not available (Turnbull et al., 1954).

d LC_{50} for *Daphnia magna*, 24 hours; concentration divided by a factor of 10 to provide a safety factor because chronic data not available (Bringman and Kuhn, 1977).

e Federal Water Quality Criteria; chronic criteria (USEPA, 1986) or IRIS.

f LC_{50} for *Pimephales promelas*, 96 hours; concentration divided by a factor of 10 to provide a safety factor because chronic data not available (Pickering and Henderson, 1966).

1/ Safety factor of 100 has been added to acute values at the direction of the USEPA (letter dated November 20, 1989 from Diane Scott of the USEPA to Robert L. Rhodes).

2/ Value included at the direction of the USEPA (see reference in footnote 1).

3/ Safety factor of 10 has been added to chronic values at the direction of the USEPA (see reference in footnote 1).

4/ Acute value with safety factor of 100 substituted for chronic value at the direction of the USEPA (see reference in footnote 1).

(GAC). At that time spent GAC would be collected and transported to an off-site regeneration facility. O&M for Alternative 3 would also include bioassays to assure that surface water discharge standards continue to be achieved.

Alternative 4

Alternative 4 consists of implementing the following remedial actions:

- Institutional Controls or Other Land Use Restrictions;
- Ground water Monitoring of the Surficial and Floridan Aquifers;
- Ground water Recovery via Wells;
- Ground water Treatment by Aeration, Biological Oxidation, Filtration, and Carbon Adsorption;
- Reinjection of Treated Effluent to Surficial Aquifer;
- Backup Discharge Plan; and
- Review of Ground Water Use for Surficial Aquifer Every Five Years.

Alternative 4 involves the reinjection of treated effluent into the shallow aquifer; thus ground water would be treated for compliance with remediation goals for potential drinking water supplies. The treatment scenario proposed for Alternative 4 includes aeration, biological oxidation, and filtration followed by carbon adsorption for polishing prior to reinjection of the treated effluent.

Aeration would be effective in removing all of the target list organics except for the highly soluble compounds acetone, MEK, and MIBK. Alternative 4 incorporates the use of biological oxidation for destruction of the ketones and compliance with remediation goals for drinking water. Filtration and carbon adsorption are also included in this alternative for polishing of the waste stream prior to disposal of treated effluent by reinjection. The carbon adsorption unit would also provide a backup in case of temporary interferences or upsets in the biological system performance.

The insoluble precipitates formed following aeration would settle and be removed from the wastewater in the biological clarifier. Suspended solids carried over would be removed in the filtration unit prior to carbon adsorption. The settled sludge from the biological oxidation process would be channeled through a gravity thickener followed by a belt filter press for volume reduction prior to disposal.

Two lines of reinjection wells would be needed to discharge the treated effluent. Twelve wells would be located along a north-south line downgradient of the contaminant plume and an additional 12 wells would be located in a north-south line upgradient of the plume. The final system configuration will be designed once better definition of the impacted ground water plume is conducted.

Under unusually severe weather conditions, discharge to reinjection wells may result in the upwelling of impacted ground water, as it may be pushed to the surface by treated water being reinjected at depth. The reinjection well system, therefore, would include an emergency provision for management of treated effluent during severe weather to avoid this occurrence. An emergency by-pass pipeline for transmission of the treated effluent to the county maintained drainage canal east of the Sears Warehouse or an on-site storage tank is needed during periods when reinjection is precluded by saturated conditions. The inclusion of the bypass pipeline would necessitate securing an NPDES permit in addition to the UIC permit required for discharge to reinjection wells. This alternative includes institutional controls or other land use restrictions necessary to prevent adverse effects to the remedy. This may invlove deed restricitons, easements, and other rights of way.

It is anticipated that ARARs and TBCs for the ground water will be achieved after an estimated 14 years of extraction and treatment. Treated ground water to be reinjected into the surficial aquifer must also meet these drinking water standards.

O&M requirements for Alternative 4 include monitoring the performance of the recovery air stripper, and discharge systems, and media cleaning or replacement for the air stripper, similar to that described for Alternative 3. O&M requirements for a biological treatment system would include daily inspections and adjustments by an operator. In addition, waste activated sludge and settled sludge from the spent backwash water sedimentation tank would be collected and stabilized. The supernatant from the spent backwash water tank would be recycled through the treatment system. Spent carbon from the carbon adsorption system would be transported to an off-site regeneration facility and regenerated replacement carbon would be delivered to the site on a monthly basis.

<u>Alternative 5</u> - (Alternative 6 in FS)

Alternative 5 consists of implementing the following remedial actions:

- Institutional Controls or Other Land Use Restrictions;
- Ground water Monitoring of Surficial and Floridan Aquifers;
- Ground water Recovery via Wells;
- Ground water Treatment by Aeration, Precipitation, Filtration, and Carbon Adsorption;
- Reinjection of Treated Effluent;
- Backup Discharge Plan; and
- Review of Ground Water Use for Surficial Aquifer Every Five Years.

Alternative 5 utilizes carbon adsorption as a primary treatment process, unlike Alternatives 3 and 4, which incorporate carbon adsorption treatment as a final polishing step following primary treatment by other processes. This distinction is significant when identifying carbon usage rates and annual operational costs associated with replacing carbon. In Alternative 5, recovered ground water is treated by aeration for removal of volatile organic compounds and pretreated for removal of iron by precipitation and filtration. Carbon adsorption would then be used for primary treatment of the remaining organics, including ketones, prior to reinjection of the treated effluent into the shallow aquifer as described for Alternative 4.

Under unusually severe weather conditions, discharge to reinjection wells may result in the upwelling of impacted ground water, as it may be pushed to the surface by treated water being reinjected at depth. The reinjection well system, therefore, would include an emergency provision for management of treated effluent during severe weather to avoid this occurrence. An emergency by-pass pipeline for transmission of the treated effluent to the county maintained drainage canal east of the Sears Warehouse or on-site storage tank is needed during periods when reinjection is precluded by saturated conditions. The inclusion of the bypass pipeline would necessitate securing an NPDES permit in addition to the UIC permit required for discharge to reinjection wells.

This alternative includes institutional controls or other land use restrictions necessary to prevent adverse effects to the remedy. This may invlove deed restricitons, easements, and other rights of way.

As for the other alternatives, 14 years has been estimated for achieving drinking water ARARs and TBCs. These standards must be met in the treated groundwater before reinjection in the surficial aquifer.

The O&M requirements for Alternative 5 are similar to those required for Alternative 3 with respect to the recovery, aeration, precipitation, and filtration. Estimated carbon usage rates indicate that regeneration and replacement of spent carbon would be required every 48 hours.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The major objective of the Feasibility Study (FS) was to develop, screen, and evaluate alternatives for remediating the City Chemical Site. This decision document deals with the ground water, for which several remedial technologies were identified. These technologies were screened based on their feasibility given the contaminants present and site characteristics. Those which remained after the initial screening were evaluated in detail based on the nine selection criteria required by SARA and listed in the NCP, which are listed below:

1) Overall protection of human health and the environment;
2) Compliance with applicable or relevant and appropriate requirements (ARARs);
3) Long-term effectiveness
4) Reduction of toxicity, mobility or volume
5) Short-term effectiveness
6) Implementability
7) Cost
8) State acceptance
9) Community acceptance

Cost was used to compare alternatives only when they provided similar degrees of protection and treatment. Five alternatives remained after the detailed evaluation and were listed in the previous section. A summary of the relative performance of the alternatives with respect to each of the nine criteria is provided in this section.

8.1 PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT

All alternatives presented in this document except for no action would be protective of human health and the environment. The no action alternative is not protective because it would allow further migration of the contaminants, leading to possible ingestion of contaminated water if drinking-water wells were to be drilled into the surficial aquifer or a connection between the surficial and Floridan aquifers were to form in the vicinity of the plume. The other alternatives would be protective because ground water with unacceptable levels of contaminants would be removed from the aquifer. The water would then be treated to make it safe for discharge or reinjection.

8.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

All alternatives except for no action would comply with applicable or relevant and appropriate requirements (ARARs). The no action alternative would allow contaminants to remain in the ground water at concentrations above drinking water standards, thus violating the Safe Drinking Water Act (SDWA), which is an ARAR for this site. The other alternatives would restore the levels of contaminants in the aquifer to drinking water standards, and comply with the SDWA. Water discharged to the canal in Alternative 3 would meet NPDES permit limits and the fresh-water quality criteria listed in Table 7-2, which are requirements of the Clean Water Act (CWA). In Alternatives 4 and 5, the extracted ground water would be treated to meet drinking water standards prior to reinjection into the surficial aquifer.

The primary ARARs for the ground water are maximum contaminant levels (MCLs) under the Safe Drinking Water Act (SDWA). These are applicable where water will be provided directly to 25 or more people or will be supplied to 15 or more service connections. MCLs are relevant and appropriate where the surface water or ground water is being used or may potentially be used for drinking water. Although the surficial aquifer at the City Chemical site is not currently being used for drinking water, it has the potential to be used in the future.

Other ARARs that must be complied with are surface water discharge requirements of the National Pollutant Discharge Elimination System (NPDES) covered under the Clean Water Act (CWA). Air emissions specifications for the air stripper established by the Clean Air Act must also be met.

8.3 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

All alternatives except for no action reduce the toxicity, mobility and volume of the ground water contamination by decreasing the size of the plume and removing it from the surficial aquifer. The no action alternative would allow the plume to continue to spread.

8.4 LONG-TERM EFFECTIVENESS

All alternatives except for no action would have long-term effectiveness and permanence. Once the contaminant plume has been captured, the risk associated with drinking the ground water would be in the acceptable risk range and would remain acceptable.

8.5 SHORT-TERM EFFECTIVENESS

An estimated fourteen (14) years will be necessary to achieve the remedial action goals for all alternatives except no action. During that time the community would be protected from short-term risk by institutional controls which would prevent drinking water and drainage wells from being drilled into the plume. Any short-term risk to workers involved in construction of the remedy would be mitigated through implementation of a health and safety plan. The no action alternative would not be effective in the short or long term.

8.6 IMPLEMENTABILITY

The implementability of an alternative is based on technical feasibility, administrative feasibility and the availability of services and materials. Services and materials are available for all alternatives. Reinjection of treated water into the surficial aquifer as included in Alternatives 4 and 5 is not technically feasible because of the shallow ground water table. Reinjection will cause mounding of the ground water table which could result in ponding of water on the ground surface during wet weather conditions. However, the treatment methods in these alternatives are feasible. Alternative 2 may not be administratively feasible if the POTW will not accept discharge from the site.

8.7 COST

A present worth cost of $103,700 for ground water monitoring would be associated with Alternative 1, the No Action alternative. Alternative 2 has an estimated present worth cost of $4,575,632 including Operations and Maintenance (O&M) costs. The estimated present worth of Alternative 3 is $4,262,101; Alternative 4 is $6,472,000; and Alternative 5 is $54,901,000. Alternatives 2 and 3 are based on a ten (15) year present worth cost at a 5% interest rate. The other alternatives are based on 10 year present worth cost. Alternative 5 is not cost-effective because it does not provide an additional degree of protectiveness necessary to justify the increased cost of remediation.

8.8 STATE ACCEPTANCE

The State of Florida, as represented by the Florida Department of Environmental Regulation, is in favor of extraction of the ground water and treatment via aeration. The State will concur with discharge of the treated water to the City of Orlando Iron Bridge POTW or other local POTW for further treatment if the POTW is willing to accept the waste.

In the event the city does not accept the waste, FDER concurs with EPA's contingency alternative of ground water extraction and treatment by aeration, precipitation, filtration, and carbon adsorption followed by surface water discharge.

8.9 COMMUNITY ACCEPTANCE

Based on comments made by citizens at the public meeting held on February 6, 1990, and those received during the public comment period, the community agrees that an extraction and treatment system will effectively protect human health and the environment. Citizens at the public meeting indicated opposition to surface water discharge and a preference for discharge to the POTW.

9.0 THE SELECTED REMEDY

Based on available data and analysis to date, the US EPA selects Alternative 2, which involves ground water extraction and treatment via aeration with discharge to the City of Orlando Iron Bridge POTW or other local POTW. However, in the event that a POTW has not agreed to accept the discharge from the City Chemical Site within a reasonable period of time after the date of signature of the Record of Decision, EPA has selected Alternative 3 as a contingency alternative. Alternative 3 consists of ground water extraction and treatment by aeration, filtration, precipitation, and carbon adsorption followed by discharge to a county-maintained drainage canal. Both the selected and contingency alternatives include institutional controls or other land use restrictions necessary to prevent adverse effects to the remedy. This may invlove deed restricitons, easements, and other rights of way.

Alternative 2 was developed for treatment of constituents recovered in ground water to levels suitable for discharge to a POTW. The proposed ground water recovery system will include installation of 12 recovery wells below grade in a north-south alignment east of the City Chemical Site. The anticipated flow rate from the entire system is estimated to be 100 gpm. The exact location of each well will be determined after the areal and vertical extent of the plume is defined during a plume delineation study. This study will require samples to be collected and analyzed from existing monitoring wells. Based on these data, the design of the recovery system will be refined.

Recovered ground water will be piped to an on-site treatment system consisting of an equalization tank in series with a forced draft air stripping tower for removal of volatile organic compounds. The air stripper effluent would be tested to verify that pre-treatment standards are met and piped to a clarifier.

The effluent from the treatment system would be pumped to the nearest City of Winter Park sewer system manhole, which is located approximately 350 feet east of Forsyth Road and approximately 250 feet south of the Sears Warehouse. The transmission main would be approximately 1,350 feet in length and would require a 4-inch diameter pipe to handle the 100 gpm flow. At the proposed manhole connection, the treated effluent would be discharged to the existing City of Winter Park 8-inch vitrified-clay gravity sewer line which terminates approximately 2,300 feet downstream at the Showalt Lift Station. The discharge would then be transported, via the sanitary sewer, to the City of Orlando Iron Bridge Wastewater Treatment Facility where it would undergo biological treatment.

Implementation of the treatment and discharge scenario proposed for Alternative 2 would require the responsible parties to secure the approval of administrative personnel from the city governments of both Winter Park and Orlando. The treated effluent would have to meet pretreatment criteria established by these administrative officials as well as comply with EPA guidelines for discharging of a CERCLA wastewater to a POTW.

Easements and construction rights-of-way would be required for installation of the recovery wells and piping and the discharge piping to the sewer interconnection. These easements and rights-of-way are essential to the implementation of any remedial action because the plume has migrated past property boundaries.

A security fence would be installed around the perimeter of the treatment system. Installation of the fence would restrict unauthorized access to the treatment area which ultimately minimizes the potential for direct human contact with the impacted ground water that is recovered.

The O&M will include monitoring of system controls which will be incorporated to ensure the effluent quality meets established pretreatment criteria prior to discharge to the POTW. The routine O&M procedure would require an operator present on-site to monitor performance of the recovery, aeration, and discharge system components. Efficient operation of an air stripper also requires periodic cleaning or replacement of the tower's packing media to avoid clogging from accumulated biological growth or precipitated matter. Periodic monitoring of the ground water would be performed to assure that the remedy was working. Detailed cost analysis for Alternative 2 is contained in Table 9-1.

Alternative 3, the contingency alternative, is proposed in the event that the POTW is unable to accept the effluent from City Chemical. The primary differences between the preferred Remedial Alternative 2 and this contingency Remedial Alternative 3 are twofold. First, Alternative 2 involves discharge to the POTW whereas Alternative 3 discharges to surface water. Second, additional treatment units have been included in Alternative 3 to meet surface-water discharge criteria. In both alternatives, volatile organics with the exception of the ketones would be removed from the ground water by aeration using a forced draft air stripper system. Consequently, further treatment of the ketones is required. In Alternative 2, this additional treatment is the POTW's rotating biological contact system. Alternative 3 utilizes carbon adsorption to reduce the ketone concentrations to levels acceptable for surface water discharge. In addition to carbon adsorption, oxidation,

Table Number 9-1

Alternative No.: 2 w/ Emergency Discharge System

CAPITAL COSTS
ALT. NO. 2 WITH EMERGENCY

Alternative: RECOVERY, PRETREAT & DISCHARGE TO POTW WITH EMERGENCY SYSTEM IN-PLACE
Site Name: CITY CHEMICAL/INDUSTRIES
Site Location: WINTER PARK, FLORIDA
Term of Operations: 15 YRS

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE DOLLARS	TOTAL COST DOLLARS
A. PLUME DELINEATION	ls	1	$28,000	$28,000
B. GROUND WATER RECOVERY				
Recovery Wells (4-inch)	ea	12	$6,500	$78,000
Pumps, Piping, Valves, etc.	ea	12	$3,200	$38,400
Controls/Electrical	ls	1	$27,000	$27,000
Piping	lf	1,400	$14	$19,600
Pavement Replacement	lf	1,300	$11	$14,300
Pipe Crossing	ls	1	$15,000.00	$15,000
C. GROUND WATER TREATMENT				
Effluent Studies	ls	1	$30,000	$30,000
Aeration	ls	1	$35,000	$35,000
D. EFFLUENT DISCHARGE SYSTEM				
Clarifier	ls	1	$5,000	$5,000
Pump	ls	1	$1,000	$1,000
Piping	lf	1,350	$14	$18,900
Controls/Electrical	ls	1	$2,000	$2,000
Pipe Crossing	ls	1	$15,000	$15,000
Pavement and Parking Crossing	ls	1	$12,000	$12,000
Sewer Connection Impact Fees	ls	1	$3,000	$3,000
POTW Authorization	ls	1	$15,000	$15,000
E. EASEMENTS AND CONSTRUCTION ACC	ls	1	$64,000	$64,000
F. CONSTRUCTION MGMT SERVICES	ls	1	$90,000	$90,000
G. TERMINATION OF REMEDIAL SERVICES				
Final Report, EA, Closure Plan	ls	1	$20,000	$20,000
Plugging and Abandonement				
---Recovery Wells	ea	12	$900	$10,800
---Monitoring Wells	ls	1	$12,000	$12,000
Removal of Equip/Piping	ls	1	$72,000	$72,000
Closure Management	ls	1	$7[illegible]000	$75,000
H. EMERGENCY TREATMENT SYSTEM				
Precipitation	ls	1	$42,000	$42,000
Filtration	ls	1	$100,000	$100,000
Carbon Adsorption	ls	1	$148,000	$148,000
Sludge Dewatering	ls	1	$15,000	$15,000
I. SURFACE WATER DISCHARGE SYSTEM				
Pump	ls	1	$1,000	$1,000
Piping	lf	2250	$14	$31,500
[illegible]	ls	1	$5,000	$5,000
Controls/Electrical	ls	1	$2,000	$2,000
Pipe Crossing	ls	1	$15,000	$15,000
NPDES & NVTDS Permits	ls	1	$30,000	$30,000
Pavement & Parking Crossing	ls	1	$25,000	$25,000
J. LAB ANALYSIS OF SLUDGE	ls	1	$8,000	$8,000
SUBTOTAL - CAPITAL COST				$1,123,500
Engineering_Administrative & Health and Safety (20% of Capital Cost)				$224,700
Subtotal				$1,348,200
Contingency (15% of Capital Cost)				$168,525
TOTAL CAPITAL COST				$1,516,725
PRESENT WORTH O&M COST				$3,058,907

Table Number: 9-1

Alternative No.: 2 w/ Emergency Discharge System

Alternative: RECOVERY, PRETREAT & DISCHARGE TO POTW WITH EMERGENCY SYSTEM IN-PLACE

Site Name: CITY CHEMICAL/INDUSTRIES

Site Location: WINTER PARK, FLORIDA

Term of Operations: 15 YRS

OPERATION & MAINTENANCE COSTS
ALT. NO. 2 EMERGENCY

ITEM DESCRIPTION	UNITS	QTY	UNIT COST	TOTAL ANNUAL COST, DOLLARS	OPERATION TIME, YEARS	PRESENT WORTH
GROUND WATER MONITORING						
Sampling	year	1	$24,000	$24,000	15	$249,112
Sampling	year	1	$24,000	$24,000	1	$22,857
RECOVERY SYSTEM OPERATION						
Electrical Power	year	1	$8,000	$8,000	15	$83,037
Operator Operation	year	1	$8,000	$8,000	15	$83,037
Maintenance	year	1	$16,000	$16,000	15	$166,075
Sewer Usage Fee	year	1	$158,000	$158,000	15	$1,639,986
System Management	year	1	$20,000	$20,000	15	$207,593
SUBTOTAL			$234,000	$234,000		$2,451,697
HEALTH AND SAFETY (10%)		1	$23,400	$23,400	15	$242,884
CONTINGENCY (15%)		1	$35,100	$35,100	15	$364,326
TOTAL				$292,500		$3,058,907

precipitation, and sedimentation in a conventional gravity settling device would be utilized to reduce the ambient concentrations of iron, aluminum, and other metals which may be recovered in the ground water. Although all the target list compounds are organics, the inorganic composition of the treated effluent is pertinent to the feasibility of discharge to surface waters. Filtration is required for further removal of metals and suspended solids which may blind adsorption sites on the activated carbon. Should treatability studies show that carbon adsorption is infeasible for meeting surface water discharge criteria, other treatment methods, such as biological treatment, could be implemented.

Bioassay studies would be conducted to verify system performance and compliance with surface water discharge criteria. The bioassay studies would include testing of influent samples collected from the recovery system as well as effluent samples from each component of the treatment system.

The effluent from the treatment system will be transported via a gravity pipeline approximately 2250 feet to the east and discharged to the County maintained drainage canal. A minimum 6 inch diameter pipe is proposed to adequately handle the 100 gpm flow rate. The drainage canal in the vicinity of the discharge location is about 15 feet deep and 15 to 20 feet wide. The canal is a part of the Little Econlockhatchee Drainage Basin and, based on visual inspection, is believed to be more than adequate to handle the 0.2 cubic feet per second discharge flow rate from the City Chemical Site. A NPDES discharge permit will be required which will include the monitoring program to ensure compliance with surface-water discharge criteria.

As in Alternative 2, O&M requirements for Alternative 3 would include inspection of the performance of recovery, treatment, and discharge system components and periodic cleaning or replacement of air stripper packing media. Additional O&M required for Alternative 3 would include the collection and stabilization of sludges generated in the precipitation unit and the spent-backwash water sedimentation tank. The supernatant from the backwash water sedimentation tank would be recycled through the treatment system. The carbon absorption system would require periodic replacement and regeneration of the spent GAC. At that time spent GAC would be collected and transported to an off-site regeneration facility. A detailed cost breakdown for Alternative 3 is contained in Table 9-2.

Under both the selected and contingency alternatives, ground water monitoring of the surficial and Floridan aquifers would be performed to assess the efficiency of organic constituent recovery utilizing the system proposed. Approximately 12 samples would be collected and analyzed for target list compounds quarterly for the first year and as a minimum semiannually thereafter. Analytical results would be used to track the progress in achievement of remediation goals.

Both alternatives will require an estimated 14 years to achieve the ground water cleanup goals listed in Table 7-1, based on ground water

Table Number: 9-2

Alternative No.: 3

Alternative: RECOVERY, ONSITE TREATMENT, DISCHARGE TO SURFACE WATER BODY

Site Name: CITY CHEMICAL/INDUSTRIES

Site Location: WINTER PARK, FLORIDA

Term of Operations: 10 YRS + 5 YRS

CAPITAL COSTS ALT. NO. 3 WITH ADDITIONAL 5 YRS, AERATION ONLY

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE DOLLARS	TOTAL COST DOLLARS
A. PLUME DELINEATION	ls	1	$28,000	$28,000
B. GROUND WATER RECOVERY				
Recovery Wells (4-inch)	ea	12	$6,500	$78,000
Pumps, Piping, Valves, etc.	ea	12	$3,200	$38,400
Controls/Electrical	ls	1	$27,000	$27,000
Piping	lf	1,400	$14	$19,600
Pavement Replacement	lf	1,300	$11	$14,300
Pipe Crossing	ls	1	$15,000	$15,000
C. GROUND WATER TREATMENT				
Effluent Studies	ls	1	$75,000	$75,000
Aeration	ls	1	$35,000	$35,000
Precipitation	ls	1	$42,000	$42,000
Filtration	ls	1	$100,000	$100,000
Carbon Adsorption	ls	1	$148,000	$148,000
Sludge Dewatering	ls	1	$15,000	$15,000
D. SURFACE WATER DISCHARGE SYSTEM				
Pump	ls	1	$1,000	$1,000
Piping	lf	2,250	$14	$31,500
Headwall	ls	1	$5,000	$5,000
Controls/Electrical	ls	1	$2,000	$2,000
Pipe Crossing	ls	1	$15,000	$15,000
NPDES & WTDS Permits	ls	1	$30,000	$30,000
Pavement and Parking Crossing	ls	1	$25,000	$25,000
E. EASEMENTS AND CONSTRUCTION ACC	ls	1	$53,000	$53,000
F. LAB ANALYSIS OF SLUDGE	ls	1	$8,000	$8,000
G. CONSTRUCTION MGMT SERVICES	ls	1	$82,000	$82,000
H. TERMINATION OF REMEDIAL SERVICES				
Final Report, EA, Closure Plan	ls	1	$20,000	$20,000
Plugging and Abandonement				
---Recovery Wells	ea	12	$900	$10,800
---Monitoring Wells	ls	1	$12,000	$12,000
Removal of Equip/Piping	ls	1	$61,000	$61,000
Closure Management	ls	1	$55,000	$55,000
SUBTOTAL - CAPITAL COST				$1,046,600
Engineering, Administrative & Health and Safety (20% of Capital Cost)				$209,320
Subtotal				$1,255,920
Contingency (15% of Capital Cost)				$156,990
TOTAL CAPITAL COST				$1,412,910
PRESENT WORTH O&M COST				$2,849,191
TOTAL PRESENT WORTH COST				[illegible]

OPERATION & MAINTENANCE COSTS
ADDITIONAL 5 YRS
AERATION ONLY

Table Number 9-2

Alternative No.: 3

Alternative: RECOVERY, ONSITE TREATMENT, DISCHARGE TO SURFACE WATER BODY

Site Name: CITY CHEMICAL/INDUSTRIES

Site Location: WINTER PARK, FLORIDA

Term of Operations: 5 Yrs

ITEM DESCRIPTION	UNITS	QTY	UNIT COST	TOTAL ANNUAL COST, DOLLARS
GROUND WATER MONITORING				
Sampling	year	1	$24,000	$24,000
SYSTEM OPERATION				
Electrical Power	year	1	$8,000	$8,000
Operator Operation	year	1	$8,000	$8,000
Maintenance	year	1	$16,000	$16,000
Sludge Disposal	year	1	$0	$0
Carbon Replacement	year	1	$0	$0
System Management	year	1	$15,000	$15,000
SUBTOTAL			$71,000	$71,000
HEALTH AND SAFETY (10%)		1	$7,100	$7,100
CONTINGENCY (15%)		1	$10,650	$10,650
SUBTOTAL				$88,750
PRESENT VALUE AT 10 YRS (5%)				$685,304
PRESENT VALUE AT 15 YRS (5%)				$921,195
TOTAL				$235,891

10.0 STATUTORY DETERMINATIONS

The US EPA has determined that both the selected and contingency remedies will satisfy the following statutory requirements of section 121 of CERCLA: protection of human health and the environment, attaining ARARs, cost-effectiveness, and utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected and contingency remedies adequately protect human health by reducing the risk of consumption of contaminated ground water. This will be accomplished through the capture of the ground water contaminant plume. Environmental risk will be reduced by preventing the use of contaminated water for irrigation. No unacceptable short-term risks will result from the implementation of these remedies.

10.2 ATTAINMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

These remedies assure that drinking water supplied to current well users will meet available MCLs under the Safe Drinking Water Act (SDWA). For those chemicals which do not have assigned MCLs, to-be-considered health-based values will be attained. Discharge from the ground water treatment system will meet either the POTW's pretreatment standards or NPDES permit discharge limits under the Clean Water Act (CWA). The CWA is an applicable requirement, while the SDWA (MCLs) is relevant and appropriate.

10.3 COST-EFFECTIVENESS

Alternative 2, the selected alternative, is the most cost-effective remedy analyzed. The total present worth cost is $4,575,632. Alternative 3, the contingency alternative, would provide a comparable level of protection, and has a lower present worth cost of $4,262,101.

The US EPA has determined that the costs of the selected and contingency alternatives are proportionate to the overall effectiveness and both are a reasonable value for the money.

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT (OR RESOURCE RECOVERY) TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE (MEP)

Both the selected and contingency alternatives utilize permanent solutions and treatment technologies to the maximum extent practicable. Both provide short-term and long-term effectiveness and would reduce the toxicity, mobility, and volume through extraction and treatment of the ground water. Both would require an estimated 10 years to achieve clean-up goals. The selected alternative, Alternative 2, is the most cost-effective remedy but may not be implementable if the City of Orlando Iron Bridge POTW or other local POTW is unable to accept discharge from the City Chemical Site within a reasonable period of time after the signature date for this ROD. Alternative 3 costs about $0.3 million more and would become the selected remedy for the site if the above contingency is not met.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The statutory preference for treatment will be met because the principal threat from the City Chemical Site is ingestion of or dermal contact with contaminated ground water. Both the selected and contingency remedies will reduce this risk to public health through capture of the ground water plume.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

Two significant changes from the proposed plan are incorporated in this decision document. The first is the possible substitution of biological treatment for carbon adsorption in Alternative 3. The State presented new information which indicated that biological treatment may be more cost-effective for an equivalent degree of protectiveness. Additional public comment is not necessary because incorporation of this technology in Alternative 3 is considered a logical outgrowth of the information on which the public already had the opportunity to comment.

The second significant change is the length of remediation and susequently the cost for the preferred and contingency remedies. It was discovered that the period of treatment for one of the contaminants is longer than the others and will require an extended period of treatment. Public comment is not necessary because the additional time period required for this contaminant was documented in the Endangerment Assessment, which is an appendix to the Feasibility Study Report and was available for public review during the public comment period. Therefore, this change could have been reasonably anticipated by the public.

APPENDIX A

Remedial Investigation
Sampling Data and Locations

TABLE A-1

Summary of Phase II B Ground-Water Sample Analyses

Constituent	Number of Detections	Number of Analyses	Range of Concentrations (ppb)	Location of Highest Concentration[2]
Acetone	12	33	262,000	8I
Benzene	6	33	74	8I
Chloroform	1	33	39	12I
1,1-Dichloroethane	13	33	2,000	8I
1,2-Dichloroethane	0	33	---	---
T-1,2-Dichloroethene	14	33	7,200	13I
1,1-Dichloroethene	14	33	18,000	8D
Ethyl Benzene	8	33	0.378	8I
Methylene Chloride	13	33	126,000	12I
Methyl Ethyl Ketone	10	33	10,800	8I
Methyl Isobutyl Ketone	5	33	60,000	8I
Phenol	4	33	0.060	12I
Tetrachloroethene	11	33	1,100	8D
Thallium	0	33	---	---
Toluene	13	33	26,700	8I
Total Phthalate Esters (as Bis-2-ethylhexyl)	19	33	0.008	18D
1,1,1-Trichloroethane	11	33	10,000	15S
Trichloroethene	15	33	150,000	8D
Xylenes, Total	12	33	1,200	8I
Chromium, Total	3	33	3-18	24S
Copper, Total	3	33	2-8	24S
Lead, Total	1	33	46	24I
Zinc, Total	3	33	4-21	24S

Notes:

1. Data compiled from ESE Phase IIB Report, Appendix D.
2. Location of highest concentration is designated by the monitor well number and the following depth range notation:

   S: 10 ft - 20 ft

   I: 25 ft - 35 ft

   D: 50 ft - 60 ft

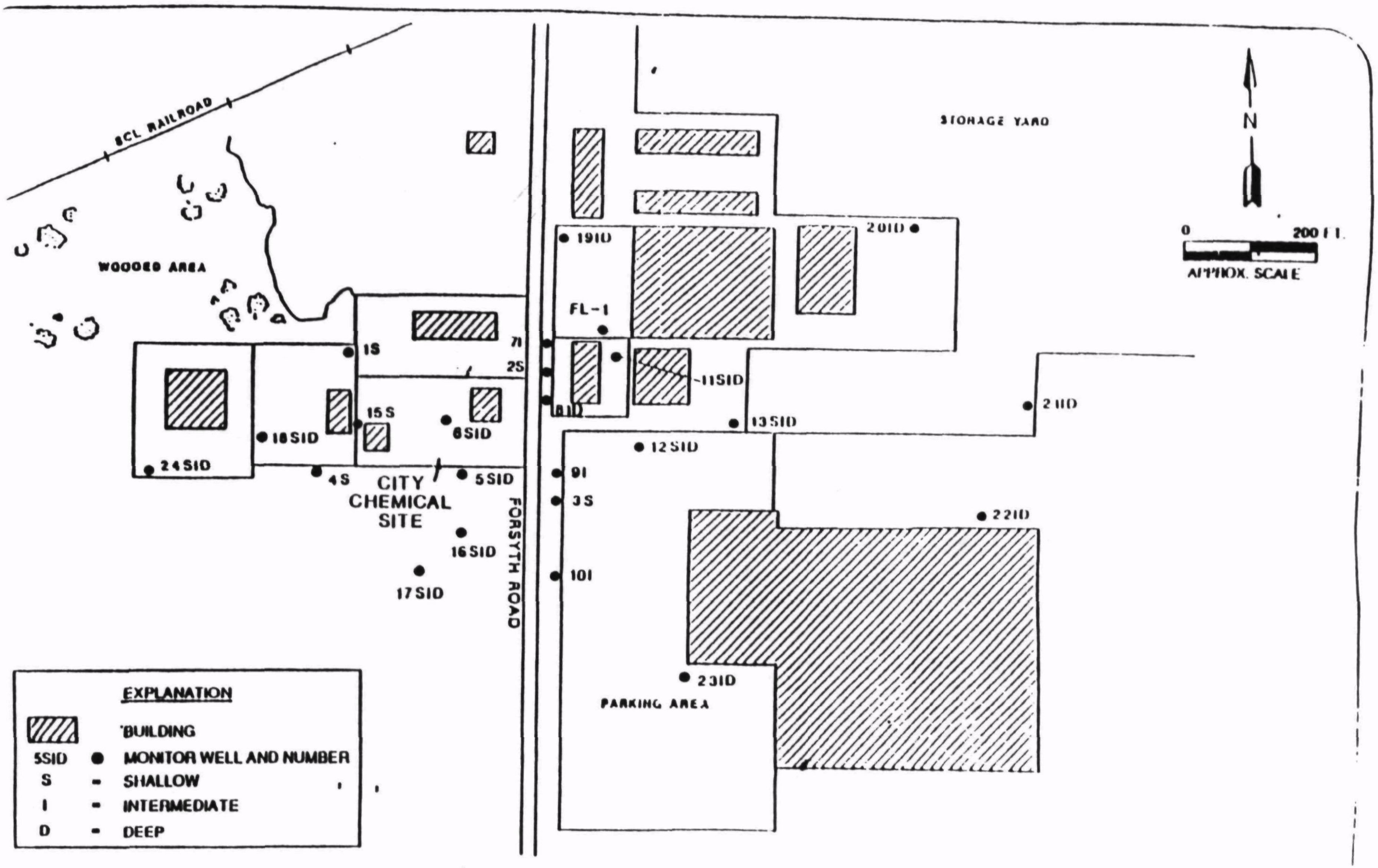


FIGURE A-1: Phase IIB Ground Water Sampling Locations

SOURCE:
GERAGHTY & MILLER ENGINEERS, INC.

TABLE A-2

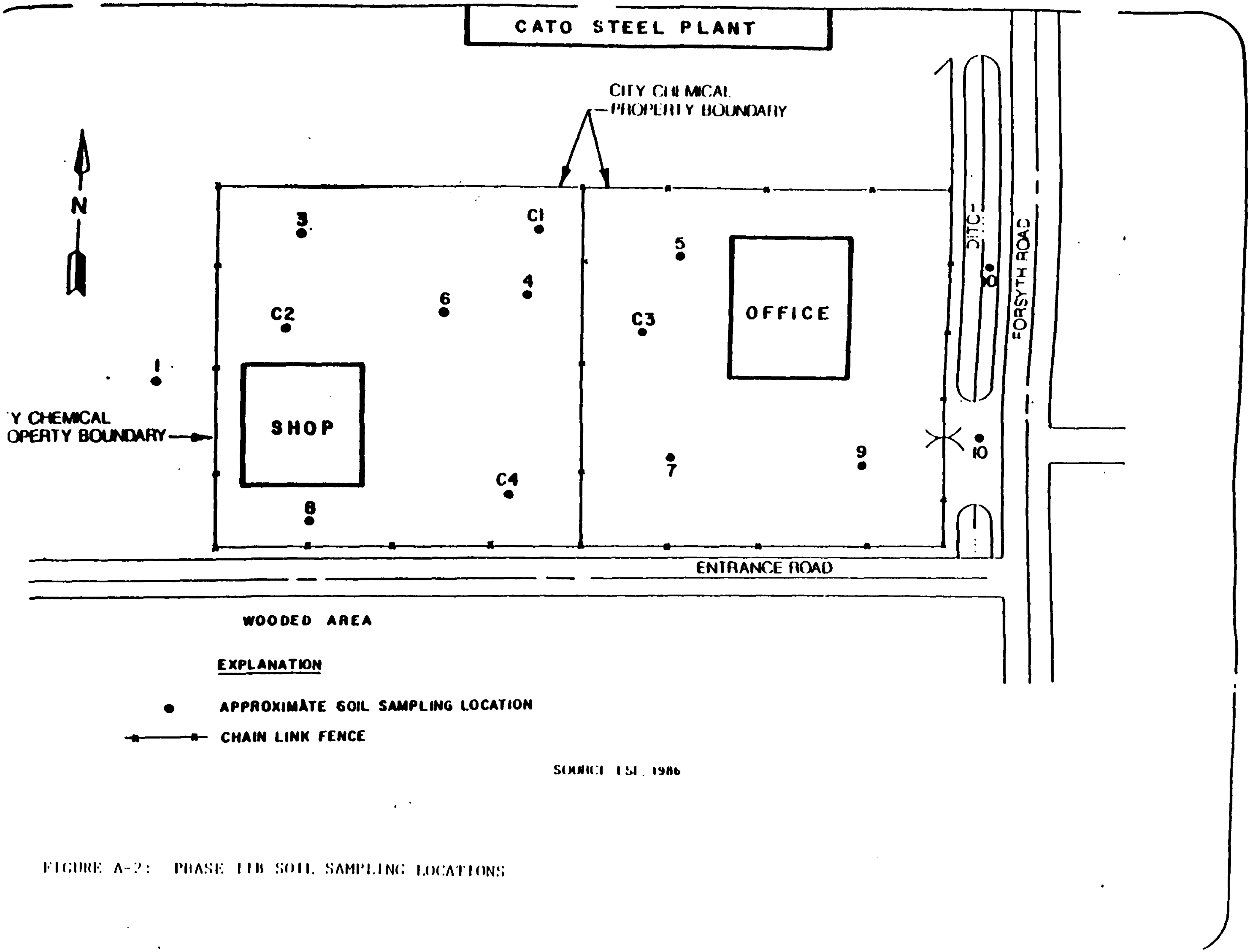
Summary of Phase II B Soil Sample Analyses

Constituent	Number of Detections	Number of Analyses	Range of Concentrations (ppm)	Location of Highest Concentration[2]
1,2 Dichlorobenzene	2	11	0.09-0.30	1S
T-1,2-Dichloroethene	1	11	5.00	1S
Di-N-Butyl Phthalate	7	11	0.30-2.00	10S
Di-N-Octyl Phthalate	2	11	0.07-0.30	7S
Ethyl Benzene	2	11	3.90-12.00	6S
Hydrocarbons, Petrol	8	11	0.061-9.73	6S
Methylene Chloride	1	11	0.21	4S
Naphthalene	1	11	11.80	6S
Tetrachloroethene	3	11	1.61-6.91	1S
Toluene	1	11	281.00	6S
Bis-2-ethylhexyl Phthalate	9	11	0.35-5.90	6S
1,1,1-Trichloroethane	3	11	1.45-18.70	3S
Trichloroethene	2	11	20.80-22.90	1S
Xylene	2	11	7.00-40.00	6S

Notes:

1. Data compiled from ESE Phase IIB Report.

2. Location of highest concentration is designated by the sampling point number and the depth range. "S" indicates the sample was taken from a depth of 0-5 feet.



SOURCE ESI, 1986

FIGURE A-2: PHASE IIB SOIL SAMPLING LOCATIONS

TABLE A-3

Summary of Data Augmentation Analysis Results for Ground-water Samples[1]

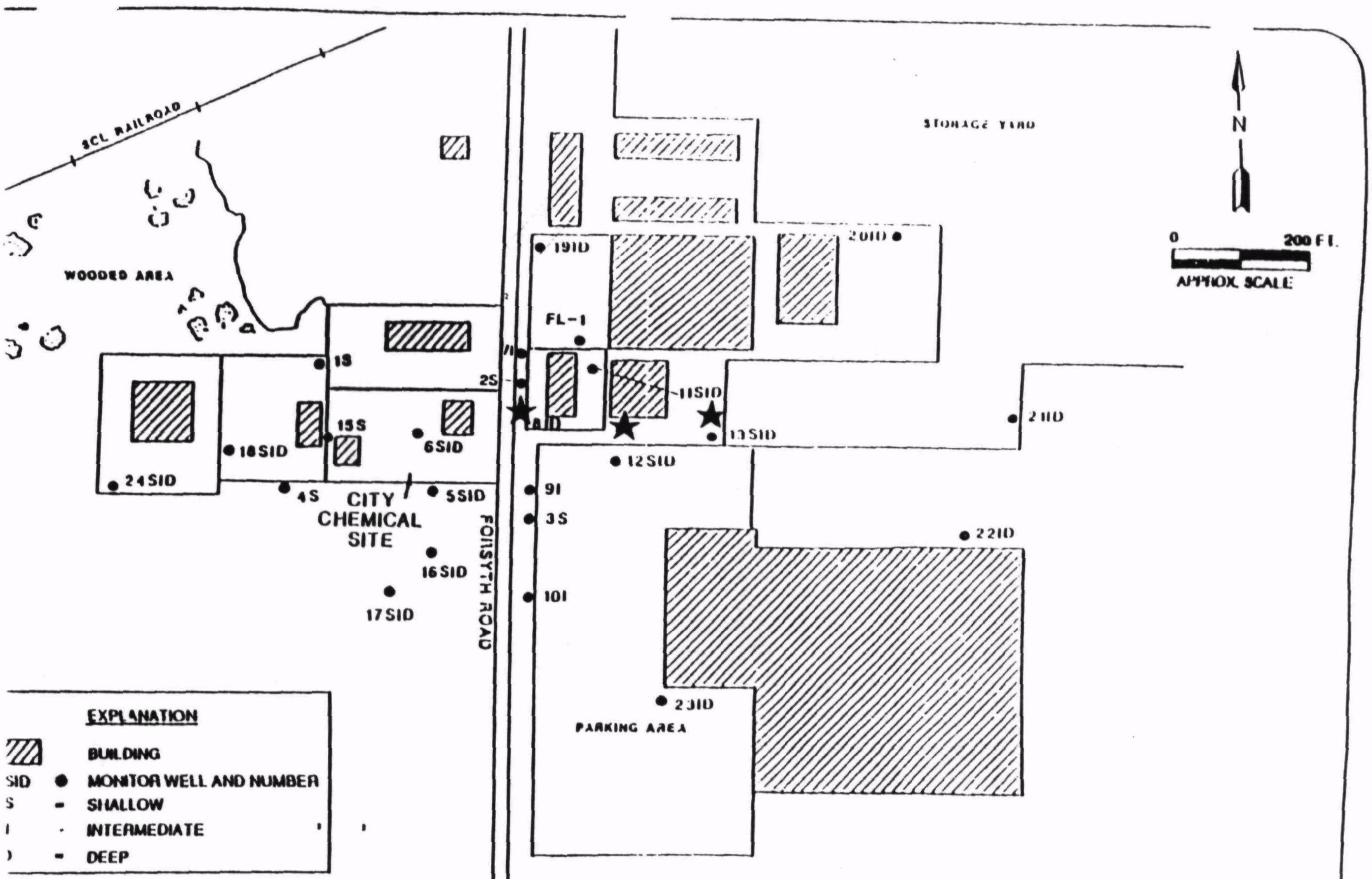
CONSTITUENT	CONCENTRATION (PPB) DETECTED IN SELECTED MONITOR WELLS[2]					
	MW-8I	MW-8D	MW-12I	MW-12D	MW-13I	MW-13D
I. Target Organic Compounds						
Acetone	143,000	9,600	146,000	BDL	108,300	BDL[3]
Benzene	BDL	BDL	BDL	BDL	BDL	100
2-Butanone (MEK)	20,000	4,800	BDL	BDL	9,300	BDL
Chloroform	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	500	BDL	BDL	BDL	BDL	160
1,2-Dichloroethane	BDL	BDL	BDL	BDL	BDL	30
1,1-Dichloroethene	1,900	4,700	6,000	240	1,100	2,700
Ethyl benzene	BDL	BDL	BDL	BDL	BDL	BDL
Methylene chloride	87,000	6,100	165,000	300	4,300	370
4-Methyl-2-pentanone (MIBK)	78,000	BDL	BDL	BDL	11,900	BDL
Phenol	68	5	43	BDL	6,008 6	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	9,000	900	6,000	40	130	170
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	27,000	3,800	15,000	BDL	1,700	100
Total Xylenes	BDL	BDL	500	BDL	BDL	20
II. Selected Metals						
Aluminum, Total	4,800	4,400	8,400	BDL	800	BDL
Aluminum, Dissolved	4,300	700	8,000	BDL	800	BDL
Barium, Total	BDL	BDL	100	BDL	BDL	BDL
Barium, Dissolved	BDL	BDL	100	BDL	BDL	BDL
Chromium, Total	BDL	BDL	BDL	20	10	BDL
Chromium, Dissolved	BDL	BDL	BDL	BDL	BDL	BDL
Iron, Total	2,600	1,200	3,200	200	1,600	160
Iron, Dissolved	2,400	1,200	3,100	120	1,500	160
Lead, Total	2	BDL	2	BDL	4	1
Lead, Dissolved	BDL	BDL	BDL	BDL	BDL	BDL
Manganese, Total	BDL	BDL	BDL	10	BDL	20
Manganese, Dissolved	BDL	BDL	BDL	10	BDL	20
Selenium, Total	BDL	BDL	BDL	BDL	BDL	BDL
Selenium, Dissolved	BDL	BDL	BDL	BDL	BDL	BDL
Silver, Total	BDL	BDL	BDL	BDL	BDL	BDL
Silver, Dissolved	BDL	BDL	BDL	BDL	BDL	BDL
Thallium, Total	5	1	4	7	4	2
Thallium, Dissolved	5	BDL	4	6	2	BDL

NOTES

(1) All data augmentation ground-water samples were analyzed for phenol and selected metals on March 16, 1988, and for target list compounds on March 18, 1988.

(2) The monitor wells sampled for data augmen--ion analysis were those situated nearest the centerline of the expected plum migration pa: Constituent concentrations detected in samples from this group of monitor wells, therefore, are believed to be representative of the worst case concentrations in the contaminant plume emanating from the City chemical site.

(3) The designation BDL indicates that the constituent concentration in the sample was below the detection limit associated with the laboratory analysis method used.



SOURCE:
GERAGHTY & MILLER ENGINEERS, INC.

URE A-3: LOCATION OF MONITORING WELLS SAMPLED FOR SITE DATA AUGMENTATION

TABLE A-4

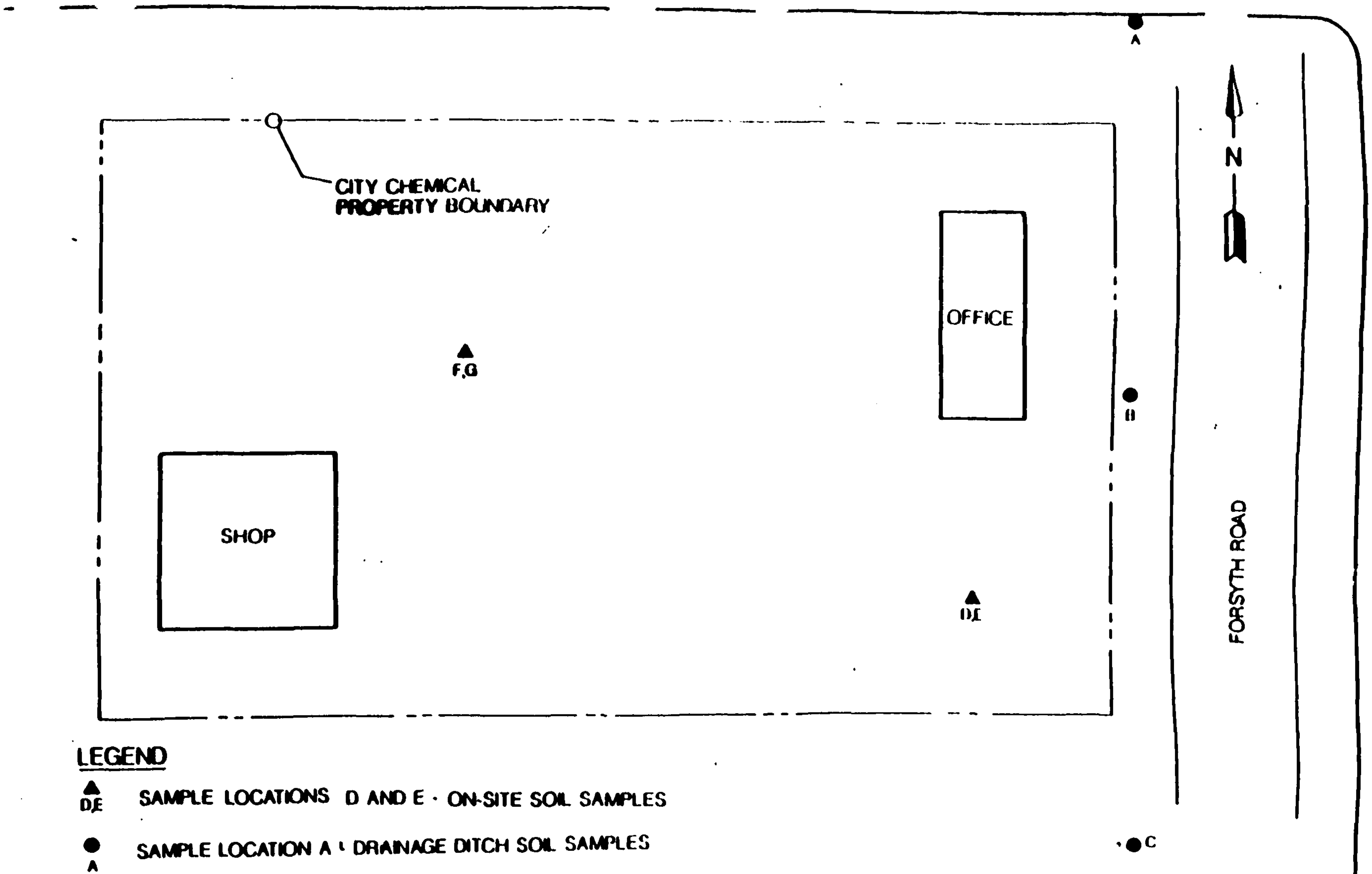
Summary of Data Augmentation Analysis Results for Drainage Ditch Soil Samples[1]

CONSTITUENT	DETECTION LIMIT (PPB)	CONCENTRATION (PPB) DETECTED IN DRAINAGE DITCH SAMPLES		
		SAMPLE A	SAMPLE B	SAMPLE C
I. Target Organic Compounds				
Acetone	10	BDL[2]	BDL	BDL
Benzene	1	BDL	BDL	BDL
2-Butanone (MEK)	100	BDL	BDL	BDL
Chloroform	5	BDL	BDL	BDL
1,1-Dichloroethane	5	BDL	BDL	BDL
1,2-Dichloroethane	3	BDL	BDL	BDL
1,1-Dichloroethene	5	BDL	BDL	BDL
Ethyl benzene	1	BDL	BDL	BDL
Methylene chloride	5	BDL	BDL	BDL
4-Methyl-2-pentanone (MIBK)	50	BDL	BDL	BDL
Phenol	5	BDL	BDL	BDL
Tetrachloroethene	3	BDL	BDL	BDL
Toluene	1	BDL	BDL	BDL
1,1,1-Trichloroethane	5	BDL	BDL	BDL
Trichloroethene	1	BDL	BDL	BDL
Total Xylenes	5	BDL	BDL	BDL

NOTES

(1) Drainage ditch samples were analyzed for phenol and target list compounds on March 15, 1988.

(2) The designation BDL indicates that the constituent concentration in the sample was below the detection limit associated with the laboratory analysis method used.



URE A-4: SITE DATA AUGMENTATION
SOIL SAMPLING LOCATIONS

SOURCE:
GMCE
G&M CONSULTING ENGINEERS INC.

TABLE A-5

Summary of Data Augmentation Analysis Results for On-Site Soil TCLP Composite Samples[1]

CONSTITUENT	DETECTION LIMIT (PPB)	CONCENTRATION (PPB) DETECTED IN TCLP COMPOSITE SAMPLES				
		SAMPLE D	SAMPLE E	SAMPLE F	SAMPLE G	SAMPLE G2
I. Target Organic Compounds						
Acetone	10	BDL[2]	BDL	BDL	BDL	--
Benzene	1	BDL	BDL	BDL	BDL	--
2-Butanone (MEK)	100	BDL	BDL	BDL	BDL	--
Chloroform	5	BDL	BDL	BDL	BDL	--
1,1-Dichloroethane	5	BDL	BDL	BDL	BDL	--
1,2-Dichloroethane	3	BDL	BDL	BDL	BDL	--
1,1-Dichloroethene	5	BDL	BDL	BDL	BDL	--
Ethyl benzene	1	BDL	BDL	BDL	BDL	--
Methylene chloride	5	BDL	BDL	BDL	BDL	--
4-Methyl-2-pentanone (MIBK)	50	BDL	BDL	BDL	BDL	--
Phenol	5	BDL	BDL	BDL	BDL	--
Tetrachloroethene	3	BDL	BDL	BDL	BDL	--
Toluene	1	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	5	BDL	BDL	BDL	BDL	--
Trichloroethene	1	BDL	BDL	BDL	BDL	--
Total Xylenes	5	BDL	BDL	BDL	BDL	--

NOTES

(1) TCLP composite samples were analyzed to determine the leachability of phenol and target list compounds on March 15, 1988.

(2) The designation BDL indicates that the constituent concentration in the sample was below the detection limit associated with the laboratory analysis method used.

(3) Sample G2 was a confirmation sample analyzed for total toluene only.

TABLE A-6

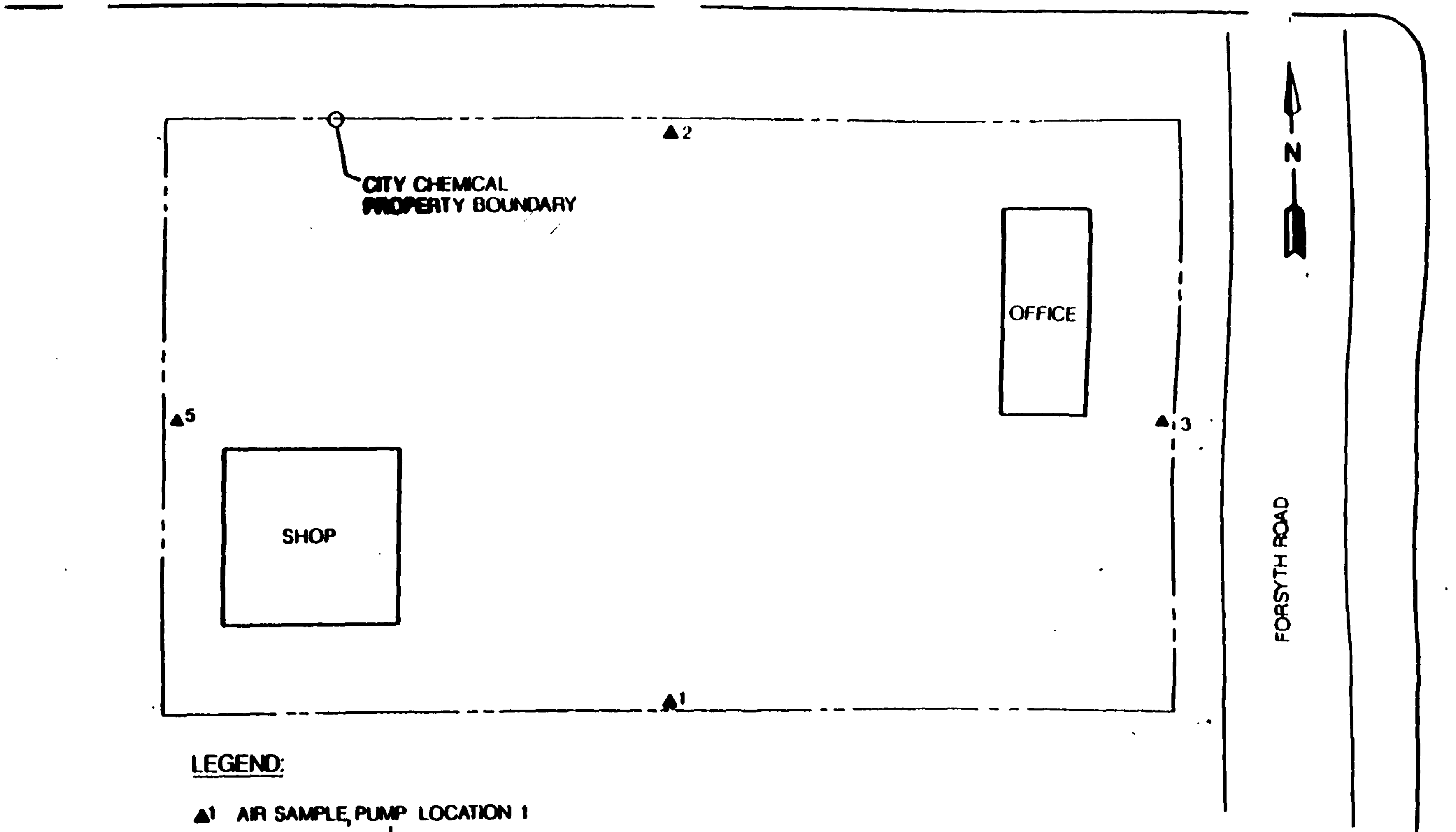
Summary of Data Augmentation Analysis Results for Ambient Air Samples[1]

CONSTITUENT	DETECTION LIMIT	CONCENTRATION (PPB) DETECTED IN AMBIENT AIR SAMPLES			
		SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 5
I. Target Organic Compounds					
Acetone	0.5	BDL[2]	BDL	BDL	BDL
Benzene	0.5	BDL	BDL	BDL	BDL
2-Butanone (MEK)	0.5	BDL	BDL	BDL	BDL
Chloroform	0.5	BDL	BDL	BDL	BDL
1,1-Dichloroethane	0.5	BDL	BDL	BDL	BDL
1,2-Dichloroethane	0.5	BDL	BDL	BDL	BDL
1,1-Dichloroethene	0.5	BDL	BDL	BDL	BDL
Ethyl benzene	0.5	BDL	BDL	BDL	BDL
Methylene chloride	0.5	BDL	BDL	BDL	BDL
4-Methyl-2-pentanone (MIBK)	0.5	BDL	BDL	BDL	BDL
Phenol	0.5	BDL	BDL	BDL	BDL
Tetrachloroethene	0.5	BDL	BDL	BDL	BDL
Toluene	0.5	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	0.5	BDL	BDL	BDL	BDL
Trichloroethene	0.5	BDL	BDL	BDL	BDL
Total Xylenes	0.5	BDL	BDL	BDL	BDL

NOTES

(1) Ambient air samples were analyzed for target list volatile compounds and phenol on March 15, 1988.

(2) The designation BDL indicates that the constituent concentration in the sample was below the detection limit associated with the laboratory analysis method used.



SOURCE:
GMCE
G&M CONSULTING ENG[redacted]S INC

FIGURE A-5: SITE DATA AUGMENTATION AIR SAMPLE COLLECTION LOCATIONS

APPENDIX B

Responsiveness Summary

RESPONSIVENESS SUMMARY
CITY INDUSTRIES SITE
WINTER PARK, FLORIDA
(WORK ASSIGNMENT C04024)

CONTRACT NO. 68-W9-0005
(RAI PROJECT NO. 8808110-3)

MARCH 26, 1990

PREPARED FOR:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV

PREPARED BY:

RESOURCE APPLICATIONS, INC.
ENGINEERS ■ SCIENTISTS ■ PLANNERS
1000 CAMBRIDGE SQUARE, SUITE D
ALPHARETTA, GA 30201
404/664-3618

CONTENTS

1.0 OVERVIEW

This Responsiveness Summary is a continuation of the community relations activities for the City Industries Superfund site (also known as the City Chemical site) east of Winter Park, Florida. During the Public Comment Period held from February 6, 1990 to March 8, 1990, the U.S. Environmental Protection Agency (US EPA) encouraged community input on the subject of various alternatives under consideration for site remediation. This report includes a summary of the major comments received by EPA, and documents the resultant responses. EPA responses which are quoted verbatim are enclosed in quotation marks.

Groundwater contamination is the principal threat remaining at the City Industries site; its remediation will be the final action for the site. The remedial alternative preferred by EPA involves pumping and treating the contaminated groundwater, then discharging the treated water to the City of Orlando's Iron Bridge publicly-owned treatment works (POTW) for further treatment. The major components of the preferred remedy include:

- Deed/regional well restrictions;
- Groundwater monitoring;
- Groundwater recovery via wells;
- Groundwater treatment by aeration;
- Discharge of treated effluent to the Iron Bridge POTW.

EPA has also selected a contingency alternative, which consists of the following remedial actions:

- Deed/regional well restrictions;
- Groundwater monitoring;
- Groundwater recovery via wells;
- Groundwater treatment by aeration, precipitation, filtration, and carbon adsorption;
- Surface water discharge of treated effluent.

The majority of opinions presented throughout the course of the public comment period were in support of the preferred remedy. Those who voiced objections stated that their concurrence with the selection of EPA's preferred alternative would be contingent upon resolution of technical issues.

Information regarding other aspects of the site cleanup are available at the City Industries site Information Repository, located at the following address:

Winter Park Public Library
Robert Melanson, Director
460 E. New England Ave.
Winter Park, FL 32789
(407) 647-1638

2.0 BACKGROUND OF COMMUNITY INVOLVEMENT AND COMMUNITY CONCERNS

2.1 Community Profile

Winter Park is located just north of Orlando in Orange County. The unincorporated township of Goldenrod is adjacent to the eastern city limits of Winter Park. While the population of Goldenrod can only be estimated, Winter Park is home for almost 4% of approximately 654,000 people in Orange County. Major employers in the area include Walt Disney World Amusement Park, banks, and schools.

Nearby natural features include the Crane Strand Wetland and several small lakes, such as Lake Osceola, Lake Corinne, and Lake Waunatta. Augmentation of some of the wetland area has provided additional room for the rapid growth of residential developments and commercial ventures. Fields and wooded areas comprise the balance of the undeveloped land.

The City Industries site is located in an industrial area, with many different businesses in close proximity. The closest residences are within 2000 feet of the site.

2.2 History of Community Involvement and Community Concerns

The City Industries site has come to be associated with the town of Winter Park due to its Winter Park mailing address. It is situated, however, outside the city limits in the unincorporated township of Goldenrod. Some Winter Park citizens feel they have been affected by the conditions at the site, but the majority of public interest comes from the Goldenrod community.

In 1983, the community of Goldenrod held meetings for the purpose of establishing emergency evacuation procedures. These meetings included representatives from the Florida Department of Environmental Regulations (FDER), Orange County, Seminole County, neighborhood watch and homeowners associations, apartment complexes, private citizens, and various media personnel. The threat at the time was considered to be from explosion or fire. In addition, a concern was voiced that City Industries trucks transporting drums on city streets could be involved in an accident, or drums could fall from the trucks and spill contaminants. On one occasion, evacuation procedures were initiated in the immediate area in response to an onsite spill; this was later determined to be unnecessary.

When onsite investigative activities began, protective suits worn by workers alarmed both the people in the immediate vicinity and those living on the further perimeter, but close enough to be affected should an emergency situation arise. Their concern was why they were permitted to remain so close to the facility if the suits were required.

Several people stated that their private wells were sampled during the City Industries investigation, but they never received information regarding the analytical results. None of these wells have been used for drinking water, but the concern was mentioned that children or pets playing in the water from lawn sprinklers, or possibly drinking some of the water, may have been at risk. A similar concern was that someone walking through freshly watered grass may have absorbed contaminants through the skin. The question was raised by one individual whether a number of deaths attributed to cancer might be related to possible contaminants in the water. It was suggested that a health survey be conducted to assess the possibility, and be used as a learning opportunity should a connection exist.

One businessman discovered that monitoring wells had been installed on his property without his permission and he has not been satisfied with attempts by FDER to rectify installation deficiencies (These wells were among the ones installed in early efforts to monitor the movement of contaminants in the groundwater).

The question of property value depreciation has been raised, predominantly by residential property owners. Some businesses expressed concern about the possibility of depreciation; however, property in the commercial zone remains in high demand and commercial land value appears to be unaffected by site conditions. The problem for the business sector is that property ownership may not be transferable until the property is declared clear of contamination.

Virtually everyone contacted expressed extreme dissatisfaction with the nominal sentence received by Arthur Greer, the owner/operator of City Industries, Inc.

Recently, the issue of the site seems to surface only when reference is made to pollution or contamination in general. The Environmental Health Division of Orange County Health Department reported that no recent comments or concerns had been received. Most people feel the critical issue now is to expedite the implementation of the final remedial efforts.

2.3 Summary of Key Issues and Community Concerns

The primary concern in the area is that the necessary remedial actions at the site be completed as soon as possible. The community also wants to be kept informed of the site status and any potential threat resulting from site conditions. For those who do not feel their health may be threatened, the main concern is property devaluation. The leniency of punishment sustained by Mr. Greer is a source of dissatisfaction to many of the citizens interviewed.

3.0 SUMMARY OF MAJOR PUBLIC COMMENTS AND AGENCY RESPONSES

3.1 Remedial Alternative Preferences

3.1.1 The Potentially Responsible Party (PRP) Steering Committee is in agreement with EPA that the preferred alternative presents the best solution to the City Industries site contamination.

3.1.2 Mr. Tom Lothrop, director of environmental services for the City of Orlando, stated that the city and the Iron Bridge POTW were strongly opposed to EPA's preferred alternative at this time. Mr. Lothrop's position was based on several issues, which are addressed individually in the following sections. Mr. Lothrop believes that, at present, the City of Orlando would consider EPA's contingency alternative (involving surface water discharge) to be the most viable method of site remediation. The City of Winter Park, represented by Mr. Dan Mercer, supports this position.

3.1.3 Several private citizens voiced a strong desire that the preferred alternative be implemented immediately. One resident, however, stated that the people of Goldenrod would be satisfied with EPA's preferred alternative, but would not accept the discharge of City Industries effluent to surface waters.

3.1.4 On behalf of Orange County, Deputy Fire Chief Edwin Spahn expressed support of EPA's actions and indicated the county's willingness to cooperate in the remediation of the site.

3.2 Health Issues

3.2.1 Mr. Alex Alexander of the Florida Department of Environmental Regulations questioned possible effects of the site effluent on drinking water sources.

EPA Response: There are no such risks at the present time. The contamination is located in the surficial aquifer, which is not used as a source of drinking water. The underlying Floridan Aquifer is a source of drinking water; if cross-contamination occurred, however, the regional flow of the lower aquifer would transport any contaminants from the City Industries site away from the nearby Winter Park wellfield. The municipal water supply wells are being monitored as a precaution.

3.2.2 Several private citizens expressed concern about what impact the site contamination would have on residents who have had contact with groundwater.

EPA Response: The EPA Remedial Project Manager determined the location of the residences in question, then assured these citizens that the contaminant plume does not currently encompass that area, and is moving away from their vicinity.

3.2.3 A local resident requested information regarding the long-term and short-term physical effects of the contaminants on both humans and animals.

EPA Response: "The organic chemicals in the groundwater, when present in high enough concentrations, can cause various acute (short-term) effects depending on the chemical. Some of these are drowsiness, dizziness, headaches, and nausea. Chronic (long-term) effects are chemical-dependent as well and include damage to liver, kidneys, heart, lungs, and nervous system, reproductive disorders, and cancer. However, based on a map of the extent of the contaminant plume, groundwater in the vicinity of your home is not currently affected by the City Chemical site."

3.2.4 An interested party inquired whether water discharged to the county-maintained drainage canal would present a potential risk to birds or children should the contingency alternative be chosen. This party also asked the eventual destination of the water.

EPA Response: Ambient water quality standards must be met before treated water can be discharged to surface waters. This precludes continuance of site-related health risks. The discharged water will eventually reenter the surficial aquifer, again posing no site-related risks.

3.2.5 A citizen voiced the concern that a volatile vapor phase may emanate from the surficial aquifer.

EPA Response: A risk would exist only in a low-level, enclosed, unventilated area.

3.3 Technical Questions Regarding Remedial Alternatives

3.3.1 A public meeting participant inquired what the projected pumping rate of the extraction wells would be.

EPA Response: The rate would be 100 gallons per minute, or 144,000 gallons per day.

3.3.2 A resident of Goldenrod queried whether the aeration tower would emit odors, and requested the names of local representatives who could be contacted with complaints regarding emitted odor.

EPA Response: Some odor may be inherent in aeration treatment due to some of the compounds which are present. Two factors would preclude noxious odor: 1) controlled concentrations would be released from the tower, and 2) the release height would be twenty to forty feet above the breathing zone. Ms. Diane Scott, EPA Remedial Project Manager, named herself as a Region IV contact, and Mr. Don Harris and Mr. Jim Jarmolowski of FDER-Orlando were named as local contacts.

3.3.3 Several residents requested the time frame until remedial action begins.

EPA Response: The implementation of the remedy will begin in approximately two years.

3.3.4 Another concern voiced was whether EPA had been given the right of eminent domain for access to land where extraction wells may be placed.

EPA Response: EPA does not have that right. EPA attempts to persuade reluctant landowners by explaining the need for access, and a court order would be necessary if education of the landowner was not sufficiently persuasive.

3.3.5 A local businessman asked if the contamination would go away by itself if left alone.

EPA Response: No.

3.3.6 A citizen inquired whether air stripping treatment would merely be removing contaminants from the groundwater and placing them in the atmosphere.

EPA Response: The years-long span of the treatment would minimize the concentration entering the atmosphere at any one point in time, and pollution control equipment will be utilized if monitoring at the top of the tower reveals the need. In addition, sunlight itself can reduce the hazard of contaminants.

3.3.7 A public meeting participant asked if the Floridan aquifer was being monitored.

EPA Response: Yes. No contaminants have been detected in that aquifer at this time.

3.3.8 The City of Orlando's technical objection to EPA's preferred alternative concerns pretreatment of the site groundwater. Orlando officials state that before Iron Bridge POTW will consider accepting City Industries effluent, an agreement must be reached with the PRPs in reference to pretreatment requirements.

EPA Response: "The POTW personnel have been invited to participate in Remedial Design/Remedial Action (RD/RA) negotiations with EPA and the PRPs as well as technical review of RD/RA documents to ensure that their legal and technical concerns are addressed."

3.3.9 The PRP Steering Committee believes administrative obstacles to implementation of the preferred alternative (i.e., discharge of effluent to the Iron Bridge POTW) should be resolved prior to finalization of the Record of Decision. In addition, the Steering Committee requested that all its previous correspondence and other submittals be incorporated into the City Industries site Administrative Record.

EPA Response: "Delaying issuance of the Record of Decision until negotiations with the Iron Bridge POTW are complete would cause an unnecessary delay in remediation of the site. All previous submittals by the Steering Committee have been included in the Administrative Record."

3.3.10 Officials at the South Seminole and North Orange County Wastewater Transmission Authority are concerned that chemicals present in the groundwater from the City Industries site might cause deterioration of the Wastewater Transmission Authority's pump station and force main system.

EPA Response: "The chemicals are present in high enough concentrations to have an effect on human health, but not on pipes or pumps."

3.3.11 Mr. Dan Mercer, representing the City of Winter Park, expressed an interest in ensuring that safety and quality contingencies are build into the design of the remedy selected for the site.

EPA Response: That is a part of the ensuing Remedial Design/Remedial Action process.

3.3.12 A resident questioned whether EPA had reviewed an alternative which considered the contingency of storage for substandard effluent.

EPA Response: That contingency has been considered, and provisions will be made during the remedial design phase.

3.3.13 Mr. Byron Brooks of the Orange County Administrator's Office raised several concerns regarding EPA's contingency alternative, which involves discharge to a county-maintained drainage canal. Mr. Brooks requested information regarding the estimated rate, volume, and duration of the discharge from the site to the Crane Strand Canal, and the effect on the water surface profile and hydro-period in the area. He also advised EPA that the connection to the Crane Strand Canal would require a Right-of-Way Utilization Permit. Finally, Mr. Brooks requested that an on-site pilot project be incorporated into the deliberation and testing process if the contingency alternative is the remedy selected.

EPA Response: "The rate of discharge to the Crane Strand Canal is 100 gpm or 0.2 ft^3/sec. The total volume of water to be discharged based on pumping and treating for 14 years at the above rate is 736 million gallons. This discharge is not anticipated to have a significant effect on the water surface profile when the canal is at flood stage. The proposed discharge should not affect the hydro-period of the conservation area east of Goldenrod Road.

"EPA will coordinate the Right-of-Way Utilization Permit with Orange County in the event that the treated water from the City Chemical site is discharged to the Crane Strand Canal.

"Pilot testing of Alternative 3 [the contingency alternative] would be conducted prior to implementation if this alternative becomes necessary."

3.4 Public Participation Process Comments

3.4.1 City of Orlando officials were unsatisfied with the level of involvement offered to the City during the development of the Feasibility Study. They believe that the City of Orlando should be more involved in the planning and design of the preferred alternative if Iron Bridge is to accept the City Industries effluent.

EPA Response: "EPA has met with the City to discuss the deficiencies in the Feasibility Study and will make sure that these issues are addressed during remedial design."

3.5 Costs Funding Issues

3.5.1 Mr. Tom Lothrop questioned the high estimated cost of the Feasibility Study's Alternative #5, which includes groundwater extraction, treatment by aeration, precipitation, filtration and carbon adsorption, and reinjection into the surficial aquifer.

EPA Response: The high estimate is due to two factors: 1) the carbon adsorption process, as the primary treatment for this alternative, would require frequent carbon regeneration, and 2) reinjection of the treated water would necessitate more stringent control of the effluent quality.

3.5.2 An attorney for a local bank was interested in whether the bank would be responsible for the expense should they request the installation of a monitoring well on their property.

EPA Response: No.

3.6 Enforcement Concerns

3.6.1 Mr. Alex Alexander asked who the responsible parties were.

EPA Response: There are approximately 180 generators named as Potentially Responsible Parties (PRPs).

3.6.2 A citizen inquired whether other businesses in the area may have contributed to the contaminant plume.

EPA Response: Through sampling of the monitoring wells, it has been determined that City Industries was the sole source of this plume.

3.6.3 One individual was interested in determining who will be responsible for facility operation once the remedial design has been implemented.

EPA Response: The PRPs will ultimately be responsible, but will probably hire a contractor to handle the remedial operation.

3.6.4 Officials at the South Seminole and North Orange County Wastewater Transmission Authority stated that if the City Chemical site facility malfunctions, it would seem appropriate that penalties should be levied directly against the operators of the City Chemical facility and not the owners of the treatment plant nor the collection system.

EPA Response: "While the POTW is responsible for any violations of their NPDES permit, there are mechanisms available to the POTW, such as the possibility of an agreement with the PRPs to obtain reimbursement for penalties incurred."

3.6.5 The question of liability has prompted the City of Orlando to require assurances that the POTW will not be held liable for problems resulting from accepting the City Industries water.

EPA Response: "EPA understands the City's concerns about liability as it relates to accepting the City Chemical discharge. The POTW personnel have been invited to participate in Remedial Design/Remedial Action (RD/RA) negotiations with EPA and the PRPs as well as technical review of RD/RA documents to ensure that their legal and technical concerns are addressed. EPA has also proposed automatic shutdown of the intercept system in the event that high effluent concentrations are detected, in order to prevent NPDES permit infractions by the POTW."

3.6.6 A local businessman was curious to learn what controls are imposed on EPA.

EPA Response: The judicial system watches EPA's activities through the consent decrees issued to the agency.

3.7 Decision Process Questions

3.7.1 A resident asked what criteria were used in the selection of the remedial alternatives.

EPA Response: The EPA Remedial Project Manager outlined the nine standard selection criteria utilized by EPA.

4.0 REMAINING PUBLIC CONCERNS

The only remaining issue which EPA was unable to resolve concerns the question of potential property value depreciation.

ATTACHMENT A - Community Relations Activities Conducted to Date

November 1989

- EPA representatives conducted personal interviews with local officials and interested citizens in the City Industries area;
- An interested-parties mailing list was compiled;
- The development of a site-specific Community Relations Plan was initiated.

January 1990

- The Community Relations Plan was finalized;
- EPA mailed fact sheets to everyone on the mailing list;
- EPA announced the upcoming Public Meeting with a printed notice in the Orlando Sentinel.

February 1990

- An Information Repository was established at the Winter Park Public Library (see Section 1.0 for location). Relevant site-related documents were placed in the repository to facilitate community access;
- EPA held a public meeting February 6 at the Elks Lodge in Winter Park to present the Remedial Investigation/Feasibility Study and the Proposed Plan to the community. The meeting was attended by approximately 60 people, including local officials, private citizens, members of the PRP Steering Committee, and other interested parties. A transcript of the meeting is available at the information repository;
- The Public Comment Period began February 6;
- The mailing list was updated and expanded.

March 1990

- The public comment period closed March 8. Due to continued input, however, EPA accepted correspondence after the closing date;
- This Responsiveness Summary documented the major comments and responses presented during the public comment period.