United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-92/197
June 1992

EPA

Superfund Record of Decision:

Reilly Tar & Chemical (Indianapolis Plant), IN

NOTICE

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

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-92/197	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Reilly Tar & Chemical (Indianapolis Plant), IN First Remedial Action - Interim			5. Report Date 06/30/92 6.
7. Author(s)			8. Performing Organization Rept. No.
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12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

PB93-964115

16. Abstract (Limit: 200 words)

The 120-acre Reilly Tar & Chemical (Indianapolis Plant) site is a former coal tar refinery and creosote wood treatment plant located in Indianapolis, Indiana. The site is divided into the 40-acre Oak Park property and the 80-acre Maywood property. The Oak Park property contains the majority of the operating facilities, including above-ground storage tanks, distillation towers, and above-ground and underground utilities. The Maywood property contains operating facilities on its northern end. This property was formerly the site of chemical process and wood preserving activities and currently contains four waste disposal areas. The area surrounding the site is mixed residential, industrial, and commercial. The site lies within the White River drainage basin. From 1921 until 1972, coal tar refinery and creosote wood treatment plants operated onsite. Beginning in 1941, several chemical plants were constructed and operated on the Oak Park property. Environmental problems at the site were found to be related to the improper use and disposal of creosoting process wastes and substances used in manufacturing chemicals. In 1955, alpha picoline, a chemical manufactured onsite, was identified in nearby residential wells, and in 1964, three contaminants from the site were detected in offsite ground water samples and onsite

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Reilly Tar & Chemical (Indianpolis Plant), IN
First Remedial Action - Interim
Contaminated Medium: gw
Key Contaminants: VOCs (benzene, toluene, xylenes), other organics (PAHs), metals (arsenic, chromium, lead), other inorganics (ammonia)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 78
	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)

surface water samples. In 1975, state investigations identified several onsite problems believed to be contributing to ground water contamination with organic chemicals. In 1980, state investigations revealed various organic chemicals in soil and subsequently in 1987, 60,000 gallons of waste fuel were accidentally spilled on the Oak Park property. The spilled fuel oil was recovered, and some of the contaminated soil was excavated. This ROD provides an interim remedy for OU1 and addresses offsite migration of contaminated ground water. Several additional operable units are planned to address contamination of onsite source and onsite and offsite ground water impacted by the site. The primary contaminants of concern affecting the ground water are VOCs, including benzene, toluene, and xylenes; other organics, including PAHs; metals, including arsenic, chromium, and lead; and other inorganics, including ammonia.

The selected remedial action for this site includes two alternatives for the treatment of ground water: a final selection of options and specific design parameters will be determined during the remedial design. The first alternative includes extraction of ground water down-gradient of the site and biological treatment, followed by filtration and activated carbon adsorption; and discharge of 0.5 mgd to POTW with the remainder reinjected to the aquifer. The second option includes a combination of ground water extraction from up-gradient wells treated with precipitation/clarification, followed by activated carbon and reinjection to the aquifer; and ground water to the aquifer. The second option includes a combination of ground water extraction from up-gradient wells treated with precipitation/clarification, followed by activated carbon and reinjection to the aquifer; and ground water extraction from interior of the site treated with precipitation/clarification, followed by air stripping and discharge to the POTW. Monitoring ground water and implementing engineering controls will be conducted. Treatability tests are planned to determine the optimum design and operating requirements. The estimated present worth cost for this remedial action is $15,000,000, which includes an annual O&M cost of $1,000,000 for 30 years.

<u>PERFORMANCE STANDARDS OR GOALS</u>: Interim ground water clean-up levels are based on the more stringent of a 10^{-6} cumulative lifetime cancer risk, or MCLs for carcinogens; and MCLGs, MCLs, or a HI of 1 for noncarcinogens. Chemical-specific ground water goals include benzene 5 ug/l (MCL), toluene 1,000 ug/l (MCL), xylenes 10,000 ug/l (MCL), pyridine and pyridine derivatives 35 ug/l (HI), arsenic 50 ug/l (MCL), chromium (MCL), lead 5 ug/l (MCL), and ammonia 30 ug/l (MCL). Treated ground water discharged to the POTW must meet separate clean-up criteria under CWA.

Declaration for the Record of Decision
Reilly Tar and Chemical
Groundwater Operable Unit

Site Name and Location

Reilly Tar and Chemical
Indianapolis, Indiana

Statement of Basis and Purpose

This decision document presents the selected remedial action for the ground water operable unit at the Reilly Tar and Chemical site (the Site) in Indianapolis, Indiana. This remedial action was selected in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. The selection of this remedy is based on the Administrative Record for the Site.

The State of Indiana concurs with 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 human health, welfare, or the environment.

Description of the Selected Remedy

This operable unit action is the first of several planned for the Site. It specifically outlines an interim action to control the off-site migration of contaminated ground water, which has been determined by the Remedial Investigation to pose unacceptable risks to off-site receptors.

The major components of the selected remedy include:

- Ground-water extraction, treatment and discharge;

- Treatment of ground water to achieve the cleanup standards listed in the ROD using one or more of the following processes: biological treatment, filtration through granular activated carbon, filtration via precipitation/clarification, and/or air stripping. The actual optimum treatment train will be determined during remedial design.

- Discharge of a portion of the treated ground water to the Publicly Owned Treatment Works (POTW).

- Recharge of a portion of the treated ground water to the aquifer after treatment to achieve cleanup standards.

- Ground-water monitoring to ensure that the containment goals of this action are met and that this action prevents the off-site migration of contaminated ground water.

Declaration

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

6/30/92
Date

David A. Ullrich
for Valdas V. Adamkus
Regional Administrator

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CC: BECK
RA RF
Novak

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We make Indiana a cleaner, healthier place to live

Evan Bayh
Governor
Kathy Prosser
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June 25, 1992

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ASSOCIATE DIVISION DIRECTOR

Mr. Valdas Adamkus
Regional Administrator
U.S. Environmental Protection Agency
77 West Jackson Blvd.
Chicago, Illinois 60604

Dear Mr. Adamkus:

Re: Record of Decision
Ground Water Operable Unit
Reilly Tar and Chemical
Superfund Site
Indianapolis, Indiana

The Indiana Department of Environmental Management (IDEM) has reviewed the U.S. Environmental Protection Agency's Record of Decision (ROD). The IDEM is in full concurrence with the major components of the selected operable unit remedy, which include:

- Ground water extraction, treatment and discharge;
- Treatment of ground water to achieve the cleanup standards listed in the ROD, using one or more of the described processes to be optimized during remedial design;
- Discharge of a portion of the treated ground water to the Publicly Owned Treatment Works (POTW);
- Recharge of a portion of the treated ground water to the aquifer after treatment to achieve cleanup standards; and
- Ground water monitoring to ensure that the containment goals of this action are met and that this action prevents the off-site migration of contaminated ground water.

We also agree that this action attains Federal and State requirements that are applicable or relevant and appropriate to this remedy. Because this action does not constitute the final remedy for the site, the statutory mandate for permanence and treatment to the maximum extent practicable will only be met partially by the containment and treatment goals of the remedy. However, future operable units will fully address the threats posed by conditions at this site.

IDEM staff have been working closely with Region V staff in the selection of an appropriate interim operable unit for the Reilly Tar and Chemical site and are satisfied that the selected alternative adequately addresses the immediate threat of off-site migration of contaminated ground water.

Please be assured that IDEM is committed to accomplish cleanup of all Indiana sites on the NPL and intends to fulfill all obligations required by law to achieve that goal.

Sincerely,

Kathy Prosser

Kathy Prosser
Commissioner

cc: Krista Eskilson, IDEM
Dion Novak, U.S. EPA, Region V

Decision Summary - Ground Water Operable Unit
Reilly Tar and Chemical
Indianapolis, Indiana

Site Name, Location and Description

Reilly Tar and Chemical
Indianapolis, Indiana

The Reilly Tar and Chemical site (the Site) is located at 1500 South Tibbs Avenue in the southwest quadrant of Indianapolis. Minnesota Street divides the 120 acre site into two parcels. The Oak Park property, occupying approximately 40 acres, the major operating facility for Reilly Tar, is located north of Minnesota Street. The Maywood property occupies approximately 80 acres, and is located south of Minnesota Street (see Figures 1 and 2). The Oak Park property contains the majority of Reilly's operating facilities, including above-ground storage tanks, distillation towers, and above- and below-ground utilities. The Maywood property contains operating facilities on its northern end. This property was formerly the site of chemical process and wood preserving activities and currently contains four waste disposal areas. The majority of the operating facility buildings are located north of Minnesota Street; approximately 75% of the Oak Park property is covered by buildings, pavement and above-ground tank farms. Approximately 20% of the Maywood property is covered by buildings, pavement and above-ground storage tanks. The remainder is primarily unpaved and vegetated.

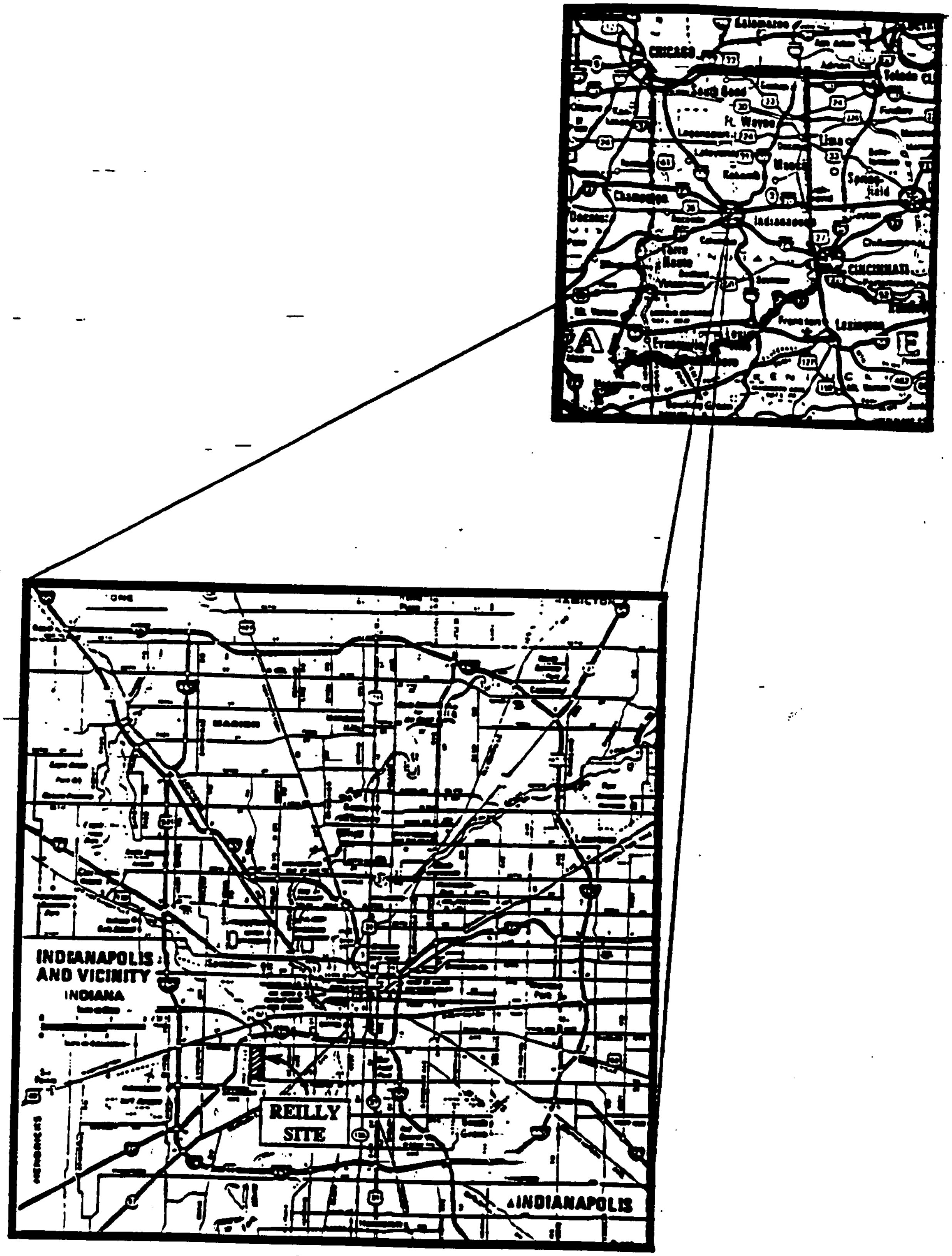
The Reilly Tar site is surrounded by a mix of residential, industrial and commercial properties. Residential neighborhoods are located immediately adjacent to the eastern boundary (on the east side of Tibbs Avenue) of the Oak Park property. Two residences are also located abutting the northern property boundary near the Lime Pond in the northwest corner of the site. Commercial and industrial uses are located south and west of the site.

Site History and Enforcement Activities

Industrial development of the Reilly site began in 1921 when the Republic Creosoting Company (which later became Reilly Tar & Chemical, which in turn became Reilly Industries, Inc.) started a coal tar refinery and a creosote wood treatment operation on the Maywood property. On-site plants operated from 1921 until 1972. Beginning in 1941, several chemical plants were constructed and operated on the Oak Park property. Environmental problems at the site are related to the use and disposal of creosoting process wastes and substances used in manufacturing chemicals.

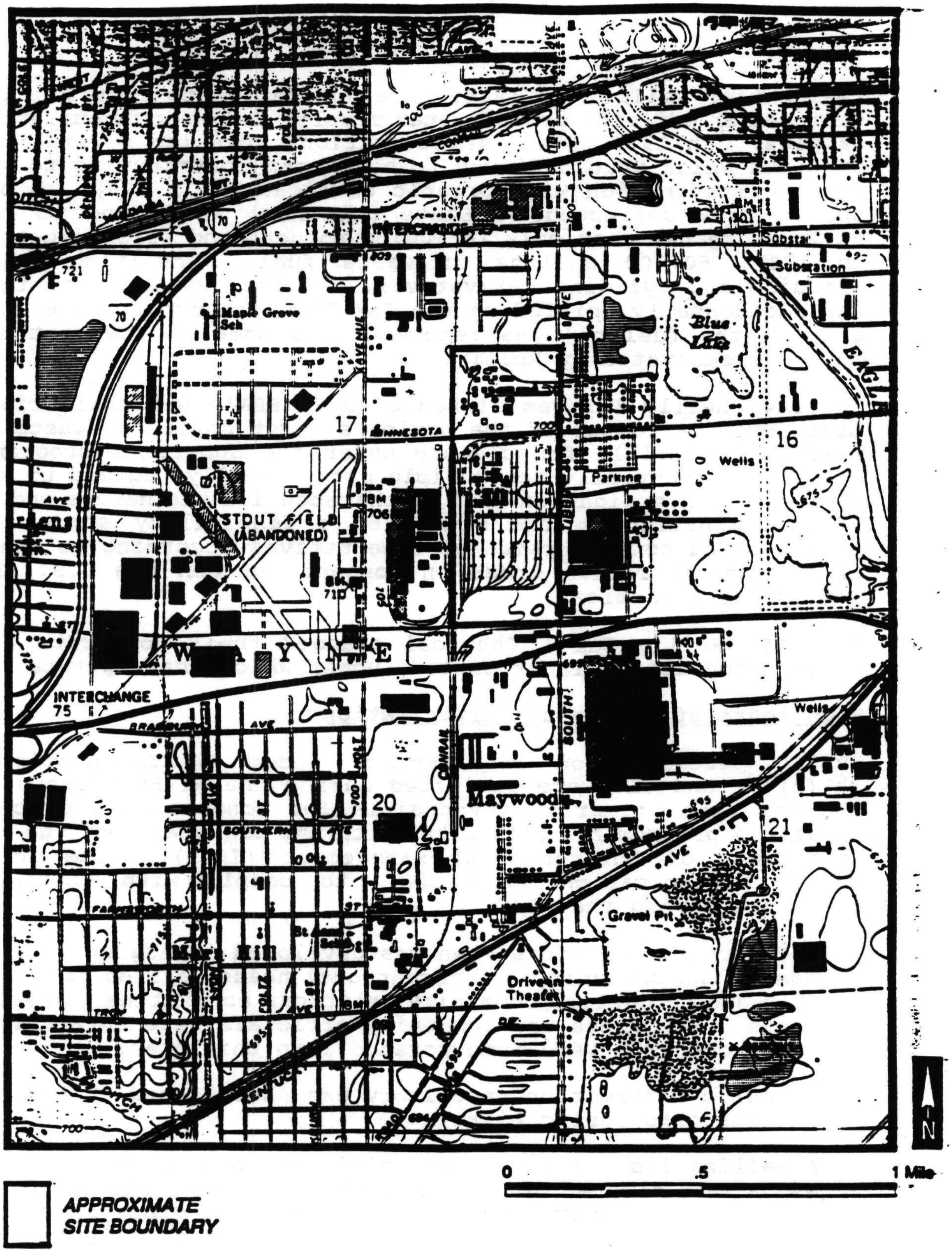
The earliest recorded complaint about odors and disposal practices at the site was in 1955, which referenced the fact that a chemical manufactured at Reilly (alpha picoline) had been found in nearby

FIGURE 1



POOR QUALITY ORIGINAL

FIGURE 2



POOR QUALITY ORIGINAL

residential wells. In 1964, three contaminants from Reilly were detected in off-site ground-water samples and on-site surface-water samples. In 1975, State investigations revealed several on-site problems which were believed to have been contributing to ground-water contamination with organic chemicals. In 1980, an on-site soil sample collected by State personnel was found to contain various organic chemicals including toluene and trichloroethylene. In 1987, 60,000 gallons of waste fuel, containing primarily pyridine and pyridine derivatives, benzene, xylene, and toluene, was accidentally spilled on the Oak Park property. Some, but not all, of the fuel oil was recovered and some of the contaminated soil was excavated by Reilly.

In 1984, Reilly Tar was listed on U.S. EPA's National Priorities List (NPL), a roster of the nation's worst hazardous waste sites, making it eligible for cleanup under the Superfund program. In 1987, the potentially responsible party (Reilly) agreed to conduct a remedial investigation (RI) to characterize the nature and extent of contamination at the site, and a feasibility study (FS) to evaluate and compare remedial alternatives according to the terms of an Administrative Order on Consent between the U.S. EPA and Reilly Tar & Chemical.

In 1989, Reilly Tar & Chemical changed their corporate name to Reilly Industries, Incorporated, under which they operate today.

Highlights of Community Participation

Public participation requirements under CERCLA Sections 113 (k)(2)(B) and 117 were satisfied during the RI/FS process. U.S. EPA has been primarily responsible for conducting the community relations program for this Site, with the assistance of the Indiana Department of Environmental Management (IDEM). The following public participation activities, to comply with CERCLA, were conducted during the RI/FS.

- A Community Relations Plan was developed in August 1987 to assess the community's informational needs related to the Reilly site and to outline community relations activities to meet these needs. Residents and community officials were interviewed and their concerns were incorporated into this plan.

- A public information repository was established at the Indianapolis Public Library

- A mailing list of interested citizens, organizations, news media, and elected officials in local, county, State and Federal government was developed. Fact Sheets and other information regarding site activities were mailed periodically to all persons or entities on this mailing list. This mailing list was also updated from time to time as persons approached EPA for information about the site.

- A Fact Sheet was mailed to the public in August 1987, that announced a public meeting to discuss the upcoming Remedial Investigation and answer site related questions from the public.

- A public meeting on September 2, 1987, at the Indianapolis City-County Building announced the initiation of the Remedial Investigation and provided details about its conduct.

- A Fact Sheet was mailed to the public in Winter 1988, that announced the beginning of Phase 1 RI sampling and the release of the EPA approved Phase 1 RI workplan.

- A Fact Sheet was mailed to the public in Fall 1988, that summarized the findings of the Phase 1 investigation and provided a preview of proposed Phase 2 sampling activities.

- A Fact Sheet was mailed to the public in January 1990, that announced the findings of the Phase 2 investigation and provided a preview of proposed Phase 3 sampling activities.

- Two availability sessions were held on September 6, 1990, at the Stout Field School to discuss site progress and discuss results of completed sampling activities.

- A Fact Sheet was mailed to the public in August 1991, that summarized results of the completed Remedial Investigation. The EPA approved Remedial Investigation Report was also released at this time.

- A Fact Sheet was mailed to the public in January 1992, that summarized EPA's recommended remedial alternative in a proposed plan for the ground-water operable unit. The EPA approved Focused Feasibility Study was also released at that time. This fact sheet also announced a public comment period for the proposed remedial action and was accompanied by paid newspaper advertisements in the Indianapolis Star and the Indianapolis News.

- A Public Meeting was held on January 23, 1992, at the South Wayne Junior High School to present EPA's proposed plan for the ground-water operable unit and to receive formal public comment.

- Paid newspaper advertisements announced the RI public meeting, the availability sessions, and the FS and proposed plan public meetings.

- Periodic news releases announced results of studies at the site.

- A public comment period of thirty days was originally planned, running from January 16, 1992, to February 14, 1992. Based on a written request during the original comment period, the comment period was extended until March 31, 1992, for a total comment period of 76 days. The extension was announced by letter to the requestor and in a newspaper advertisement in the Indianapolis Star.

A Responsiveness Summary addressing comments and questions received during the public comment period on the RI/FS and the proposed plan is included with this Record of Decision as Appendix A.

This Record of Decision presents the selected remedial action for the ground-water operable unit at the Reilly Tar and Chemical site in Indianapolis, Indiana, chosen in accordance with CERCLA, as amended by SARA, and the National Contingency Plan. The decision for this operable unit at the site is based on the Administrative Record.

Scope and Role of the Operable Unit

As with many Superfund sites, the problems at the Site are complex. The Remedial Investigation (RI) investigated five distinct on-site source areas and ground water. The RI determined that ground water had been contaminated by the site and is migrating away from the site at levels that were determined by the site Risk Assessment to pose unacceptable threats to human health. The RI also determined that there was not a good correlation between these five distinct source areas and ground water contamination. As a result, this operable unit action was selected by EPA to stop further off-site migration of contaminated ground water, thus giving adequate time to study and remediate on-site source areas as well as to prevent the further contribution of site related contamination to area ground-water resources.

This operable unit action is the first of several operable unit remedial actions to be taken at the Site. Subsequent actions will be taken to remediate on-site source areas, primarily cleanup of source area soils, and potentially off-site ground-water resources already impacted by the site, so that the source(s) of ground-water contamination can be eliminated or contained. Additionally, the Remedial Investigation identified an area on the Oak Park property that appears to be a source of ground-water contamination, primarily because the highest levels of contamination were found there. Additional characterization work for this area will be performed under a separate enforceable document to define the nature and extent of contamination there. This operable unit will allow time for this work to be performed while ensuring that any contamination associated with this area will remain onsite, thus reducing the risks posed to off-site receptors. This operable unit will also be designed to be consistent with any future cleanup actions at the site.

Site Characteristics

The RI/FS was conducted to identify the types, quantities and locations of contaminants at the Site and to develop alternatives that best address these contamination problems. Because of the size and complexity of the Site, the RI was performed in three distinct phases. The first phase focused on sampling off site commercial, industrial and residential wells to determine the presence of and extent of off site contamination. The second phase concentrated on on site sampling activities to determine the extent of contamination onsite so that site contributions to areal contamination could be determined. The third phase concentrated on collecting additional on site and off site data to complete the investigatory picture so that a Feasibility Study could be started to address contamination problems. The nature and extent of actual or potential contamination related to the Site was determined by a series of field investigations, including:

- development of detailed information regarding historical site operations
- on site geophysical surveys
- surface soil sampling, both onsite and offsite
- exploratory test-pit excavation and sampling
- installation and sampling of ground water monitoring wells, both onsite and offsite
- surface-water sampling, both onsite and offsite
- identification and sampling of existing ground-water wells in the site vicinity
- installation and sampling of soil borings
- a surface-water drainage study
- a water-level monitoring program, both onsite and offsite
- identification of ground-water contamination sources within a one-mile radius of the Reilly site
- hydraulic conductivity testing and the performance of a short-term continuous water level monitoring program
- preparation of a site-wide human health and ecological risk assessment

Geology/Hydrogeology: The Reilly site lies within the White River drainage basin, located approximately three miles to the east. Eagle Creek is an attendant tributary and flows in a southeasterly direction approximately 4000 feet to the east of the site. Topography in the site area is relatively flat with a gentle downward slope in an easterly direction. Other surface-water bodies in the site area include Blue Lake (a former gravel pit) located approximately 2000 feet northeast of the site, several small ponds or surface-water impoundments located 2000 to 4000 feet east of the site, and one surface-water impoundment located immediately southwest of the Maywood property (see Figure 2). The westernmost extension of Blue Lake has been filled in since 1979.

The sand and gravel deposits that underlie almost all of the White River drainage basin form the principal aquifer in the area. There are three industrial well fields located to the east of the site that have a reported combined pumping rate of 10 million gallons per day, or approximately 7000 gallons per minute (see Figure 2). In the vicinity of the site, upper and lower zones have been identified within the sand and gravel outwash aquifer. At some locations, especially directly underneath the site, these zones are separated by one or more till units which, because of their silt content, are less permeable layers and may impede flow vertically. The lack of a continuous fine unit and similar ground-water levels in shallow and deep wells suggest that the upper and lower zones of the outwash sand and gravel deposits are hydraulically connected and that the till units do not act as a barrier to contaminant flow in ground water.

Regional hydrogeologic data indicate that ground water in the unconsolidated material in the area of the Reilly site flows east towards Eagle Creek with a southerly component. Water level data from the RI indicate that ground-water flow is generally from the northwest to the southeast and that withdrawals from neighboring industrial production wells significantly impact the flow of ground water east of the site. Hydraulic conductivities for wells tested during the RI range from 10(-2) to 10(-3) centimeters per second. An average linear ground-water velocity of 0.68 feet per day was calculated for the area that is not influenced by the industrial pumping to the east of the site. An average linear ground-water velocity of 2.0 feet per day was calculated for the area that is influenced by the industrial pumping.

A detailed analysis of past operations during Task 2 of the Remedial Investigation demonstrated that there are at least five former waste-disposal areas onsite. These five former waste-disposal areas were identified as potential source areas for both on-site and off-site contamination. These include the Lime Pond on the Oak Park property, the Abandoned Railway Trench on the northern portion of the Maywood property, the Former Sludge Treatment Pit on the northern portion of the Maywood property, the Drainage Ditch on the southern portion of the Maywood property and the South Landfill on the southern portion of the Maywood property (See Figure 3). This task also identified ground water as a primary area of investigation for the RI.

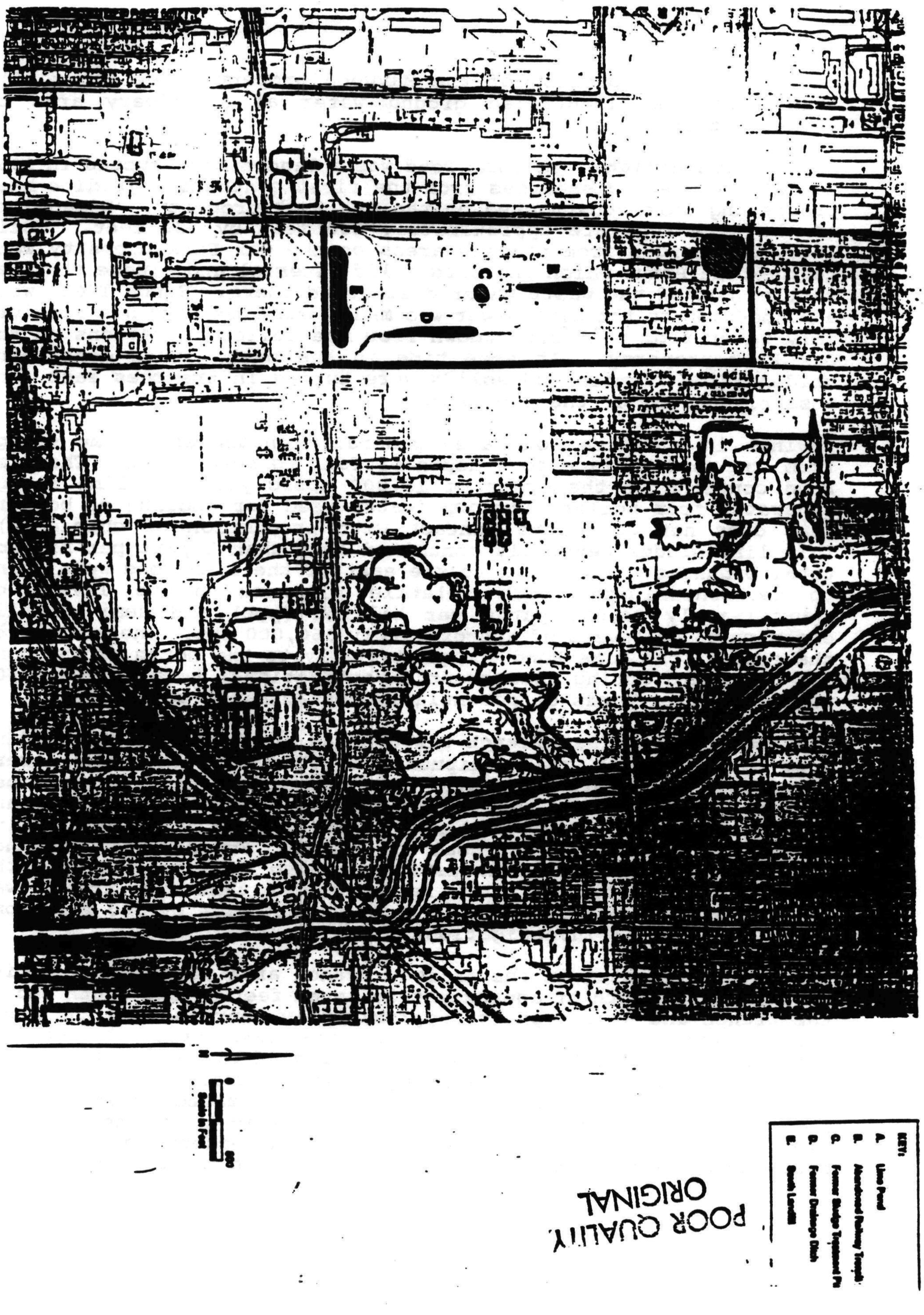
Soil Contamination: The **Lime Pond** was a lagoon constructed in 1953 to receive waste discharges from the first synthetic pyridine base processing unit constructed on the Oak Park property. Dimensions of the Lime Pond are approximately 350 feet by 350 feet. Until 1965, discharges from process areas on the Oak Park property went to the Lime Pond, which included solid material and sludge that had settled out of the waste water discharged there. Since 1965, when a connection to the city sewer was made, the Lime Pond has received only water from boiler blowdown from the boiler operations on the Oak Park property. At some time in the past, drums containing unidentified liquids and solids were buried in trenches east (and possibly north) of the Lime Pond.

Borings in the Lime Pond area generally encountered lime sludge from the pond surface to a depth of four to seven feet. The Lime Pond contains on the order of 15,000 cubic yards of lime sludge generated from boiler blowdown (water used for cooling of boilers that does not come into contact with production of chemicals). This lime sludge generally contained less than 1 part per million total organics. The soils to the east of the Lime Pond were found to be contaminated with volatile organics up to levels of approximately 24,000 parts per billion (ppb) and semi-volatile organics up to levels of approximately 360,000 ppb. These areas to the east of the Lime Pond and potentially to the north of the pond (if confirmed during subsequent investigations) total between 400 and 1700 cubic yards of potentially contaminated material.

The **Abandoned Railway Trench** was used as an unloading and loading area for incoming rail shipments. The railroad tracks were depressed below ground level to facilitate these operations. During the 1960s, the use of the railway trench for loading and unloading purposes decreased and it was gradually filled in with drums of off-specification coal tar enamel. Foundry sand obtained from a variety of local industry was also used to complete the filling of the trench. It is estimated that the trench was approximately five feet deep by fifteen feet wide by 580 feet long based on Phase II investigations.

Test pits completed in the railway trench area revealed a sloping rail bed at a depth of approximately three feet at the south end of the trench and at a depth of approximately four feet at the north end. A surface layer of crushed stone was encountered at each test pit location and fill material consisting of black, brown or gray sand and gravel, foundry sand, coal cinders, coal tar wastes, wood debris and drums was found beneath. The estimated volume of fill materials in the trench was calculated to be in the range of 700 to 4100 cubic yards, the exact amount being dependent on the trench dimensions. Soil contaminant concentrations in the trench sampling

FIGURE 3



N
0
Scale in Feet
KEY:
A. Lime Pond
B. Abandoned Railway Trench
D. Former Drainage Ditch
E. South Landfill

for volatile organics ranged to 656,000 ppb and for semi-volatile organics ranged to 22,160,000 ppb.

From the early 1950s until 1979, waste water sludge from the coal tar refinery and synthetic chemicals operations was dried by placing it in the **Former Sludge Treatment Pit**, located in the center of the Maywood property. The sludge pit was used for thickening sludge by evaporation prior to off-site disposal to landfills. The current RCRA-permitted sludge treatment area is located directly above the northern portion of this historical area. The dimensions of the original sludge pit, as reported in the RI, are 110 feet long by 20 feet wide by 4 feet deep. The estimated volume of waste material in this sludge pit is approximately 800 cubic yards; however, the volume may be greater since test pit samples indicate that contamination may be as deep as 10 feet in some places.

Soil contaminant concentrations in the sludge pit sampling for volatile organics ranged to 13,030 ppb and for semi-volatiles ranged to 6,118,000 ppb.

From the beginning of site operations in 1921 until the mid 1970s, the southern portion of the Maywood property was used as a landfill, **the South Landfill**, for construction debris and soil. In addition, various solid and semi-solid wastes (tars, sludges, still bottoms, tank cleanings) from the coal tar and the synthetic chemicals operations were also deposited in this area. Coal refinery wastes deposited in the area included off-specification pitches, creosoted timbers, coal, and tank car sludges and waste water sludge from the Maywood American Petroleum Institute (API) separator. Wastes from the synthetic chemical operations were also deposited in the south landfill beginning in the 1960s. These wastes included waste water sludge from the API separator and distillation residues from various unit processes including vinylpyridine residue and 3-pyridine carbonitrile residue. Dimensions of the south landfill are approximately 1000 feet by 200 feet.

A dug well, or fire pond, was situated at the extreme southeast corner of the south landfill. This pond was reportedly dug by facility personnel for the purpose of providing a water supply for fire suppression. The dimensions of the fire pond were approximately 112 feet in diameter and 23 feet in depth. The fire pond dried up after a period of time, probably due to the increased industrial ground-water usage in the site vicinity. Limited data regarding the materials used to fill the dry dug well (reported to be tars, sludges, various chemical production residues, and foundry sand) were derived during the RI.

The estimated volume of fill material in the South Landfill is 34,000 cubic yards. Soil contaminant concentrations in the South Landfill sampling for volatile organics range to 110,000 ppb and for semi-volatiles range to 35,280,000 ppb. Field investigations in this area also identified both NAPLs (non-aqueous phase liquids) and DNAPLs (dense non-aqueous phase liquids) as present in the ground water in the form of oily sheen and distinct oil phases in ground-water samples.

Prior to 1970, waste water and storm water were conveyed from the API separator by the **Former Drainage Ditch** into the Raymond Street storm sewer, which then discharged directly to Eagle Creek. This water consisted of water separated from the raw tar, water decanted from the tar storage tanks, water separated from the oil-water, "wet-dry" in the refinery, blowdown water from the boiler operations, aqueous sodium sulfate from the extraction of tar acids and tar bases from the light and middle oils, and storm water entering the system due to natural drainage. Historically, the length of the ditch was 1220 feet, the width was between 15 and 50 feet, and the depth was approximately 8 feet. The estimated volume of fill material ranges from 5600 to 15,800 cubic feet. Soil contaminant concentrations in the Former Drainage Ditch sampling for volatile organics range to 171,000 ppb and for semi-volatiles range to 117,120,000 ppb.

Ground Water Contamination: Benzene concentrations in the ground water range from below detection limits to 38,000 ppb, with the highest levels detected on the Oak Park property. Pyridine and pyridine derivative concentrations, which were summarized in the remedial investigation (RI) as total pyridine derivatives, were found in the ground water ranging from below detection limits to 305,405 ppb, with the highest levels detected on the south-central portion of the Oak Park property. Ammonia concentrations in the ground water ranged from 0.1 parts per million (ppm) to 53.3 ppm with concentrations greatest in the northwest portion of the Oak Park property (see Figures 4, 5, and 6 for maps of contaminant plumes).

Other contaminants present in the ground water include polynuclear aromatic hydrocarbons (PAHs) and chlorinated ethanes and ethenes. Concentrations of PAHs range from below detection limits to 85 parts per trillion (ppt) with concentrations greatest in the southeast corner of the Reilly property, in close proximity to the area known as the South Landfill. Concentrations of chlorinated ethanes and ethenes, with trichloroethene (TCE) being the primary component, range from below detection limits to 110 ppb; the TCE was detected just south of the southern boundary of the Reilly site (see Table 1 for ground-water contaminant profiles)

These contaminant profiles were developed for use in the preliminary modeling of the extraction and treatment network necessary for site containment. Three profiles were developed of groundwater conditions; upgradient, downgradient, and internal gradient. Monitoring wells used for the upgradient average included RI-1 and RI-16. Monitoring wells used for the

TABLE 1

Groundwater Characteristics
Reilly Site, Indianapolis, IN

Contaminant	Profile 1 Downgradient Composite Average (µg/l)	Profile 2 Upgradient Composite Average (µg/l)	Profile 3 Internal Gradient Control Composite Average (µg/l)
Volatile Organic Compounds			
methylene chloride	75 BJ	<2.5	<568
acetone	304 BJ	16	2,423 J
chloroform	14	6	41
1,2-dichloroethane	14 J	<2.5	<568
2-butanone	26 BJ	<5	5 J
bromodichloromethane	3 J	2	2 J
benzene	3,934	<2.5	25,380
toluene	258 J	<2.5	2,368
ethylbenzene	252 J	<2.5	2,068
total xylene	551 J	<2.5	5,005
Pyridine Derivatives			
pyridine	3,608	<5.13	21,503
2-picoline	27,608	<5.13	164,400
3 & 4-picoline	2,813	<5.13	15,893
2,6-lutidine	208	<5.13	778
2-ethylpyridine	303	<5.13	1,388
2,4 & 2,5-lutidine	248	<5.13	278
2,3-lutidine	214	<5.13	494
3-ethylpyridine	126	<5.13	411

TABLE 1 (CONT

Groundwater Characteristics
Reilly Site, Indianapolis, IN

Contaminant	Profile 1 Downgradient Composite Average (µg/l)	Profile 2 Upgradient Composite Average (µg/l)	Profile 3 Internal Gradient Control Composite Average (µg/l)
4-ethylpyridine	6	<5.13	<659
3,5-lutidine	713	<5.13	986
3,4-lutidine	52	<5.13	<659
2-methyl-5-ethylpyridine	171	<5.13	291
2-methyl-3-ethylpyridine	206	<5.13	327
3-ethyl-4-methylpyridine	42	<5.13	14
Polynuclear Aromatic Hydrocarbons			
naphthalene	489 J	<5	N/A
1-methylnaphthalene	11 J	<5	<659
Semivolatiles			
bis-2(ethylhexyl) phthalate	48	10	NA
2,4-dimethylphenol	48	<5	NA
Metals**			
aluminum	14,265	755	27,700*
arsenic	16(12)	12	44*
barium	526(375)	760	417*
beryllium	1	5	1*
chromium	25	126	40*
cobalt	18	116	35*
copper	77(4)	434	123*
lead	24(0.6)	118	42*

Groundwater Characteristics
Reilly Site, Indianapolis, IN

Contaminant	Profile 1 Downgradient Composite Average (µg/l)	Profile 2 Upgradient Composite Average (µg/l)	Profile 3 Internal Gradient Control Composite Average (µg/l)**
mercury	0.20	0.4	<0.1*
nickel	41(6.6)	210	70*
silver	11	5	<2*
vanadium	41	224	76*
zinc	138(9)	809	189*
General Water Quality Information**	**(mg/l)**	**(mg/l)**	**(mg/l)**
calcium	119(112)	979	102(94)
iron	37(1.5)	193	62*
magnesium	46(45)	332	30(29)
manganese	1.2(0.22)	7.3	2.4*
potassium	6.0(0.52)	9.0	5*
sodium	217	32	81*
hardness (as $CaCO_3$)	486	NA	378
chemical oxygen demand	187	NA	902
total organic carbon	83	NA	417
biological oxygen demand	114	NA	550
total suspended solids	25	7.2	76
conductivity (micromhos/cm)	1387	641	1190
Total dissolved solids (TDS)	866	400	743
alkalinity	560	NA	640
chlorides	187	NA	60

TABLE 1 (CON

Groundwater Characteristics
Reilly Site, Indianapolis, IN

Contaminant	Profile 1 Downgradient Composite Average (mg/l)	Profile 2 Upgradient Composite Average (mg/l)	Profile 3 Internal Gradient Control Composite Average (mg/l)
sulfates	31	NA	12
ammonia - N	15	0.620	11
kjeldahl - N	23	NA	50
nitrate - N	0.27	NA	0.37
phosphorus	0.12	NA	0.40
pH	7.3	NA	7.4
Temperature (°C)	17	NA	19

* approximated from RI-4
b estimated from conductivity
B detected in blanks
J estimated value below detection limit
< indicates the compound was not detected at this level/value represents 1/2 detection limit
( ) metal concentration in filtered sample
NA Not available

FIGURE 4

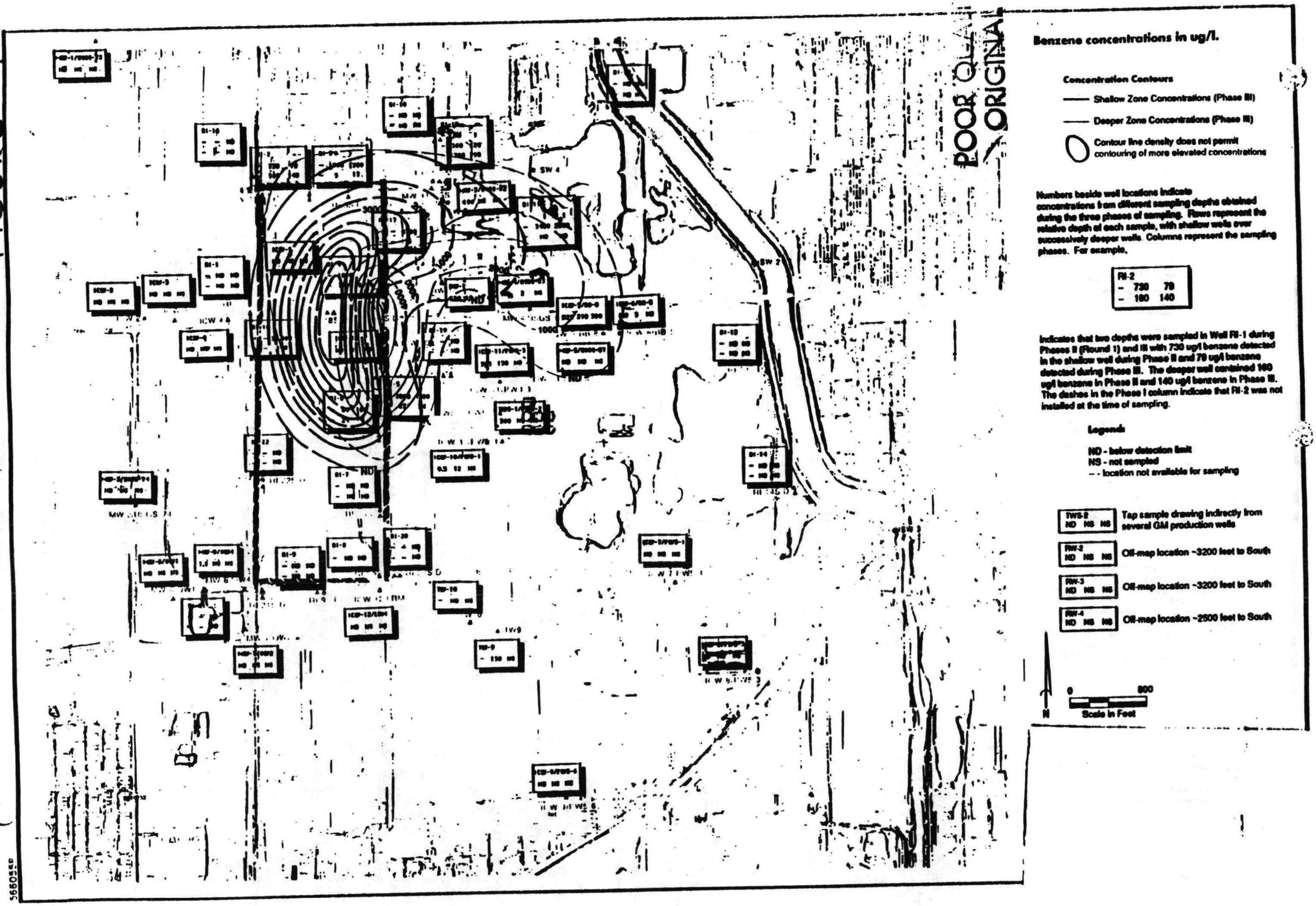


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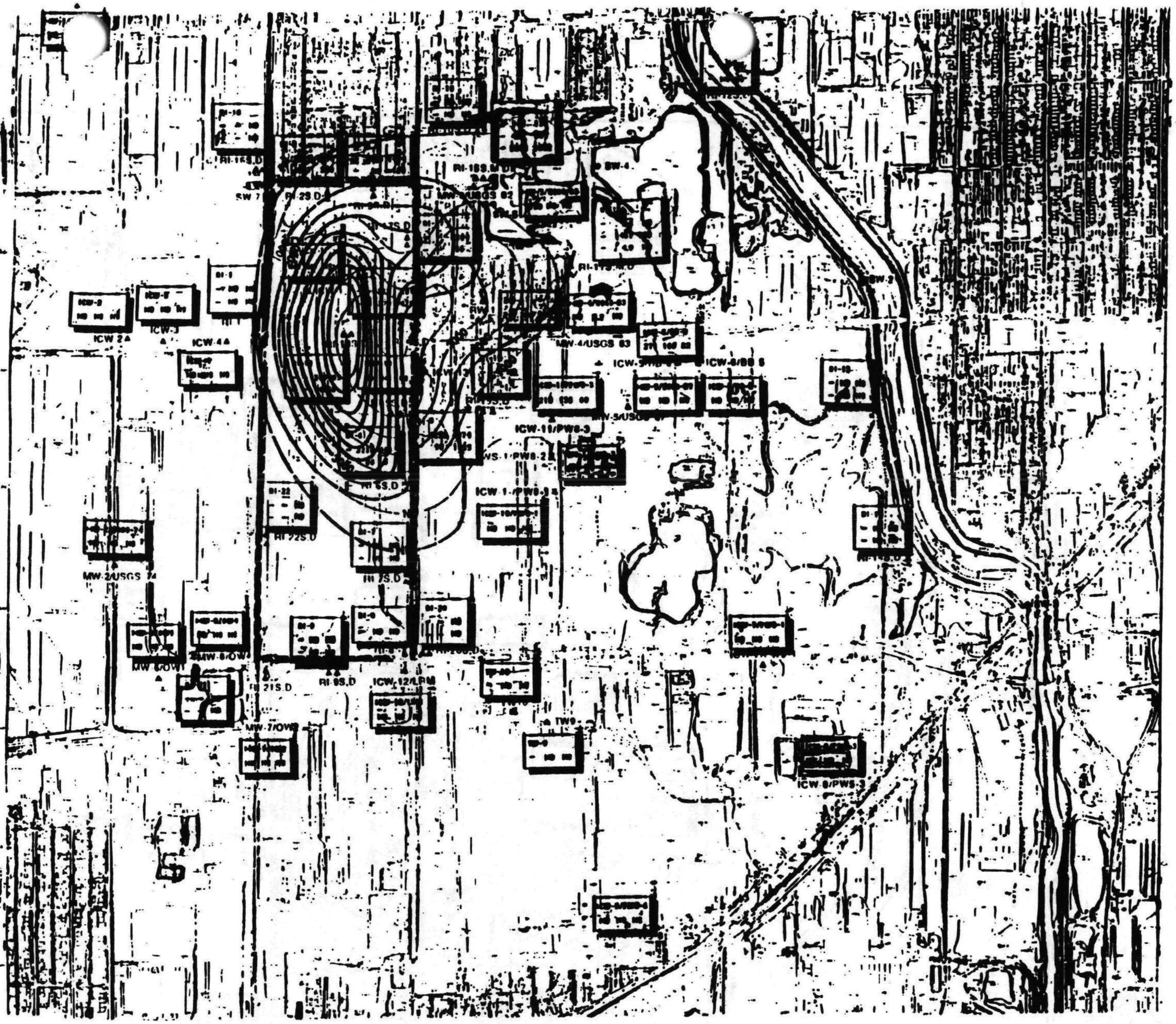
FIGURE 7



Total Pyridine Derivat Concentrations in µg/l.

Concentration Contours

—— Shallow Zone Concentrations (Phase III)

—— Deeper Zone Concentrations (Phase III)

Contour line density does not permit contouring of more elevated concentrations

Numbers beside well locations indicate total concentrations from different sampling depths obtained during the three phases of sampling. Rows represent the relative depth of each sample, with shallow wells over successively deeper wells. Columns represent the sampling phases. For example,

RI-2		
–	2180	1008
–	247	330

Indicates that two depths were sampled in Well RI-2 during Phases II (Round 1) and III with 2180 ug/l total pyridines, lutidines and picolines detected in the shallow well during Phase II and 1008 ug/l total pyridines, lutidines and picolines detected during Phase III. The deeper well contained 247.3 ug/l total pyridines, lutidines and picolines in Phase II and 330 ug/l total pyridines, lutidines and picolines in Phase III. The dashes in the Phase I column indicate that RI-2 was not installed at the time of sampling.

Legend:

ND - below detection limit
NS - not sampled
-- - location not available for sampling

TWS-2 ND NS NS	Tap sample drawing indirectly from several GM production wells
RW-2 NS NS NS	Off-map location ~3200 feet to South
RW-3 NS NS NS	Off-map location ~3200 feet to South
RW-4 ND NS NS	Off-map location ~2500 feet to South

N

0 — 600
Scale in Feet

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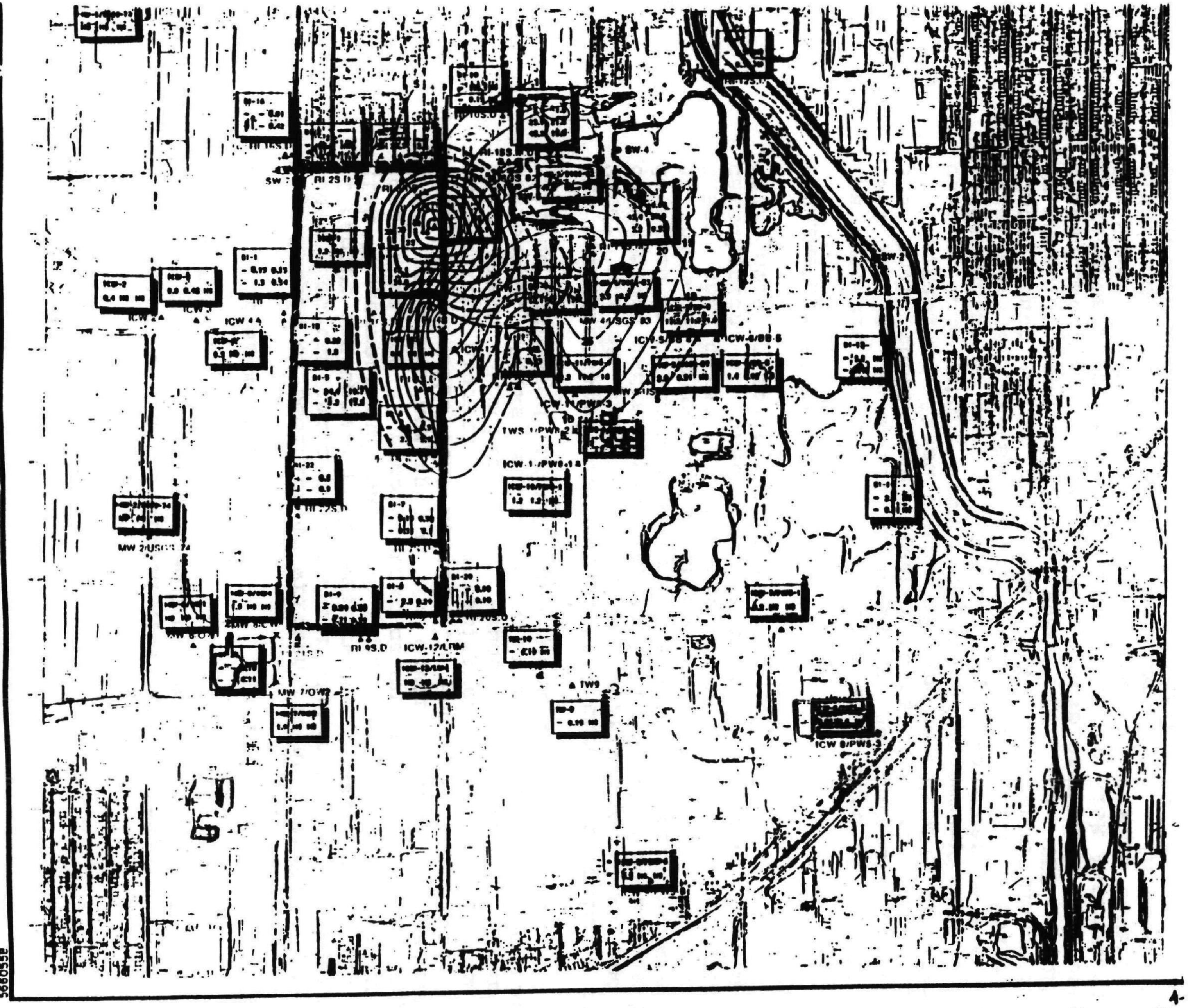
FIGURE 6



Ammonia Concentrations in mg/l.

Concentration Contours

—— Shallow Zone Concentrations (Phase III)

—— Deeper Zone Concentrations (Phase III)

Numbers beside well locations indicate concentrations from different sampling depths obtained during the three phases of sampling. Rows represent the relative depth of each sample, with shallow wells over successively deeper wells. Columns represent the sampling phases. For example,

RI-1		
–	0.13	0.15
–	1.3	0.54

Indicates that two depths were sampled in Well RI-1 during Phases II (Round 1) and III with 0.13 mg/l ammonia detected in the shallow well during Phase II and 0.15 mg/l ammonia detected during Phase III. The deeper well contained 1.3 mg/l ammonia in Phase II and 0.54 mg/l ammonia in Phase III. The dashes in the Phase I column indicate that RI-1 was not installed at the time of sampling.

Legend:

NA - not analyzed, sample broken
ND - below detection limit
NS - not sampled
-- - location not available for sampling

TWS-2			
2.0	NS	NS	Tap sample drawing indirectly from several GM production wells
RW-2			
ND	NS	NS	Off-map location ~3200 feet to South
RW-3			
ND	NS	NS	Off-map location ~3200 feet to South
RW-4			
0.3	NS	NS	Off-map location ~2500 feet to South

N

0 800
Scale in Feet

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POOR QUALITY ORIGINAL

downgradient average included RI-3, RI-4, RI-5, RI-6, RI-17 and RI-18. The monitoring well used for the internal gradient average was also RI-18.

Summary of Site Risks

This Record of Decision is written for an operable unit action to prevent contaminated ground water within the site boundaries. The RI report includes a risk assessment, prepared by Reilly using the Risk Assessment Guidance for Superfund and approved by EPA as a portion of the RI report, that calculated the actual or potential risks to human health and the environment that may result from exposure to site contamination. Because this action will only address the migration of contaminated ground water from the site, only risks calculated for exposure to ground water will be presented. Risks associated with exposure to contaminated soils will be addressed through subsequent actions.

The risk assessment determined that three chemicals in the ground water are of primary concern: **benzene**, **pyridine** and **pyridine derivatives** and **ammonia** (see Table 1). Other chemicals that were detected in the ground water are also of concern but were not found at the same frequency as these listed above. Concentrations of these chemicals in the ground water have resulted in the calculation of unacceptable risks to human health and the environment posed by exposure.

Exposure Assessment

The exposure assessment conducted as a part of the RI concluded that several media are impacted by the contaminants at the site, and that there are several potential exposure routes for contamination. These routes of exposure were identified for both current and future scenarios (as is commonly done in EPA risk assessments) so that all potential pathways can be evaluated. The baseline risk assessment computed risks from exposure to these contaminants using the upper 95% confidence intervals of the arithmetic mean of the Phase II and III sampling data concentrations of the above contaminants. The use of the confidence intervals is suggested in the Risk Assessment Guidance for Superfund and represents a conservative step towards assessing risks associated with potential exposures. In some cases where sample results vary widely or sample size is small, these confidence intervals may exceed maximum detected concentrations.

Due to the proximity of the site to the surrounding neighborhood and major streets, and its size, the following potential receptors were identified in the risk assessment, and risks were computed for their exposure.

Under the current land-use scenario, on-site workers could potentially be exposed through **ingestion** and **dermal contact** with surface soils, and inhalation of surface-soil dust. Off-site neighborhood residents could potentially be exposed through **ingestion and dermal contact** with surface-soils from the Maywood property (primarily from site trespassers), **inhalation** of surface soil dust (migration of dust from the site), **ingestion and dermal contact** with surface soil from the Oak Park property (residents playing basketball at a court located in the northern portion of the site), and **ingestion and dermal contact** with on-site surface water (site trespassers contacting a transient area of ponded water). Off-site industrial workers could potentially be at risk through **exposure to volatilized contaminants** (local industrial usage of the ground water).

Under the future-use scenario, on-site workers could potentially be exposed through **ingestion and dermal contact** with surface soils (some workers can enter the area of the Maywood property), and **inhalation** of surface-soil and dust (Maywood) and subsurface soils (all areas) (workers may be exposed to on-site dust generated during intrusive construction activities). Off-site neighborhood residents could potentially be exposed through **ingestion and dermal contact** with surface soils (site trespassers), **inhalation** of surface soil dust (Maywood) and subsurface (all areas) soils (wind blown dust from the site), and **ingestion and dermal contact** with surface soils from the Oak Park property (residents playing basketball), **ingestion and dermal contact** with on-site surface water (site trespassers). Construction workers could potentially be exposed through **ingestion and dermal contact** with surface and subsurface soils (industrial facility construction on the Maywood property). Future on-site residents (assuming that the site will be converted to this use in the future) could potentially be exposed through **ingestion and dermal contact** with surface soil (Maywood) and subsurface soil (all areas), **ingestion and dermal contact** with on-site surface water, and **inhalation** of surface dust (Maywood) and subsurface soil (all areas). Future off-site residents could be exposed through **ingestion and dermal contact** with ground water (if residents used wells for water supply for drinking and other household uses). Future off-site industrial workers could be at risk through **exposure** to volatilized contaminants from the ground water (industrial water usage).

Toxicity Assessment

Benzene is classified as a known human carcinogen (Class A) and has been associated with hematologic effects on humans as well as anemia (decreased red blood cells), leukopenia (decreased white blood cells), and thrombocytopenia (decreased platelets). Chronic exposure has been shown to cause pancytopenia (decrease in all circulating cells) and aplastic anemia (failure to manufacture blood cells). Exposure by inhalation has been shown to cause leukemia. Benzene has been shown to be a growth inhibitor *in utero*; however, it has not been shown to be teratogenic (causing birth defects). Animal studies have shown preliminary evidence of carcinogenicity; a link to leukemia via inhalation has also been suggested. Benzene has been shown to be nonmutagenic (not causing mutations); benzene oxide, the presumed initial metabolite of benzene, is mutagenic (causing mutations).

Limited data exists on the oral absorption of **pyridine**; data on the pulmonary and dermal absorption of the chemical was not located. Available evidence indicates that pyridine is well absorbed rapidly from the GI tract and is not expected to accumulate in the body. Available information from animal testing does not suggest that lethality is a human health concern for exposure to pyridine by inhalation or ingestion. The major human health concern is for liver damage, based on recent studies with laboratory rats. Other human health concerns include the potential for neurologic effects and kidney effects. Pyridine has been administered to mice and rats in order to evaluate the potential carcinogenicity of pyridine. The studies have concluded that pyridine did not produce increases in the incidence of tumors with respect to controls. EPA has decided that increased liver weight in female rats is the most sensitive toxic endpoint.

Ammonia has been shown to cause deleterious effects in acute exposures. Irritation of the eyes, nose, throat and chest are associated with exposure to ammonia. Ingestion can cause gastritis and corrosive esophagitis. Exposure to high concentrations of ammonia gas can cause pulmonary edema or death. Ammonia has also been shown to cause negative effects to the respiratory tract, labored breathing, eye irritation, inflammatory lung changes, and death to many animal species.

Trichloroethylene (TCE) is considered a probable carcinogen (Class B2) and is associated with central nervous system and renal system problems, liver damage, hepatic injury, and damage to other organs. Animal studies have indicated that TCE is fetotoxic but not teratogenic, producing primarily skeletal ossification anomalies, decreased fetal weight, and other effects consistent with delayed development.

Ethylbenzene is readily absorbed via inhalation, ingestion, and dermal exposure, both in humans and in animals. Ethylbenzene adversely affects the kidneys, lungs, adipose tissue, digestive tract, and liver. There is little information available on the toxicity of ethylbenzene in humans, although exposure to moderate to high concentrations causes irritation to the eyes, nose, and throat. Ethylbenzene is not mutagenic and has been assigned a Class D (not classified) carcinogenicity rating due to lack of data.

Toluene is primarily absorbed through the lung and gut, although it can also be absorbed through the skin. Toluene is metabolized extensively and is excreted in the urine as well as in expired air. Toluene adversely affects the central nervous system causing dizziness and unconciousness. Toluene is not mutagenic or teratogenic, but there is some evidence that it causes adverse effects in laboratory animals.

Xylene is easily absorbed through inhalation and is transported in the blood. Exposure to xylene can produce effects ranging from irritation of the eyes, nose, and throat for acute doses, to central nervous system depression and cardiac arrest in chronic doses. Xylene has been found to be embryotoxic and teratogenic in laboratory animals and has been assigned a Class D (not classified) carcinogenicity rating by U.S. EPA.

Both the Integrated Information System (IRIS-1989) and the Health Effects Assessment Summary Table (HEAST-1990) were used as sources for this contaminant toxicity data.

Risk Assessment

The carcinogenic risks associated with exposure to benzene by ground-water ingestion were computed for several potential exposure scenarios (see Table 2). These include off-site resident (5.5 x 10(-4)), off-site industrial worker (current risk - 1.06 x 10(-6) for a quiescent scenario and 1.64 x 10(-5) for an aerated scenario (mixing of the water with associated volatilization of the benzene into the breathing space)), off-site industrial worker (future risk - using the upper 95 % confidence interval for the ground-water plume - 6.83 x 10(-4) for a quiescent scenario, and 7.35 x 10(-4) for an aerated scenario), and on-site resident (6 x 10(-4)).

The non-carcinogenic risks associated with exposure to pyridine, pyridine derivatives, and ammonia by ingestion of ground water, were computed for the same exposure scenarios as were used for the carcinogenic risks. Generally, total Hazard Indices (HI) are used to calculate non carcinogenic risks and must be below a value of 1.0; otherwise CERCLA requires remedial action. Hazard Indices exceeded the 1.0 trigger for scenarios such as the off-site resident (HI=247), and off-site industrial worker (HI=277) (see Table 2).

Because this is an interim action, calculation of residual risks is not necessary and will be addressed by the final remedy for ground water, which will likely include source remediation. However, it should be noted that ground water will be prevented from migrating from the site as a result of this action, and ground-water treatment will achieve ARARs.

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 human health, welfare, or the environment.

TABLE 2

Summary of Site Risks
Groundwater

	Hazard Index	Estimated Lifetime Cancer Risks
Future Offsite Resident		
- Drinking	247 (pyridine)	5.5×10^{-4} (benzene)
- Contact	0.90	7.4×10^{-6} (benzene)
Current Offsite Industrial Worker		
- Inhalation	0.13-0.29	1.64×10^{-5} - 1.07×10^{-4}
Future Offsite Industrial Worker		
- Inhalation	277.01 - 279.25	7.35×10^{-4} - 6.84×10^{-4}

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Remediation Options for Detailed Analyses
Reilly Site, Indianapolis, IN

Alternative 1:	No Action
Alternative 2:	In-Situ Bioremediation Using Combination Extraction/Reinjection Well Design
Alternative 3:	Alternative 3A - Extraction Downgradient/Treatment/Injection Upgradient Alternative 3B - Extraction Upgradient/Treatment/Injection Downgradient/Interior Gradient Control
Alternative 4:	Alternative 4A - Fully Encircling Slurry Wall/Interior Gradient Control/Treatment Alternative 4B - Fully Encircling Slurry Wall/Interior Gradient Control/Extraction Upgradient/ Treatment/Injection Downgradient

Description of Alternatives

During the Focused Feasibility Study (FFS), Reilly identified and evaluated a list of alternatives that could be used to address the threats and/or potential threats identified for the ground water at the site. Reilly screened the list of alternatives based on criteria for effectiveness (i.e. protection of human health and the environment, reliability), implementability (i.e. technical feasibility, compliance with applicable State and Federal regulations), and relative costs (i.e. capital, operation and maintenance). Following this initial screening, the list of alternatives was evaluated and only alternatives that met the nine criteria were submitted for detailed analysis.

Four alternatives were evaluated during the detailed analysis of alternatives in the FFS (See Table 3). These included no action; in-situ bioremediation; ground-water extraction, treatment and discharge; and a fully-encircling slurry wall with accompanying ground-water extraction, treatment and discharge, as described below.

Alternative 1: No Action

Under this alternative, no remediation would occur and the site would remain in its present condition. All contamination would remain in the ground water, with continued off-site movement at unacceptable levels. This alternative would include periodic monitoring of the ground-water quality both on and offsite. Although this alternative does not address the ground-water contamination problem, its inclusion in the detailed alternatives analysis is required by CERCLA as a baseline for comparison to the other alternatives developed.

Expected Capital Cost	$ 0
Expected Annual Operation and Maintenance	$ 82,000
Present Worth Cost:	$127,000
Time to Implement:	none

Alternative 2: In-situ Bioremediation

This technology can be implemented in a number of forms, and involves the treatment, destruction, and control of subsurface pollutants with microbes. Using this alternative, oxygen and certain nutrients (such as phosphates) would be injected (through injection wells) into ground water to accelerate the natural breakdown of contaminants and control their movement offsite. Ground water would be monitored for several years to determine whether the remedy is working effectively.

In-situ bioremediation could be enhanced by the use of several technologies. These include underground barriers (such as slurry walls) to control contaminated ground-water flow, an air-stripping system to remove contaminants from water blown through a controlled facility, or a soil vapor extraction system which draws air through contaminated soil to remove organic contaminants. The contaminated air would be treated by filters containing activated carbon.

Expected Capital Costs	$ 8,000,000
Expected Annual Operation	
and Maintenance (year 1-2)	$ 1,110,000
(year 2-30)	$ 660,000
Present Worth Costs	$ 15,000,000
Time to Implement:	3 to 10 months

Alternative 3: Ground-Water Extraction, Treatment and Discharge

The FFS describes two ways this alternative could be implemented, details of which would be determined during the design phase of the cleanup. Ground water extraction at the property boundary will create a hydraulic barrier that will prevent ground water movement off-site. Ground water would first be extracted and then treated through one or more of the following processes: biological treatment, filtration through granular activated carbon, filtration via precipitation/clarification, and/or air stripping. Most of the treated water would be recharged to the aquifer (using wells located up-gradient or down-gradient of the site). The remaining treated water would be discharged to the Publicly Owned Treatment Works (POTW). It was estimated in the FFS that approximately 1.7 to 2.1 million gallons of water per day would need to be pumped from 8 to 12 extraction wells to achieve the containment objectives of this action. These estimates would be further revised during remedial design, using, at a minimum, a pump test of the aquifer to further define aquifer properties. This remedial action would be designed to isolate the site so that ground water would be contained onsite.

Expected Capital Costs	$ 5,500,000
Expected Annual Operation & Maintenance	$ 1,000,000
Present Worth Costs:	$15,000,000
Time to Implement	2 to 6 months

Alternative 4: Fully-Encircling Slurry Wall; Ground-water Extraction, Treatment and Discharge

The FFS describes two ways this alternative could be implemented, details of which would be determined during the design phase of the cleanup. Each proposal includes a slurry wall that encircles the site and is connected to the shale bedrock below the site, approximately 60 to 100 feet in depth. This slurry wall would create a physical barrier that will prevent the further off-site movement of contaminated ground water and, when combined with ground water extraction, will effectively isolate the site. Ground water would be extracted from the west side and/or the center of the site and treated with precipitation/clarification followed by air stripping or filtration through granular activated carbon. Treated ground water would then be discharged to the POTW or reinjected to the aquifer using wells located down-gradient of the site. Treatability studies on the soils extracted from the slurry trench would be necessary during remedial design so that it could be determined whether it was acceptable to either use them in the construction of the slurry wall or dispose of them offsite. It was estimated in the FFS that approximately 0.6 to 1.7 million gallons of water per day would need to be pumped from 4 to 8 extraction wells to achieve the containment objectives of this action. These estimates would be further revised during remedial design, using, at a minimum, a pump test of the aquifer to further define aquifer properties. This remedial action would be designed to isolate the site so that ground water would be contained onsite.

Expected Capital Costs	$ 20,000,000
Expected Annual Operation & Maintenance	$ 500,000
Present Worth Costs:	$ 25,000,000
Time to Implement	6 to 12 months

__Summary of the Comparative Analysis of Alternatives__

The nine criteria used by U.S. EPA to evaluate remedial alternatives, as set forth in the NCP, 40 CFR Part 300.430, include: overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements (ARARs); long-term effectiveness; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability; cost; state acceptance; and community acceptance. Based on evaluation of the alternatives with respect to these nine criteria, U.S. EPA has selected Alternative 3 - Ground-Water Extraction, Treatment and Discharge - as the alternative for the interim remedy for this Site.

__THRESHOLD CRITERIA__

__Protection of Human Health and the Environment__

Addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Alternative 1 would not protect human health and the environment because it does not reduce risks associated with exposure to ground water. Pilot testing is needed before a final determination can be made regarding Alternative 2; however, it appears that it can control the off-site movement of contaminated ground water. Because the effectiveness of the technology has not been verified, it is not clear whether Alternative 2 can meet necessary Federal and State drinking-water standards or recharge/discharge limits. However, it does not appear that the hydrogeologic environment at the site will allow for sufficient time for the bioremediation to work effectively, because of ground-water velocity and the presence of clay lenses. Alternatives 3 and 4 are the most protective, because--they use proven technologies to control the off-site migration of contaminated ground water. Both Alternatives 3 and 4 are capable of meeting recharge/discharge ARARs. Air emissions controls will be provided if required for the air strippers used in Alternatives 3 and 4. Sludge disposal from the biological system and/or from backwash solids associated with the extraction and treatment systems will remove the contamination from the site to a location where exposure is minimized by engineering controls.

Therefore, since it has been determined that Alternative 1 would not be protective of human health and the environment or meet ARARs, it will no longer be considered in the nine criteria evaluation. It appears that Alternative 2 may be able to meet ARARs, although further pilot testing is necessary before a final determination can be made. Alternatives 3 and 4 are functionally equivalent with respect to this threshold criterion.

Compliance with ARARs

Addresses whether a remedy will meet all of the ARARs of other Federal and State environmental laws and/or justifies a waiver of those laws.

Alternatives 2, 3, and 4 should meet the ARARs relating to treatment and discharge, although they will not immediately meet Maximum Contaminant Levels (MCLs) at the property boundary. Pilot testing would be necessary to confirm this determination for Alternative 2, In-Situ Bioremediation. All on-site activities associated with Alternatives 2, 3 and 4 will comply with worker health and safety requirements, air emissions standards, discharge/recharge permit requirements, and waste disposal requirements (see Table 4 for listing of ARARs).

Therefore, it has been determined that Alternative 2 needs further testing to determine whether it can meet ARARs, while Alternatives 3 and 4 are functionally equivalent with respect to this threshold criterion.

BALANCING CRITERIA

Long Term Effectiveness

Addresses any expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup standards have been met.

Alternative 2 cannot be ranked relative to the other alternatives with respect to this criterion until further bench-scale and pilot-

ARARs

[illegible]	[illegible] ARARs	[illegible] State ARARs
NO ACTION	**40 CFR 141.11-.16, 141.50-.51, and 141.61(a) (SDWA) sets MCLs and MCLGs for public drinking water systems. A list of MCLs is provided in Table 3-5 under discharge criteria for reinjection.** **40 CFR 264.29 and 264.94, RCRA groundwater protection standards. Three types of standards may be used: (1) chemical specific standards for 14 toxic compounds (MCLs), (2) the groundwater must be cleaned to background levels or (3) RCRA Alternate Concentration Limits may be used.**	**327 IAC 2-1-7 Underground Water Standards. All groundwaters of the state which are a present or probable future source for public or industrial water supply shall meet water quality standards. All groundwaters at all times shall meet the minimum conditions of being free from substances which are in amounts sufficient to injure, be acutely toxic to, be chronically toxic to, or be carcinogenic, mutagenic or teratogenic to humans, animals, aquatic life or plants (327 IAC 2-1-7(b)). In addition, if the groundwater is used for drinking water at the point at which such waters are withdrawn for use, then chemical constituents in groundwater shall not be present in such levels as to prevent, after conventional treatment, meeting drinking water standards (327 IAC 2-1-7(c)). State MCLs are included in Table 3-5**

TABLE 4 (CONT.)

[illegible]	[illegible]	State ARARs
IN-SITU BIOREMEDIATION	40 CFR 141.11-141.16, 141.50-141.51, and 141.61(a) Safe Drinking Water Act (SDWA) sets MCLs and MCLGs for public drinking water systems. Although the groundwater is not currently a drinking water source it is potentially a drinking water source in the future and therefore, according to the NCP (40 CFR 300.430(e)(2)(B)), should be protected to levels appropriate to its potential use as a drinking water source. A list of MCLs is provided in Table 3-5 under the discharge criteria for reinjection. 40 CFR 264.29 and 264.94, RCRA groundwater protection standards. Three types of standards may be used: (1) chemical specific standards for 14 toxic compounds (MCLs), (2) the groundwater must be cleaned to background levels or (3) RCRA Alternate Concentration Limits may be used.	327 IAC 2-1-7 Underground Water Standards. All groundwaters of the state which are a present or probable future source for public or industrial water supply shall meet water quality standards. All groundwaters at all times shall meet the minimum conditions of being free from substances which are in amounts sufficient to injure, be acutely toxic to, be chronically toxic to, or be carcinogenic, mutagenic or teratogenic to humans, animals, aquatic life or plants (327 IAC 2-1-7(b)). In addition, if the groundwater is used for drinking water at the point at which such waters are withdrawn for use, then chemical constituents in groundwater shall not be present in such levels as to prevent, after conventional treatment, meeting drinking water standards (327 IAC 2-1-7(c)). State MCLs are included in Table 3-5.

[illegible]	[illegible]	[illegible] State ARARs
EXTRACTION, TREATMENT AND REINJECTION		
[illegible] Chemical-Specific [illegible]		
ARARs Common to all Alternatives	40 CFR 264.29 and 264.94, RCRA groundwater protection standards. Three types of standards may be used: (1) chemical specific standards for 14 toxic compounds (MCLs), (2) the groundwater must be cleaned to background levels or (3) RCRA Alternate Concentration Limits may be used.	327 IAC 2-1 outlines water quality standards developed by IDEM to prevent degradation of state waters 327 IAC 2-1-7 Underground Water Standards. All groundwaters of the state which are a present or probable future source for public or industrial water supply shall meet water quality standards. All groundwaters at all times shall meet the minimum conditions of being free from substances which are in amounts sufficient to injure, be acutely toxic to, be chronically toxic to, or be carcinogenic, mutagenic or teratogenic to humans, animals, aquatic life or plants (327 IAC 2-1-7(b)). In addition, if the groundwater is used for drinking water at the point at which such waters are withdrawn for use, then chemical constituents in groundwater shall not be present in such levels as to prevent, after conventional treatment, meeting drinking water standards (327 IAC 2-1-7(c)). State MCLs are included in Table 3-5.

TABLE 4 (CON

TABLE 4 (CONT

[illegible]	[illegible]	[illegible] State ARARs
ARARs Common to all Alternatives (Continued)	40 CFR 141.11-141.16, 141.50-141.51, and 141.61(a) Safe Drinking Water Act (SDWA) sets MCLs and MCLGs for public drinking water systems. Although the groundwater is not currently a drinking water source it is potentially a drinking water source in the future and therefore, according to the NCP (40 CFR 300.430 (e)(2)(B)), should be protected to levels appropriate to its use as a drinking water source. A list of MCLs is provided in Table 3-5 under the discharge criteria for reinjection.	
	Location-Specific	
	RCRA location requirements. RCRA explicitly places limits on where on-site storage, treatment, or disposal of hazardous waste may occur.	
	Action-Specific	
	29 CFR 1910, 1926, 1904, Occupational Health and Safety Standards to be complied with during site remediation. 40 CFR 268, RCRA Land Disposal Requirements. The use of filtration to remove suspended solids or metals will produce a solid waste which must be disposed of in accordance with RCRA requirements, depending upon waste classification.	State Industrial Pretreatment Requirements, Comply with 307(b) CWA. Requires notification of discharge of toxic pollutants (as defined by CWA) if over defined limits.

[illegible]	[illegible]	[illegible] State ARARs
ARARs Common to all Alternatives (Continued)	40 CFR 263,49 CFR 107, 171-179 Transportation requirements for shipment of hazardous residuals; applicability depends on waste classification. 40 CFR 144, Underground Injection Control Program. These regulations define the requirements for siting, permitting, and monitoring underground injection wells under SDWA and RCRA. Notably: 40 CFR 144.13(c) allows operation of Class IV injection wells during CERCLA remediation; 40 CFR 144.23 applies to closure of a Class IV well; and 40 CFR 144.31 outlines the information required by EPA to consider and approve a new injection well. 40 CFR 146, Underground Injection Control Program: Criteria and Standards. Notably, 40 CFR 146.6 defines procedures to be used to calculate the "zone of endangering influence", and 40 CFR 146.8 defines standards and testing procedures for the mechanical integrity of an injection well. Subpart E of the rule, pertaining specifically to Class IV wells, has not been promulgated and thus is not an ARAR.	327 IAC 5-4-2, underground injection of pollutants. Underground injection of treated wastewater at a facility that does not have a NPDES-permitted discharge does not require a permit. Instead, the state regulates and discharges under 327 IAC 3.

POOR QUALITY ORIGINAL

TABLE 4 (Cont)

TABLE 4 (CONT)

[illegible]	[illegible]	[illegible] ARARs
	Action-Specific	
Biological Treatment	Depending on the identity of the by-products, the chemical-specific ARARs previously listed may be applicable (SDWA, RCRA). No specific by-products have been identified that would trigger this requirement.	
Activated Carbon	40 CFR 268, RCRA requirements may pertain to disposal of spent activated carbon.	
Stripping	40 CFR 264.1032 Organic Air Emission Standards for Process Vents pertains to stripping operations that emit a total organics (TO) of 10 ppm by weight or greater. If this rule applies, then total organic emissions must be reduced to below 1.4 kg/hr, <u>or</u> control devices that reduce total organic emissions by 95% must be installed and operated.	Indianapolis Air Pollution Control Board Regulation IX-1, Permits. Sources emitting more than 3 lb/hr or 15 lb/day are required to obtain a construction permit and a permit to operate. 326 1AC 8 Air Management Rule. Sources emitting more than 25 ton per year have to demonstrate compliance with Best Available Technology Requirements.
Containment [Slurry Wall]	Land Disposal Restrictions [40 CFR 268] may apply to excavated soils depending on waste classification.	

POOR QUALITY ORIGINAL

TABLE 4 (CONT)

[illegible]	[illegible]	[illegible] ARARs
	Location-Specific	
Discharge to POTW	40 CFR Part 122.42(b), NPDES Permit Regulations - Requires notification of issuing authority of re-evaluation of POTW pretreatment standards (It must be noted that in the event that the POTW does not have a local limitation for a particular pollutant found in the discharge from this Superfund site, it must evaluate its local limitations, and develop such a limitation as necessary to protect the POTW from interference, pass-through, or inhibition from the discharge.); 40 CFR Part 403.5, NPDES National Pretreatment Standards, discharge to a POTW must not interfere, pass through untreated into the receiving waters, or contaminate the sewage sludge (See note above.); and, 40 CFR Part 403.g(f), NPDES Pretreatment Program Requirements for POTWs. (J. O'Grady, 3-1938)	327 IAC 5-11, pretreatment program limiting discharges to POTW 327 IAC 5-13 Applicability of Industrial Waste Pretreatment Permit.

scale tests are performed, due to uncertainties associated with the distribution of oxygen and nutrients, soil heterogeneities, and reaction kinetics. The long-term effectiveness of Alternative 4 is dependent on the structural integrity of the slurry wall and the continued operation of the interior ground-water extraction system. Following proper design, continued operation of this alternative shall effectively control future off-site movement of contaminated ground water.

The long-term effectiveness of Alternative 3 depends on the integrity of the extraction system; however, continued operation of Alternative 3 shall effectively control future off-site movement of contaminants through extraction and treatment of ground water. The use of backup systems, such as backup power generators, redundant extraction wells, designing the extraction wells so that their radii of influence overlap, and designing the system to accommodate "shock" loads such as spills and accidental releases related to remedial activities, should satisfy the concern identified in the proposed plan regarding extraction system failure, thereby ensuring that the containment provided by this remedial action will not be compromised.

Therefore, it has been determined, based on additional information provided during the public comment period, that Alternatives 3 and 4 are functionally equivalent with respect to this balancing criterion.

<u>Reduction of Toxicity, Mobility or Volume</u>

Addresses the anticipated performance of the treatment technologies a remedy may employ.

Alternative 2, the in-situ treatment option, should reduce contaminant levels within the aquifer (although mobile constituents can be transformed and degraded by aerobic microorganisms, their specific metabolites have not been fully characterized). Both Alternatives 3 & 4 utilize conventional technologies that have proven to be effective in reducing the toxicity and volume of contaminated ground water. The presence of the slurry wall will not, in itself, reduce the toxicity of the contaminated water, but in conjunction with extraction and treatment, would provide contaminant reduction similar to the non slurry-wall options.

Therefore, it has been determined that Alternatives 3 and 4 are functionally equivalent with respect to this balancing criterion.

<u>Short Term Effectiveness</u>

Addresses the period of time needed to achieve protection and any negative effects on human health and the environment that may be posed during the construction and implementation period, until cleanup standards are achieved.

Alternative 2 cannot be ranked in terms of short-term effectiveness until further pilot- and bench-scale tests are performed. However, Alternative 2 will cause minimal exposure during installation of the well system, and control and monitoring equipment. Approximately 3-10 months will be required to meet the containment objectives of the operable unit.

For the Alternative 3 extraction and treatment options, installation of extraction and re-injection wells and the construction of a treatment plant will cause limited exposure to hazardous substances. Approximately 2-6 months will be required to meet the containment objectives of this operable unit.

The installation of a slurry wall (Alternative 4) will cause exposure to humans because of increased air emissions during construction of the wall, and management and off-site disposal of excavated soils (if determined to be hazardous enough to warrant this action). The short-term effectiveness of Alternative 4 is also dependent on management of the residuals associated with the excavation of potentially contaminated soil during slurry wall construction. However, potential impacts on the surrounding area from this action will be minimized through the use of vapor-suppressing foam and other similar means. This activity may also cause disruptions to electrical and gas utilities and to water mains vital to area services during construction activities, as was identified during the public comment period. Disruptions to neighboring residents, Reilly's everyday operations, and to Conrail's operation of the railroad tracks along the western property boundary are also possible as a result of construction. Installation of extraction and re-injection wells and the construction of the treatment plant for this Alternative would cause limited exposure to hazardous substances. Approximately 6-12 months would be required to meet the containment objectives of the operable unit.

Therefore, based on the new information presented to EPA during the public comment period, it has been determined that Alternative 3 is superior to the other alternatives in effectiveness in the short term.

Implementability

Addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed for a particular option to be put in place.

The equipment and materials required for the Alternative 3 extraction and treatment options are available and commonly used for remediation. The use of extraction wells is a proven, reliable method for ground-water extraction. Air stripping, biological treatment and carbon adsorption are all proven technologies. Treatability testing of these technologies will be needed to determine design and operating requirements for the ground water from the site. The options which involve air stripping may need emissions control to meet air emissions standards. The activated carbon system would need replacement and/or regeneration of carbon periodically. The Alternative 2 in-situ treatment options involved installation of a network of wells, using commercially available components, but tailored to subsurface conditions. Field testing would be required to effectively develop the design.

Although slurry walls have been used for remediation at other sites, and the technology to install deep slurry walls is available, potential problems exist with installing a wall to confining layer depths such as those at the Site, and in keying the wall into shale bedrock. Complications in the construction of the slurry wall could also arise from the presence of underground utilities.

Therefore, it has been determined that Alternative 3 is superior to the other alternatives with respect to implementability.

<u>Cost</u>

Included are capital costs, annual operation and maintenance costs (assuming a 30 year time period), and net present value of capital and operation and maintenance costs. The selected remedy must be cost effective.

The FFS presented net present worth cost estimates for each of the four alternatives brought forward for detailed analysis. These estimates were derived from literature, vendor quotations, actual costs from similar projects, and standard cost information sources. Cost estimates are provided primarily for the purpose of conducting a comparative assessment between remedial options, in order to assess the economic feasibility of the different alternatives. Where limited or insufficient information was available regarding site-specific hydrogeologic characteristics or contaminant specific treatability efficiencies, assumptions were made based on literature and professional judgement where necessary to develop costs associated with different processes. As directed by U.S. EPA, the FFS also presented a cost-sensitivity analysis for each of the alternatives, outlining expected, best, and worst cases. The cost estimates provided in the FFS are expected to provide an accuracy of +/- 50 percent, except for Alternative 4 which has undergone a slightly more detailed analysis, provided to U.S. EPA during the public comment period.

Cost estimates for Alternative 3, Ground Water Extraction/Treatment/Discharge, and Alternative 2, In-situ Bioremediation, are comparable. Expected capital costs for Alternative 2 are higher, at $8 million (versus $5.4 million to $5.5 million for Alternative 3), but operation and maintenance costs are lower for Alternative 2; $1.1 million for the first two years and $660,000 annually thereafter for Alternative 2, and $1 million annually for Alternative 3. The 30-year present worth costs are $15 million, and between $13.9 million and $15 million for Alternatives 2 and 3, respectively. Alternative 4, which incorporates the fully-encircling slurry wall, has a higher expected capital cost (estimated to be between $19.2 million and $22.7 million, based on information presented to EPA during the public comment period), but a lower expected annual operation and maintenance cost (estimated at between $470,000 and $700,000). The expected 30-year present worth estimate for Alternative 4 is between $23.6 million and $29.4 million.

Therefore, based on analysis of the costs associated with all of the alternatives analyzed in the FFS, it appears that Alternative 3 has the lowest capital cost, Alternative 4 has the lowest operation and maintenance costs, and Alternatives 2 and 3 have the lowest present worth cost.

MODIFYING CRITERIA

State Acceptance

Addresses whether or not the State agency agrees to or objects to any of the remedial alternatives, and considers State ARARs.

The Indiana Department of Environmental Management (IDEM) has been intimately involved with the Site throughout the RI/FS, has attended all technical progress meetings, has been provided opportunity to comment on technical decisions, and concurs with the selection of Alternative 3 as the selected remedy for this interim action at the Site.

Community Acceptance

Addresses the public's general response to the remedial alternatives and proposed plan.

Throughout the RI/FS at the Site, community involvement has been moderate. U.S. EPA has been accessible and responsive to community concerns throughout the study. At the public meeting for the proposed plan, there were many citizens who voiced opposition to the proposed slurry wall alternative for many reasons. Written public comments also reflected many of the reasons for opposition. These included that the added benefits of the slurry wall did not justify the additional costs; installation of the slurry wall would disrupt the neighborhood, area utilities and Minnesota Street; installation of a slurry wall at the Reilly site would be difficult to accomplish and even more difficult to monitor and repair; and the cost differential between the slurry wall and the ground-water extraction alternatives could be better spent by Reilly on improvements in the company and for the workers and surrounding neighbors.

At the public meeting, the majority of those in attendance, as well as the majority of those who submitted written comments regarding the proposed plan, were in favor of Alternative 3 as the most appropriate choice for this action. Reasons for this ranged from cost effectiveness to short-term effectiveness to implementability.

In summation, Alternative 1 is unacceptable for protection of human health and the environment. Alternative 2 would require additional time for pilot studies, may not be effective, and has a similar present worth cost as Alternative 3. Alternative 4 may pose problems regarding short-term effectiveness, implementability, and cost effectiveness. Therefore, the best balance among the four alternatives is Alternative 3, Ground-water Extraction, Treatment and Discharge.

Selected Remedy

As was discussed in the previous section, EPA has selected Alternative 3 - Ground-water Extraction, Treatment and Discharge as the appropriate interim remedy for the Reilly Tar and Chemical site. This alternative was selected because it is the most appropriate alternative for this interim action and is compatible with the final remedial alternatives anticipated for the Site, which will mainly encompass source-area remediation.

The objective of this interim action is to contain the site to prevent the further off-site migration of ground water contaminated by the site. Design of this remedy will also include adequate documentation so that it can be demonstrated that ground water is indeed being captured by the extraction system and not migrating from the site.

The FFS described two different ways this alternative could be implemented. The first was a combination of ground-water extraction down-gradient (or east) of the site and biological treatment, followed by filtration and activated carbon adsorption to meet the cleanup standards. After the biological treatment, 0.5 million gallons of water per day would be discharged to the Publicly Owned Treatment Works (POTW). The remainder of the water would be reinjected to the aquifer after the activated carbon treatment. This alternative was described as Alternative 3A.

Alternative 3B consisted of a combination of ground-water extraction up-gradient (or west) of the site and in the interior of the site. Ground water extracted from the up-gradient side of the site would be treated with precipitation/clarification followed by activated carbon to meet the cleanup standards. Ground water extracted from the interior of the site (primarily for gradient control) would be treated with precipitation/clarification followed by air stripping to meet the cleanup standards. Following treatment, the ground water extracted from the up-gradient wells

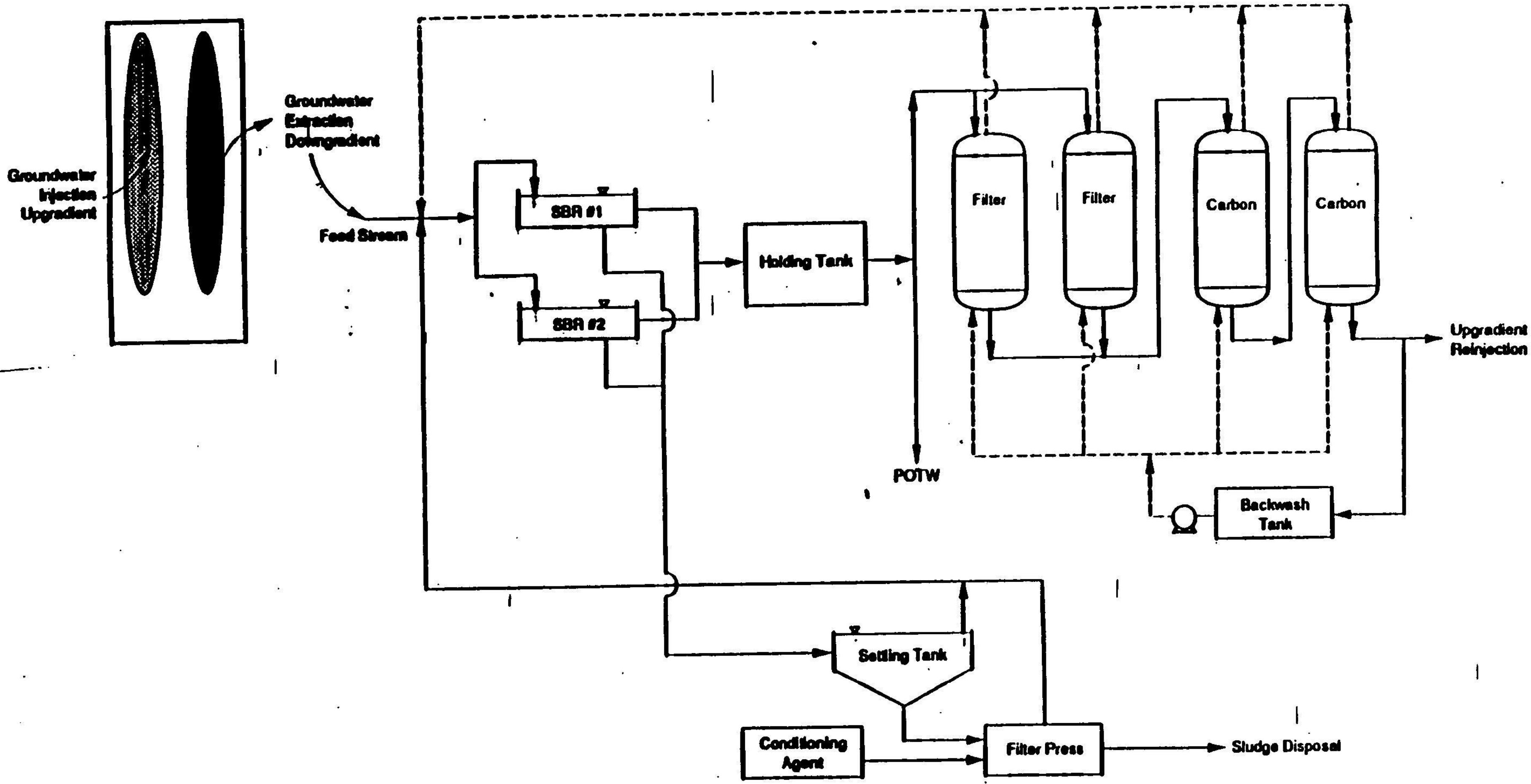
Groundwater Injection Upgradient
Groundwater Extraction Downgradient
Feed Stream
SBR #1
SBR #2
Holding Tank
Filter
Filter
Carbon
Carbon
Upgradient Reinjection
POTW
Backwash Tank
Settling Tank
Conditioning Agent
Filter Press
Sludge Disposal

FIGURE 7

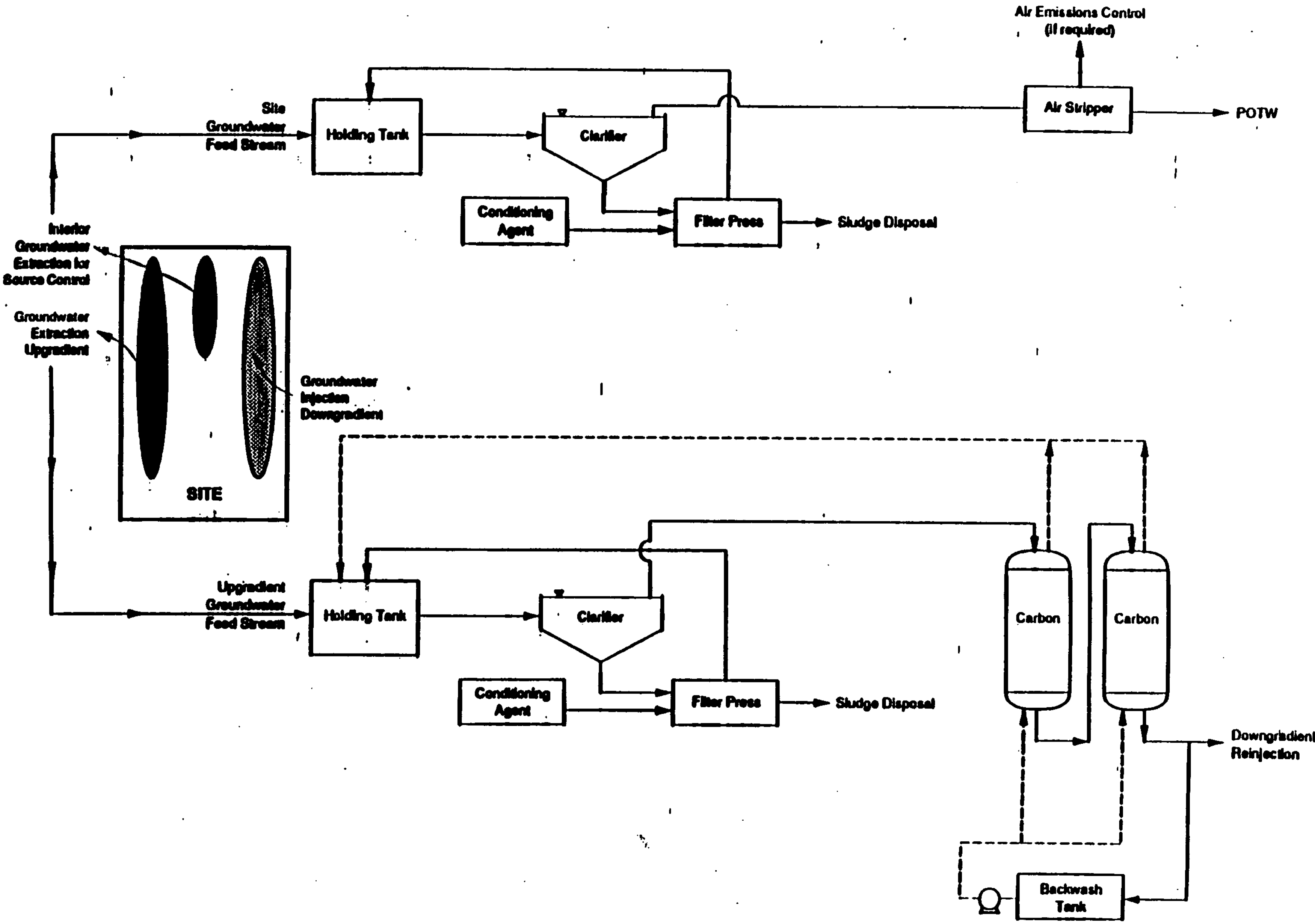
Air Emissions Control
(If required)
Site
Groundwater
Feed Stream
Holding Tank
Clarifier
Air Stripper
POTW
Conditioning
Agent
Filter Press
Sludge Disposal
Interior
Groundwater
Extraction for
Source Control
Groundwater
Extraction
Upgradient
Groundwater
Injection
Downgradient
SITE
Upgradient
Groundwater
Feed Stream
Holding Tank
Clarifier
Conditioning
Agent
Filter Press
Sludge Disposal
Carbon
Carbon
Downgradient
Reinjection
Backwash
Tank

FIGURE 8

TABLE 5

Discharge Criteria
Reilly Site, Indianapolis, IN

Contaminant	Recharge[illegible] Limit (µg/l)	Discharge to POTW Limit[illegible] (µg/l)	
Volatile Organic Compounds			
methylene chloride	5	19.07	
acetone	-	-	
chloroform	100	58.80	
1,2-dichloroethane	5	95.36	
2-butanone	-	-	
bromodichloromethane	100	-	
benzene	5	30.20	*
toluene	1000	14.83	*
ethylbenzene	700	75.23	*
total xylene	10,000	-	*
Pyridine Derivatives			
pyridine	35[illegible]	-	*
2-picoline	35[illegible]	-	*
3 & 4-picoline	35[illegible]	-	*
2,6-lutidine	35[illegible]	-	*
2-ethylpyridine	35[illegible]	-	*
2,4 & 2,5-lutidine	35[illegible]	-	*
2,3-lutidine	35[illegible]	-	*
3-ethylpyridine	35[illegible]	-	*
4-ethylpyridine	35[illegible]	-	*

TABLE 5 (CON

Discharge Criteria
Reilly Site, Indianapolis, IN

Contaminant	Recharge[a] Limit (µg/l)	Discharge to POTW Limit[b] (µg/l)	
3,5-lutidine	35[e]	-	*
3,4-lutidine	35[e]	-	*
2-methyl-5-ethylpyridine	35[e]	-	*
2-methyl-3-ethylpyridine	35[e]	-	*
3-ethyl-4-methylpyridne	35[e]	-	*
Polynuclear Aromatic Hydrocarbons			
naphthalene	-	-	
1-methylnaphthalene	-	-	
Metals			
aluminum	-	-	
arsenic	50	4,000	
barium	1000[d]	-	
beryllium	1	-	
cadmium	10[d]	1200[e]	
chromium	50[d]	24,000[e]	
cobalt	-	-	
copper	1,300	2,200[e]	
lead	5	4,700	
mercury	1	25	
nickel	100	7,300	
selenium	10[d]	-	
silver	35	4,200	

TABLE 5 (CONT.)

Discharge Criteria
Reilly Site, Indianapolis, IN

Contaminant	Recharge[a] Limit (µg/l)	Discharge to POTW Limit[b] (µg/l)
vanadium	-	-
zinc	-	38,000[e]
Semi Volatiles		
2,4-dimethylphenol	-	-
bis(2-ethylhexyl) phthalate	4,200	-
3 & 4-dimethylphenol	-	-
General Water Quality	(mg/l)	(mg/l)
ammonia - nitrogen	30	-
nitrate - nitrogen	10	- *
kjeldahl - nitrogen	-	-
nitrite - nitrogen	1	-
nitrate + nitrite	10	-
phosphorus[f]	1	-
calcium	-	-
iron[g]	1	-
magnesium	-	-
manganese	-	-
potassium	-	-
sodium	-	-
hardness (as $CaCO_3$)	-	-
chemical oxygen demand	-	-
total organic carbon	-	-

Discharge Criteria
Reilly Site, Indianapolis, IN

Contaminant	Recharge Limit (mg/l)[a][c][d]	Discharge to POTW Limit[b][e] (mg/l)
total suspended solids[f]	25 - 30	-
biological oxygen demand[f]	25 - 30	-
alkalinity	-	-
pH	6 - 9	5 -10
specific conductivity (micromhos/cm)	1,200	-
chlorides	250	-
sulfates	250	-
temperature	-	-

(a) Based on MCLs or other pertinent standards.
(b) Based on Reilly's existing permit for discharge to the Belmont POTW.
(c) Calculated assuming hazard index of 1.
(d) Supplied by IDEM by fax dated 9/5/91.
(e) Indianapolis City Sewer Ordinance.
(f) Clark, Viessman and Hammer, 1977.
(g) Supplied by EPA in letter dated 9/16/91.

** Results from filtered samples are in parentheses.

treatment, the ground water extracted from the up-gradient wells would be reinjected to the aquifer and ground water extracted from the interior wells would be discharged to the POTW.

U.S. EPA did not specifically select either of these options for this Record of Decision. Although Alternative 3 satisfies the nine criteria as being the most appropriate alternative for this action, actual remedial design of this system will determine which of these two options, and the specific design parameters for said option (see Figure 7-treatment train for Alternative 3A and Figure 8-treatment train for Alternative 3B), is the most appropriate for satisfying the remedial objectives of halting the off-site spread of contaminants from the site and achieving the cleanup standards listed below in the most expeditious manner.

Extracted ground water will be treated using the above methods to meet the cleanup standards (see Table 5-cleanup standards are marked with asterisks). Cleanup standards are: benzene - 5 ppb; pyridine - 35 ppb; pyridine derivatives (2-picoline, 3 & 4-picoline, 2,6-lutidine, 2-ethylpyridine, 2,4 & 2,5-lutidine, 2,3-lutidine, 3-ethylpyridine, 4-ethylpyridine, 3,5-lutidine, 3,4-lutidine, 2-methyl-5-ethylpyridine, 2-methyl-3-ethylpyridine, 3-ethyl-4-methylpyridine) - 35 ppb; ammonia (as nitrate) - 10 ppm; trichloroethene - 5 ppb; ethylbenzene - 700 ppb; toluene - 1000 ppb; total xylenes - 10,000 ppb; benz(a) anthracene - 100 parts per trillion (ppt); benzo (a) pyrene - 200 ppt; benzo (b) fluoranthene - 200 ppt; benzo(k) fluoranthene - 200 ppt; chrysene - 200 ppt; dibenz(a,h) anthracene - 300 ppt; indeno (1,2,3 -c,d) pyrene - 400 ppt. If at any time, any contaminants are present in the extracted ground water other than those listed in this paragraph that exceed a 10(-6) cumulative lifetime cancer risk, or MCLs for carcinogens, whichever is more stringent; and MCLs, maximum contaminant level goals (MCLGs), or a hazard index of 1.0, whichever is more stringent, for non carcinogens, additional remedial work as determined by U.S. EPA shall be performed.

The point of compliance for these levels for this action only, will be the site property boundary, as is illustrated in site documents such as the RI and the FFS and is included in this ROD. While this action will ensure that ground water will not migrate past the site boundary, any ground water at the point of compliance must meet the cleanup criteria mentioned above.

Documentation of Significant Changes

EPA published a proposed plan for this interim action on January 16, 1992, that selected Alternative 4 (slurry wall) as the preferred remedial action. This selection was based on the knowledge of the site and the Focused Feasibility Study that was prepared by Reilly and approved by EPA. In the FFS, Reilly prepared a cost sensitivity analysis for each of the alternatives to analyze the costs from three scenarios: an expected case, a lowcost estimate and a high cost estimate. This analysis was required by EPA so that the alternatives could be compared based on all available data. In the FFS, it was assumed for the expected case that 50% of all excavated soils would have to be disposed of offsite at a cost of approximately $12 million. EPA prepared a memorandum dated February 16, 1992, which analyzed the major component of the anticipated cost of slurry wall construction, namely, the off-site disposal of excavated soils. The results of this memorandum, which calculated expected contaminant concentrations on the soils based on ground-water monitoring results from the RI, appeared to indicate that the bulk of the excavated soils would not be sufficiently contaminated to necessitate off-site disposal, which would decrease this estimate.

The comments received during the public comment period are one measure of the community's acceptance of U.S. EPA's proposed remedy. Comments received during the public comment period from local utility companies as well as a slurry wall contractor indicated that the costing analysis presented in the FFS was not entirely correct and that potential costs were dramatically greater than initially estimated. Numerous comments from local citizens also reflected concerns with EPA's remedy selection and voiced many of the concerns that are outlined here. Potential disruption to local utilities was not presented as a major problem in the initial FFS; however, the local gas company raised the comment that slurry wall construction would impact their customers by removing from service a vital transmission line that cannot be bypassed during the winter season.

Slurry wall cost estimates in the FFS did not accurately portray the costs of rerouting electrical power lines, sewer lines, phone lines, water mains, construction of a suitable roadbed for emplacement over the completed trench where it crosses Minnesota Street in two locations, operational traffic requirements imposed by the City of Indianapolis for rerouting traffic while the slurry wall construction proceeds across Minnesota Street, providing for stability for the foundations of large active storage tanks along the western boundary of the site, design of a railroad embankment structure that could be rapidly emplaced over the slurry trench to allow the use of active Conrail railroad tracks along the western boundary of the site as well as lines entering the Reilly facility used for transportation of Reilly products, providing for vapor suppression foam to minimize dust and air quality impacts from slurry wall construction, minimizing construction impacts on the residences located immediately adjacent to the northern boundary of the site, work requiring Level C protective clothing (including respiratory protection) and potential requirements of bedrock grouting to ensure adequate connection to the shale bedrock.

Based on information received during the public comment period that was not available to EPA at the time the proposed plan was released for public comment as well as public sentiment towards the proposed integrity of the community, EPA has chosen Alternative 3, instead of Alternative 4, as its interim remedial action for ground water at the Site. Alternative 3 consists of ground-water extraction, treatment and discharge.

Statutory Determinations

EPA and IDEM believe the selected remedy satisfies the statutory requirements specified in Section 121 of SARA to protect human health and the environment; will comply with ARARs (or provide grounds for invoking a waiver); provides overall effectiveness proportionate to its costs; and will utilize permanent solutions and alternate treatment technologies to the maximum extent practicable.

Protection of Human Health and the Environment

The selected remedy, Alternative 3, provides protection of human health and the environment for this ground-water operable unit action by intercepting contaminated ground water before it reaches potential off-site receptors. No unacceptable short-term risks will be posed by the implementation of the remedy.

The selection of treatment trains will be made in the design phase of the remedy. Any potential for cross-media impacts being caused by treatment and discharge will be addressed in the design phase of the remedy, and will be prevented by compliance with ARARs. Treatment trains which create a potential for such cross-media impacts (e.g., air-stripping) will be evaluated in the light of such concerns and, if selected, will be required to comply with ARARs. Discharge of treated ground water to the POTW is contemplated, and compliance with ARARs will be required for any such discharge.

Attainment of Applicable or Relevant and Appropriate Requirements

This action meets Federal and State ARARs specific to the extraction and treatment of contaminated ground water. Due to the limited nature of this operable unit action, chemical-specific ARARs for ground water and surface water will not be addressed, except that ground water treated and discharged to the aquifer will meet MCLs. SARA Section 121(d)(4)(A) allows for selection of a remedy not meeting ARARs when the remedial action selected is only part of a total remedial action that will ultimately meet all ARARs. The National Contingency Plan (NCP) as set forth at 40 CFR 300.430 (f)(ii)(c)(1) indicates that an alternative that does not meet Federal or State environmental laws may be selected if the alternative is an interim measure and will become part of a total remedial action that will, when completed, attain the applicable or relevant and appropriate requirements. ARARs specific to this operable unit interim action remedy are listed below.

Chemical Specific ARARs

The remedy selected contemplates the discharge/recharge of treated water to the aquifer. Therefore, compliance with ARARs for discharge to ground water, as summarized below, will be required.

The Safe Drinking Water Act sets Maximum Contaminant Levels and Maximum Contaminant Level Goals (MCLs and MCLGs) for public drinking water systems. These are codified at 40 CFR Part 141 (Maximum Contaminant Levels). These are considered relevant and appropriate for water to be treated and discharged to the aquifer as a result of this action. Although ground water is not currently used as a potable water supply, it is a potential future source of potable water; therefore, the NCP (40 CFR 300.430(e)(2)(B)) indicates that it is appropriate to treat the water to levels consistent with future use as drinking water (i.e. to MCLs established pursuant to the SDWA).

The Indiana Department of Environmental Management (IDEM) has also developed water quality standards to prevent degradation of State waters. These standards are set forth at 327 Indiana Administrative Code (IAC) 2-1. Underground Water Standards are set forth at 327 IAC 2-1-7. All ground waters of the State which are a present or probable future source for public or industrial water supply shall meet water quality standards.

The Resource Conservation and Recovery Act (RCRA) ground-water protection standards are set forth at 40 CFR 264.29 and 264.94. These standards provide that ground water must be cleaned up to meet 1) MCLs where such standards are available, 2) background levels where appropriate, or 3) a RCRA Alternative Concentration Level, which may be established for a specific contaminant for which an MCL has not been established.

Action-Specific ARARs

The use of filtration to remove suspended solids or metals will produce a solid waste which must be disposed of in accordance with the applicable RCRA regulations. The Land Disposal requirements of RCRA are set forth at 40 CFR Part 268.

Transportation requirements for shipment of hazardous wastes are applicable, and these regulations are set forth at 40 CFR 263, 49 CFR 107, 171-179.

The Underground Injection Control Program's requirements will be applicable to the remedial action selected as a component of the action calls for the recharge to the aquifer by injection wells of treated ground water. The regulations set forth at 40 CFR Part 144 are applicable. The Criteria and Standards set forth at 40 CFR Part 146 are also applicable to this action.

State ARARs for underground injection of pollutants also apply here. The applicable regulations are set forth at 327 IAC 5-4-2.

Depending on the components selected in the design phase for treatment of the contaminated ground water extracted from the aquifer, the following regulations may apply:

--Chemical-specific ARARs for by-products of biological treatment

--40 CFR 268, regarding RCRA Land Disposal Restrictions, for disposal of spent activated carbon

--40 CFR 264.1032, Organic Air Emission Standards for Process Vents pertains to air-stripping operations that emit total organics of 10ppm by weight or greater

State and local ARARs for Air Pollution also may apply (depending on treatment components selected in design and weight of pollutants emitted). These include:

--Indiana's Air Management Rule set forth at 326 IAC 8. Sources emitting in excess of 25 tons a year must demonstrate compliance with Best Available Control Technology (BACT) requirements

The remedy selected will involve a discharge to the POTW. State Industrial Pretreatment Requirements require compliance with § 307(a) of the Clean Water Act (CWA). This requires notification of the discharge of toxic pollutants in amounts exceeding the limits defined by the Act and its implementing regulations.

--Indianapolis Air Pollution Control Board Permits. Sources that emit in excess of 3 lbs per hour or 15 lbs per day are required to obtain a construction permit and an operating permit.

__Location-Specific ARARs__

The site is an operating RCRA facility. RCRA explicitly regulates all storage, treatment or disposal of hazardous waste. Because the site is a RCRA facility, the RCRA regulations are applicable to all remedial actions undertaken at the site.

Because the remedy selected for this interim action will involve discharge to the local POTW, which is off-site, the following ARARs are applicable:

--40 CFR Part 122.42(b), NPDES Permit Regulations, requires the notification to the issuing authority of a re-evaluation of POTW pretreatment standards (n.b., if the local POTW does not have a local limitation for a particular pollutant to be discharged from this Superfund site, then it must develop such a limitation to prevent interference, pass-through, or inhibition, from occurring as a result of the discharge).

--40 CFR Part 403.5, NPDES National Pretreatment Standards, requires that discharge to a POTW not result in interference, pass-through of pollutants to receiving water or contamination of sewage sludge. --

State ARARs for pretreatment include 327-IAC 5-11, limiting discharges to POTW, and 327 IAC 5-13, regarding the applicability of the Industrial Waste Pretreatment Program.

Cost-Effectiveness

The remedy selected will provide an overall effectiveness proportionate to its cost by employing a readily available and proven technology to contain and prevent off-site migration of contaminants while treating the captured ground water to MCLs, or other levels, before recharge to the aquifer. While the operation and maintenance costs for this remedy are higher than Alternative 4 ($1,000,000 annually for Alternative 3 versus approximately $500,000 annually for Alternative 4), the initial capital costs expected for implementation are considerably lower (approximately $5,000,000 for Alternative 3 versus $20,000,000 for Alternative 4).

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The intent of this operable unit is to provide effective remediation of the potential threat posed by off-site migration of ground water contaminated by the Site, while providing flexibility in developing a final remedy for the Site. The remedy selected for this interim action will contain and isolate contaminated ground water at the Site until the source areas on-site can be thoroughly defined, characterized and remediated.

The threshold criteria, **Protection of Human Health and the Environment**, and **Compliance with ARARs**, eliminated Alternative 1 from consideration. The need for pilot-scale testing and the uncertainties associated with the performance of Alternative 2 eliminated it from further consideration. Two of the five primary balancing criteria, **Long-term Effectiveness**, and **Reduction of Toxicity, Mobility, or Volume through Treatment** , indicated that the remaining two alternatives presented in the FFS were functionally equivalent. However, two of the balancing criteria, **Short-term Effectiveness** and **Implementability**, indicated that Alternative 3 was superior to Alternative 4, once the additional information (not supplied in the FFS but presented during the public comment period) was factored into the evaluation of alternatives.

The superiority of Alternative 3 over Alternative 4 when both alternatives were measured against these two criteria was evidenced by higher risks and greater difficulties in implementation associated with Alternative 4. The higher risks were attributable to the dangers of contact with contaminants encountered in excavation of a trench for a slurry wall in an area proximate to individual residences, while greater difficulties of implementation were presented by the Site's location in an area where roads, railways, and buried utilities made the construction of a slurry wall a potential source of serious disruption to the community.

Furthermore, the considerations of State and community acceptance also support the selection of Alternative 3, as a number of the comments received indicated that the selection of Alternative 4 would present problems of community acceptance due to potential disruption of traffic and utilities in the area. The majority of the comments received indicated a much higher level of community acceptance for Alternative 3.

Utilization of permanent solutions and alternative treatment technologies was not considered practicable within the limited scope of this interim action operable unit. Isolation of the site will allow more flexibility for the study and design of permanent solutions for the overall site remedy.

Preference for Treatment as a Principal Element

The statutory preference for selection of remedial actions in which treatment is a principal element is satisfied by the selection of Alternative 3. Although this interim action is only intended to contain and prevent migration of the contaminant plume, pending future operable unit remedial actions to address source areas on-site, and despite the fact that this interim action will only address chemical-specific ARARs to the extent that ground water discharged to the aquifer will be remediated to meet MCLs, this latter clean-up objective will be achieved by the use of treatment trains whose specific components will be selected in the Remedial Design phase. Because this action is an interim action that is designed to control ground water movement, it is not designed to treat the principal threats at the site. These will be addressed in future source area actions.

EPA and IDEM believe the selected remedy satisfies the statutory requirements specified in Section 121 of SARA to protect human health and the environment, attain ARARs (or provide grounds for invoking a waiver), and utilize permanent solutions and alternate treatment technologies to the maximum extent practicable.

APPENDIX A

Reilly Tar & Chemical
Indianapolis, Indiana

RESPONSIVENESS SUMMARY

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with CERCLA Section 117, a public comment period was held from January 16, 1992 to March-31, 1992, to allow interested parties to comment on the United States Environmental Protection Agency's (U.S. EPA's) Focused Feasibility Study (FFS) and Proposed Plan for an interim ground-water remedy at the Reilly Tar and Chemical Superfund site. At-a January 23, 1992, public meeting, EPA and Indiana Department of Environmental Management (IDEM) officials presented the Proposed Plan for ground-water remediation at the Reilly site, answered questions and accepted comments from the public. Written comments were also received through the mail.

II. BACKGROUND OF COMMUNITY CONCERN

Reilly Industries is an operating RCRA facility located on the south side of Indianapolis, Indiana. Reilly Tar & Chemical (its former name) was proposed for the NPL in 1983.

There is a lengthy history of community concern about the Reilly Tar & Chemical Company (now Reilly Industries). Complaints about pollution from the site are recorded as far back as 1955, when concerns about contaminated wells were made to the Indiana Department of Conservation. Indiana State Board of Health tests showed contaminants from Reilly in local drinking-water wells. Consistent complaints since then have revolved around water issues and air pollution. The issues have received significant media attention all along.

III. EPA'S PROPOSED REMEDY AND ITS RELATION TO THE FINAL ROD

In a Proposed Plan that was issued on January 16, 1992, U.S. EPA selected Alternative 4, Fully Encircling Slurry Wall with accompanying Ground-water Extraction, Treatment and Discharge. This remedy was based on the information presented in the FFS prepared by Reilly. During the public comment period, EPA received numerous comments regarding the selection of Alternative 4, most of which were not favorable. The majority of the comments recommended that U.S. EPA select Alternative 3, Ground-water Extraction, Treatment and Discharge. As a result of the significant public comment received, which included information that was not available to EPA at the time the Proposed Plan was released, EPA has selected Alternative 3 for the Record of Decision. As a result of this additional information and the change in the selected remedy, many of the comments that were raised regarding the remedy selection have, in effect, already been answered. However, EPA will attempt to provide information relative to the change in remedy, demonstrating that public concerns play a large role in Superfund remedy selection.

IV. SUMMARY OF SIGNIFICANT COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

The comments are organized into the following categories:

A. Summary of comments concerning potential disruption to the neighborhood and local utilities, including safety and health concerns

1. Comments were raised concerning disruption to the neighborhood from increased truck and construction traffic and disruption to area utilities from the slurry wall installation activities.

U.S. EPA response 1: U.S. EPA understands the concerns relating to the potential disruption to the neighborhood from the slurry wall construction. While the majority of the construction work would occur onsite, the excavated material would remain onsite until final disposition was decided, and measures would be taken to ensure that disruption would be minimal, EPA agrees that the disruption to area utilities, including gas and water mains that are vital to area services, that would be associated with slurry wall construction is more important than originally presented in the FFS. Therefore, potential long-term benefits from slurry wall construction are outweighed by short-term effects on the area.

2. Comments were raised regarding potential exposure to contaminated soil that to be excavated for the slurry wall construction.

EPA response 2: During typical slurry wall construction activities, exposure to excavated soils and wind-blown dust is minimized. Vapor-suppressing foam and water spray are typically used for soil piles to minimize exposure to harmful emissions. Tarps and plastic sheeting are also typically used to cover the piles to prevent exposure to the elements. Finally, portable instruments are used to monitor the air around the excavation so that the impacts of potential emissions on the neighborhood are minimized. Because the selected remedy was changed to Alternative 3, this potential exposure should be greatly reduced. However, measures will be taken to ensure that well drilling and development activities do not release potential contaminants into the air. Also, the site health and safety plan will contain provisions for monitoring the air space around each drill site so that human health and the environment are properly protected.

B. Summary of comments concerning cost of the proposed remedy

3. Comments were raised regarding the estimated costs for Alternative 4 and their relation to the estimated costs for the other three alternatives, particularly Alternative 3.

EPA response 3: EPA based its decision on the remedy contained in the proposed plan on the information that was available in the Site FFS. However, based on information presented during the public comment period, it does not appear that the benefits of the slurry wall justify the added costs. Therefore, EPA has selected Alternative 3, as outlined above.

C. Summary of comments concerning the feasibility, reliability, constructability, and other engineering concerns of the proposed remedy

4. Comments were raised regarding problems with slurry wall installation and monitoring such as difficulty in installing and keying into bedrock and difficulty in inspecting and repairing fractures and breaks.

EPA response 4: Slurry walls are becoming more common in remediating waste sites. Slurry wall installation problems are commonly addressed during remedial design so that potential problems can be avoided. Water levels, both inside and outside of the slurry wall, are typically monitored continuously so that containment can be proven. Slurry wall inspections typically consist of evaluating monitoring information and performance of soil strength tests so that slurry wall performance can be maximized. Fractures in slurry walls are typically repaired by injecting grout into the problem area or, in more extreme cases, an entire section of the slurry wall is excavated and replaced.

5. Several comments stated that the installation of the slurry wall would impede remedial efforts near the wall, that the installation would cause ground subsidence, and permanently impede the natural ground-water flow. They also commented that without interior pumping, rising ground water levels would cause the wall the collapse, installation would cause an increase in contaminant mobility, and the slurry wall would be susceptible to earthquakes.

EPA response 5: Because the difference in the ground-water elevation onsite and offsite would be minimal (1-2 feet), there would not be much chance for ground subsidence. The installation of the slurry wall would not impede remedial efforts near the wall because of the effects of the interior pumping and the resultant inward ground-water flow, nor would there be any "bathtub effect" because of the constant pumping. Slurry walls are commonly designed to withstand ground-water pressure, usually by increasing the wall thickness. Finally, contaminant mobility is usually not increased due to the constant mixing of soils with the slurry in the construction trench. Earthquakes are not a problem with soil bentonite slurry walls because they are flexible and if the wall does not cross an active fault line, are not a detriment.

6. Commentors raised concerns over health and safety issues such as children falling into the slurry trench, physical movement of the contaminated soil, and the fact that clay is not impervious.

EPA response 6: Construction of a slurry wall does not include an "open" trench such that people could fall in. Trenches are excavated and immediately filled in with a soil slurry such that these activities are almost simultaneous. Not all of the excavated soil would be contaminated and all excavated soils would be piled near the trench until disposition. Clay is not impervious, but it is impermeable enough to effectively stop ground-water flow, especially when combined with an extraction system.

7. Several commentors stated that the slurry wall construction could take 2-3 years to complete, not 6-12 months as was stated in the proposed plan.

EPA response 7. EPA disagrees with this comment in that a comment received from an independent consultant stated that their estimate for completion of the slurry wall was approximately 9 months.

D. Summary of comments concerning the equivalent performance of Alternative 3

8. Many commentors stated that Alternative 3 provided the same benefits as Alternative 4 and, since it was less costly, should be selected.

EPA response 8. Based on information received during the public comment period, EPA agrees that Alternative 3 provides the best balance and is the most appropriate remedy for this action.

9. A commentor stated that Alternative 3 would maintain the natural ground-water flow while Alternative 4 would not.

EPA response 9. EPA disagrees with this comment because both alternatives would alter the natural ground-water flow across the site. By doing this, which is the goal of this action, the site is isolated and any Reilly-related contaminants are prevented from migrating offsite.

E. Summary of comment concerning the problem of off-site contamination

10. Several commentors stated that the presence of the slurry wall would block the ability of the wells installed onsite to draw the off-site plume back to the site.

EPA response 10: The goal of this interim action is to isolate the site so that no site-related contamination can migrate offsite. None of the alternatives were designed to draw any off-site contamination back to the site. The performance goals for Alternatives 2, 3, and 4 are to pump just enough ground water to contain the plume at the site boundary.

11. A commentor stated that the off-site plume could migrate further with the installation of the slurry wall.

EPA response 11: EPA disagrees with this comment. The presence of the slurry wall or the ground-water extraction system would not cause any accelerated off-site plume movement. By isolating the Reilly site so that further degradation to the aquifer is prevented, the off-site plume would not increase in size and extent and probably would decrease in the future.

12. A commentor stated that the installation of the slurry wall would delay work on the off-site plume until additional public hearings were held. This same commentor considered Alternative 3 as being able to partially clean up the off-site plume.

EPA response 12: Alternative 3 was not designed to clean up any off-site contamination. The off-site plume will be the subject of potential future remedial activity so that all risks posed by the Reilly site can be addressed.

13. A commentor stated that the neighborhood should be cleaned up first and that EPA should reconsider their plans to help Reilly with this action.

EPA response 13: The off-site plume will be addressed through future actions as stated previously. EPA is not helping Reilly with this action. EPA is taking steps to correct the contamination problem at the site that has existed for many years. This is the first step towards the ultimate goal, making the Site safe.

F. Summary of comments concerning support for the proposed alternative

14. Several commentors stated that they believed that the proposed alternative would provide greater protection against off-site movement of contaminants and that Alternative 4 would be preferred if EPA didn't think Alternative 3 would be effective.

EPA response 14: EPA expressed concern that if the extraction wells under Alternative 3 failed, contaminants would migrate offsite. During the public comment period, EPA received information that provided assurances that this would not happen. This information, which would be incorporated into remedial design activities, included the installation of sister pumps, the establishment of overlapping cones of influence, and the availability of backup generators, which was not included in the FFS that EPA approved. With this additional information, and the proper remedial design, EPA believes that Alternative 3 will accomplish the goals of this action.

15. A commentor stated that because Reilly continues to spill contaminants, the slurry wall is better.

EPA response 15: Both Alternatives 3 and 4 will contain the site and contain spills through the installation of the containment system.

G. Summary of comments concerning mechanical issues related to Alternative 3

16. Several commentors stated that sister pumps could be installed to ensure the reliability of Alternative 3.

EPA response 16: EPA did not possess this information at the time of the drafting of the proposed plan. Based on the submission of this, and other, information, EPA agrees and has selected Alternative 3 as the remedy for this action.

H. Summary of comment concerning the need for cleanup at the site

17. A commentor asked if the Site would ever be safe.

EPA response 17: Eventually, after all of the sources of contamination are addressed, the Site will be safe. This ground water interim remedy is the first step towards achieving this goal.

18. Many commentors stated that none of the proposed alternatives would make the ground water safe to drink.

EPA response 18: The goals of Superfund are to discover contaminated sites, and remediate the contamination problems posed by those sites. Because the wealth of information on off-site conditions was collected during times that Reilly contaminants were being introduced into the ground, the risks associated with drinking the ground water without the presence of Reilly contaminants is not known. This information would be useful to collect after the extraction system is operational and will be a part of the remedial design so that the effectiveness of the extraction system can be verified.

19. Several commentors stated that current operations are not contributing to the contamination problem and others asked if the pumps installed by Reilly would clean up the site.

EPA response 19: Levels of contamination that were found in off-site wells are similar to levels that were present in sampling done 10 years ago. The RI identified a plume of ground water contaminated with benzene, pyridine, and ammonia that is centered around active Reilly facilities. EPA does not know of any pumps that have recently been installed by Reilly; if they were designed to clean up the site, the RI results would have shown this.

20. A commentor stated that, if left alone, the ground water would be cleaned up by natural biodegradation.

EPA response 20: If the source was removed, this would be true, but it would take many many years. If the source is not removed or contained, then this is not true. This statement can be made for many sites, but EPA has been charged with the task of expediting cleanups so that risks posed by contamination can be minimized or eliminated.

21. A commentor stated that Reilly is currently taking measures not to release contamination.

EPA response 21: EPA is not aware of these activities and, if this is true, they will assist the eventual site cleanup.

I. Summary of comments concerning the need for source control at the site

22. A commentor stated that this remedial action does not provide for treatment of on-site sources.

EPA response 22: This action does not address treatment of on-site sources. Source control, as is outlined in the ROD, will be the subject of future actions at the site.

23. A commentor stated that Alternative 2 is the best alternative after the actual release is stopped,

EPA response 23: Bench- and pilot-scale testing would be needed before the effectiveness of Alternative 2 could be accurately judged. However, it does not appear that with current ground-water conditions, there is sufficient time or distance for bioremediation to work effectively.

J. Summary of comments concerning other issues not related to the other categories of comments listed here

24. A commentor stated that the selection of Alternative 4 would cripple voluntary cleanup action in the Indianapolis area.

EPA response 24: EPA cannot comment on this statement but Superfund sites typically require remediation of contamination problems that are very extensive and costly to fix.

25. A commentor stated that landfilling of the excavated slurry trench soils does not reduce the volume of contaminants.

EPA response 25: EPA agrees with this commentor and with the selection of Alternative 3, this potential problem will be avoided.

26. A commentor stated that after ground-water treatment, Reilly could provide clean ground water to their neighbors.

EPA response 26: This possibility was not discussed during the FFS. It appears unworkable. Ground water will be treated to regulatory standards and discharged to the Publicly Owned Treatment Works or recharged to the aquifer.

27. A commentor stated that the source of the contamination would be located and remediated eventually so current action is unnecessary.

EPA response 27: While the source of the contamination will eventually be remediated, this action will address risks posed by ground-water contamination that have been determined as unacceptable by EPA standards.

28. Several commentors stated that this action will do nothing to address the neighbors' concerns about odors and property values.

EPA response 28: This action is the first action to address the contamination problem at the Reilly site. There will be other actions that will be taken so that eventually, the site will no longer pose a threat to human health or the environment. Odor problems are the result of current operations and are subject to the Clean Air Act regulations.

29. A commentor asked if the State really had a role in remedy selection.

EPA response 29: The State has been intimately involved in all discussions regarding the Site. They have attended all negotiating meetings and have been provided the opportunity to comment on all technical documents produced by Reilly. The State commented on the proposed plan and the ROD, and their concerns have been addressed. This is evidenced by their letter of concurrence that is attached to the ROD for this action.

30. A commentor stated that the best use for the ground water is industrial process water.

EPA response 30: The goal of remedial action at the Site is to address the ground-water contamination problem and through treatment, to reduce to acceptable levels the risks associated with exposure. Following this, the use of the ground water is not restricted as long as the risks are within acceptable levels.

The comments are paraphrased in order to effectively summarize them in this document. The reader is referred to the public meeting transcript which is available in the public information repository, located at the Indianapolis Public Library, 48 East St. Claire, Indianapolis, Indiana. Written comments received at EPA's regional office are on file in the Region 5 office. A copy of these written comments has also been placed in the Indianapolis Public Library.

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ORIGINAL

REILLY TAR & CHEMICAL CORPORATION

INDIANAPOLIS, INDIANA

06/18/92

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65	05/03/91	Baker, R., IDEM	Novak, D., U.S. EPA	Review Comments on Revised CERCLA RI Report & RCRA RFI Phase III Release Characterization Report (for Facility SWMU)	[illegible]
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70	05/23/91	Groff, K., & Clemens, R., ENSR	Novak, D., U.S. EPA	Scope of Work for Collecting Certain Groundwater Quality Data	31
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79	06/13/91	Krumhansl, R., & Clemens, R., ENSR	Novak, D., U.S. EPA	Transmittal--Revised Text & Figures of CERCLA RI & RCRA RFI Phase III Release Characterization Report and Comment Response	28

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83	07/12/91	Marrero, J., U.S. EPA	Novak, D., U.S. EPA	Review of Draft FS	2
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106	10/22/91	Clemens, R., ENSR	Novak, D., U.S. EPA	Responses to Comments on Revised FFS	5
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(These documents may be viewed at Region V Headquarters)

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3	11/07/86	U.S. EPA	9285.4-01	Superfund Public Health Evaluation Manual	0
4	12/24/86	U.S. EPA	9355.0-19	Interim Guidance on Superfund Selection of Remedy	8
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6	04/22/87	U.S. EPA	9285.4-02	Guidance for Coordinating ATSDR Health Assessment Activities with the Superfund Remedial Process	22
7	07/21/87	U.S. EPA	9375.1-09	Interim Guidance on State Participation in Pre-Remedial and Remedial Response	23
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21	11/30/90	U.S. EPA	9230.0-20	Innovative Methods to Increase Public Involvement in Superfund Community Relations	5
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