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FINAL

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ATTACHMENT C

WORK PLAN

AMERICAN CHEMICAL SERVICES, INC.

TECHNICAL SCOPE OF WORK
APRIL 1988

INITIALLY DRAFTED UNDER
EPA WORK ASSIGNMENT NO. 61-5L
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APRIL 1988

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EXECUTIVE SUMMARY

This Work Plan has been prepared to guide the conduct of the Remedial Investigation/Feasibility Study for the American Chemical Services, Inc. (ACS) site located in Griffith, Indiana. The Pazmey Corporation property (formerly Kapica Drum, Inc.), and the inactive portions of Griffith Landfill property are also included within the total site boundary. Review of existing information revealed references to hazardous wastes being disposed of in Griffith Landfill by ACS. There were also references concerning drum and drum cleaning residues from the operation at Kapica Drum, Inc., being disposed of on ACS property adjacent to the Kapica Drum property and in the Griffith Landfill. It is also likely that drum and drum cleaning residues were disposed of by Kapica Drum, Inc., on its own property.

The Work Plan describes the site background, technical approach to site investigation and feasibility study activities, schedule for project execution, and project staffing for conducting an RI/FS at the ACS site. The objectives of the RI/FS are to conduct a remedial investigation to determine the nature and extent of the release or threatened release of hazardous substances, pollutants or contaminants from the American Chemical Services, Inc. site and to perform a feasibility study to identify and evaluate alternatives for the appropriate extent of remedial action, to prevent or mitigate the migration or release or threatened release, of hazardous substances, pollutants, or contaminants from the American Chemical Services, Inc. facility.

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The remedial investigation field work will result in the collection of 68 source characterization samples from the documented and suspected waste burial and soil contamination areas at the site. In addition, 187 site characterization samples (groundwater, surface water, sediment private well and geotechnical) will be collected during the remedial investigation field work.

The feasibility study will include the initial screening of candidate remedial alternatives and subsequent detailed evaluation of selected alternatives. Technical, environmental, economic, and institutional criteria will be utilized to perform the alternative evaluations. A conceptual design and associated cost estimates will be prepared for the recommended remedial strategy.

The estimated time for completion of the RI/FS is 22 months from the date that authorization to proceed is given. This includes 12 months for the remedial investigation and 10 months beyond the end of the RI phase for the completion of the feasibility study.

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SECTION 1
INTRODUCTION

1.1 Site Location and History

The American Chemical Services, Inc. (ACS) site is located at 420 South Colfax Avenue in Griffith, Indiana (Figure 1-1). Although the site name is American Chemical Services, Inc., U.S. EPA has defined the site as including the inactive portion of the Griffith Landfill and the property previously owned by Kapica Drum, Inc. (now owned by Pazmey Corporation) (Figure 1-2). The vast majority of on-site investigative work proposed in the work plan will be on ACS property since it is this property that has a documented hazardous waste disposal history and is on the NPL list. However, review of existing information revealed references to hazardous wastes being disposed of in Griffith Landfill by ACS. There were also references concerning drum and drum cleaning residues from the operation of Kapica Drum, Inc. being disposed of on ACS property adjacent to the Kapica Drum property and in the Griffith Landfill. Kapica Drum Inc. may have disposed of drum and drum cleaning residues on its own property; however, there is no data that substantiates this suspicion.

ACS began operations in May 1955, solely as a solvent recovery firm. Later, the company also began a limited chemical manufacturing operation.

From 1955 to at least 1975, ACS disposed of a variety of hazardous wastes at various locations on its property. The hazardous wastes disposed of on ACS property were primarily from on-site chemical manufacturing and solvent reclamation operations. Some waste was accepted from off-site sources for incineration in the ACS on-site incinerator. The incinerator-generated ash was then disposed of on ACS property.

The Griffith Landfill is still an active sanitary landfill and has been in operation since the 1950's. As stated previously the inactive portion has been included in the Work Plan because it has been reported (Response to U.S. EPA Request for Information sent to ACS-10/18/84) that hazardous wastes from ACS and Kapica Drum, Inc. were disposed of in the landfill prior to the promulgation of RCRA.

Kapica Drum, Inc. had been in operation since 1951. Kapica Drum, Inc. was a drum reconditioning facility which generated drum residues and rinse water from cleaning drums that contained hazardous wastes. Again, as previously stated, it has been included in the Work Plan because it has been reported (response to U.S. EPA Request for Information sent to ACS on 10/18/84) that hazardous waste drum rinse water has been discharged on the ACS and Griffith Landfill property.

Figure 1-3 summarizes the interrelationship between ACS, Kapica Drum, Inc., and the Griffith Landfill based on a review of available information. For a more detailed site history refer to the ACS Initial Site Evaluation Report (document number 160-WP1-RT-AUJD-1).

1.2 Site Status and Project Type

ACS is an active RCRA interim status facility. The 1983 notifier's listing indicates treatment, storage and disposal activities at the site. ACS's EPA I.D. number is IND016360265. The June 1983 Hazard Ranking System scores for this facility were as follows:

1)	Groundwater Route Score	59.86
2)	Surface Water Route Score	8.89
3)	Air Route Score	0
4)	Overall Average Score	34.98

This Work Plan is for a Remedial Investigation/Feasibility Study (RI/FS) project.

1.3 Overview

This Work Plan was initially prepared in accordance with the requirements of the Work Plan Memorandum (Document No. 160-WP1-WM-ARLB-1) and Work Assignment (No. 61-5LJ7.0) for the ACS site. The Work Plan was revised by Warzyn Engineering Inc. (Warzyn) for the ACS Steering Committee. General information regarding the site and background data originally presented by Roy E. Weston, Inc. (Weston) was not verified. The objective of this RI/FS is to evaluate the existence and magnitude of contamination and based upon this RI, recommend cost-effective, viable, remedial action alternative(s) for mitigating the hazard posed by the contamination at the site. Specific objectives of the RI/FS include:

- Determining if the ACS site poses a risk to public health, welfare, or the environment.
- Determining the characteristics, extent and magnitude of contamination at the site.
- Defining the pathways of contaminant migration from the site.
- Defining on-site physical features and facilities that could affect contaminant migration, containment, or cleanup.
- Developing viable remedial action alternatives.
- Evaluating and screening remedial action alternatives.
- Recommending the cost-effective remedial action alternative which adequately protects health, welfare and the environment.

This Work Plan presents the site background, technical approach to site investigation and feasibility study activities, schedule for project execution, and project staffing for conducting the RI/FS at the ACS site in Griffith, Indiana.

The first section of the RI/FS Work Plan presents information concerning the location, history, and the status of the ACS site. The second section summarizes the results of the initial site evaluation as reported in the

Initial Site Evaluation Report (Document No. 160-WP-1-RT-AVJD-1). Included in this section are a site description, contamination problem definition, contaminant migration definition, environmental and health effects review, and operable units discussion. The third section describes remedial action alternatives that could be applied at the ACS site and identifies associated data gaps. The fourth section describes the various tasks that will be performed as part of the remedial investigation activity. The fifth section describes the work elements for the feasibility study. The sixth section presents the project schedule.

SECTION 2
INITIAL SITE EVALUATION

The purpose of Section 2 is to summarize the information presented in the Initial Site Evaluation for the American Chemical Services, Inc. site (Document Number 160-WP1-RT-AVJD-1). For detailed discussion and data refer to that document.

2.1 Site Description

2.1.1 Environmental Setting

The American Chemical Services, Inc. (ACS) site is located 1/2 mile southeast of Griffith, Indiana, in the northeast 1/4 of the southeast 1/4, Section 2, Township 35 North, Range 9 West, Lake County, Indiana. The site includes the ACS property (19 acres), the inactive portions of the 31-acre Griffith Landfill on the southwest, and Pazmey Corporation (formerly Kapica Drum, Inc.) on the south (2 acres). The Chesapeake and Ohio Railroad bisects the site. Griffith is located in the Calumet Lacustrine Plain which is characterized by 40 to 250 feet of Wisconsin Age surficial deposits that composed the bed of Glacial Lake Chicago. The Calumet Lacustrine Plain is an area of low relief with three relict shorelines containing dunes (some up to 40 ft high).

Bedrock consists of 4000 feet of Cambrian to Devonian Age limestones, dolomite, sandstones, and shales overlying Pre-Cambrian granitic basement rock. The Detroit River and Traverse Formations, composed of limestone, underlie the Town of Griffith. The sedimentary rocks are gently flexed to form a saddle-like structure as part of the Kankakee Arch. Dip is five to seven feet/mile to the southeast.

Drainage of surface waters in the city of Griffith is to the north and the Little Calumet River is the major drainageway; on the southside of the city of Griffith, drainage is the south toward Turkey Creek. The sediments of the

Calumet Lacustrine Plain are fine lake silts and clays, paludal deposits of muck and peat, and great expanses of beach and dune sand. Sand and gravel deposits also occur in outwash and in till inclusions, and clay-rich tills are also present in the area. The three beach ridges in the area were formed as falling lake levels in Glacial Lake Chicago slightly stabilized after the Valparaiso Moraine was breached. Each beach ridge formation was accompanied by nearshore foredunes.

The topography at the site is almost level in the portion north of the railroad and rises slowly from 630 to 645 feet above MSL in the southern half of the site. Griffith Landfill has excavated about 30 feet of soil to the west of the ACS Off-Site Drum Containment Area near the southeast boundary of the ACS property, thus modifying the gently sloping topography. A marsh to the north of the landfill and west of the ACS property has a surface elevation of about 625 feet. The two major soils in the area are the Plainfield fine sand and the maumee loamy fine sand with average hydraulic conductivities of 1.42×10^{-2} cm/sec.

There are no natural streams in the area of the site, but a marsh does exist immediately to the west of the northern half of the site. Man-made drainage ditches form the western border of the site and eventually enter Turkey Creek one mile to the south. A natural surface water drainage pond is located just to the west of the western boundary of the site, and a fire pond, a pond in which rainwater is collected to be used in case of a fire at the facility, is located about 200 feet to the east. Turkey Creek, a small stream, flows about 1 mile south of the site and the Little Calumet River is located three miles to the north. A copy of the National Wetland Inventory Map for the region is provided as Figure 2-2.

Surficial deposits are 130 feet thick in the vicinity of ACS. They are divided into three units. Unit 1 is a gray and brown sand 10 to 14 feet thick, Unit 2 is a gray clay 10 to 24 feet thick, and Unit 3 is a sand and gravel layer that extends to bedrock. Bedrock consists of Devonian Limestone. Installation of four shallow groundwater monitoring wells and review of local boring records by the Ecology and Environment, Inc., the U.S. EPA FIT team, confirmed these findings.

Hantke, Hill and Reshkin, (1975) summarized the surficial geology of Lake and Porter counties. Unit 1, was described as medium to coarse silty sand with interbedded beach gravels, and hydraulic conductivity ranging from 2.8×10^{-3} to 4.7×10^{-7} cm/sec. Unit 2 was estimated to have a vertical hydraulic conductivity of 3.3×10^{-7} cm/sec. Unit 3 hydraulic conductivity was estimated to range from 9.4×10^{-3} to 4.7×10^{-2} cm/sec with a storage coefficient of 0.003, indicative of partially confined conditions. Unit 4, a clay unit 15 to 30 feet thick overlying bedrock found regionally was not indicated to be at the site.

At the ACS site, Unit 1 is an unconfined aquifer with a water table that ranges from 3 to 10 feet below the surface. Flow is to the northwest along the Unit 1/Unit 2 contact. Unit 3 is the main aquifer in the area and regional flow in Unit 3 may be to the northeast. (Ecology and Environment, 1980, FIT team report, 1982 and Hantke, Hill and Reshke.) Flow directions at the site in the Unit ? are not documented.

Although it has been previously stated that groundwater flow is to the northwest at the site in Unit 1, it should be noted that because Turkey Creek flows 1 mile to the south and the Little Calumet River is located three miles to the north of the site, a groundwater flow divide may exist somewhere between the two surface water bodies. Also, due to recent and continued excavations of up to 30 feet of soil from the Griffith Landfill, regional groundwater data may not adequately characterize present conditions at the site.

2.1.2 Site History

A detailed site chronology for the ACS site is included in the ACS Initial Site Evaluation Report (Document No: 160-WP1-RT-AVJD-1). The chronology is divided into the following categories:

- ACS Property Ownership History
- Indiana State Board of Health Site Inspections/Activities and Correspondence Concerning ACS
- U.S. EPA Region V Site Inspections/Activities and Correspondence Concerning ACS
- Correspondence From and To ACS
- Correspondence From the Congress of the United States and Indiana State Legislature Concerning ACS
- Chronology of Newspaper Articles Concerning ACS
- Chronological Summary of ACS On-site Events

The pertinent site history presented in the ACS Initial Site Evaluation Report is summarized in the following paragraphs.

The maximum amount of property that has ever been under American Chemical Services, Inc. control since the company was founded in 1955, is approximately 52 acres. Over the years the amount of property under ACS control has decreased. Two acres of the approximately 39 acre tract south of the C&O railroad were sold to Kapica Drum, Inc. and subsequently resold to Pazmey Corp. An additional 31 acres of the 39 acre tract south of the C&O railroad were sold to the City of Griffith for use as a sanitary landfill. At the present time, American Chemical Services, Inc. owns 6 acres of the original 39 acre tract south of the C&O railroad and approximately 9 acres north of the C&O railroad for a total of approximately 15 acres. In addition, ACS leases 4 acres north of the C&O railroad from the C&O Railway Company.

April 1972 is the earliest documentation of Indiana State Board of Health (ISBH) regulatory activity at the ACS site. Between April, 1972 to September, 1973 the ISBH attempted to achieve improved waste handling, spill prevention measures and site maintenance. ISBH continued involvement with ACS from September 1974 to September 1975 in response to reports that the company was discharging chemicals to the sanitary sewer and dumping chemicals on-site. There was very little ISBH activity concerning ACS during the period September 1975 to December 1982. The first step to list American Chemical Services, Inc. as a NPL site was taken in December 1982 and continued through April 1984 when data was supplied by Techlaw.

U.S. EPA activities concerning the American Chemical Services, Inc. site began in February 1980 and continue to the present. During this period, two on-site investigations were conducted in order to provide information for the Hazard Ranking System. During May of 1980, sampling was conducted at ACS by the U.S. EPA Environmental Emergency and Investigation Branch. Monitoring well installation and sampling was conducted in November 1982 by a U.S. EPA contractor.

2.2 Contamination Problem Definition

2.2.1 Waste Disposed of at Site

Based on available information there are four documented waste burial locations, one suspected waste burial location and four suspected contaminated soil areas. Figure 2-1 shows the locations of each of these areas, and Table 2-1 summarizes the corresponding waste types.

2.2.2 Toxicity of Contaminants

All of the contaminants may have been on the site for ten or more years. Chemical characteristics of the contaminants as they exist now are unknown; therefore, an accurate interpretation of relative toxicity is not possible at this time. As part of the remedial investigation, an endangerment assessment will be conducted that will address the toxicity of contaminants. The U.S. EPA will provide the necessary information to the Agency for Toxic Substances and Disease Registry (ATSDR) so a Health Assessment may be performed as required by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

2.2.3 Degree of Site Contamination

Documented evidence of the degree of site contamination is limited to the results of two on-site sampling events. During May 1980, samples were collected and analyzed by the U.S. EPA. The results of that analysis revealed organic compounds in the soil and water from a leachate pool near the ACS Off-Site Containment Area. During November 1982, a U.S. EPA contractor installed four monitoring wells on ACS property and collected groundwater samples from the wells. The samples from the two wells near the ACS Off-Site Containment Area contained organic compounds including benzene, toluene, vinyl chloride, pentachlorophenol, ether and chloroethane. Based on this limited information, it appears that site contamination is confirmed near the ACS Off-Site Containment Area. Other areas at the site are also suspected of contaminating the groundwater and soil; however, this cannot be evaluated until the results of the remedial investigation are available.

2.3 Contaminant Migration and Environmental/Health Effects

2.3.1 Migration Pathways

Contaminant migration from the ACS site would most likely be by surface water or groundwater pathways. Airborne contaminant migration is not considered likely from the ACS site. As noted in Section 2.2.3, there is limited documentation concerning contamination of the on-site surface and groundwater. Off site surface water sampling has not been conducted.

Off site groundwater sampling has been conducted on two occasions. The first study was a Lake County Groundwater Survey conducted by the Indiana State Board of Health in 1981. This was a general county survey and was not conducted in response to the ACS site. The purpose of the survey was to measure total metal content and no organic compound data was collected. Data from seven wells were collected in the vicinity of the ACS site. Well locations ranged from one-half to one-mile southwest of the site. The results of the survey did not reveal any contamination greater than maximum levels set by the Safe Drinking Water Act (SDWA). Since groundwater flow is thought to be in the northeasterly direction, these wells are upgradient from the site and would not be expected to reflect any contamination contributed by the ACS site.

The second groundwater sampling program undertaken by the Lake County Health Department in 1981 consisted of sampling well water from seven homes near the ACS site.

2.3.2 Potential Receptors

Groundwater users are the primary receptor of concern. Surface water users and ecosystems are a secondary receptor. Existing information indicates that there are two aquifers beneath the site that are separated by a clay layer. It has been suggested in the literature that the clay layer is impermeable and continuous; however, this has not been evaluated. Existing information indicates that the majority of the private water wells in the vicinity of the site use the lower (Valparaiso) aquifer as their water source. If the clay layer is continuous, then any contamination would probably be limited to the upper aquifer. In order to investigate the contamination of these groundwater receptors, monitoring wells will be installed during the remedial investigation. In addition, a survey of residential well water quality will be conducted during the remedial investigation.

Surface water in the vicinity of the site is limited to the marsh west of ACS property and a drainage ditch that flows through the marsh. This ditch flows to Turkey Creek which is approximately one mile south of the ACS property. Contamination of these surface waters would be from runoff from the ACS site or surface leachate from waste disposal sites. Existing records do not indicate any leachate runoff during the past three years. At the present time, there is no surface water quality data available.

2.3.3 Environmental and Public Health Effects

There have been no visible environmental impacts noted since the clay wall was installed around the north end of the ACS Off-Site Containment Area during the early 1980's. Adverse environmental effects or surface leachate were not observed during the initial site visit.

The potential for environmental and public health effects due to surface water contamination is unknown. To date, there are not data available concerning surface water contamination.

The most significant evidence that ACS may threaten local water supply wells was the documentation of low levels of organic contaminants in Test Well #2 located southeast of the Off Site Containment Area. The magnitude of this potential threat to area water supply wells is unknown at this time.

As part of the remedial investigation, an endangerment assessment will be conducted to more accurately define the potential for environmental and public health effects.

2.4 Operable Units

Based on the review of available information and the initial site visit, no operable units have been identified at this time. In the early 1980's a clay containment wall was built around the north end of the ACS Off Site Containment Area where leachate had been observed. During the initial site visit, there was evidence of heavy ground vegetation from the previous growing season at the Off-Site Containment Area. No leachate or any other alarming conditions meriting immediate or fast track measures were observed at the Off-Site Containment Area or at any of the other known disposal sites during the site visit.

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AMERICAN CHEMICAL SERVICES, INC.

During December 1984, the Region V Technical Assistance T
site assessment of the ACS site. Their findings concur t
have been identified at this time. In the TAT report, it
that other residential wells be sampled and analyzed agai
1986 by U.S. EPA.

SECTION 3
PRELIMINARY ASSESSMENT OF REMEDIAL ALTERNATIVES

The purpose of this section of the Work Plan is to identify, in a very preliminary way, potential remedial approaches that are consistent with the available site information. This initial identification of potential alternatives was utilized during formulation of the Project Sampling and Analysis Plan so that the data required to ultimately evaluate candidate remedial strategies would be collected. The criteria that will be used to screen and evaluate remedial alternatives are also described. It must be noted that these alternatives have been identified on a preliminary basis based on information currently existing for the site.

3.1 Identification of Remedial Alternatives

Information compiled during the preparation of the Initial Site Evaluation Report indicates that the on-site soils, surface waters, and groundwater are potentially contaminated from past American Chemical Service, Inc., (ACS) and Kapica Drum, Inc., disposal activities and drum reconditioning (i.e., cleaning). Based on the preliminary site characterization data collected to date, possible remedial alternatives listed below have been identified for review and evaluation. It must be noted that because of the paucity of information on the extent and type of buried materials that additional remedial alternatives will be developed during the RI phase.

Remedial Alternative 1	Off-site treatment or disposal of drum material and contaminated soils and sediments
	On-site treatment which permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants.
Alternative Component Technologies	Evaluate available hazardous waste disposal facilities proximal to the site
Remedial Alternative 2	On-site containment

Alternative Component Technologies	-Native soil cover -Multilayer cap system -Synthetic cap system (e.g., liner) -Slurry Wall -Grout Curtain -Sheet Piling
Remedial Alternative 3	On-site disposal of contaminated soil and drum material
Alternative Component Technologies	On-site encapsulation in a specially engineered cell
Remedial Alternative 4	Groundwater treatment
Alternative Component Technologies	-Steam or air stripping -Activated carbon treatment -UV/ozonation
Remedial Alternative 5	No action
Alternative Component Technologies	Periodic monitoring

A combination of the above can be identified as additional alternatives, such as:

Remedial Alternative 6	Off site treatment/disposal of contaminated soils/sediments and subsurface environmental isolation
Remedial Alternative 7	Off site treatment/disposal of contaminated soils/sediments, subsurface environmental isolation and treatment of groundwater
Remedial Alternative 8	Isolation/treatment on-site contaminated soil disposal and subsurface environmental isolation
Remedial Alternative 9	Contaminated soil isolation/treatment/ on-site disposal, subsurface environmental isolation and treatment of groundwater

3.2 Performance Criteria and Standards for Remedial Alternatives

Performance criteria will be based on standards that are developed to protect human health and environment at the site. If appropriate, existing standards such as Maximum Contaminant Levels/Maximum Contaminant Level Goals under the Safe Drinking Water Act, water quality criteria under section 304 or 303 of the Clean Water Act, State Water Quality Criteria Standards or State ARARs, RCRA regulations or other appropriate and relevant guidelines, regulations, or standards may be considered.

3.3 Approach to Alternative Evaluation

The following factors will be used as the basis for evaluating remedial alternatives. The factor will provide a consistent basis for comparison of remedial alternatives. Specific evaluation factors are listed and summarized below:

1. Technical Feasibility

   The technical feasibility will be evaluated based on the following factors:

   - Proven technology - Has the technology been successfully applied in a similar remedial action project?
   - Reliability - Is the technology dependable; can equipment be expected to operate with a minimum of downtime?
   - Operability - Is the technology simple to operate; can it be practically operated under the site field conditions?
   - Flexibility - Will the technology operate efficiently under variable conditions (i.e., safety constraints required by nature of the contaminated soils or varying hydraulic loadings for a groundwater treatment system)?
   - Equipment availability - Is the equipment commercially and readily available for field application or can a long delivery time be expected?
   - Susceptibility to toxic contaminants - Is the technology subject to upset due to the presence of toxic constituents (i.e., soil and groundwater treatment processes)?
   - Implementability - Alternatives considered must be implementable in a relatively short time to minimize costs.

2. Institutional Factors

The institutional factors that will be considered in the evaluation of remedial action alternatives include:

- Acceptability by Federal and State regulatory agencies.
- Safety (i.e., on-site and off-site requirements during implementation of the alternatives).
- Public acceptance.
- Permits and licenses (i.e., air or water discharge permits; construction or operations permits).
- Long-term land use.
- Long-term management agency requirements.
- Permanent reduction through mobility, toxicity, or volume (M,T or V) as required by Section 121 of SARA.
- Short-term and long-term uncertainties associated with land use; the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents.

3. Environmental and Public Health Factors

The purpose of remedial action at the site is to respond to, and if feasible, rectify any existing and potential future environmental effects and mitigate conditions that could potentially affect public health, welfare, or the environment in the area. Therefore, the ability of a remedial alternative to mitigate or eliminate these impacts is important. Remedial alternatives will be evaluated considering their ability to:

- Prevent human access or possible contact with the contaminated materials after site work is completed.
- Abate/minimize existing and potential future groundwater migration and contamination.
- Minimize any potential additional impacts during remedial action operations on air, land, surface water, and groundwater.

- Minimize any potential adverse impacts on human health, wildlife and vegetation, neighboring properties, and other sensitive populations.
- Abate/minimize existing and potential future migration and contamination of air, soils, and surface waters.
- Address the short-term and long-term risks associated with implementing the specific alternative.

4. Cost Effectiveness

   A remedial clean-up program must not only be technically feasible for meeting the environmental objectives of the remedial action, but must also be amenable to being implemented in a cost-effective manner. In evaluating the cost-effectiveness of various remedial alternatives, costs for each alternative will be identified by taking into consideration capital and investment costs, labor/expenses, operating costs, and any long-term maintenance costs. If appropriate, a present worth method, approved by EPA, will be utilized for cost comparison purposes. The cost of alternatives will be compared to the alternative which meets all pertinent regulations.

3.4 Identification of Data Requirements

The review of available data has provided the following information concerning the American Chemical Services, Inc. site which includes the Griffith Landfill and Kapica Drum, Inc. (now Pazmey Corp.) property.

1. General information concerning geology and hydrogeology of the area from published studies and reports. Some site specific soils information is available from on-site soils borings and off site well logs.
2. Specific information as to the types and quantities of wastes disposed of by ACS.
3. Non-specific information as to the types and quantities of waste disposed of by Kapica Drum, Inc. Basically all that is known is that Kapica Drum, Inc. reconditioned drums containing hazardous and non-hazardous residues from ACS and other clients. It has been reported the drum residue and rinse water was disposed of on Kapica Drum property and ACS property. In addition, this information is second-hand since it was supplied by ACS, not Kapica Drum, Inc.

4. Specific information as to the types of waste disposed of by ACS at the Griffith Landfill.

5. Non-specific information concerning the types of waste disposed of by Kapica Drum, Inc. at the Griffith Landfill. Again, this is second-hand information supplied by ACS.

6. Specific information concerning the location of known waste disposal on ACS property and areas of suspected soil contamination.

7. Non-specific information concerning the location of waste disposal on Griffith Landfill property.

8. Specific but limited data concerning on-site migration of hazardous wastes on ACS property. No data is available concerning hazardous waste migration from suspected disposal locations on Kapica Drum, Inc. or Griffith Landfill property.

9. Very limited data concerning waste migration outside of ACS, Kapica Drum, Inc. and Griffith Landfill property. In particular, there is very little data concerning groundwater contamination.

10. Detailed information concerning property ownership was available; however, there is a question as to whether or not part of the ACS Off-Site Containment Area is on Griffith Landfill property.

The information needed to fill the available gaps in the data are as follows:

1. The following information is needed concerning on-site geology:

   a. Stratigraphy at the site determined by boreholes extending to bedrock.

   b. Characterization of geotechnical, hydrological, and geological parameters of the soils and sediments on site.

   c. Confirmation of the given geological data including well logs and hydrogeologic data such as hydraulic conductivities and transmissivities.

   d. Better definition of the water table configuration.

e. Better definition of the permeability, extent and continuity of the clay layer.

2. Specific information concerning the types of quantities of hazardous wastes disposed of by Kapica Drum, Inc. and accepted for disposal by the Griffith Landfill. In general, more information concerning the disposal of hazardous materials by Kapica Drum, Inc. and Griffith Landfill is needed. A request for information similar to that sent to ACS by the U.S. EPA would provide useful information.

3. A more detailed characterization of the waste as it exists now on the ACS property.

4. A more detailed evaluation of the extent of migration of contaminants from the site. This includes the ACS, Kapica Drum, Inc. and the inactive portion of Griffith Landfill property.

5. More detailed information concerning potential impact to receptors. Specifically, a survey of public water supplies should be conducted to determine those residents that use groundwater, including determining which aquifer is used. Selected wells will be sampled and analyzed for hazardous waste constituents.

6. More detailed information on the current ACS operations including process piping, water usage, effluent volumes, effluent quality and spill containment, and control plans.

3.5 Remedial Investigation/Feasibility Study Objectives

The objectives of the RI/FS include:

- Determining the nature and extent of any release or threatened release of hazardous substances, pollutants or contaminants from the American Chemical Services, Inc. facility.

  - Identify relationship between current contamination and origin/source.

  - Define the potential for future off-site contaminant clean-up.

  - Identify/develop standards and criteria for contaminant cleanup.

  - Evaluate present and future risk and potential for harm to public health, welfare, or the environment.

- Assess remedial action alternatives for the appropriate extent of remedial action to prevent the migration or release or threatened release of hazardous substances from the American Chemical Services, Inc. facility.

  - Identify technological options for cleaning up and preventing migration of contaminants beyond the site boundaries.

  - Evaluate remediation alternatives consistent with the National Contingency Plan, other regulatory requirements and considering applicable guidelines.

  - Recommend the remedial action that is technically and environmentally sound, and cost effective.

- Supply the basis for preparing the Record-of-Decision.

SECTION 4
REMEDIAL INVESTIGATION SCOPE OF WORK

This section of the Work Plan describes the site investigation activities that will be conducted during execution of the project. Various project plans that address specific issues of project execution, that require more detailed treatment than the scope of a typical work plan would include, are being prepared as supporting documents to the Work Plan. The following three plans, having individual scopes as described below, are being prepared:

- Health and Safety Plan - including a Site Evaluation form (SEF) which covers personal protective equipment needed depending on location and activity within the site, contingency plans and emergency procedures, field monitoring equipment, and decontamination procedures. Also included in the Health and Safety Plan will be a section concerning site management. This section will address operations at the site including site access security, site office decontamination facilities, equipment and materials needs and storage, communications and support functions, and coordination of sampling activities.

- Quality Assurance Project Plan - covers QA data measurement objectives, sampling objectives and procedures, sample custody, calibration procedures, internal QC checks, QA performance audits, QA reports, preventive maintenance, data assessment procedures, corrective action, and field protocols.

- Sampling and Analysis Plan - covers data collection objectives, sample locations, sample identification numbering, sampling equipment and procedures, sample analysis and handling, sample documentation and tracking, sampling team organization, and sampling schedule. The sampling and Analysis Plan will be an appendix to the Quality Assurance Project Plan. This will be a document to be used <u>in the field</u>, as well as in project planning.

Under the Superfund Amendments and Reauthorization Act of 1986 (SARA), it is recommended that the RI and FS are integrated so that parts of each are conducted concurrently. Therefore, the project will be conducted in several phases of investigation. Each phase will be designed to make optimal use of information as it is derived and to produce the information which is necessary to complete the FS. Because this approach makes use of the most current information, data overlaps and data gaps are minimized. The phased approach allows "mid-course" corrections to be made so that the investigation will develop in the most efficient and cost-effective sequence. This Work Plan presents the conceptual details for the first two phases. Additional phases would be developed if and when it were to be determined that additional information would be required which had not been developed in Phases I and II. Reports and technical memoranda for each phase will include discussions of the significance of each phase to the whole RI/FS process. An outline of the Phase I and Phase II activities consists of:

PHASE I - REMEDIAL INVESTIGATION

I. TASK 1 - PROBLEM DEFINITION

A. Review Available Information
   1. Published data (USGS, ASCS, etc.)
   2. Site visit and interviews
   3. Aerial photographs
   4. Water use survey
      a. Domestic wells including commercial and residential wells
      b. Industrial and municipal wells
   5. Review available reports (RCRA submittal,etc)

B. Survey Site Boundaries
   1. Establish site grid
   2. Survey site boundaries

C. Geophysical Survey
   1. Magnetometer/gradiometer (where effective)
      a. On-site containment area (E on Figure 2-1)
      b. Off-site containment area (C on Figure 2-1)
      c. Old still bottoms (F on Figure 2-1)
      d. Treatment pond (G on Figure 2-1)
      e. Kapica drum draining area (L on Figure 2-1)

D. Surface Water Survey
   1. Set up surface water bench marks

E. Environmental Audit of ACS
   1. Coordinate with RCRA audit
   2. Evaluate process streams
   3. Define potential sources

F. Establish Remedial Alternatives

II. TASK 2 - HYDROGEOLOGIC INVESTIGATION

A. Characterize Flow System
   1. Monitor ACS hydraulics
      a. Evaluate volumes
   2. Evaluate landfill hydraulics
      a. Install leachate wells
      b. Monitor de-watering pumpage
   3. Install perimeter monitoring wells
      a. Test near surface hydraulic properties
   4. Install piezometer grid
   5. Model groundwater flow system
      a. Conduct water balance
      b. Determine groundwater flow paths and rates

B. Initial Shallow Sampling
   1. Effluent sampling
   2. Groundwater sampling from perimeter wells
   3. Surface water and sediment sampling

III. TASK 3 - NEAR SURFACE CONTAMINATION INVESTIGATION

A. Waste Characterization
   1. Soil borings at ACS (E F G M on Figure 2-1)
   2. Leachate Sampling
      a. Leachate Wells in Landfill
   3. Waste volume calculation

PHASE II REMEDIAL INVESTIGATION

IV. TASK 4 - PHASE II SITE CHARACTERIZATION

A. Groundwater Characterization
   1. Install eight new shallow monitoring wells
   2. Install four lower aquifer monitoring wells
      a. Extend stratigraphic description
      b. Conduct hydraulic property tests
   3. Sample existing and new monitoring wells

B. Soil Contamination
   1. Additional Soil Sampling

C. Groundwater Transport Model

PHASE III - REMEDIAL INVESTIGATION

V. ADDITIONAL CONTAMINATION INVESTIGATION

A. Install Additional Monitoring Wells as Necessary
   1. Upper aquifer
   2. Lower aquifer
B. Collect Additional Samples as Necessary

VI. ENDANGERMENT ASSESSMENT

4.1 RI TASK 1 - PROBLEM DEFINITION

Task 1 will consist of gathering available information regarding the site and using non-invasive investigative techniques at the site to better define potential problems that should be investigated in subsequent phases.

4.1.1 Review Available Information

The Project Team will obtain, review, and evaluate existing information which can help define the origin, history, nature, and extent of the environmental problems deriving from the ACS site. Included in the review will be the relevant publications by state and federal agencies (i.e., IDNR, IDEM, EPA, USGS, ASCS, etc.). Climatological data, logs for private and public wells, and other data significant to the groundwater system will be obtained from the appropriate sources. Additionally, any available reports from previous investigations will be obtained for review and possible integration into this investigation.

Aerial photographs will be obtained for available dates back to 1955. These will be used to develop a site history, delineating excavated areas, filled areas, and areas used for drum storage. Several days will be spent on-site correlating aerial-photo-observations to on-site anomalies. Additionally, personnel who worked for American Chemical Services, Inc. (ACS), the Griffith Landfill, Kapica Inc., and other near-site concerns will be interviewed about their recollections of operational practices and disposal areas. U.S. EPA will be given notice of any interview.

A survey of residential, municipal and industrial wells within a one-mile radius of the ACS site will be conducted. If results indicate contamination from the ACS site appears to be extending beyond that one mile radius, the survey may be extended. The objectives of the survey include:

- Identify water sources in the area (lake, river, groundwater, etc.).
- Identify the number, type and location of wells in the vicinity of the ACS site. Information concerning well construction (depth, casing and screen materials, screened interval, etc.) will be gathered.
- Determine if the private wells pump from the upper or lower aquifer below the ACS site.
- Determine which private wells should be sampled as part of the remedial investigation work.

4.1.2 Survey Site Boundaries

A site boundary survey will be conducted in order to accurately define the study boundaries and delineate the ACS, Griffith Landfill, and Kapica Drum, Inc. (now Pazmey Corporation) property boundaries. Existing survey data will be used to the fullest extent possible in order to minimize the need for additional surveying. The survey data will be utilized to prepare site maps, locate sampling points and monitoring well locations, and assist in determining which parties must be contacted to obtain property access permission for off-site investigation activities. The survey work will also be used to determine if the Griffith Landfill property boundary overlaps the ACS off-site drum containment area. In addition, the boundary survey will identify those other parties who own property that has had hazardous materials stored and/or disposed on it.

All boundary surveys will be conducted by a licensed Indiana surveyor. Permanent boundary markers will be installed as necessary in order to easily distinguish individual pieces of property. These boundary marker locations shall be marked with a sign so they are easy to locate in any heavy vegetation.

A grid system will be established in the field at the ACS site to allow accurate siting of sampling points, and allow mapping of historic waste disposal site and contaminated areas. The grid will be based upon two perpendicular baselines with a maximum grid interval of 100 feet. Site (ground) elevation data will be collected at selected grid points to establish elevations of sampling locations. The elevation data could also eventually be used to establish initial ground control elevations during initial site remediation activities and to estimate soil quantities for cut/fill calculations. The grid system will also provide ground control for geophysical surveys. The grid system will be shown on sample location maps in the final RI Report.

4.1.3 Geophysical Surveys

If feasible, a geophysical survey will be conducted in order to more accurately define the extent of drum disposal areas (i.e., potentially contaminated areas). Because of the presence of railroads, power lines, metal buildings, and metal process tanks across and surrounding the site, geophysical methods may be of limited utility. Survey by magnetometer has the best probability of yielding meaningful data. After a test to determine feasibility, the method would be used to locate drums in the ACS Off-Site Containment Area, On-Site Containment Area, Old Still Bottoms Pond and Treatment Pond #1 and the Kapica Drum, Inc. drum draining area. The data collected will be utilized to finalize soil boring and monitoring well locations.

4.1.4 Surface Water Survey

A series of surface water bench marks will be established across the site so that surface water elevations can be determined at the same time groundwater monitoring wells are sampled. The bench marks will be referenced to U.S.G.S. elevations. The resulting data will be used to document the interaction between surface and groundwater and should allow determination of whether the marshes which surround the site are discharge areas or recharge sources.

4.1.5 Environmental Audit of ACS

An environmental audit will be conducted of the ACS facility to determine if it currently contributes to the groundwater system. The audit will include an examination of process streams and an assessment of the integrity of product piping, sewer piping, drains, and the effluent transport system. Site access and the cooperation of ACS management will be necessary for successful completion of this task. Also, this will be coordinated with the U.S. EPA and the State of Indiana RCRA personnel. Starting information includes the pending RCRA permit, the ATEC January 15, 1986 report, the Subsurface Soil Exploration of Griffith Sanitary Landfill November 7, 1986, and other available reports.

It is anticipated that the results of the audit will suggest that some type of monitoring of the ACS facility would be prudent. This monitoring could consist of flowmeters on influent and effluent, timed samples of the effluent wastestreams, or sampling devices that are connected to portable detection equipment such as pH meters or Organic Vapor Analyzers.

4.1.6 Establish Remedial Alternatives

Results from the Feasibility Study, (Section 5), will be used to evaluate and rank the possible remedial actions according to economic, environmental, technical, and institutional considerations. To conduct a thorough Feasibility Study, a data base should be developed which characterizes the media, the contaminants, and the potential migration pathways, according to the specific remedial actions which are feasible for the site. To develop a complete data base, possible remedial activities will be listed and screened for potential feasibility based on the results of a review of available information and limited non-intrusive site investigations. From this list, a short list will be developed, containing only the remedial procedures which are viable for the hazardous compounds, contaminated media, and potential pathways which are at the site. This short list will provide focus for refining the data quality objectives (DQO).

The original complete list and the short list of Remedial Alternatives will be provided along with a brief justification for each selection. The list will be considered flexible, open to amendment and deletion as the RI progresses.

4.1.7 Technical Memorandum

A technical memorandum will be prepared to document the activities undertaken with RI Task 1. This memorandum will also provide detailed results of each survey including: 1) Property boundaries map; 2) a grid and surface elevation map; 3) results of the local groundwater utilization survey; 4) results of the geophysical surveys; 5) results of the environmental audit of ACS; and 6) a list of Potential Remedial Alternatives.

4.2 RI TASK 2 HYDROGEOLOGIC INVESTIGATION

4.2.1 Characterization Flow System

After the problem areas have been delineated in Task 1, the setting of the problem, the shallow groundwater flow system, will be characterized in Task 2. The focus of this subtask will be to determine the groundwater flow directions in the shallow aquifer. Specifically, the subtask will:

- Evaluate the details of on-site soil stratigraphy and the stratigraphy in adjacent off-site areas.

- Determine the hydrogeologic conditions in the upper aquifer, including vertical and horizontal groundwater flow conditions on site and in adjacent off-site areas.
- Determine the configuration of the water table in the upper aquifer on site and in adjacent areas off site.
- Identify surficial drainage features and flow patterns, and characterize the relationship of surface water to groundwater on site and in adjacent off-site areas.
- Characterize the extent of surface water and sediment contamination on site and in adjacent off-site areas.

Regional groundwater flow in the vicinity of the ACS site is reportedly to the northeast; however, due to several features near the site, flow patterns on site are not well defined. Turkey Creek, is located one mile to the south. The only other major surface water body is the Little Calumet River, three miles to the north, therefore, there may be a local drainage divide through or to the north of the site. Griffith Landfill has also excavated 30 feet of soil material and is pumping to control the inflowing water, which will also affect local groundwater flow.

Based on existing subsurface data, the hydrostratigraphy at the site appears to consist of:

- An upper aquifer fine-to coarse-grained sand with fine to coarse gravel, and small amounts of peat and silt, about 20-feet thick.
- An intervening silty clay to clay unit containing discontinuous lenses of gravel, 15 to 30-feet thick.
- A lower sand and gravel aquifer, 90-feet thick.

A fourth soil unit consisting of thick, stiff clay is reported in the area, but borings indicate it is absent on site. The deeper sand and gravel unit is the major water supply aquifer in the area. The depth to bedrock, which consists of interbedded shales and dolomites, is about 130 feet.

To determine if the on-going ACS operation has a current impact on the groundwater flow system, a water budget will be conducted to account for the total water usage within the facility. The total water extracted from on-site wells or obtained from off-site sources will be compared to the volume of water discharged to sewers. Additionally, a system will be established to monitor the quality of effluent discharged from plant operations. Completion of this task will require cooperation from ACS.

Installation of groundwater monitoring wells will provide the data needed to determine the vertical and horizontal directions of groundwater flow and the horizontal and vertical extent of contamination. Also, they will provide better stratigraphic and geotechnical information concerning sediments under the site.

During Task 2, six monitoring wells will be installed around the perimeter of the ACS site (Figure 4-2). The wells would be constructed with 10-foot screens located to intersect the water table. If the aquifer is thicker than 15 feet, and the results of sampling indicate the necessity, Phase II monitoring wells could be constructed to sample the lower part of the upper aquifer. The purpose of the wells would be to define potential contaminants migrating away from the site. In addition, areas found to be uncontaminated would be potential areas for locating wells that would penetrate into the lower aquifer in Task 4.

A detailed water table map will be necessary to define the flow directions and gradients across the site. A series of temporary piezometers and wells will be installed within the site in an approximately rectangular grid to augment the surface water level data and provide the groundwater elevation data necessary to develop a water table map for the upper aquifer. The groundwater grid will include the six perimeter monitoring wells and several leachate wells in the landfill. Slug tests, bail tests, or pump tests will be conducted in three of the six Phase I monitoring wells to determine the hydraulic properties of the aquifer. Specific wells to test will be selected to represent upper aquifer conditions. Criteria for selection will include saturated thickness and grain size. Placement of wells in the landfill will require cooperation from the Griffith Landfill. The locations of the piezometer grid and leachate wells are shown in Figure 4-1. In areas outside of the landfill, the piezometers would be installed by jetting them into the ground. Within the landfill, they would probably be installed with a drill rig. Screens for the piezometers will be set at the top of the first saturated layer. Under no circumstances would piezometers be installed through the base of the landfill. Piezometers will be installed with caps which can be "pop-riveted" in place to seal the well and avoid tampering.

It is anticipated that water levels in the piezometers would be measured at least twice during the course of the RI. Levels at the piezometers and surface water points will be measured within a week after they are installed, and again before the Phase I field work is complete. Uncertainty in field conditions, scheduling, and site access does not allow more specific scheduling. If possible, measurements would also be made during both dry and wet periods, and collected at several closely-spaced intervals immediately after a major precipitation event to determine the response of the system to major surface water inflow.

The information developed in Tasks 1 and 2 will be synthesized using a groundwater flow model. The purpose of the model would be to conduct a water balance of the site and determine the groundwater flow paths and rates in the near surface aquifer. Since two aquifers will be analyzed, it is anticipated that the U.S.G.S. Three-Dimensional Groundwater Flow Model (Modflow) will be used. The model is capable of simulating groundwater flow within and between aquifers. It can simulate stresses to the aquifer(s) by actions such as: flow from external sources, flow to wells, areal recharge, evapotranspiration, flow to drains, and flow through riverbeds. Additionally, the head values derived in modeling can be used to develop hydraulic gradients, velocity field, and estimate solute transport rates.

4.2.2 Initial Shallow Sampling

During Phase I of the remedial investigation, surface water and sediment samples will be collected, some residential wells may be sampled, and some groundwater monitoring wells will be installed and sampled. Based on the results of Phase I, Phase II monitoring wells will be installed and sampled, and samples will be collected at water supply wells downgradient of the site. One upgradient water supply well will also be sampled.

It is anticipated that based on results of the environmental audit of the ACS facility, four sampling locations will be defined. Samples will be collected from these four areas as part of Task 2.

The most significant migration pathway by which contamination at the ACS site may migrate is via groundwater, particularly the upper aquifer. In 1982, four shallow (approximately 20 ft.) test wells were installed by the FIT. A groundwater sample collected from one of these wells (Test Well 1-Figure 2-1) was found to contain organic chemicals, including benzene, toluene, and trichloroethylene. Monitoring wells, soil boring samples, water level measurements, permeability tests, and geotechnical testing of soil samples will be used to characterize this potential migration pathway. Private water supply wells will be sampled as a precaution for protection of the public health and to provide information regarding the presence and extent of contamination in the lower aquifer, which is the main aquifer used for water supply in the area. Private wells adjacent to the site, set in the upper aquifer (Unit 1, defined in Section 2.1.1) would be sampled in Phase I. Private wells screened in the lower aquifer (Unit 3 defined in Section 2.1.1) downgradient of the site will be sampled in the second phase after groundwater gradient has been determined in that aquifer. At least one sample will be collected upgradient of the site to indicate background water quality.

The Phase I monitoring wells will be instrumented with 10 foot screens located to intersect the water table. If results of Phase I sampling indicate the need for collecting samples of groundwater deeper in the aquifer, deeper wells will be designated in subsequent phases of investigation.

In addition to the sampling of groundwater monitoring wells, samples will be collected from four leachate piezometers installed at the Town of Griffith Landfill. The purpose of the leachate samples is to characterize the leachate quality within the landfill. Samples will be collected from wells that represent conditions that may have been encountered during various stages of the landfill development.

Surface water drainage from the site may contain hazardous contaminants. In addition, contaminated groundwater could be discharging to nearby surface water bodies - marsh west of the ACS property and the excavated area at the toe of the working face in the Griffith Landfill. Water that collects in this low area is periodically pumped into a municipal sanitary sewer. Contaminants could also be accumulating on or migrating with sediments that are eroded off the site. Eleven samples of surface water and sediment will be collected and analyzed to assess these possibilities. The approximate locations of these eleven pairs of surface water and sediment samples are shown in Figure 4-3. Sampling locations will include Treatment Pond 2 (Location 1), the ACS Retention Pond (Location 2), a drainage ditch at the southwest corner of the ACS plant (Location 3), the marsh (Location 4), ponded water near the Off-Site Drum Containment Area (Location 5), the Griffith Landfill excavation (Location 6), three sites along a drainage ditch (including a small pond north of the railroad track) connecting the marsh to Turkey Creek (location 7), and a drainage ditch that is parallel to Colfax Avenue south of the intersection of Colfax Avenue and Reder road (Location 8) in addition drainage ditch 1800 feet southeast of the ACS site; is designated as Location 9, although it falls beyond the limits of Figure 4-3.

The Phase I sampling effort is summarized in Table 4-1, and the sampling analysis program is presented in detail in Table 4-2.

A technical memorandum will be prepared upon completion of Task 2 to document actual activities and present the findings. The technical memorandum specific to site characterization will address, as a minimum, the following subjects:

1. Hydrogeologic conditions in the study area; identification and characterization of soil stratigraphy and areal relationships of soil deposits; identification and characterization of hydrostratigraphic units and areal relationship; evaluation of groundwater flow systems, flow directions, flow rates and recharge-discharge distribution.

2. Sampling and analysis of water supply wells and groundwater; identification of contaminant levels in all the hydrostratigraphic units investigated both on and off site during the phases which have been completed; evaluation of potential contaminant migration across the site boundary and into the water supply aquifer.

3. Sampling and analysis of surface water and sediment; identification of on-site contaminant levels; elevation of off-site contaminant migration.

4.3 RI TASK 3 - NEAR SURFACE CONTAMINATION INVESTIGATION

There are insufficient data regarding the volume, concentration, and character of waste disposed at the American Chemical Service (ACS) site. ACS has provided some information on the approximate location and general nature of waste disposal on-site, but additional data are needed. Therefore, an investigation of the known disposal sites (the Still Bottoms Pond, Treatment Pond 1, the On-Site Drum Containment Area, the Off Site Drum Containment Area, and the Kapica Dump Site) will be completed during Phase I of the remedial investigation. This will involve sampling of the waste and the natural soil materials underlying the waste. There is also evidence that waste material has been spilled or dumped on the ground in the Drum Storage Area and possibly within the old Kapica Drum (now Pazmey Corporation) property. Investigation of these areas will involve sampling of surficial and subsurface soils for characterization of residual contamination.

The sampling program to be implemented as part of the RI/FS at the American Chemical Services site in Griffith, Indiana, will evaluate and characterize the location, nature and volume of the contaminated areas on site including the old Still Bottoms Ponds, Treatment Pond 1, Kapica Dump Site, the On-Site Drum Containment Area and the Off Site Drum Containment Area.

The scope of sampling activities to be conducted as part of the source characterization task includes surface soil sampling, drilling of 14 soil and waste borings and excavation of six waste pits. Chemical analysis to detect priority pollutants and other hazardous materials will be performed investigative samples. Depending upon the results of source sampli be necessary to conduct RCRA tests on some samples. For example, R characteristic tests such as ignitability or E.P. toxicity may be s for some waste samples. The sources characterization sampling effo summarized in Table 4-3, and the sampling analysis program is prese detail in Table 4-4. A qualified geologist or geotechnical enginee all excavation and drilling activities. Additional test pits and s may be conducted in Phase II of the investigation.

Three source areas are known to contain buried drums - the On-Site D Containment Area, the Still Bottoms Pond and Treatment Pond 1 (see F 4-4). In two of these areas (Still Bottoms Pond and Treatment Pond drums were dumped, crushed and compacted and it is expected that fil materials will consist of a mixture of waste residue and drum carcas Test-pits will be used to allow collection of waste samples and soil from at least one foot into natural soil. The approximate locations test pits are shown in Figure 4-4 (Locations E, F, G). If a liner is encountered, excavation will cease. The liner shall not be penetrate pit will be sufficient in the On-Site Drum Containment Area (Location pits are needed in the Still bottoms Pond (Location F) (parts of wh have process structures built on top), and three will be needed in th Treatment Pond No. 1 area (Location G). In each test pit, one compos sample, consisting of 5 discrete samples, and one natural subsoil sam be collected. This sampling in conjunction with geophysical studies provide data for evaluating the volume, concentration, and character wastes in these source areas. Data will also provide the basis for as the extent to which the wastes are moving into adjacent soil materials

Test borings will be used to collect waste and natural soil samples in two of the source areas - the Off-Site Drum Containment Area, and the Kapica Dump Site (see Figure 4-4). Although there is evidence of a substantial number of drums buried in the Off-Site Drum Containment Area, borings are proposed (rather than test pits) because there is a clay cap over the area and it seems likely that the drums are not densely packed. It is anticipated that the drums disposed of in this area were crushed and the fill materials will consist of a mixture of waste residues and drum carcasses. Thus there should be less damage to the integrity of the cap with a good probability of successfully defining the extent of contamination. The approximate locations of the test borings are shown in Figure 4-4 (Locations C and L). Five borings will be drilled in the Off-Site Drum Containment Area (Location C) with one composite waste sample, consisting of 5 discrete samples, and one natural soil sample will be collected in each boring. Three borings are planned for Kapica Drum Site (Location L), which apparently consists of alternating layers of drum sludges and soil. One composite waste sample and one natural subsoil sample will be collected from these borings. This sampling will provide data for evaluating the volume, concentration and character of the wastes in these source areas and for assessing the extent to which the wastes are moving into adjacent soils materials. If the magnetometer survey or attempted boring indicate that test borings will not be possible, it may be necessary to excavate test pits as described above.

In both the ACS Old Drum Storage Area and the former Kapica Drum property (see Figure 4-5), there is evidence indicating that minor drips, spills and leaks of various chemical substances did or could have occurred. Resulting residual contamination of the unsaturated zone, if there is any remaining at this time, would be dispersed throughout relatively large areas. Composite soil samples will be used to provide a general characterization of any residual contamination in these potential source areas. The approximate Phase I locations of the sampling areas for the soil area samples are shown in Figure

4-5 (Locations E, P, R, O). The on-site containment area will be divided into four sampling areas (Location E) and the former Kapica Drum property will be divided into two sampling areas (Location O). Within each sampling area, soil will be collected at five discrete sites at one depth interval - 6 to 18 inches. Each soil sample will be qualitatively screened for organic vapors using HNu or OVA. Samples will be composited by depth within each sampling area. In addition to these composite samples, grab samples will be collected at two specific areas - near the former fume incinerator (Location P) and at the site of a previous spill/fire (Location R) - at the same depth interval. The exact location of the fume incinerator of the spill/fire site will be specified by American Chemical Service. These soil samples represent Phase I numbers and locations. Additional phases of investigation may be necessary.

Specific data regarding the vertical distribution of residual soil contamination in the Old Drum Storage Area (see Figure 4-5) is needed to complement the general data regarding areal extent obtained from the soil area samples. This data will be collected using six vertically sampled soil borings. The approximate locations of the soil boring samples are shown in Figure 4-5 (Location M). The borings will be located on the basis of qualitative organic vapor screening performed during soil area sampling so that attenuation profiles can be developed for a range of near-surface contaminant conditions. In each soil boring, samples from depths of 2-2.5 feet and 4-4.5 feet will be submitted to the laboratory for chemical analysis. Second phase sampling may be used to refine definitions of the depth and extent.

A technical memorandum will be prepared upon completion of the source characterization field work to document the field activities and present the findings. The technical memorandum specific source characterization will address, as a minimum, the following subjects:

- Sampling and analysis of waste from pits and borings; identification of source areas and type and extent of contamination.

- Sampling and analysis of soil on site from composite and grab samples and soil borings; identification of on-site contaminant levels in soil including areal extent and depth, evaluation of contaminant mobility and attenuation.

4.4 RI TASK 4 - PHASE II SITE CHARACTERIZATION

4.4.1 Groundwater Characterization

Based on the results of the work conducted during Task 2 and 3, it is anticipated that at least 8 and up to 12 new monitoring wells will be installed in Task 4. Although the need for, the location, and the number of second phase wells is currently unknown, 4 Phase II wells will penetrate to the top of the lower aquifer and at least 4 and up to 8 of the wells would be additional shallow wells. The purpose of the shallow wells would be to further define the extent of contamination in the upper aquifer. The purpose of the lower wells would be to extend the stratigraphic description of the site, determine vertical gradients between the two aquifers, and investigate potential contamination of the lower aquifer. All monitoring wells constructed during the RI/FS (6 in Phase I and up to 12 in Phase II) will be sampled following installation and development. After all wells have been sampled for the full Target Compound List, it may be anticipated that the Phase I and II wells will be re-sampled; up to half will be analyzed for the full Target Compound List, and the remaining wells (with EPA review and comment) may be sampled only for compounds indicated in prior sampling.

A survey as described in Task 1 will be performed to identify sources of drinking water and groundwater utilization within one mile of the site. Existing data suggests that the main areas of groundwater use for drinking water are to the south and east of the site. All known private, industrial, and commercial production wells within 1 mile of the ACS site are plotted on Figure 1-4. The plot also indicates the depth of the screened interval. Four

Phase II monitoring wells will be constructed in the upper part of the sand and gravel aquifer (Unit 3). Water levels will be measured in these during Phase II so that the hydraulic gradient in the aquifer can be determined. On the basis of the groundwater flow direction, the production wells within one mile downgradient of the site will be sampled. A private well, just across Colfax Avenue on Reder Road will be sampled. If it is one of the downgradient wells, one upgradient well will be sampled to provide an indication of background groundwater quality. It is anticipated that 10 wells will be sampled. Information covering well construction (depth, screened interval, materials, etc.) will be obtained, if possible, for each residential well that is sampled.

4.4.2 Additional Soil Sampling

Based on the results of the work conducted in Task 3, it is anticipated that additional drilling, sampling, and analysis will be required to define the lateral and vertical extent of soil contamination at the site. The actual need and location of the samples would be determined in Task 3. It is anticipated that up to 20 soil samples would be collected for analysis. It is anticipated that after U.S.EPA review and comment samples will only be tested for the compounds detected at each location during Phase I sampling.

4.4.3 Groundwater Transport Model

The role of the groundwater model is to formulate the appropriate questions and to help in obtaining quantitative answers of sufficient accuracy and detail to guide in decision making. The role of models is not to provide precise answers to the questions which have been posed. Rather, the model should be used to produce information needed to guide the thinking underlying the decision to be made. If modeling is conducted, the proposed model and associated assumptions will be submitted to the U.S. EPA for review and approval.

Mathematical models have the potential for performing the following functions:

1. Organization - One of the biggest problems encountered in planning or design is to represent and display in simple terms the numerous characteristics of complex systems and proposed plans. Models serve an invaluable function in proving a basis for such representation and for actually carrying out much of the computation which is required for this organization.

2. Amplification - When properly used, models can amplify available knowledge of the behavior of complex systems. Models do not produce new information; however, they permit the extraction of greater amounts of information from the existing database. In this sense, they increase understanding of the problem under study and of the options for dealing with it.

3. Evaluation - Models can be designed to incorporate measures of performance of the system under study and may therefore be designed to produce comparative evaluations of performance. Modeling can project or predict the consequences of alternative future actions, including the no-action alternative.

The hydraulic conductivity of the penetrated aquifer will be estimated by conducting slug test on selected completed wells. The basic concept behind these tests is that the rate of rise of the water level in a well after an "instantaneous" displacement of a "slug" of water is a function of aquifer hydraulic conductivity. Thus by measuring water levels at various times following displacement of the slug, the hydraulic conductivity can be calculated. To be a meaningful test, it is necessary to quickly displace a fairly large volume of water and readily and accurately measure water levels in the well. Analysis of test data should use appropriate computational methods such as that presented by Bouwer, H. and R.C. Rice, 1977, "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells," Water Resources Research, Vol. 12, No. 3, pp. 423-428 of Nguyen and Pinder, 1984. If indicated, a pump test might be conducted.

A total of 8 wells will be used for aquifer testing by the slug test method. All of the lower aquifer wells constructed in Phase II (4 wells in Unit 3) will be tested, and 4 of the monitoring wells completed in the shallow aquifer (Unit 1) will be tested. The four shallow wells will be selected to be most representative of the shallow aquifer, and to be best suited for conducting tests by the slug method (i.e. the geologic material must be characteristic of average upper aquifer materials, and the well should cut across at least 75% of the aquifer).

Hydraulic conductivity testing of monitoring wells installed at the ACS site will be performed as follows:

- An initial measurement of static water level will be made.
- A volume of water will then be displaced as rapidly as possible using a calibrated solid cylinder or compressed air. Highly permeable conditions ($K \geq 10^{-3}$ cm/sec) are anticipated.
- Water level changes in the well will be sensed and recorded by a pressure transducer connected to an electronic data logger. Water level measurements will be collected automatically on logarithmically increasing time steps, starting at 0.003 minutes (i.e., the first 10 measurements will be taken at the following elapsed time: 0, 0.003, 0.007, 0.010, 0.013, 0.017, 0.020, 0.0233, 0.026, 0.030). The total test time could last from several minutes to several hours for each well.
- The data will be plotted in the field (water level vs. log time) using semi-log paper to determine if the data are sufficient to establish a reasonable straight-line relationship.

This Work Plan presents the conceptual details for the first two phases of investigation. Additional phases could be developed if and when it were to be determined that additional information would be required which has not been developed in Phases I and II. After completion of the first and subsequent phases, meetings will be held among the PRP representatives, the PRP's consultant, the IDEM, DOI, and U.S.EPA to develop the scope of the next phase.

4.5 RI TASK 5 - FEASIBILITY STUDY TESTING

During the development and initial screening of alternatives, laboratory and bench scale studies and modeling may be needed to determine the overall implementability, operability, reliability and cost effectiveness of a particular alternative.

Laboratory studies, pilot scale studies or supplemental studies that may be needed to determine engineering design and operating criteria for full-scale operation of the chosen technologies are discussed below. If laboratory studies are deemed necessary based on work activities, a separate work plan, schedule and budget will be developed for IDEM and U.S. EPA approval. This work will be submitted in a time frame that maintains steady progress of the overall feasibility study.

4.5.1 Treatability Studies

Treatability investigations that may be required include:

- Waste fixation technologies to ensure that any encapsulation alternatives will effectively provide containment of the wastes located on the site.
- Treatability with a physical/chemical or biological process to determine loading effectiveness, required sizing, chemical and other material requirements for treatment of groundwater and/or storm water run-off from the site.
- Incineration pilot studies to determine contaminant destruction efficiencies, design criteria, materials handling requirements and sidestream (i.e., off gases and ash) treatment/handling/disposal requirements.

4.5.2 Compatibility Studies

One remedial action alternative that may be considered is the use of contaminant migration barrier walls. The compatibility of soil bentonite wall and waste material deposited on the ACS site and leachate being generated on the site may have to be investigated. In addition, any synergistic reactions that could occur when different waste materials and decomposition by-products are mixed will be examined.

4.6 RI TASK 6 - DATA VALIDATION

The data validation task will be conducted by the Project Team.

4.7 RI TASK 7 - CONTAMINANT PATHWAY AND TRANSPORT EVALUATION

This task will involve the identification of contaminant transport pathways. The pathways that will be investigated include soil (unsaturated zone), groundwater, surface water and air. The evaluation developed under this task will be used as the basis for the work to be conducted under Task 8 - Endangerment Assessment.

4.7.1 Unsaturated Soil Zone

Numerous soil samples will be collected during the on-site remedial investigation. The soil sampling survey is described in detail in the Sampling and Analysis Plan. The information that will be collected will be used to evaluate contaminant pathways and transport pathways includes the following:

- The type of contaminants present
- The extent of contamination (i.e., delineation of contaminant zones)
- Contaminant solubilities
- Contaminant densities
- Contaminant amenability to soil absorption/adsorption
- Volatility of contaminants

This type of information will allow a determination to be made concerning the directions (i.e., pathways) contaminants are migrating from various disposal locations on the ACS site. Data will also determine whether the contaminants are being transported through the unsaturated soil zone into the groundwater or being attenuated in the soil.

4.7.2. Groundwater

Groundwater sampling will also be conducted during the on-site remedial investigation work. Information gained through potential groundwater sampling will allow delineation of the type and extent of groundwater contamination both on and off site. Specific contaminant characteristics, such as solubility and density in conjunction with hydrogeologic data, such as soil hydrologic conductivity and transmissivity, will allow determination of such items as:

- Projected direction and rate of contaminant transport in the groundwater;
- Estimated volume of contaminated water (and contaminants) present:
- Determination of whether contaminants would collect at the interface of the aquifer surface and the unsaturated soil zone or settle through the aquifer and become concentrated along the surface of the underlying bedrock (or even seep into the fractured bedrock);
- Whether contaminants would be dissolved (solubilize) in rainwater as it percolated through the soil and be leached out and subsequently transported into the underlying aquifer.

4.7.3 Surface Water

Surface water sampling will also be conducted during the remedial investigation task. This will allow determination of off-site migration of contaminants. Migration could be occurring via one of the following pathways:

- Recharge of surface streams with contaminated groundwater;
- Contaminated stormwater run-off from the ACS site;
- Discharge of contaminants from the marsh area which borders the west side of the ACS site.

Prior to 1974, according to ACS, some process wastewaters were discharged into the marsh area west of the ACS site. The stream that runs through the marsh could be absorbing contaminants as it passes through the marsh and transporting them off site. In addition to collecting surface water samples, sediment sampling will also be conducted.

4.7.4 Air

Based on the review of existing information, (e.g., the Hazard Ranking System scores) the ambient air is not considered to be a contaminant pathway and no air sampling is proposed. However, during excavation and boring operations planned for the remedial investigation it is possible that contaminated surface soil particles (i.e., fugitive dust), and volatile organic emissions from the waste material disposal and spill areas will be released in the vicinity of the drilling or excavation area. Therefore, limited air monitoring for personnel protection will be conducted.

4.8 RI Task 8 - Endangerment Assessment

An endangerment assessment will be conducted to establish the extent to which contaminants present at the site or released from the site may present a danger to the public health, welfare, or the environment. This endangerment assessment will evaluate conditions at the site in the absence of any further remedial actions, i.e., it will constitute an assessment of the "No-Action" remedial alternative. This endangerment assessment will be conducted consistent with applicable EPA draft guideline documents. The following eight factors will be considered:

- Contaminants found at the site
- Factors affecting migration
- Environmental factors
- Exposure evaluation
- Toxicity evaluation
- Environmental impacts
- Data gaps and recommendations
- Quality assurance

4.8.1 Contaminants Found at the Site

Information on the identity, quantity, physical state, and concentrations on contaminants found at the site will be summarized in tabular and/or graphic form and will be used as the basis for the transport and exposure models outlined below. Specifically, data on source strengths and ambient concentrations in soil, groundwater, and surface water will be summarized. (Air is not considered a significant exposure pathway at this site.) Special attention will be paid to the reliability of analytical data and the tabulations will ordinarily be limited to those data validated by acceptable QA/QC procedures.

A short list of contaminants of primary concern for hazard evaluation will be compiled. This list will include, at a minimum, the following compounds preliminarily identified in the soil, surface water and groundwater at the site: phenol, chlorinated ethanes, chlorinated ethenes, phthalates, heavy metals and cyanide. Any other contaminants found at or near the site during the RI will be screened for inclusion in the list. In particular, if polychlorinated biphenols (PCBs), pesticides, maleic anhydride, methanol or formaldehyde (compounds that are known to have been disposed of at the site) are found at or near the site during the RI, these will be given special attention in screening. The screening of contaminants will be based on quantities present, potential for exposure, and toxicity (using toxicity indices such as reference doses, ambient water quality criteria or unit risks). This information will be used to derive a hazard index to permit comparison and ranking the relative hazards posed by each chemical found during the RI. Based on this ranking, a short list of contaminants of primary concern will be compiled, and a preliminary report will be prepared for review by EPA and EPA's technical consultants. After approval of the short list by EPA, the remainder of the endangerment assessment will be limited to consideration of the chemicals on the short list of indicator chemicals.

4.8.2 Factors Affecting Migration

Information on topography, soil environment, geological environment, hydrological characteristics, and climate will be summarized to serve as the basis of exposure models, as discussed below.

4.8.3 Environmental Fate of Contaminants

Physical and chemical characteristics of contaminants will be derived from standard sources and will be used to characterize the environmental persistence of each chemical, as well as its propensity to migrate in various media and to transfer from one medium to another. Specifically, a detailed evaluation will be made of the persistence and mobility of PAHs, chlorinated solvents, and other compounds in soils under the conditions prevailing at the site, including their tendency to be absorbed to soils and other materials present at the site, and their tendency to leach into groundwater. This evaluation will also take into account, to the extent possible, differences in physical and chemical properties among different organic species and will evaluate the potential for differential persistence or mobility of the more toxic species. The evaluation will take into account the presence of hydrocarbons, phenols, or other solvents that may increase leaching through the clay confining layer below the site. A similar evaluation will be made of the mobility of metals and of any other contaminants included in the short list.

Specific routes of contamination that would be considered are:

1. Leaching of contaminants into the shallow Calumet Aquifer, followed by transport in shallow groundwater to points were groundwater discharges to surface water (potentially the marsh west of the site) or to areas where groundwater may be withdrawn for use.

2. Transport of contaminants into the deep aquifer (the Valparaiso Aquifer), with the specific goal of predicting concentrations of contaminants in areas where the aquifer is used for drinking water supply.

3. Contaminated surface run-off or erosion of contaminated soil particles into surface water drainage.

4. The fate of the contaminants in off-site surface waters (if the results of No. 3 above indicate potential or actual transport of contaminants into these water). The evaluation will take into account dilution, degradation, spatial dispersion, biological uptake, and bioconcentration in food chains.

Other routes of transport that will be considered to the extent necessary to evaluate their potential significance include direct contact with contaminated soils by on-site worker and tracking of contaminated soils off site by vehicles, humans, or animals.

The objective of contaminant transport evaluation will be to derive estimates of ambient concentrations of contaminants both on site and off site and hence to estimate exposure by human and wildlife receptors. Therefore, the evaluation will be focused on areas where potential receptors have been identified and need not attempt to generate a detailed description of the movement of levels of contaminants into remote areas.

4.8.4 Exposure Evaluation

In the first stage in the exposure assessment, the populations at risk will be described. For human populations, this will include the number and distribution of residents and workers (both on site and off site), the demographic characteristics of the population, and projections for changes in future decades (obtainable from government and commercial sources). At the ACS site, an evaluation will focus on human exposure via potential consumption of contaminated groundwater. Any especially sensitive populations (children, older person, etc.) will be identified. If off-site transport of contaminants if found likely to occur, wildlife populations at risk will be defined using information from governmental and private surveys, supplemented by focused field investigation, if needed. Applicable EPA guidelines and current practices will be followed in compiling and presenting this information.

In the second stage in exposure assessment, scenarios for exposure will be constructed. These scenarios will include, at a minimum, the following:

1. Direct contact with contaminated surface soils by present or future users of the site.
2. Current or future consumption or other use of contaminated groundwater, if migration of contaminants into groundwater is found to be a significant exposure pathway.
3. Consumption of contaminated water and sediment by wildlife, either through groundwater recharge of surface waters or direct contact via surface run-off.

4.8.5. Toxicity Evaluation

A detailed summary of the toxicity of each of the contaminants on the short list will be presented. Toxicity summaries should be obtained from the Integrated Risk Information System (IRIS) initially; this information will be supplemented with more recently updated information on toxicity and human health from the EPA's verified reference doses (RfDs) evaluations by EPA's carcinogenic assessment group (CAG) and health effects assessments (HEA) documents. Computerized literature searches may be conducted to identify any more recent studies that may require consideration and/or modification in hazard assessment. Quantitative assessment of toxic hazards at predicted levels of exposure will follow current EPA procedures.

The potential for synergistic effects will also be evaluated. Accordingly, special attention will be paid to circumstances in which sequential exposure to chemicals might occur.

4.8.6. Environmental Impacts

The substantial effects on vegetation or wildlife, if any, caused by chemicals released at the site, will be assessed by comparing the predicted ambient concentrations of contaminants with those known to be toxic to test species.

4.8.7 Data Gaps, Recommendations, and Questions

This section of the Endangerment Assessment will define data gaps and questions, and may include recommendations for further site investigation, if data gaps are of such nature that endangerment assessment cannot be finalized without further site investigations.

4.8.8 Quality Assurance

The Endangerment Assessment will be based exclusively on analytical data that have been subjected to approved QA/QC procedures, unless there is specific reason to make an exception (e.g., if the only data available are unvalidated or partially validated). In addition to QA/QC for the analytical data, the results of transport modeling, exposure assessment, and toxicity assessment will be subject to Quality Assurance. This will include, at a minimum, review of the assessments by a qualified scientist.

4.8.9 Health Assessment

A Health Assessment will be conducted by the Agency for Toxic Substances and Disease Registry (ATSDR). Data obtained through the RI process will be supplied to ATSDR.

4.9 TASK 9 - REMEDIAL INVESTIGATION REPORT

4.9.1 Draft Remedial Investigation Report

A draft remedial investigation report will be prepared to consolidate and summarize the data obtained and documented in previously prepared technical memoranda during the remedial investigation. Data gaps and the need for any additional remedial investigation field work will be determined. The proposed Remedial Investigation Report Table of Contents is shown below:

REMEDIAL INVESTIGATION REPORT

The RI will provide the site characterization, a summary of data collected and the conclusions of the site investigation analysis. The draft report will be submitted for U.S. EPA and IDEM review. The following is a summary of the draft RI report contents.

- EXECUTIVE SUMMARY

  The executive summary will provide condensed overview of the report. The format of the executive summary will follow the sections of the report. The important characteristics and findings will be briefly presented.

- OBJECTIVES

  The objectives section will state the overall objective of the RI and delineate the specific objectives of each of the samplings, investigations, and studies performed. The order of the specific objectives will be set by the chronology of the RI.

- BACKGROUND

  The background section will provide the information obtained in the initial site characterization. This section will provide an overview of the past and current activities at the site up to the RI phase.

- INVESTIGATION METHODOLOGIES

  The investigation methodologies section will provide the basic methods used to obtain the data and information that is used in the investigation analysis. The order of presentation of the methods will follow the order presented in the objectives section. Specific methodologies will in some cases be presented in the appendices. Separate subsections should be provided for each sampling, investigation or study performed.

- INVESTIGATION DATA PRESENTATION

  The data will be described as raw data for this section. The findings of each sampling, study or investigation will be presented. The basic data will be presented in appendices where appropriate.

- INVESTIGATION ANALYSIS

  The investigation analysis will provide the conclusions drawn from the data presented in the previous section. The first subsection will provide the overall conclusions drawn from all the samplings, studies, and investigations. Specific analyses of the individual sets of data will follow the order previously set.

4.9.2 Agency Review

The draft RI report will be submitted to U.S. EPA in accordance with the Consent Order. Agency comments will subsequently be incorporated into the document.

Upon completion of agency review, a meeting will be held among the Project Team, U.S. EPA project staff and representatives of IDEM. The purposes of the meeting are as follows:

- To discuss the contents of the remedial investigation report.
- To determine the remedial action objectives.
- To identify alternative operable units associated with remedial actions to be addressed in the feasibility study.

A list of operable units and potential remedial actions will be prepared by the project team prior to the meeting to provide a basis for the discussion.

On the basis of the review meeting, a revised draft remedial investigation report will be revised to include U.S. EPA and IDEM review comments as appropriate. This final report will be subject to the approval of IDEM and U.S. EPA. A public meeting may be held or fact sheets may be prepared and distributed by the U.S. EPA or IDEM at this time. Community Relations Activities are discussed separately in Section 4.10, Community Relations Support. The scope of the feasibility study, as presented in this work plan, will be reviewed and modified as appropriate to incorporate the results of the review meeting.

4.9.3 Public Meeting

A public meeting may be conducted, or fact sheets may be prepared and distributed by EPA and IDEM to present the important findings of the remedial investigation and alternative proposal for considerations at the ACS site. The purpose of the meeting or fact sheets would be to inform the concerned citizens regarding plans for mitigating hazards existing at the site and to solicit comments for possible inclusion in the final remedial investigation report. The public meetings are further discussed in Section 4.10.

4.10 Task 10 - Community Relations Support

During the remedial investigation, staff will cooperate with the implementation of the U.S. EPA-approved community relations plan for the ACS site.

The project staff may participate in a "kick-off" meeting announcing the initiation of the remedial investigation.

4.11 RI Task 11 - Quality Assurance

Quality assurance for this project will provide a totally integrated program for assuring the reliability of monitoring and measurement data. A QA Project Plan (QAPP) will specify the procedures which will be implemented to assure that the data gathered at the American Chemical Service site are consistent with specific quality goals of accuracy, precision, completeness and representativeness.

4.11.1 - Systems Audits

A minimum of one system audit will be scheduled in each project phase, as appropriate. EPA may schedule such an audit as appropriate.

4.11.2 - Quality Control

Quality Control (QC) measures will be applied to all tasks and subtasks identified with this Work Plan. The Quality Assurance Program Plan and Quality Assurance Project Plan define Quality Control procedures that will be employed. The Site Manager and Peer Review Group are the principal individuals responsible for QC implementation.

4.12 RI Task 12 - Technical Management

Project Administration encompasses the following subtasks:

- Technical review and oversight
- Meetings
- Technical and financial reporting

Technical review and oversight includes the technical direction and management provided by the Site Manager to the site team from project initiation to completion on topics that are not task-specific.

4.12.1 Technical Reports

Reporting includes the efforts involved in preparing the required monthly technical progress reports for review by U.S. EPA.

Technical Progress Reports will include the following:

- Site identification and activity
- Status of work tasks and progress to date with percent of completion defined
- Difficulties encountered or anticipated during the reporting period
- Actions being taken to resolve problem situations
- Key activities to be performed in the next month
- Changes in personnel

The monthly progress report will list target and actual completion dates for each activity, including project completion. The report will also include an explanation of any major deviation from the work plan schedule.

4.12.2 Document Control

All documents will be filed with proper document numbers according to the Steering Committee consultants Standard Operating Procedures. Alternate monthly meetings of the Project Staff and the U.S. EPA Project Coordinator will be held, if necessary.

SECTION 5
FEASIBILITY STUDY SCOPE OF WORK

5.1 FS TASK 1 - PRELIMINARY REMEDIAL ALTERNATIVE DEVELOPMENT

The feasibility study will consist of identification, development and evaluation of alternative remedial action plans based on engineering feasibility, environmental impacts and costs for the selection of an alternative or combination of alternatives that are cost effective, reliable, implementable and mitigate the hazards present at the site.

The development of alternatives will require definition of remedial response objectives, identification of remedial technologies, and identification and development of remedial alternatives.

Remedial action objectives for the site will be established and reviewed by U.S. EPA. These objectives will be based on the endangerment assessment developed for American Chemical Services, Inc. (ACS). Criteria for meeting these objectives will be developed in close consultation with the U.S. EPA and IDEM so that cleanup objectives at the site are met. They will include compliance with 40 CFR 300.68 of the National Contingency Plan, U.S. EPA interim guidance, applicable or relevant and appropriate federal and/or state laws, consideration of existing levels of contamination, and risk factors for identified sources, pathways and receptors.

5.1.1 Remedial Alternatives Identification

Three types of response will be considered: (1) source control; (2) control of contaminants which have migrated off site; and (3) removal and off-site and/or on-site treatment and disposal of either the source or contaminants that may have migrated off site.

For each type of response required, alternative response actions will be identified. For each alternative response action, implementation technologies will be identified and screened. If more than one type of response is involved, alternatives will then be formulated combining response actions (operable units) to form alternatives that address the complete site. The set of alternatives derived from the process will cover the following categories:

- Alternatives for treatment or disposal at an off-site or on-site facility, as appropriate;
- Alternatives that attain applicable or relevant and appropriate public health and environmental requirements, standards, policy, or guidance;
- As appropriate, alternatives that exceed applicable or relevant and appropriate public health and environmental requirements;
- As appropriate, alternatives that do not attain applicable or relevant and appropriate public health and environmental requirements but will reduce the likelihood of present or future threat from the hazardous substances and that provide significant protection to public health and welfare and the environment. This must include an alternative that closely approaches the level of protection provided by the applicable or relevant and appropriate requirements; and
- No action alternative.

Development of alternatives includes establishing criteria and standards for alternatives that do not fully comply with existing regulations and standards.

5.1.2 Identification and Screening of Technologies For Implementation

Remedial technologies capable of meeting the remedial response objectives for the site specific cleanup requirements will be identified, described and listed for assembly into a set of viable alternatives. Applicable technologies will be based on the nature of the contamination at the site, including the geology and hydrogeology; technical literature; and the experience of the project staff. The technologies identified will be on a media-specific basis (i.e., groundwater, soil etc.) as well as interrelationships between media.

The screening will consider and address all of the following items: 1) the contaminant(s) of concern, 2) the concentrations of the contaminant(s), 3) the extent of the spread of the contaminant(s), 4) the characteristics of the contaminant(s), 5) potential pathways and receptors, and 6) acceptable concentrations of the contaminants.

5.1.3 Definition of Alternatives/Operable Units

As discussed in Section 5.1, if more than one type of response is involved, alternatives will be formulated combining response actions into operable units to form alternatives that address the entire site.

5.1.4 Technical Memorandum

A technical memorandum will be prepared which presents the results of the preliminary remedial alternative development. This memorandum will be submitted for Agency review and approval. Approval of the technical memorandum will be required before proceeding to the next task, which is Remedial Alternative Screening.

5.2 FS TASK 2 - REMEDIAL ALTERNATIVE SCREENING

The alternatives developed in Section 5.1 and approved by U.S. EPA and IDEM will be further evaluated in this task. The purpose of screening will be to eliminate alternatives that are clearly not feasible or appropriate and will be based primarily on engineering judgment.

Criteria to be included in the evaluation will include:

- Technical feasibility and reliability.
- Environmental and public health considerations.
- Institutional considerations.
- Cost.

5.2.1 Technical Feasibility Screening

This level of screening is to eliminate those alternatives that are not compatible with site and waste source conditions. Proven technology for remediation should be a consideration.

5.2.1.1 Technical Reliability

Technical reliability will be evaluated based on available literature and project team experience. Proven technology will be given a higher evaluation rating than unproven technologies that may give the same or marginally better results.

5.2.1.2 Implementation Screening

Remedial action plans will be evaluated based on implementability, reliability and operability of each component technology that comprises the alternative plan. An implementable alternative is one that must be able to be successfully applied or accomplished in a reasonable time frame. A reliable alternative is one that must be dependable. An alternative that is operable must be both practical and feasible.

5.2.2 Environmental and Public Health Screening

The purpose of this screening is to eliminate alternatives with significant adverse impacts or that do not adequately protect the environment, public health, or welfare.

5.2.2.1 Environmental Screening

The goals of a remedial action include:

- To mitigate impacts upon air, surface water, surface sediment or groundwater quality and including natural resources and their habitats, including reduction of mobility, toxicity, or volume of contaminants.

- To minimize or eliminate groundwater and surface water contamination.

- To minimize impact upon soil.

If these goals can be met by the remedial alternatives, they will be considered to be protective of the environment. Those remedial alternatives that exceed these goals will be rated higher than those that minimally meet or cannot meet the selected goals.

Analysis of environmental effects resulting from the implementation of a remedial strategy is also an important evaluation factor. The purpose of the remedial action is to rectify existing and potential negative environmental impacts. Alternatives that create additional long-term negative impacts will be avoided. By considering and minimizing environmental effects that may result from each alternative, response objectives will be met and public welfare and the environment will be protected.

Thus, alternatives will be evaluated to determine the extent to which they will control the source of contamination and to determine if the alternatives will result in adverse environmental impact. For instance, the risks of moving wastes off site could be an environmental risk in some circumstances. Those alternatives that do not adequately control the source of contamination and result in significant adverse impacts will be eliminated from further consideration.

5.2.2.2 Public Health Screening

Groundwater is the primary factor of concern for public health at ACS. Therefore, public health advisories and federal and state standards shall be considered, with appropriate adjustment in evaluating alternatives. If additional public health concerns are found, they will also be considered.

5.2.3 Institutional Considerations

The purpose of this screening is to eliminate alternatives that do not adequately conform to institutional standards such as RCRA compliance, worker health and safety and state and local permits and codes. Included in this analysis will be consideration of community relations/operations issues.

5.2.4 Cost Screening

The remedial action program for the ACS site must not only be technically capable of addressing the environmental concerns, but it must also be implemented and operated in a cost-effective manner. For cost effectiveness screening, the cost of all applicable technologies can be compared using cost factors such as:

- Capital costs.
- Monitoring costs.
- Operation and Maintenance costs.

The purpose of the cost analysis will be to provide a basis for comparing the economic features of various remedial action alternatives. These costs will be based on site specific conditions such as, the extent of soil contamination, and will also consider costs specific to on-site or off-site disposal options. For initial screening purposes, the costs will be estimated with an accuracy of ±100 percent.

Capital costs are encountered during the implementation phase for remedial action, but monitoring and maintenance costs continue during the post-closure phase (design life typically 30 years). Monitoring and maintenance operations can represent a substantial portion of the cost of remedial action strategy, depending on the alternative chosen. This is particularly true for treatment options, such as groundwater treatment. Strategies requiring significant maintenance and monitoring will be avoided; however, some level of monitoring and maintenance will be required to evaluate the effectiveness of the remedial action.

An alternative that has higher costs compared to other alternatives and that does not provide substantially greater health or environmental benefits will be excluded from further consideration.

So that these criteria are met, emphasis will be placed on proven technologies for actions to mitigate contamination on and migrating from the ACS site.

5.2.5 Technical Memorandum

A technical memorandum will be prepared which presents the results of the Remedial Alternative Screening. This memorandum will be submitted for Agency review and comment.

5.3 FS TASK 3 REMEDIAL ALTERNATIVE ANALYSIS

Once U.S. EPA and IDEM have reviewed and commented on the initial screening activities described in the technical memorandum, a more detailed investigation of the preferred remedial action alternatives will be initiated.

The following items will be considered in the evaluation:

- Technical feasibility analysis.
- Public health analysis.
- Environmental assessment.
- Institutional analysis.
- Cost analysis.

5.3.1 Technical Feasibility Analysis

The detailed description of alternative remedial action plans will include the following technical considerations:

- A description of remedial technologies for each alternative will be developed. This will include verbal descriptions as well as conceptual drawings and/or process flow sheets of each aspect of the technology, such as waste treatment, contaminated groundwater treatment, etc.

- Special engineering considerations required to implement the alternatives will be identified. These items could include evaluation on a pilot scale basis to determine the applicability or other additional studies required before proceeding with final remedial design.

- Operation and maintenance requirements of the completed remedial alternative will also be identified. The description will highlight the type and frequency of operation and maintenance requirements.

- Monitoring Requirements
  Monitoring activities needed for the selected remedial alternative may be similar to the RCRA post-closure monitoring and maintenance requirements. Monitoring may also be needed, at least in the short-term to determine that groundwater contamination is mitigated.

- Off-site disposal needs and transportation plans will be identified for each alternative. Waste characterization will determine the types of off-site facilities that would be required for disposal. From this information, facilities available to handle these materials can be identified. Recommendations of suitable sites will be requested from IDEM. In addition, transportation plans will be developed for the local area. Generally transportation plans are developed only for the local area and will identify transportation routes to major interstate highways for transportation of waste to be managed off site.

- Temporary storage requirements will be identified. This may include storage of waste materials or wastewater before transport from the site. Any temporary storage facility will be designed to minimize the potential for environmental impacts. This may require the erection of a temporary building, pads for run-on diversion, runoff collection or other actions. Any temporary storage requirements will be identified for each alternative. Also included will be a description of the length of time a waste may remain in storage and the maximum quantity of material that would be in storage at any one time.

- Safety requirements unique to implementation of specific plans will be identified. Both on and off site health and safety will be considered. Safety concerns will be addressed for both during and after the cleanup action.

- Potential for Phasing. A description of how the alternative could be phased into individual operable units will be prepared. The description will include a discussion of how various operable units of the total remedy could be implemented individually or grouped to result in a significant improvement to public health, the environment or cost savings.

5.3.2 Public Health Analysis

The Endangerment Assessment described in Task 8 of the RI will constitute the Environmental and Health Assessment of the "No-Action" alternative. For each of the other alternative remedial actions considered in the FS, a parallel assessment will be conducted to evaluate the extent to which each alternative reduces or eliminates the endangerment to public health, welfare, or the environment. For each alternative, the extent to which the remedial action will reduce the source strength and/or the propensity of the contaminant to migrate will be estimated. The results will be used to estimate the extent to which exposure (and hence risk) via each exposure pathway will be reduced. The results will be presented in a tabular or matrix fashion to facilitate comparisons among alternatives. Any alternatives that fail to meet applicable environmental standards or that fail to reduce risks to an acceptable level will be identified.

5.3.3 Environmental Assessment

A focused assessment of the environmental impacts will be performed for each of the remedial alternatives which are evaluated in detail. The assessment will address the environmental impacts of these alternatives and will identify measures to be taken during the design and implementation to mitigate any adverse effects that may occur from implementation of the alternative. This environmental assessment will also identify any physical or legal constraints that will impair or affect the ability to implement each of the alternatives. Compliance with CERCLA, RCRA and, in particular, the National Contingency Plan, will also be evaluated in this environmental assessment.

This assessment also identifies impacts to public health, welfare or the environment if the "no action" alternative is chosen. This is the result of the risk assessment undertaken in the RI. The assessment will provide a basis for comparison of improved benefits to public health, welfare and environment that would result from implementation of other remedial action alternatives.

5.3.4 Institutional Analysis

Technical feasibility and cost-effectiveness do not necessarily insure implementation. Therefore, institutional factors must be considered in the evaluation and selection of the remedial action strategy. Some of the factors that should be considered include:

- Public acceptance.
- Needed permits or licenses.
- Zoning or other land use ordinances.
- Identification of long-term management agencies or entities.

Permits and licenses will be required by state or local units of government. These can include wastewater discharge permits; processing, landfill, or transportation licenses; and construction or operation permits. Zoning or other land use ordinances can also impact this assessment and implementation of remedial action alternatives. Existing zoning, as well as modification of ordinances, may impact the proposed strategies.

Long-term management agencies or entities must be identified during the feasibility study. This agency (state or local) or entity will be required to implement the long-term monitoring and maintenance program. This will include funding, staffing, coordinating, and keeping records on monitoring the site groundwater; maintenance and security; and long-term care costs. As such, the long-term management agency or entity should be identified during the feasibility study process and should have input in selection of the final alternative.

In addition to these criteria, an important factor in the selection of the preferred remedial action alternative is the assessment of potential risks associated with its implementation. Risk assessment for each potential action will be considered in this evaluation.

By adding an institutional factor analysis and risk assessment analysis, additional information on the implementability, reliability as well as the public acceptance of the chosen remedial alternative can be obtained. The resulting output after the completion of this task will be identification of a recommended alternative(s) for implementation.

5.3.5 Cost Analysis

A cost analysis will be developed for each of the remaining alternatives. This analysis will be more definitive than cost effectiveness analysis in the screening of alternatives, and will fall in the range of minus 30 percent to plus 50 percent accuracy. Each cost item will be identified and costed in current dollars. An agreed-upon interest rate will be used in determining the present worth cost of those portions of the projects that may extend over time, such as pumping and treatment of groundwater and long-term monitoring of the site up to 30 (thirty) years. In addition to the present worth cost, annual operation and maintenance costs will be developed for each alternative.

5.3.6 Technical Memorandum

A technical memorandum will be prepared which presents the results of the Remedial Alternative Analysis. This memorandum will be submitted for Agency review and comment.

5.4 FS TASK 4 - COMPARATIVE EVALUATION OF ACCEPTABLE ALTERNATIVES

5.4.1 Technical Considerations

Once the detailed development of the alternatives has been completed, a final comparison of these remedial action alternatives and their component technologies will be conducted. The evaluation criteria will include:

- Reliability.
- Implementability.
- Environmental Effects.
- Ability to meet ARARs.

5.4.2 Incremental Benefits - Cost Analysis

Value engineering will be utilized to compare the alternatives. The cost effective recommendation will result from a detailed evaluation of the alternatives. Each of the alternatives will be ranked. Except for cost, all other criteria are subjective in nature. To evaluate these subjective factors, a weighting system will be developed and will be used to objectively compare all alternatives. A summation of the values for each alternative provides a general ranking of its potential application.

5.4.3 Institutional Considerations

Institutional factors such as public acceptance, needed permits or licenses, zoning or land use ordinances, and identification of long-term management agencies or entities will be considered factors and included in the detailed development and evaluation of alternatives.

5.4.4 Environmental Impacts of Implementation

Upon completion of detailed analysis of remedial alternatives, environmental impacts will also be considered in the final comparison. Compliance with CERCLA, RCRA, the NCP, and State ARARs will be considered in the possible implementation of any alternatives.

5.4.5 Impact Mitigation

The percent of impact that an alternative will have on existing or potential problems will also be a factor considered in the final comparison of alternatives.

5.4.6 Technical Memorandum

A technical memorandum will be prepared which present the results of the Remedial Alternatives Analysis. This memorandum will be submitted for Agency review and comment.

5.5 FS TASK 5 - FEASIBILITY STUDY REPORT

5.5.1 Draft Feasibility Study Report

A proposed table of contents for the Draft Feasibility Study Report is shown in Table 5-1. The draft report presenting the results of evaluation conducted in tasks described in Sections 5.1 through 5.4 will be prepared. On the basis of the entire evaluation process, one alternative or a combination of alternatives will be recommended for consideration. The draft report will be submitted to U.S. EPA, DOI, and IDEM for review.

5.5.2 Revised Feasibility Study Report

Following receipt of review comments as appropriate, a Revised Draft Feasibility Study Report will be prepared incorporating the Agency's comments on the plan. The report will be submitted to IDEM, DOI, and U.S. EPA for final review.

5.5.3 Public Hearing

A three week comment period will be held on the Revised Draft Feasibility Study Report. A public meeting will be held during this period to receive comments and questions on the recommended remedial alternatives. A responsiveness summary will be prepared by the U.S.EPA following this public comment period.

5.5.4 Final Feasibility Study Report

The Final Feasibility Study Report will be prepared following the completion of the EPA decision documentation process. Revisions arising out of this process will be incorporated into the Final Feasibility Study Report. The final report will be subject to approval by U.S. EPA and IDEM.

5.6 TASK 6 - PREDESIGN REPORT

5.6.1 Process Development

Based on the results of the final feasibility study, a predesign report will be prepared for the selected alternative. Initially, the hazardous waste management scheme will be better defined. During this initial process development phase, the individual processes that collectively formulate the total waste handling strategy will be selected. This will be based on the contaminants that must be managed, the degree of removal/destruction that must be achieved, and/or the containment/stabilization alternative selected as a result of the feasibility study.

5.6.2 Conceptual Design

As a basis for preparation of construction documents, a conceptual design memorandum will be prepared. This memorandum does not discuss "why," but is much more specific about "how" engineering will be implemented. The table of contents for the conceptual design memorandum is presented in Table 5-2.

The major purpose of conceptual design memorandum is to lay out the selected alternative from the RI/FS into specific operations, equipment (sized generally), and facilities needed to meet the engineering requirements of the project.

The level of detail during conceptual design will be limited, but it considers the impact of the size limitations on the implementation of remedial actions and construction facilities. It also examines the adequacy of the data base for process development. The conceptual design memorandum will be submitted to the Agency for information purposes.

The conceptual design memorandum discussed in the preceding paragraph provides the basic definition of the proposed project and is used for review of concepts. It does not contain pertinent decisions which will be required before detailed plans and facility designs can be undertaken. The predesign report is prepared utilizing conceptual design memoranda to develop engineering details required for development of the construction documents. The predesign report will address:

- Specific methodology and protocols for movement, staging, sampling, and disposal of waste material
- Logistics of material movement and waste processing capacities on and off site
- For each processing operation on site, the number and size of processing units, pumps, storage capacity, standby units, planned hours of operation, specific utility requirement, etc.,
- Cleanup analytical guidelines which will determine progress and establish when a particular remedial operation is to be terminated.
- Health and safety requirements (specific operations, clothing, and equipment for each on-site task)
- Required temporary facility on site, such as a laboratory, decontamination station for equipment, and change stations for personnel
- Mobile equipment required on site (trucks, payloaders, backhoes, bulldozers, etc.,).
- Estimated schedule for design, procurement, construction, operation, and eventual closure of the site.
- Work outside the scope of design that must be resolved prior to the preparation of construction documents.
- Specify the procedures, extent and limits of the proposed remedial activities.

- Provide a forum upon which to obtain agency input and direction.

Also contained in the predesign report is a preliminary remediation schedule, preliminary specifications outline and conceptual cost estimate. These three items are briefly described in the following section.

The table of contents for the predesign report is shown in Table 5-3.

5.6.3 Preliminary Remediation Schedule

A preliminary remediation schedule will be prepared for final design, bidding, and implementation, including post-closure needs.

5.6.4 Preliminary Specifications Outline

The predesign report will include preliminary specifications which define the physical and chemical characteristics of wastes and contaminated soils to be used in specification of materials for construction. Specifications will be site-specific for all equipment or operations in the project. However, there may be standard sections which apply to standard materials and methods. The specifications will include plans and protocols to meet regulatory agency specifications or regulations.

For purposes of uniformity, specifications will follow the Construction Specifications institute (CSI) format. This format breaks the specifications into divisions: Division 0 and 1 include bidding, contract requirements, and general requirements. Division 2 through 16 are for technical specifications.

5.6.5 Conceptual Cost Estimate

The predesign report will contain preliminary cost estimates which are based on information in the conceptual design memorandum. The cost estimate should reflect comments received during the review stage. The preliminary cost estimate will have a precision within an order of magnitude for preliminary budgetary purpose (plus 50 percent, minus 30 percent).

5.7 FS TASK 9 - COMMUNITY RELATIONS SUPPORT

During the feasibility study, project staff will cooperate with implementation of U.S. EPA's community relations plan for the ACS site. The project staff will prepare a fact sheet summarizing the completed feasibility study .

5.8 FS TASK 10 - QUALITY ASSURANCE

Quality Assurance of the FS will be in accordance with the Standard Operating Procedures for the PRPs consultant. Audits will be performed during the FS to ensure that quality assurance is being maintained.

5.9 FS TASK 11 - TECHNICAL AND FINANCIAL MANAGEMENT

Project Administration encompasses the following subtasks:

- Technical review and oversight.
- Meetings.
- Technical reporting.

Technical review and oversight includes the technical direction and management provided by the Project Manager to the site team, from project initiation to completion on topics that are not task-specific.

5.9.1 Technical Reports

Reporting includes the efforts involved in preparing the required monthly technical progress reports requested by U.S. EPA.

Technical Progress Reports will include the following:

- A description of the action which has been taken during the month relating to the American Chemical Services Site;
- All results of sampling and tests and all other raw data produced during the month relating to the American Chemical Services site and the Appurtenant Areas;
- All plans and procedures completed during the past month, as well as such actions, data, and plans which are scheduled for the next month; and

- Target and actual completion dates for each element of activity, including the project completion, and an explanation of any deviation from the RI/FS project plan or Work Plan schedule.

The monthly progress report will list target and actual completion dates for each activity, including project completion. The report will also include an explanation of any deviation from the milestones in the work plan schedule.

5.9.2 Document Control

All documents will be filed with proper document numbers according to the Standard Operating Procedures of the Steering Committee's consultant.

5.9.3 Meetings

Alternate monthly meetings, general and management in nature, will be held regularly to provide progress updates on work being completed at the site. It is anticipated that the monthly meetings will consist of teleconferences with appropriate members of the Steering Committee, the Steering Committee's consultant, and Agency staff.

SECTION 6
SCHEDULE

The schedule for completion of the RI work defined in this Work Plan is presented in Figure 6-1. It identifies significant milestones as well as elapsed time for each task. Specific timeframes are included in the schedule for periods of review and comment by the U.S.EPA. Any additional review time required by U.S.EPA will result in corresponding increases in the schedule.

A meeting among the U.S.EPA, the IDEM, the technical subcommittee of the PRP group, and the PRP's consultant will be necessary between Phase I and Phase II of the investigation.

The estimated time for completion of the RI is 12 months from the date that authorization is given to proceed with the remedial investigation. It is anticipated that the FS will require another 10 months to complete.

TABLE 2-1
AMERICAN CHEMICAL SERVICES, INC.
DISPOSAL LOCATIONS AND WASTE TYPES

LOCATION	CLASSIFICATION	WASTE TYPES
American Chemical Services, Inc. Property		
Off-site Containment Area (Figure 2-1/Location C)	Documented Waste Disposal Location	Drums of PCB-contaminated waste. 10,000 cubic yards of distillation bottoms (drummed). Drums containing solidified materials. 68 cubic yards of incinerator ash Chlorinated solvents Acetone MEK still bottoms Cresylic acid, cyanide and chromium from plating operation Lead pigments Several hundred cases of empty bottles that had contained 2,4,D and 2,4,5-TP Tank truck containing 500 gallons of solidified paint 200 drums containing solvent solids of benzene, amylacetate, dimethyl aniline, diethylether.
On-site Containment Area (Figure 2-1/Location E)	Documented Waste Disposal Location	400 drums of sludge and semi-solids of unknown type.
Old Still Bottom Pond (Figure 2-1/Location F)	Documented Waste Disposal Location	253,510 gallons and 2,000 drums of still bottom sludge, containing 1,1,1-trichloroethane, trichloroethylene, methylene, chloride, toluene, benzene, and other low boiling point solvents.

TABLE 2-1
AMERICAN CHEMICAL SERVICES, INC.
DISPOSAL LOCATIONS AND WASTE TYPES
(continued)

Treatment Pond Number 1 (Figure 2-1/Location L)	Documented Waste Disposal Location	200 drums containing solvent, solids of benzene, amylacetate, dimethyl aniline, diethylether 41,612 gallons and 1,000 drums containing semi-soid paint, lacquer and ink waste.
Kapica Drum, Inc. Drum Draining Area (Figure 2-1/Location L)	Suspected Soil Contamination Location	Drum residue and drum rinse water from drum recycling operation.
Old Drum Storage Area (Figure 2-1/Location M)	Suspected Soil Contamination Location	Suspected soil contamination from from unknown waste type.
Old Wastewater Trenches (Figure 2-1/Locations I, J, K)	Suspected Soil Contamination	Susptected soil contamination from wastes containing 1,1,1-trichloroethane, trichloroethylene, methylene chloride, toluene, benzene, and other low boiling point solvents.
<u>Kapica Drum, Inc. Property</u>		
(Figure 2-1/Location O)	Suspected Soil Contamination	Suspected soil contamination from residue and drum rinse water from drum recycling operation.
<u>Griffith Landfill Property</u>		
(Figure 2-1/Location D)	Suspected Waste Disposal Location	10 gallons per week for 12 years of retained samples containing hazardous substances 2,500 drums of resudues from drum recycling operation

TABLE 4-1
SITE CHARACTERIZATION SAMPLING EFFORT

	INVESTIGATIVE	DUPLICATE	BLANK
Groundwater (GW)			
Phase I	6	1	1
Phase II A (up to)	12	2	2
Phase II B (up to) full TCL	9	1	1
*Phase II B (up to) reduced parameter list	(9)	(1)	(1)
Surface Water (SW)	11	2	2
Sediment (SD)	11	2	0
Private Wells (PW)	10	1	1
Leachate (LE)	4	1	1
ACS Effluent (AE)	4	1	1
SUBTOTAL	67	11	9
Chemical Subtotal	87		
Geotechnical	90		
Geotechnical Subtotal	90		

TOTAL: 177

Note:
* Numbers not included in total

TABLE 4-2
SUMMARY OF SITE CHARACTERIZATION SAMPLING AND ANALYSIS PROGRAM

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	Phase	INVESTIGATIVE SAMPLES No.	INVESTIGATIVE SAMPLES Freq.	INVESTIGATIVE SAMPLES Total	QA SAMPLES DUPLICATE No.	QA SAMPLES DUPLICATE Freq.	QA SAMPLES DUPLICATE Total	BLANK No.	BLANK Freq.	TOTAL	MATRIX TOTAL
Groundwater (Low)	pH	RAS organics package from CLP (except VOA) including 30 tentatively identified parameters	1	6	2	12	1	2	2	1	2	2	16
			2A	12	1	12	2	1	2	2	1	2	16
			2B	*									
		SAS VOA analys's from CLP (low detection limit)	1	6	2	12	1	2	2	1	2	2	16
			2A	12	1	12	2	1	2	2	1	2	16
			2B	*									
	Specific conductance	RAS inorganics package/metals from CLP filtered samples	1	6	2	12	1	2	2	1	2	2	16
			2A	12	1	12	2	1	2	2	1	2	16
			2B	*									
	Temperature	RAS inorganics package/metals and SAS for suspended solids-unfiltered samples	1	2	1	2	1	1	1	1	1	1	4
			2A	5	1	5	1	1	1	1	1	1	7
			2B	*									
		RAS inorganics package/cyanide from CLP filtered samples	1	6	2	12	1	2	2	1	2	2	16
			2A	12	1	12	2	1	2	2	1	2	16
			2B	*									
		SAS for Alkalinity, Chloride, Sulfate, TDS	1	6	2	12	1	2	2	1	2	2	16
			2A	12	1	12	2	1	2	2	1	2	16
			2B	*									
		SAS for Ammonia, Nitrate-Nitrite, COD, TOC	1	6	2	12	1	2	2	1	2	2	16
			2A	12	1	12	2	1	2	2	1	2	16
			2B	*									
Surface Water (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	1	11	1	11	2	1	2	2	1	2	15
	Specific conductance	RAS inorganics package/metals from CLP unfiltered samples	1	11	1	11	2	1	2	2	1	2	15
	Temperature	RAS inorganics package/cyanide from CLP unfiltered samples	1	11	1	11	2	1	2	2	1	2	15
		SAS for Alkalinity, Chloride, Sulfate, TDS, TSS	1	11	1	11	2	1	2	2	1	2	15

TABLE 4-2
SUMMARY OF S[illegible]CHARACTERIZATION SAMPLING AND ANALYSIS PRO[illegible]
(continued)

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	Phase	INVESTIGATIVE SAMPLES No.	Freq.	Total	QA SAMPLES DUPLICATE No.	Freq.	Total	BLANK No.	Freq.	TOTAL	MATRIX TOTAL
		SAS for Ammonia, Nitrate-Nitrite, COD	1	11	1	11	2	1	2	2	1	2	15
Sediment (Low)	Qualitative organic vapor screening with OVA and HNu	RAS organic package from CLP including 30 tentatively identified parameters	1	11	1	11	2	1	2	--	--	--	13
		RAS inorganics package/metals and cyanide from CLP	1	11	1	11	2	1	2	--	--	--	13
Private Wells (Low)	pH	Acid extractables and base/neutral extractables	2	10	1	10	1	1	1	1	1	1	12
	Specific conductance	Pesticides and PCBs	2	10	1	10	1	1	1	1	1	1	12
	Temperature	Volatile organics	2	10	1	10	1	1	1	1	1	1	12
		Metals - unfiltered samples	2	10	1	10	1	1	1	1	1	1	12
		Mercury - unfiltered samples	2	10	1	10	1	1	1	1	1	1	12
		Cyanide - unfiltered samples	2	10	1	10	1	1	1	1	1	1	12
		Minerals (alkalinity, chloride, sulfate, TDS)	2	10	1	10	1	1	1	1	1	1	12
		Nutrients (ammonia, Nitrate-Nitrite, COD)	2	10	1	10	1	1	1	1	1	1	12
Leachate	pH	RAS organics package from CLP including 30 tentatively identified parameters	1	4	1	4	1	1	1	1	1	1	6
	Specific conductance	RAS inorganics package/metals from CLP unfiltered samples	1	4	1	4	1	1	1	1	1	1	6
	Temperature	RAS inorganics package/cyanide from CLP unfiltered samples	1	4	1	4	1	1	1	1	1	1	6
		SAS for Alkalinity, Chloride, Sulfate, TDS, TSS	1	4	1	4	1	1	1	1	1	1	6
		SAS for Ammonia, Nit[illegible]e-Nitrite, COD, TOC	1	4	1	4	[illegible]	1	1	1	1	1	6

TABLE 4-2
SUMMARY OF SITE CHARACTERIZATION SAMPLING AND ANALYSIS PROGRAM
(continued)

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	Phase	INVESTIGATIVE SAMPLES No.	Freq.	Total	QA SAMPLES DUPLICATE No.	Freq.	Total	BLANK No.	Freq.	TOTAL	MATRIX TOTAL
ACS Effluent	pH	RAS organics package from CLP including 30 tentatively identified parameters	1	4	1	4	1	1	1	1	1	1	6
	Specific conductance	RAS inorganics package/metals from CLP unfiltered samples	1	4	1	4	1	1	1	1	1	1	6
	Temperature	RAS inorganics package/cyanide from CLP unfiltered samples	1	4	1	4	1	1	1	1	1	1	6
		SAS for Alkalinity, Chloride, Sulfate, TDS, TSS	1	4	1	4	1	1	1	1	1	1	6
		SAS for Ammonia, Nitrate-Nitrite, COD, TOC	1	4	1	4	1	1	1	1	1	1	6
Soil-Wells (Low)	Qualitative organic vapor screening with OVA and HNu	Atterberg Limits (ASTM D 4318-8*)	1	18	1	18	0	0	0	0	0	0	18
		Particle Size Analysis (ASTM D 422-63) Sieve analysis and hydrometer analysis	1	18	1	18	0	0	0	0	0	0	18
		Coefficient of permeability (ASTM D 2434-68)	1	18	1	18	0	0	0	0	0	0	18
		Cation exchange capacity (ASTM D 4319-83)	1	18	1	18	0	0	0	0	0	0	18
		Moisture content (ASTM D 2216-80)	1	18	1	18	0	0	0	0	0	0	18

NOTE: Field parameters determined for investigative and duplicate samples only.
ASTM methods can be found in American Society of Testing and Materials 1984 Annual. Book of Standards, Volume 4.08. Soil and Rock; Building Stones.
Laboratory testing to be performed by a qualified geotechnical laboratory.

* Total Number of Samples and specific parameters will be determined from Phase 1 and 2A sampling results at monitoring wells.
Preliminary assessment is that up to 9 wells will be sampled for complete TCL, and remaining wells will be sampled for reduced parameter list.

TABLE 4-3
SOURCE CHARACTERIZATION SAMPLING EFFORT

	INVESTIGATIVE	DUPLICATE	BLANK
PHASE I			
Waste Pit (WP)	6	1	0
Natural Soil Pit (NP)	6	1	0
Waste Boring (WB)	8	1	0
Natural Soil Boring (NB)	8	1	0
Soil Area (SA)	8	1	0
Soil Boring (SB)	12	2	0
Chemical Subtotal	48	7	0
PHASE I TOTAL: 55			
PHASE II			
To Be Defined in Phase I	20	2	0
PHASE II TOTAL: 22			

Notes:
Blanks are not necessary for solid material samples.

TABLE 4-4
SUMMARY OF SOURCE CHARACTERIZATION SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	QA Samples Duplicate Freq.	QA Samples Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Waste Pits (Med)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	6	1	6	1	1	1	0	0	0	7
		RAS inorganics package/metals from CLP	6	1	6	1	1	1	0	0	0	7
		RAS inorganics package/cyanide from CLP	6	1	6	1	1	1	0	0	0	7
Natural Soils-Waste Pits (Low)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	6	1	6	1	1	1	0	0	0	7
		RAS inorganics package/metals from CLP	6	1	6	1	1	1	0	0	0	7
		RAS inorganics package/cyanide from CLP, SAS	6	1	6	1	1	1	0	0	0	7
		SAS, TOC	6	1	6	1	1	1	0	0	0	7
Waste Borings (Med)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	8	1	8	1	1	1	0	0	0	9
		RAS inorganics package/metals from CLP	8	1	8	1	1	1	0	0	0	9
		RAS inorganics package/cyanide from CLP	8	1	8	1	1	1	0	0	0	9
Natural Soils-Waste Borings (Low)	Qualitative organic vapor screeing with OVA and Hnu	RAS organics package from CLP including 30 tentatively identified parameters	8	1	8	1	1	1	0	0	0	9
		RAS inorganics package/metals from CLP	8	1	8	1	1	1	0	0	0	9
		RAS inorganics package/cyanide from CLP	8	1	8	1	1	1	0	0	0	9
		SAS, TOC	8	1	8	1	1	1	0	0	0	9

TABLE 4-4
SUMMARY OF SOURCE CHARACTERIZATION SAMPLING AND ANALYSIS PROGRAM
(continued)

			Investigative Samples			QA Samples Duplicate				Blank		
Sample Matrix	Field Parameters	Laboratory Parameters	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	Matrix Total
Soil Areas (Low)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	8	1	8	1	1	1	0	0	0	9
		RAS inorganics package/metals from CLP	8	1	8	1	1	1	0	0	0	9
		RAS inorganic package/cyanide from CLP	8	1	8	1	1	1	0	0	0	9
Soil Borings (Med)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	12	1	12	2	1	2	0	0	0	14
		RAS inorganics package/metals from CLP	12	1	12	2	1	2	0	0	0	14
		RAS inorganics package/cyanide from CLP	12	1	12	2	1	2	0	0	0	14

NOTE: Field parameters determined for investigative and duplicate samples only.
Blank samples are not required for soil material samples.

TABLE 5-1

FEASIBILITY STUDY REPORT

TABLE OF CONTENTS

TABLE 5-2
CONCEPTUAL DESIGN MEMORANDUM
TABLE OF CONTENTS

TABLE 5-2

CONCEPTUAL DESIGN MEMORANDUM
TABLE OF CONTENTS
(Continued)

- Define the space which system operation will require
- Define the size and number of process components
- Define piping and pumping requirements
- Define utility requirements

· Groundwater remedial measures

- Removal of contaminants from soil
- Control of contaminated groundwater movement
- Recovery of contaminated groundwater
- Treatment of contaminated groundwater
- Discharge of treated groundwater

4.4 Control of air emissions during hazardous waste removal transport

4.5 Define health and safety procedures and equipment for the specific operations

· Health and safety protocol

5.0 DATA ADEQUACY EVALUATION

5.1 Critically review the RI/FS to determine whether or not site characteristics are adequately defined for design purposes:

· Location and quantities of contained hazardous waste

· Topographic data

· Area and depth of contaminated soil

· Air emissions (type and concentration)

· Groundwater contaminants (type, concentration, and plume definition)

5.2 Review the pilot and bench scale process studies for definition of the selected remedial actions and the availability of fundamental process data.

TABLE 5-2

CONCEPTUAL DESIGN MEMORANDUM
TABLE OF CONTENTS
(Continued)

- Is there an adequate estimate of quantities on which a design may be based?

- Are the site limitations suitably defined when considering construction of facilities?

5.3 Define missing information and assist in the development of field investigation and sampling or process development studies which will obtain the necessary information.

6.0 PRELIMINARY COST ESTIMATE

TABLE 5-3

PREDESIGN REPORT
TABLE OF CONTENTS

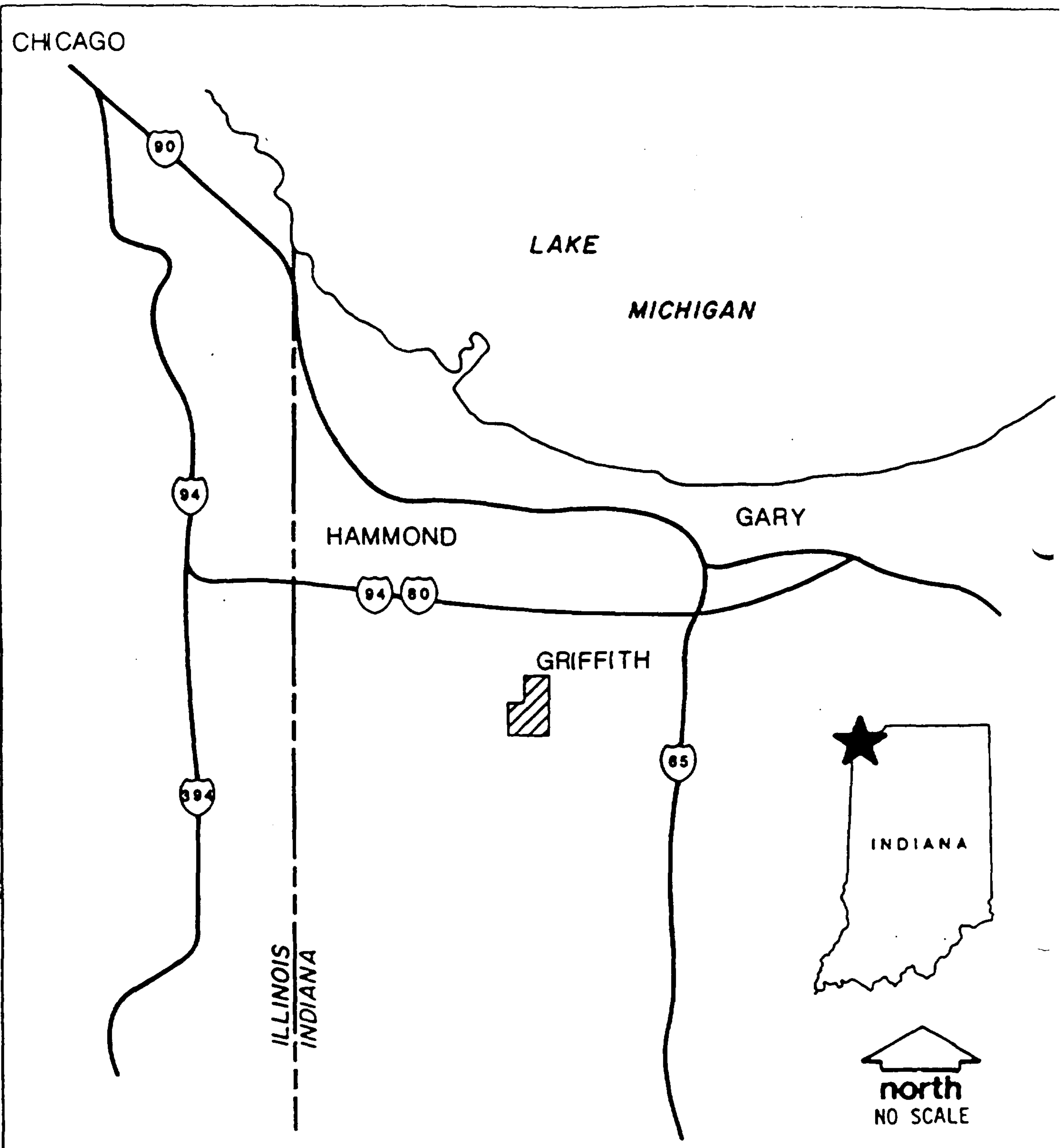
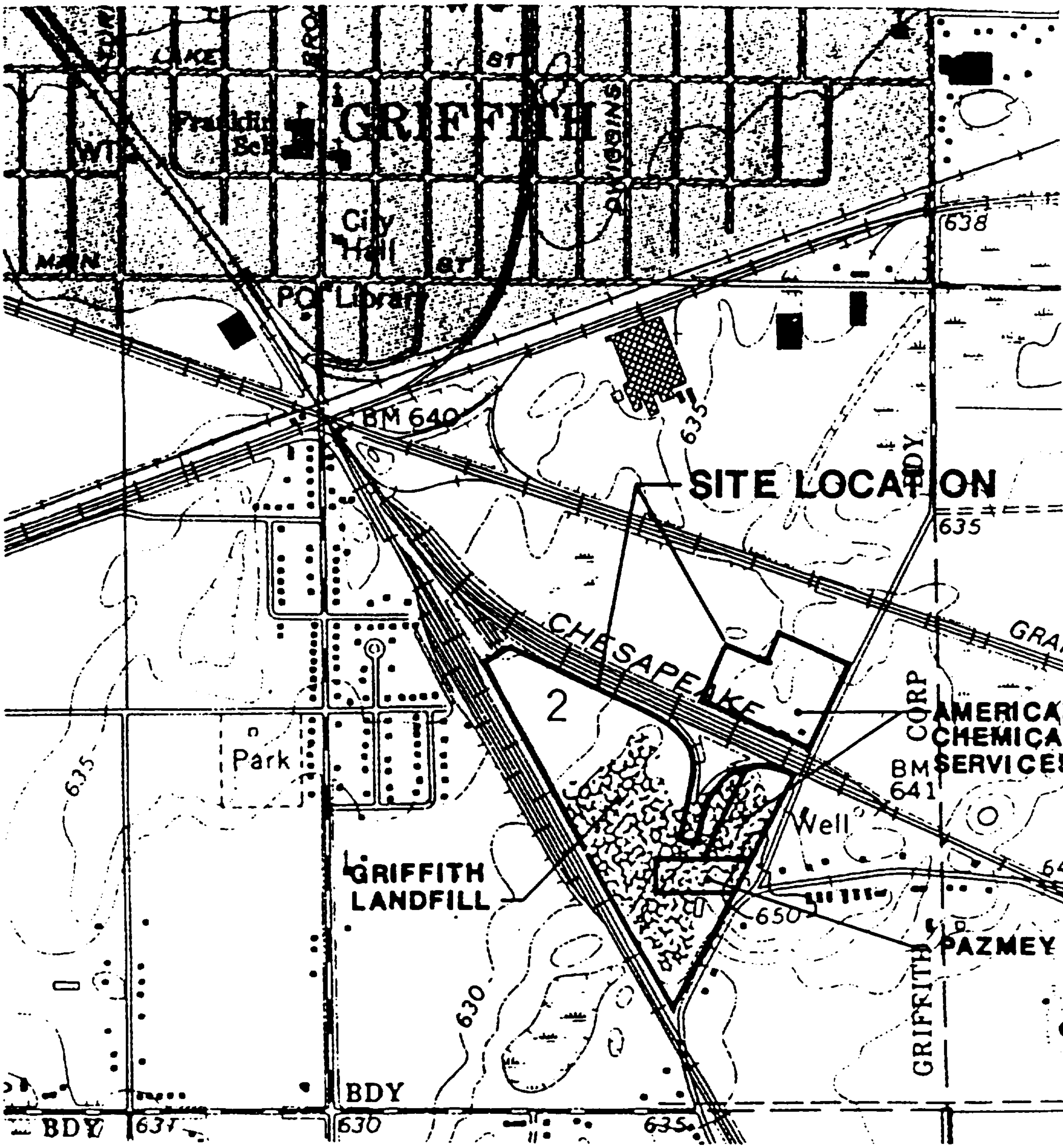


FIGURE 1-

WARZYN

REGIONAL LOCATION MAP
RI/FS
AMERICAN CHEMICAL SERVICES SI
GRIFFITH, INDIANA

DWN SJP	APP'D PJV	DATE 3/28/88	60251-A1



NOTE:

1. SITE LOCATION MAP WAS DEVELOPED FROM U.S.G.S. 7½ MINUTE QUADRANGLE MAP ENTITLED HIGHLAND, INDIANA 1968, PHOTOREVISED 1980.

north

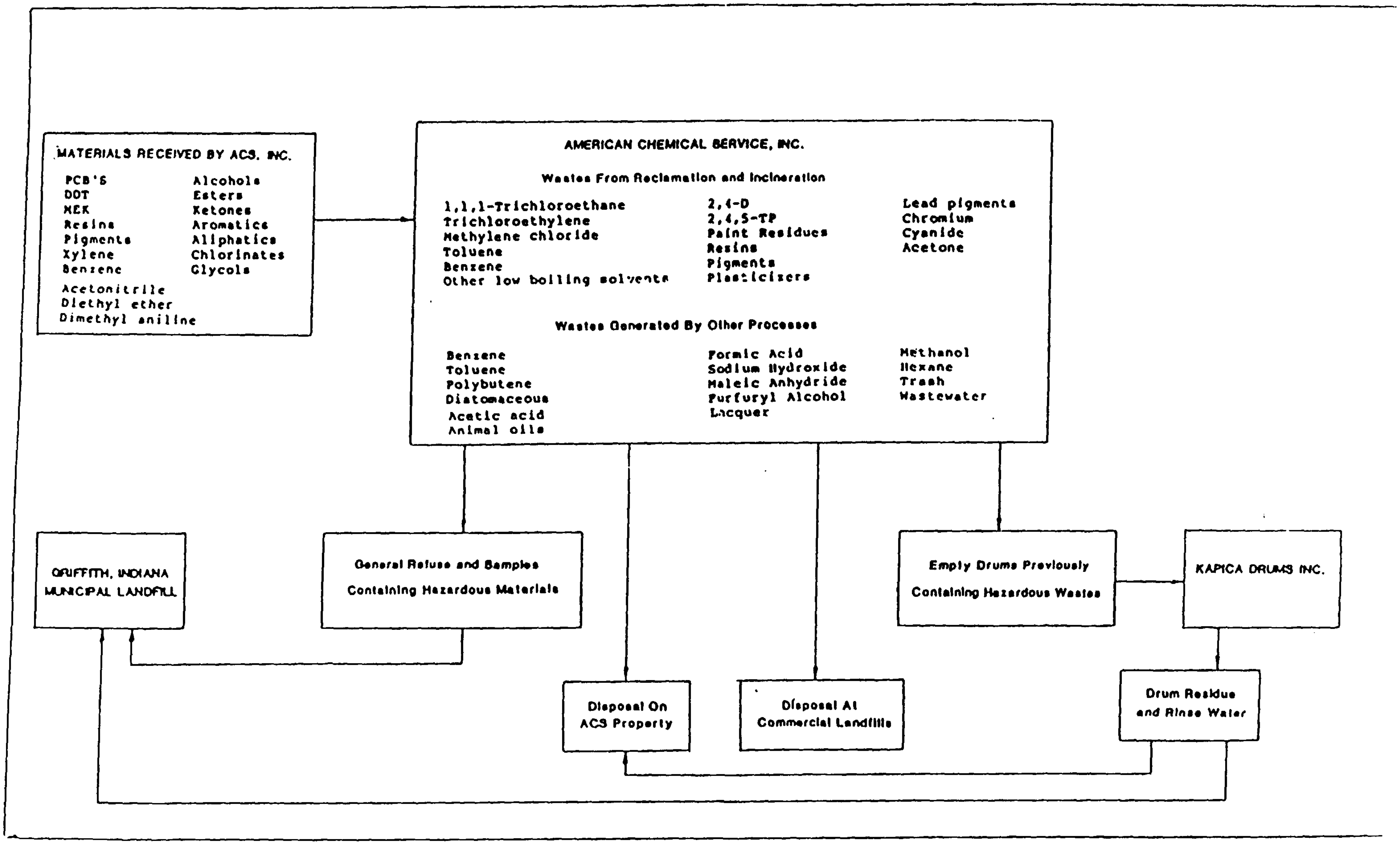
SCALE: 1"= 1000'

FIGURE 1-2

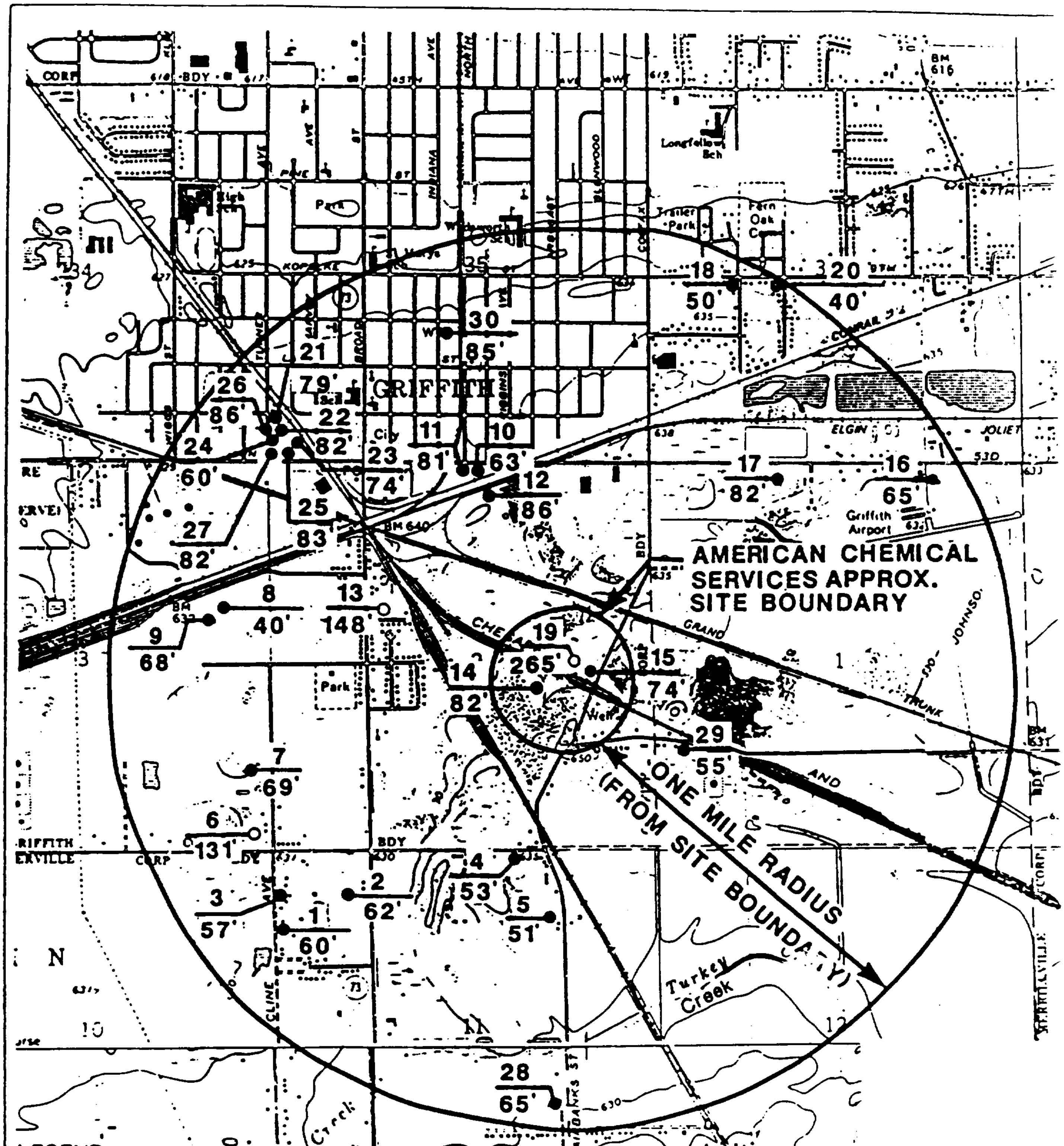
WARZYN

SITE LOCATION MAP
RI/FS
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

DWN SJP | APP'D PJV | DATE 3/28/88 | 60251-A2



MATERIALS RECEIVED BY ACS, INC.
PCB'S
DDT
MEK
Resins
Pigments
Xylene
Benzene
Alcohols
Esters
Ketones
Aromatics
Aliphatics
Chlorinates
Glycols
Acetonitrile
Diethyl ether
Dimethyl aniline
AMERICAN CHEMICAL SERVICE, INC.
Wastes From Reclamation and Incineration
1,1,1-Trichloroethane
Trichloroethylene
Methylene chloride
Toluene
Benzene
Other low boiling solvents
2,4-D
2,4,5-TP
Paint Residues
Resins
Pigments
Plasticizers
Lead pigments
Chromium
Cyanide
Acetone
Wastes Generated By Other Processes
Benzene
Toluene
Polybutene
Diatomaceous
Acetic acid
Animal oils
Formic Acid
Sodium Hydroxide
Maleic Anhydride
Furfuryl Alcohol
Lacquer
Methanol
Hexane
Trash
Wastewater
GRIFFITH, INDIANA MUNICIPAL LANDFILL
General Refuse and Samples Containing Hazardous Materials
Empty Drums Previously Containing Hazardous Wastes
KAPICA DRUMS INC.
Disposal On ACS Property
Disposal At Commercial Landfills
Drum Residue and Rinse Water



LEGEND

1 - WELL REFERENCE NUMBER
60 - DEPTH OF WELL (FEET)

● WELL SCREENED IN UNCONSOLIDATED AQUIFER

○ WELL SCREENED IN ROCK AQUIFER

north
SCALE:1"=2000'

NOTE

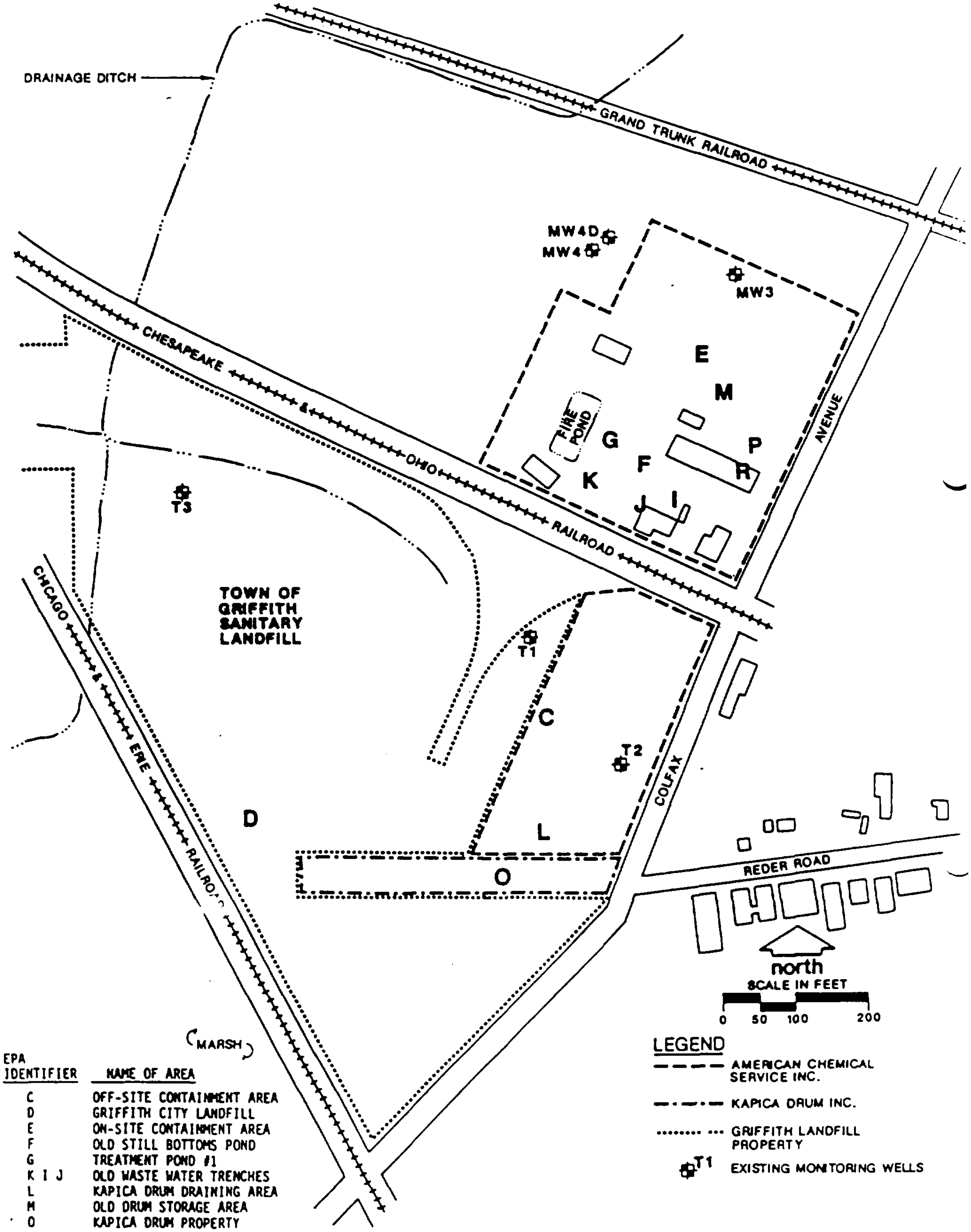
1. BASE MAP DEVELOPED FROM THE HIGHLAND, INDIANA AND THE ST. JOHN, INDIANA 7 1/2 MINUTE USGS QUADRANGLE MAPS. DATED 1968 AND 1962 RESPECTIVELY PHOTOREVISED 1980.

2. WELL REFERENCE NUMBERS REFER TO ATEC REPORT, JANUARY 1985.

FIGURE 1-4

WARZYN

REMEDIAL INVESTIGATION/FEASIBILITY STU
WATER WELL LOCATIONS
AMERICAN CHEMICAL SERVICES SITE



EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

FIGURE 2-1

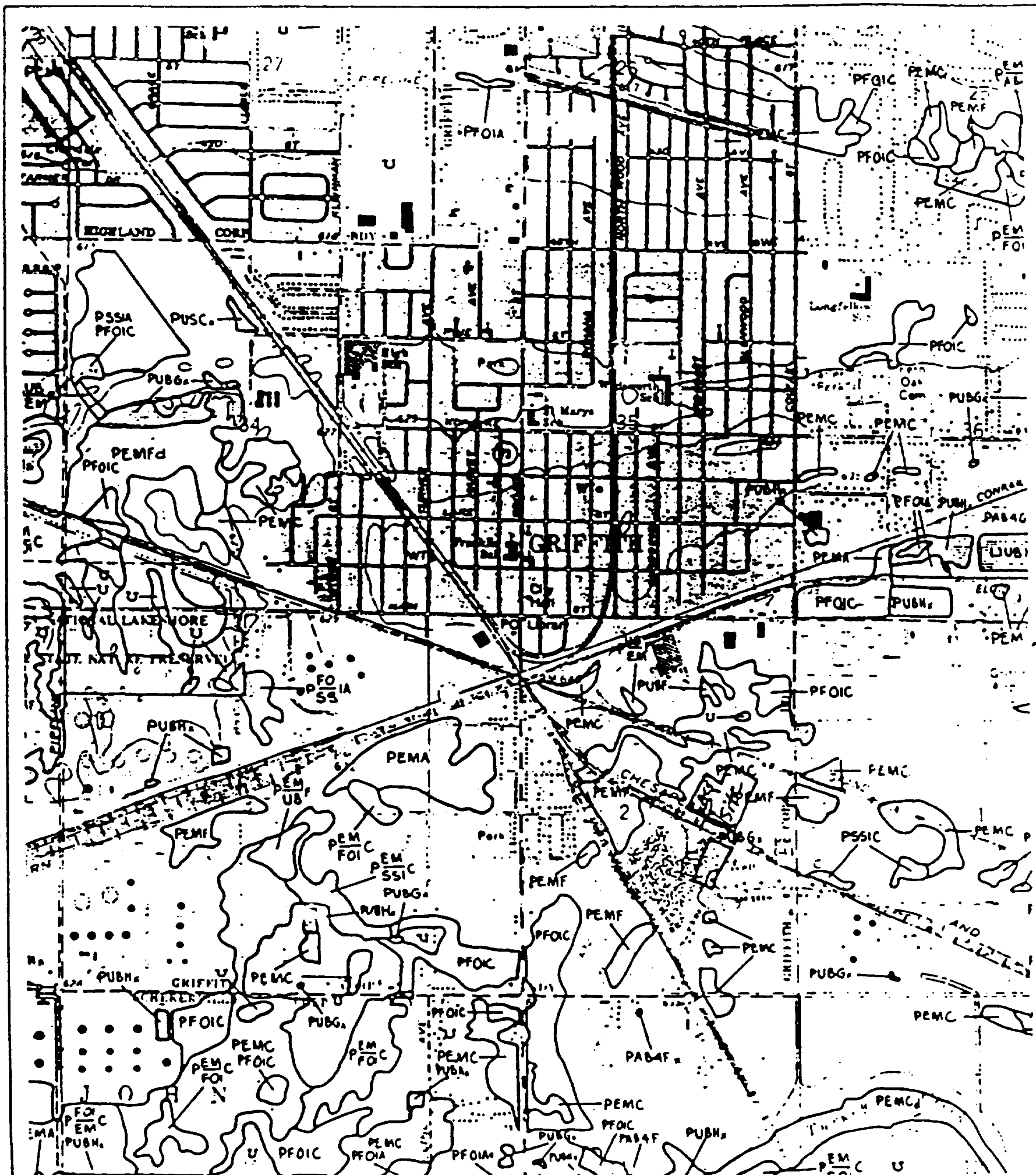
WARZYN 6025I-BI

REMEDIAL INVESTIGATION SITES

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

WARZYN

AS SHOWN



NOTE

1. BASE MAP DEVELOPED FROM THE HIGHLAND, INDIANA AND THE ST. JOHN, INDIANA 7 1/2 MINUTE USGS QUADRANGLE MAPS. DATED 1968 AND 1962 RESPECTIVELY PHOTOREVISED 1980.

north

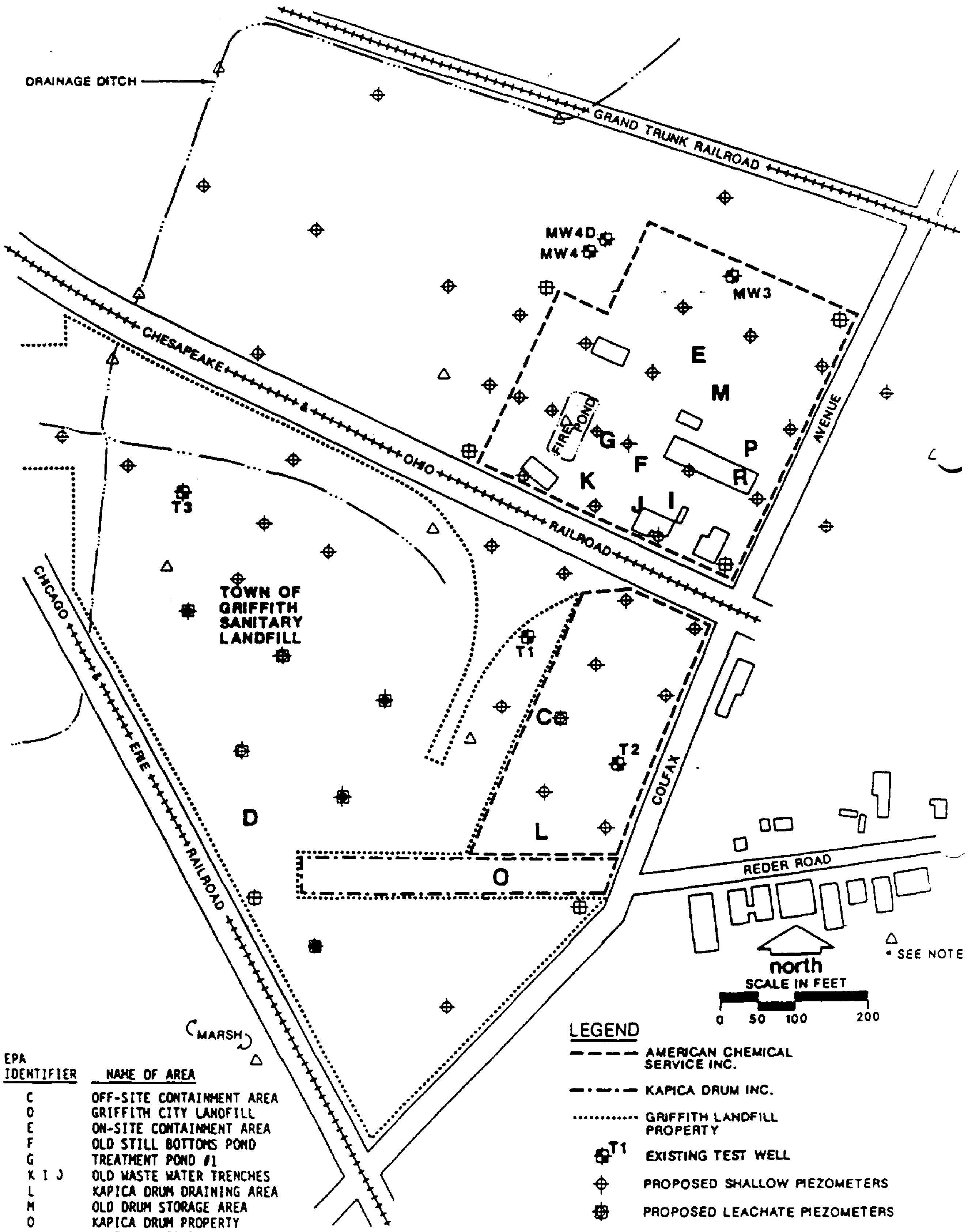
SCALE: 1"=2000'

FIGURE 2-2

WARZYN

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
NATIONAL WETLAND INVENTORY MAP
AMERICAN CHEMICAL SERVICES SITE

N47178



EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

* NOTE: SURFACE WATER POINT FALLS BEYOND THE SOUTHEAST BORDER OF THIS MAP

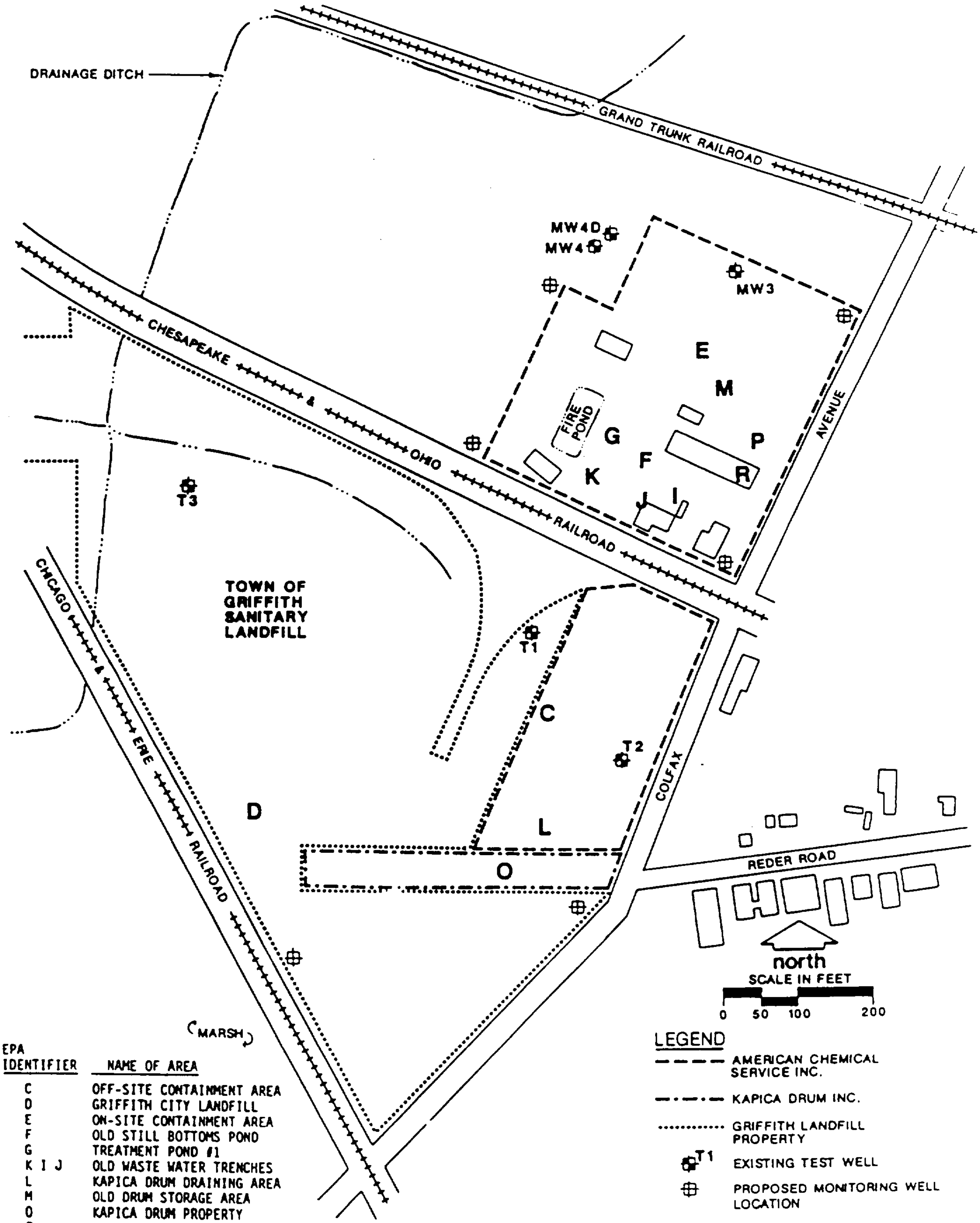
FIGURE 4-1

HYDROGEOLOGIC STUDY WATER LEVEL CONTROL POINTS
REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

WARZYN

60251-02

AS SHOWN



EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

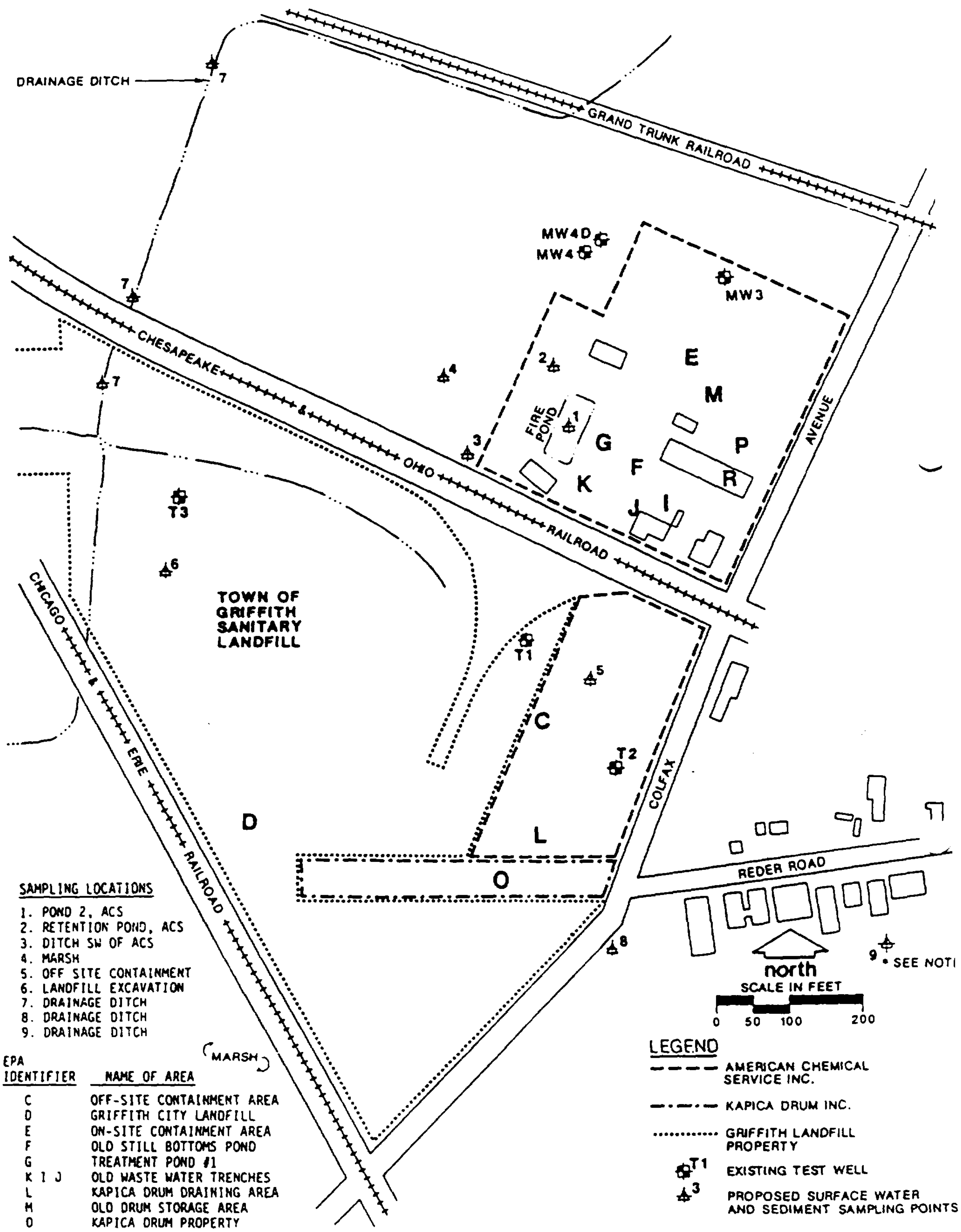
FIGURE 4-2

WARZYN 60251-83

PROPOSED PHASE I MONITORING WELL LOCATIONS
REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

WARZYN

Scale: AS SHOWN



SAMPLING LOCATIONS

1. POND 2, ACS
2. RETENTION POND, ACS
3. DITCH SW OF ACS
4. MARSH
5. OFF SITE CONTAINMENT
6. LANDFILL EXCAVATION
7. DRAINAGE DITCH
8. DRAINAGE DITCH
9. DRAINAGE DITCH

EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

• NOTE: SURFACE WATER AND SEDIMENT LOCATION 9 FALLS BEYOND THE SOUTHEAST BORDER OF THIS MAP.

FIGURE 4-3

PROPOSED SURFACE WATER & SEDIMENT SAMPLING LOCATIONS

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY

AMERICAN CHEMICAL SERVICES SITE

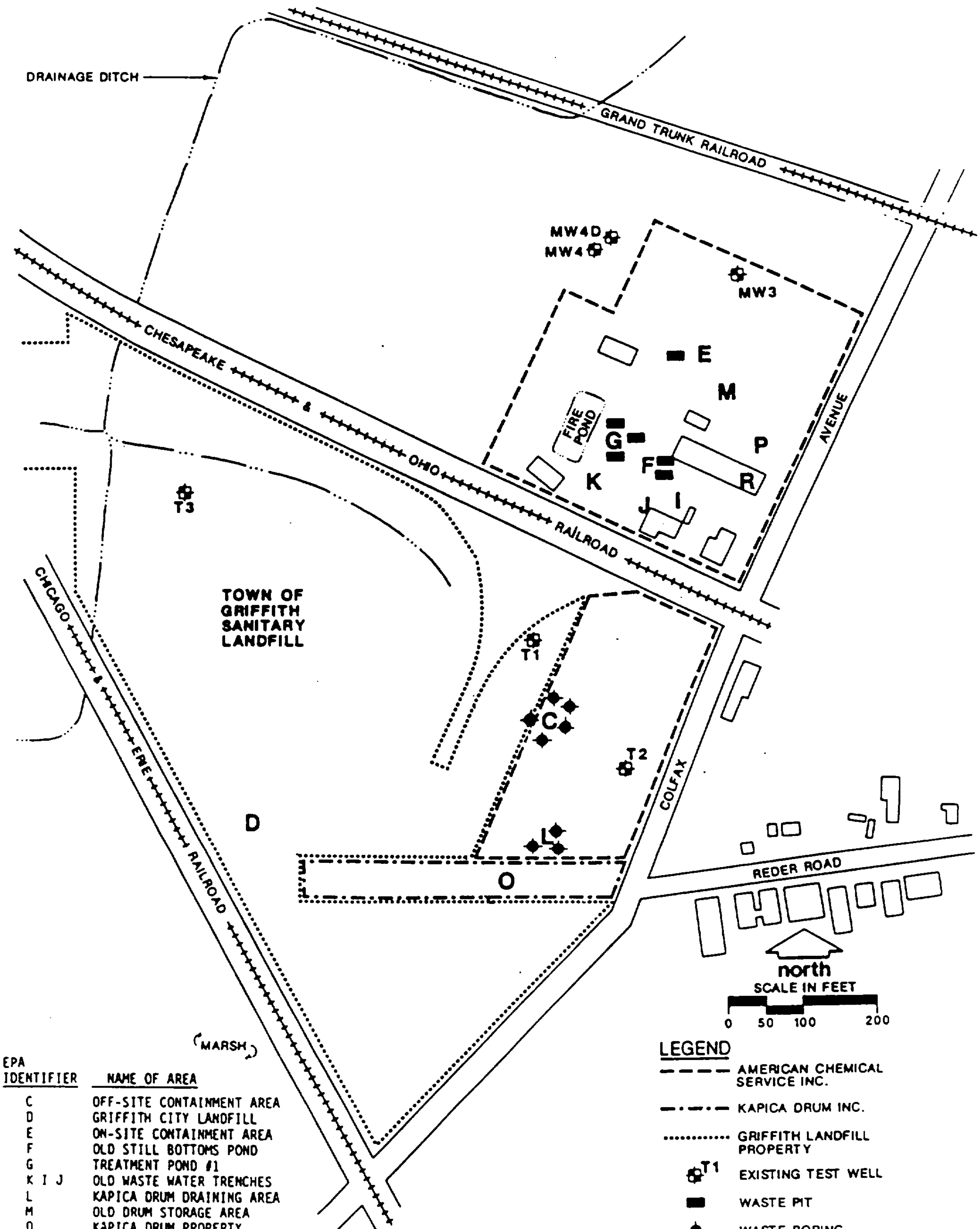
GRIFFITH, INDIANA

60251-84

WARZYN

PJV

AS SHOWN



EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

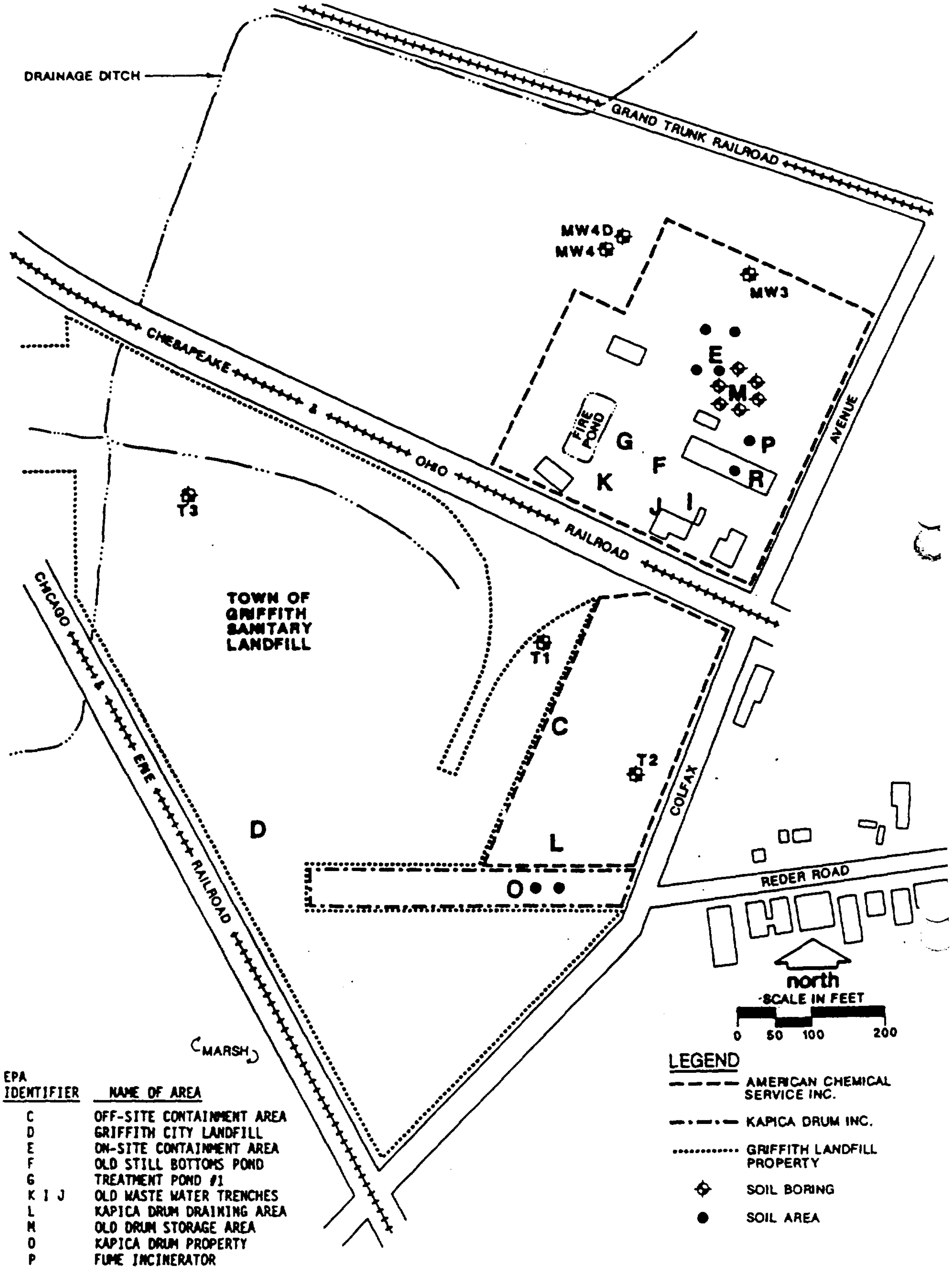
FIGURE 4-4

WASTE PIT & WASTE BORING LOCATIONS
REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE

WARZYN

AS SHOWN

60251-8



EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

FIGURE 4-5

60251-B6

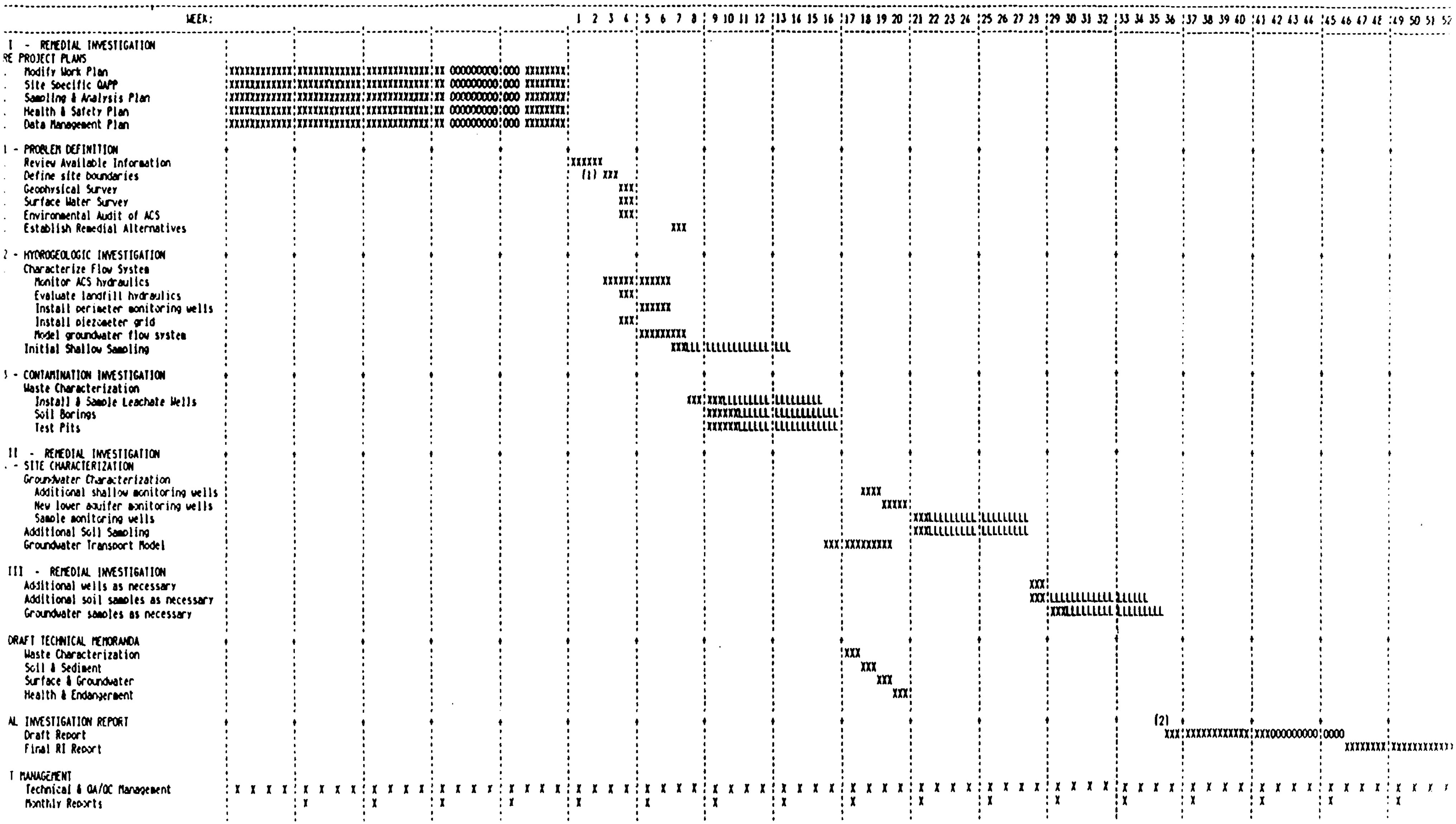
SOIL BORING & SOIL AREA LOCATIONS
.EMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

WARZYN

Scale: AS SHOWN

FIGURE 6-1A

PROPOSED REMEDIAL INVESTIGATION SCHEDULE
AMERICAN CHEMICAL SERVICES
GRIFFITH, INDIANA



X WARZYN
0 REVIEW BY EPA
L LAB TURN-AROUND

FOOTNOTES
=========

(1) Task 1.B. defining site boundaries, cannot be completed without authorization of site access from American Chemical Services.
(2) Draft RI will be submitted 10 weeks after completion of Phase II, which will be contingent upon the findings from Phase I.

FIGURE 6-1B

PROPOSED FEASIBILITY STUDY SCHEDULE
AMERICAN CHEMICAL SERVICES
GRIFFITH, INDIANA

TASK	WEEK: 53 54 55 56	57 58 59 60	61 62 63 64	65 66 67 68	69 70 71 72	73 74 75 76	77 78 79 80	81 82 83 84	85 86 87 88	89 90 91 92	93 94 95 96	97 98 99 100
FS TASK 1 - PRELIMINARY DEVELOPMENT OF REMEDIAL ALTERNATIVES	XXXXXXXXXXX	000000000000										
FS TASK 2 - REMEDIAL ALTERNATIVE SCREENING		XXXXXXXXXXX	000000000000									
FS TASK 3 - REMEDIAL ALTERNATIVE ANALYSIS			XXXXXXXXXXX	000000000000								
FS TASK 4 - COMPARATIVE ANALYSIS OF ACCEPTABLE ALTERNATIVES				XXXXXXXXXXX	000000000000							
FS TASK 5 - FEASIBLITY STUDY REPORT												
Draft FS Report					XXXXXXXXXXX	XXXXXXXXXXX	000000000000					
Revised Draft FS Report								XXXXXXXXXXX				
Public Hearing									PPPPPP			
Final FS Report									XXXXXX	XXXXXXXXXXX		
FS TASK 6 - PREDESIGN REPORT										XXXXXXXXXXX	XXXXXXXXXXX	
FS TASK 9 - QUALITY ASSURANCE	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X
FS TASK 11 - TECHNICAL AND FINANCIAL ASSURANCE	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X	X X X X
MONTHLY REPORTS		X	X	X	X	X	X	X	X	X	X	X

LEGEND

XXX WARZYN
000 REVIEW AND COMMENT BY EPA
PPP PUBLIC HEARING