REVISED

WORK PLAN FOR STAGE 1

REMEDIAL INVESTIGATION PROGRAM

EMERSON POWER TRANSMISSION (EPT)
Ithaca, New York

Prepared for:

Shaw, Pittman, Potts & Trowbridge
2300 N Street, N.W.
Washington, D.C. 20037

Prepared by:

Radian Corporation
13595 Dulles Technology Drive
Suite 200
Herndon, Virginia 22071

May 5, 1988

CPP-6
0505-01.ver.1

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

PURPOSE

This Plan of Study has been prepared to conduct Stage 1 of a Remedial Investigation of the Emerson Power Transmission (EPT) facility in Ithaca, New York. EPT (formerly Morse Industrial Corporation) is a subsidiary of Emerson Electric Company. The investigation will be performed in conformance with a Consent Order issued by the State of New York Department of Environmental Conservation (DEC) to EPT. The purpose of this study is to perform the necessary investigations of the ground water and other environmental media to assess the potential impact of any contamination at the site on possible receptors in the area. During the course of this investigation, the nature of the contamination will be characterized and migration pathways and the potential receptors will be identified. This information will be used in support of the Feasibility Study, a portion of which will be performed concurrently with the Remedial Investigation.

This work plan presents the specific objectives of the complete investigation, the data to be collected during Stage 1 and the methods for doing so, the methods of analysis to be used in their interpretation, and the procedures to be used to ensure the quality and consistency required for the performance of the proposed work. Data from previous investigations will be incorporated into the plan and data gaps will be identified. The data collected from this Stage 1 study will concentrate primarily on filling those gaps, so that the potential impacts on public health and welfare and the environment can be evaluated, the Stage 2 study can be designed and implemented, and remedial alternatives can be developed, evaluated, and preferred alternatives selected.

The major objectives of the overall program are presented below. The Stage 1 study will be used to provide the data required to complete the final Stage 2 study. More specific objectives of the various tasks included in the Stage 1 study are presented in the individual sections describing the activities that will take place.

The principal objectives of the overall Remedial Investigation are:

- To complete the data collection necessary to characterize the geology, hydrogeology, and chemistry of the site and adjacent area;
- To define the source, nature, and extent of chemical contaminants in the environment and describe the nature of their movement;
- To assess the potential human health risks associated with the chemical releases, both at the site and the adjacent properties; and
- To provide the information necessary for the development, evaluation and selection of remedial alternatives.

The scope of the Remedial Investigation includes the following components:

- Incorporation of existing data into Stage 1 and Stage 2 studies--Data from previous site efforts will be directly incorporated into the current plan.
- Field investigation program--The Stage 1 and 2 programs will include those activities designed to supplement existing knowledge and to provide additional data necessary to accomplish the study objectives. The field investigation includes

geologic mapping, soil gas monitoring, monitoring well installation, field sampling, and pump testing the aquifer, along with associated tasks. Samples collected will be analyzed by a New York State certified laboratory.

- Health risk assessment--The health risk assessment will focus on evaluating the type, magnitude, and probability of potential adverse human health risks resulting from exposure to chemicals originating at the site.

- Preliminary Feasibility Study formulation--The data necessary to conduct a Feasibility Study for site remediation will be identified. These data will be generated during the Stage 1 and 2 field investigations.

The scope of this investigation does not include residential air quality monitoring. EPT agrees to submit a separate proposal which will address DEC's concerns that the indoor air quality of homes in the vicinity of the EPT site may have been affected by the release of hazardous wastes at the site.

GENERAL PROVISIONS

The following sections present in detail the tasks to be performed to meet the objectives and fulfill the scope of work. Any dispute which arises concerning the terms of this work plan shall be resolved in the manner described in paragraph IV of the Consent Order.

TECHNICAL SCOPE OF WORK

The technical scope of work for the performance of the Stage 1 study, as described in this document, is incorporated into the tasks listed below:

- Task 1: Stage 1 Work Plan Preparation
- Task 2: Plans and Management
- Task 3: Stage 1 Site Investigation
- Task 4: Stage 1 Site Investigation Analysis
- Stage 1 Reporting
- Preparation of Stage 2 Work Plan
- Schedule

This work plan represents the completion of Task 1, Work Plan Preparation. The details of the remaining tasks are described in Sections 2.0 through 4.0. The scope of work presented in this work plan and proposed for the Stage 2 investigation is designed to be consistent with the scope and format for remedial investigations as described in the EPA guidance document entitled "Guidance on Remedial Investigations Under CERCLA," EPA/540/6-85/002, June 1985, and provide the information required by New York Compilation of Rules and Regulations, including Title 6, Chapter 375 - Inactive Hazardous Waste Disposal Sites.

In addition, the Remedial Investigation is designed to provide the information specified in 40 CFR 300.68(e), which is to be used, as appropriate, in determining whether and what type of remedial and/or removal actions will be considered. This information includes:

(1) Population, environmental, and welfare concerns at risk;

(2) Routes of exposure;

(3) Amount, concentration, hazardous properties, environmental fate and transport (e.g., ability and opportunities to bio-accumulate, persistence, mobility, etc.), and form of the substance(s) present;

(4) Hydrogeological factors (e.g., soil permeability, depth to saturated zone, hydraulic gradient, proximity to a drinking water aquifer, floodplains and wetlands proximity);

(5) Current and potential ground water use (e.g., the appropriate ground water classes under the system established in the EPA Ground-Water Protection Strategy);

(6) Climate (rainfall, etc.);

(7) The extent to which the source can be adequately identified and characterized;

(8) Whether substances at the site may be reused or recycled;

(9) The likelihood of future releases if the substances remain on-site;

(10) The extent to which natural or man-made barriers currently contain the substances and the adequacy of the barriers;

(11) The extent to which the substances have migrated or are expected to migrate from the area of their original location, or new location if relocated, and whether future migration may pose a threat to public health welfare or the environment;

(12) The extent to which State and Federal environmental and public health requirements are applicable or relevant and appropriate to the specific site, and the extent to which other State and Federal criteria, advisories, and guidance and standards are to be considered in developing the remedy;

(13) The extent to which contamination levels exceed applicable or relevant and appropriate State and Federal requirements or other Federal criteria, advisories, and guidance and State standards;

(14) Contribution of the contamination to an air, land, water, and/or food chain contamination problem;

(15) Ability of responsible party to implement and maintain the remedy until the threat is permanently abated; and

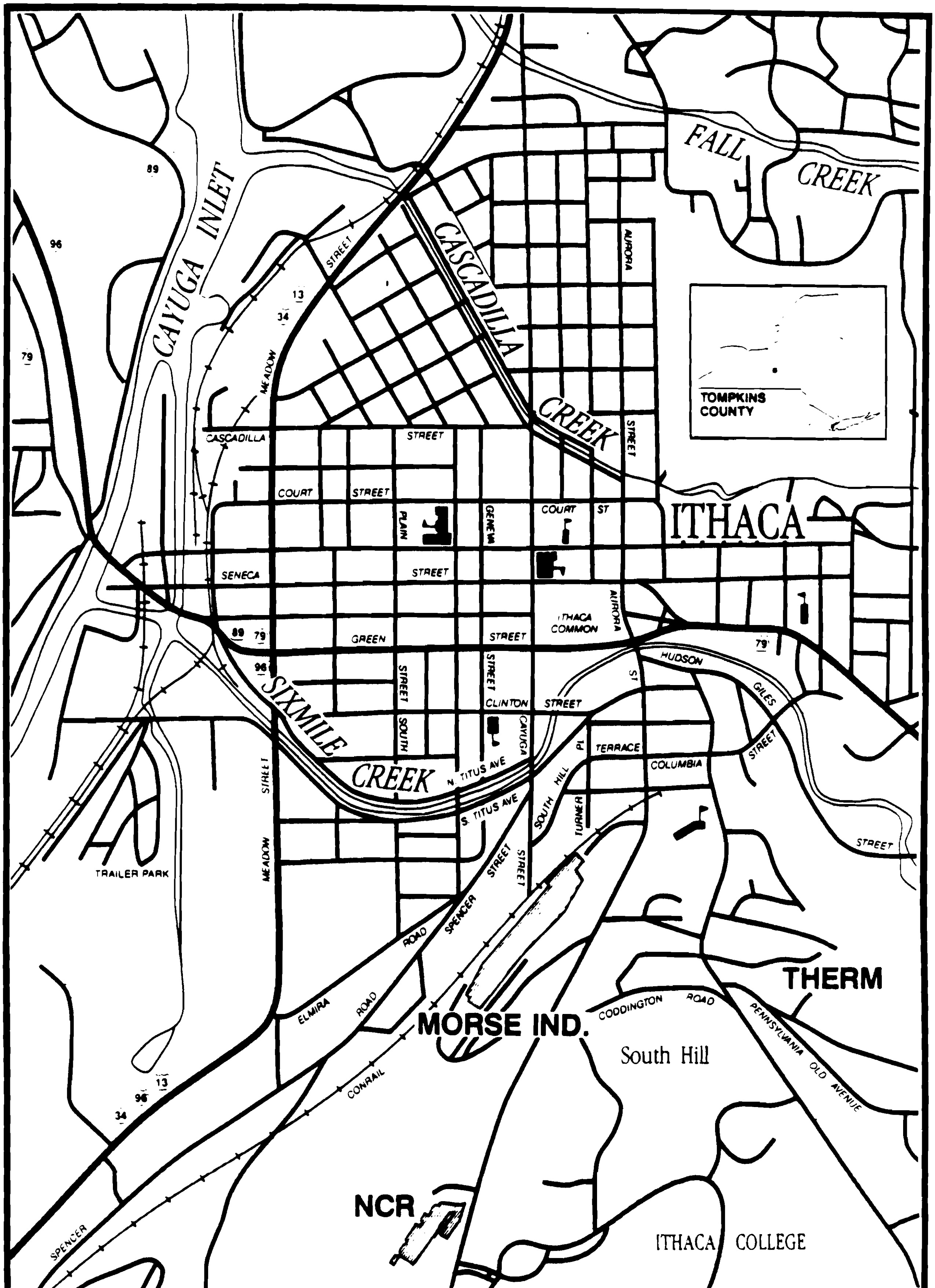
(16) Other appropriate matters may be considered.

1.0 DESCRIPTION OF CURRENT SITUATION

1.1 Background Information

EPT occupies approximately 94 acres of land located adjacent to Highway 96 in Ithaca, Tompkins County, New York. The property straddles the southern boundary between the City of Ithaca and the Town of Ithaca (see Figure 1-1). The surface of the property slopes gently toward the northwest and ranges in elevation from 450 to 720 feet above mean sea level. The site is located in the Oswego River Basin and surface water drains from the property into Six Mile Creek, which drains to Lake Ontario.

EPT was previously owned by Borg Warner and is now a subsidiary of Emerson Electric Company. Industrial power transmission products are manufactured at the EPT facility. The plant has been in operation at the site since 1906. EPT has been a subsidiary of Emerson since January 1983. Operations at the facility include metal stamping, heat treating, oil quenching, parts washing, and final product assembly. Solvents currently used at the facility include mineral spirits, a freon degreaser, and 1,1,1-trichloroethane. Prior to 1983, solvents used by the prior owner included trichloroethylene and "Safe-Tee solvent" F.O.-128, a commercially available mixture of aliphatic and chlorinated compounds, including methylene chloride and tetrachloroethylene.



Project: Morse Project No.: 003	AREA MAP	Figure 1-1

RADIAN CORPORATION

A document search has revealed that the earliest recorded use of trichloroethylene is 1967. It was used extensively until 1978, when its use was discontinued. The peak use of trichloroethylene is reported to have been 1,200 gallons per week between 1976 and 1978. Past on-site activities included the purification of spent trichloroethylene by distillation. In addition to conducting a document search, long-term EPT employees were interviewed to supplement available information on site history and past practices.

Since 1983, the principal operation at the plant has been metal forming (stamping) and assembly of steel roller chain. Waste oil, generated in the manufacturing operations at the plant, is stored on-site for less than one month and removed by a licensed commercial waste oil handling service.

Site Description

The EPT facility is located in the Finger Lake Region of the Appalachian Plateau province of the Appalachian basin. Strata in this region consist of sedimentary rocks that are folded by broad, east-northeast trending open folds. Because strata dip less than five degrees, these folds are nearly flat-lying. They are generally cut by well-defined, parallel thrust faults. The bedrock is comprised of Devonian-age rocks blanketed by glacial deposits. The lithology of the bedrock is dominantly siltstone, with lesser amounts of shale and minor amounts of limestone. The glacial deposits consist of till and outwash.

In the vicinity of the plant, bedrock is generally either at the land surface or under less than 20 feet of overburden. The bedrock is a portion of the Ithaca Member of the Genesee Formation. Bed thickness ranges from 0.1 inch to 2.5 feet. The thickest exposure of the Ithaca siltstone on site is 30 feet. The entire sequence is thought to be approximately 450 feet thick. The bedrock contains three types of fractures: nearly horizontal fractures that parallel bedding (partings) and two sets of nearly vertical fractures (joints). The near vertical joints are consistently oriented to the north-northwest (N13-17W) and east-northeast (N85-88E), dip within eight degrees of the vertical, and are present through the entire stratigraphic sequence.

The movement of ground water is strongly influenced by the secondary porosity of these fractures. The joints that appear to be more continuous and, therefore more important to ground water flow, are those oriented to the north-northwest. These joints may act as open conduits that extend vertically and laterally for some distance. Because topography governs the ground water gradient, which in turn governs the flow direction, the north-northwest trending joints are nearly parallel to the most probable direction of ground water movement.

During the early part of 1987, trichloroethylene was detected in a batch of waste oil skimmed from the surface of the water in an underground fire reservoir at the site. Subsequent sampling by plant personnel revealed that trichloroethylene was present in the reservoir water. At that time it was decided that a more detailed investigation of the reservoir and its contents was warranted.

During the spring and early summer of 1987, Radian Corporation (Radian) performed a site investigation and prepared a report entitled "Preliminary Environmental Assessment of the Fire Water Reservoir", dated July 7, 1987. The objectives of that study were two-fold: (1) to assess possible contamination by trichloroethylene (TCE) in the underground fire reservoir, and (2) to investigate the possible effect, if any, of the TCE in the reservoir on the local ground water. As part of this study, five monitoring wells were installed on the EPT property and a limited sampling and analysis program was conducted. The data generated by this study and their interpretation have been used to design the work plan and are incorporated throughout this Remedial Investigation Plan. The conclusions that were drawn from this previous investigation are briefly summarized below. The location of the reservoir, the monitoring wells installed during the preliminary investigation, and other landmarks at the site are shown in Figure 1-2.

1.2 Results of Preliminary Study

Reservoir

Following the discovery of significant concentrations of TCE in the water and solid phase materials in the reservoir, a cleanup of the reservoir

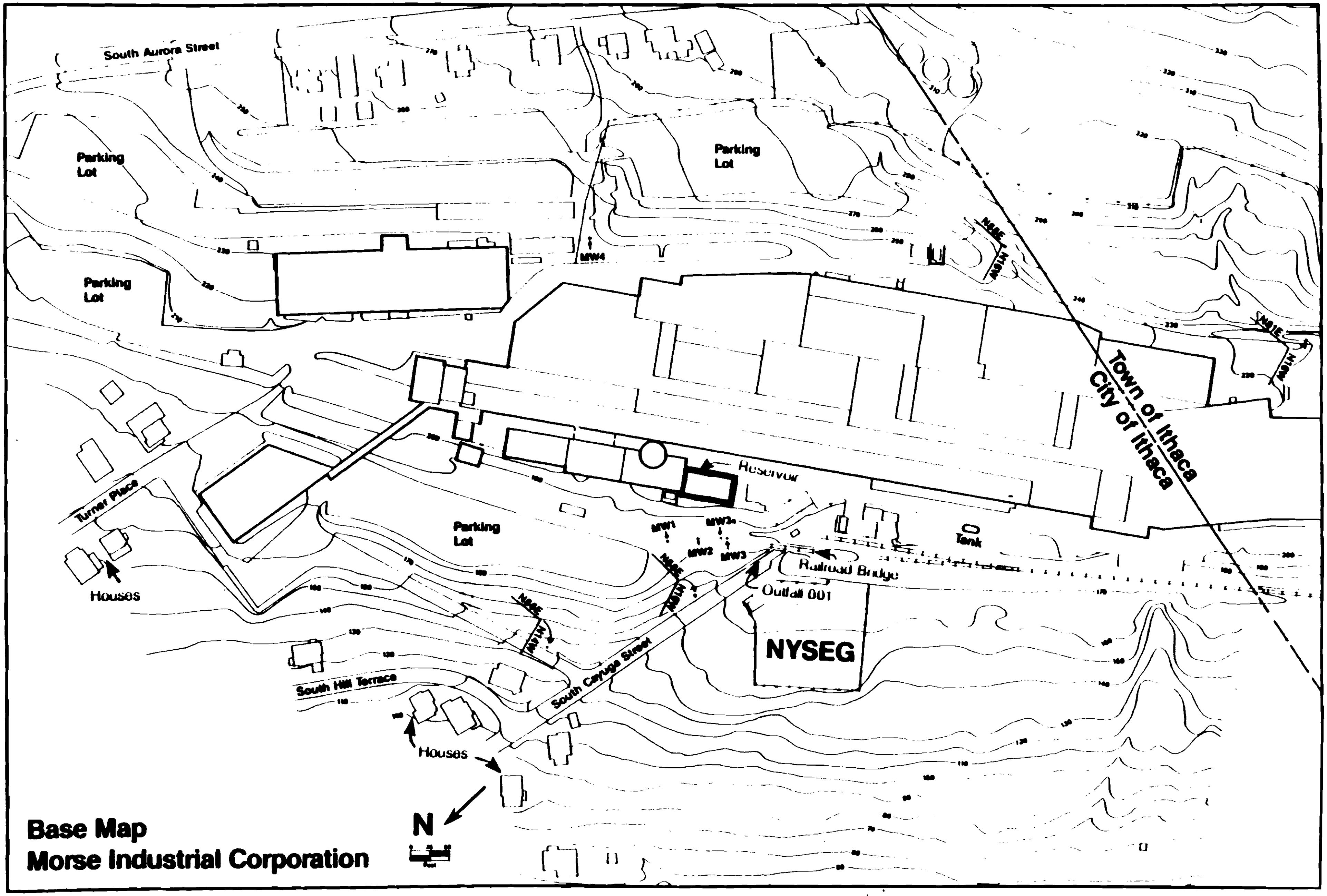


Figure 1-2 SITE MAP SHOWING EXISTING MONITORING WELL LOCATIONS

was implemented. This cleanup, which was executed in accordance with EPA/DEC regulations, involved the removal and disposal of the contents of the reservoir and pressure washing of the concrete walls and floors. The conclusions drawn from the previous study concerning the reservoir and its cleanup are:

1. Significant volatile organic contamination was found in the water and in the sludge layer at the bottom of the reservoir.

2. All of the water and sludge was removed from the reservoir and the concrete walls, floor, and ceiling were cleaned to remove visible contamination. It is still possible, however, that contamination may be present in the concrete.

3. The reservoir walls and floor contain numerous cracks and joints that allow for the continued seepage of ground water into and out of the reservoir. This has resulted in partial refilling of the reservoir with water after the cleanup was completed.

4. The water that accumulated in the reservoir subsequent to the cleanup activities was sampled and was found to contain reduced concentrations of volatile organics. These organics are either coming from contaminated ground water seeping into the reservoir, or are the result of clean ground water seeping into the reservoir and becoming contaminated through contact with contamination in the concrete walls or floor.

5. The reservoir was one obvious source of volatile organics at the site but this does not eliminate the possibility of other sources.

Geology/Hydrogeology

The geology and hydrogeologic flow patterns at the site are major factors in the control of the distribution of contaminants at the site. The conclusions that can be reached concerning the geology and hydrogeologic setting include the following:

1. The plant is located in a fractured rock setting with a relatively thin soil cover. Ground water is found both in the overburden soils and in the fractures in the bedrock.

2. Ground water is flowing to the northwest and shallow ground water is discharging out of the hillside. The major component of flow appears to be strongly influenced by the fractures in the bedrock.

3. There is hydraulic communication between the reservoir and the adjacent ground water. This is demonstrated by the continuing seepage into the reservoir.

Site Chemistry

The major conclusions drawn from the previous study concerning site chemistry are:

1. The ditch adjacent to the railroad bed downhill from the reservoir collects ground water from the hillside. Samples of both soil and standing water collected from this ditch showed detectable concentrations of chlorinated volatile organics. Two pipes which discharge boiler blowdown and pump seal water to this ditch were sampled and showed no detectable concentrations of trichloroethylene or associated compounds (1,2-dichloroethylene and vinyl chloride).

2. One of four natural seeps sampled exhibited detectable levels of trichloroethylene and associated compounds. This seep is located in the railroad bridge area.

3. The upgradient well, MW-4, contained only detection limit quantities (sub-part per billion) of volatile organic compounds. This represents upgradient background concentrations.

4. Well MW-1 exhibited trace quantities of chlorinated volatile organics. This well is only 40 feet northeast of well MW-2, which contained the highest levels of trichloroethylene observed (up to 350 ppm). Well MW-3 had water quality comparable to that of MW-2. The shallow well, MW-3s, contained two orders of magnitude less trichloroethylene than the deeper well MW-3, only five feet away. The shallow well is in overburden soils and the deeper well is in bedrock.

5. Based upon the distribution of the trichloroethylene in the four downgradient wells, it appears that the shape of the plume

in the bedrock may be controlled by the fracture patterns found there and might have a different configuration from the plume within the overlying soils.

6. Petroleum hydrocarbons were detected in the two bedrock wells (MW-2 and MW-3) and the two soil samples taken from the ditch adjacent to the railroad bed.

1.3 Soil Gas Studies

During August, 1987, a preliminary soil gas survey of selected areas of the site was performed at the request of the New York State Department of Health. The sole objective of this study was to evaluate whether any contaminants that could be leaving the EPT property could be placing the residents of houses just northeast of the plant at risk. The results of this study are described in the report by Radian Corporation, entitled "Soil Gas Survey-Morse Industrial Corporation," dated August 1987. The following summarizes the findings in that report:

- Vinyl chloride, methylene chloride, trans-1,2-dichloroethene, and 1,1-dichloroethane were not detected above the detection limit of 1 ppb in any of the samples. Trichloroethylene (TCE) was present at a maximum of 276 ppb in the soil gas sample taken immediately adjacent to MW-3.

- There were concentrations above background at the northeastern corner of the NYSEG transformer station which exhibited a gradual decline to the east and west. Of the targeted parameters, only trichloroethylene and perchloroethylene were present above background levels, with 6.1 ppb as the maximum for TCE and 3.4 ppb was the observed maximum concentration of tetrachloroethylene along this line (Line C).

During the period November 17 to December 7, 1987, a more detailed soil gas survey was performed at the site in preparation for the Remedial Investigation. This study was designed to provide screening data on the extent of any subsurface contamination. The study objectives, method, and design are detailed in Section 3.3.2. The data that resulted from this effort are currently being analyzed and will be presented as part of the Stage 1 report. A copy of the analytical results from the soil gas samples was submitted to DEC in January 1988.

1.4 Conceptual Hydrogeologic Model

Ground water flow in the area of the plant is expected to be controlled by the hydraulic gradient in the overburden and by the hydraulic gradient and secondary porosity in the underlying bedrock. Only one well, MW-3s, has been installed in the overburden at the site. It is screened just below the water table. Ground water was encountered at a depth of just over four feet in this shallow well (May 1987). Based upon the site topography, shallow ground water in the overburden soils is expected to be flowing to the northwest, down the hillside, and discharging along the slope as ground water seeps.

Ground water in the bedrock was monitored in four wells during the preliminary investigation. Bedrock was encountered at a depth ranging from six to sixteen feet below the land surface. Well MW-3 was located immediately adjacent to well MW-3s and was constructed so that the water from the overburden is isolated from the water in the bedrock. Water was encountered almost thirteen feet lower in the deeper well, indicating that ground water is either separated in the two geologic materials or that the downward flow gradient is extremely steep. The latter interpretation is more likely, given the steep topography in that area and no visible evidence of a confining layer in the samples taken in the boreholes.

The water level measurements taken in the four bedrock wells in May 1987 show that the ground water appears to be flowing in the direction of decreasing topography, as expected. However, flow through fractured bedrock does not resemble flow through porous media and the controlling factor may be the orientation of the joints and bedding plane partings rather than the topography. Based upon data collected in the spring of 1987, the joints that are oriented east-northeast may not be continuous for more than a few feet both vertically and laterally. Therefore, they may not have a significant influence on controlling ground water flow directions at the site.

1.5 Summary of Site Chemistry

Analytical results are available from previous studies for six groups of data:

- The fire reservoir,
- Outfall 001,
- Natural ground water seeps,
- Ground water monitoring wells,
- Six Mile Creek, and
- Soil gas analysis.

A detailed discussion of the analytical results are presented in the "Preliminary Environmental Assessment of the Fire Water Reservoir" and "Soil Gas

Survey-Morse Industrial Corporation" reports referred to previously. A brief summary of the analytical results is presented here.

Prior to the preliminary study, samples of the water in the fire reservoir were collected and analyzed for volatile organic compounds. Several chlorinated compounds were detected. The reservoir was resampled by Radian and the water and sludge present in the reservoir were found to contain TCE and associated chlorinated compounds at elevated concentrations. Following the cleanup of the reservoir, the water seeping into the reservoir through cracks and joints in the walls was tested. This water contained vinyl chloride (24 ug/L), trichlorofluoromethane (1.8 ug/L), cis-1,2-dichloroethylene (600 ug/L), tetrachloroethylene (9.5 ug/L), and trichloroethylene (2100 ug/L).

The two pipes discharging to the ditch adjacent to the railroad bed downhill from the reservoir leading to the plant's outfall 001 were sampled as part of the previous study. These pipes discharge boiler blowdown and pump seal water. No trichloroethylene was detected in either of these discharges. Trichloroethylene and associated compounds were observed in the soils and standing water in the ditch. The presence of trichloroethylene in these samples is probably the result of contaminated ground water seeping out of the hillside or through the fill. Some petroleum hydrocarbons were detected in the two soil samples taken in this area (180 and 590 ug/g). No polychlorinated biphenyls were detected in any of the water or soil samples in the area of the railroad bed or outfall.

Trichloroethylene was detected in one of the four natural ground water seeps sampled at concentrations of 1.8 and 5.9 ug/L during two episodes of sampling. This seep is located in the railroad bridge area. Cis-1,2-dichloroethylene (32 and 90 ug/L) and methylene chloride (140 ug/L) also were detected in this seep. Methylene chloride was detected in the other three seeps, but at much lower levels. No petroleum hydrocarbons were detected in any of the water collected from the natural seeps.

Five ground water monitoring wells were sampled. Only those located immediately downgradient from the reservoir showed significant concentrations of volatile organics. Samples from wells MW-2, MW-3, and MW-3s contained elevated levels of trichloroethylene and cis-1,2-dichloroethylene. Well MW-1 contained these same compounds, but at much lower concentrations. The upgradient well, MW-4, exhibited sub-part per billion levels of trichloroethylene. Petroleum hydrocarbons were detected in wells MW-2 (2 mg/L) and MW-3 (8 mg/L). No polychlorinated biphenyls were detected in samples from any of the wells.

Samples of water and sediment were collected from Six Mile Creek, both upstream and downstream from the plant. No significant quantities of volatile organic compounds were detected in the water samples. The sediments showed detectable levels of methylene chloride during the first round of sampling (800 ug/kg upstream and 1100 ug/kg downstream).

Additional sampling was performed in the area of the railroad bridge. Samples of oil were collected from a catch basin which collects oil from the now inactive scrap metal loading area near the railroad bridge. The catch basin is located near a utility substation. This oil was found to contain PCBs in the 30 to 300 parts per million range. This area has been targeted for additional investigation.

On August 10 and 11, 1987, Radian conducted a soil gas survey of three lines on and adjacent to the EPT property. The survey was conducted to aid in the evaluation of whether contaminants from the EPT site had migrated through the subsurface past the northern property boundary in the immediate vicinity of the closest houses. Soil gas samples from Line A, an area upgradient of the plant along Aurora Street, were collected to provide information about background concentrations at the site. Line B was located east of South Cayuga Street, along the northern property boundary. Line C was located west of South Cayuga Street and north of the NYSEG transformer station. Two readings were taken at the existing monitoring wells, MW-2 and MW-3 to provide a means of correlating the readings with known ground water quality. The compounds targeted for investigation were vinyl chloride, methylene chloride, trans-1,2-dichloroethylene (t-12DCE), 1,1-dichloroethane (11DCA), 1,1,2-trichloroethylene (TCE), toluene, xylene, and tetrachloroethylene (PCE).

Toluene and m- and p-xylenes were not found above the detection limit of 1.0 ppb in any of the samples. O-xylene was detected at a level exceeding the 1.0 ppb detection level in only one sample, in which the concentration is 1.1 ppb. Of the halocarbon compounds investigated, only two were detected above background concentrations; these were TCE and PCE. At the two monitoring wells that exhibited ground water contamination, TCE was detected in concentrations of 276 ppb and PCE was detected at concentrations of 3.4 ppb near well MW-3. Near well MW-2, concentrations of both constituents were significantly lower, 5.3 and 0.22 ppb, respectively.

TCE was detected along Line B just east of South Cayuga Street and along Line C, west of South Cayuga Street and east of the NYSEG station. Concentrations ranged from 0.54 to 6.1 ppb, indicating an area that should be further investigated for the migration of TCE in the subsurface. No other constituents were detected above background in that area.

1.6 Nature and Extent of the Contamination

The source and distribution of chlorinated solvents in the ground water is a complex issue. Because elevated levels of these compounds were detected in the water and sludge in the reservoir and because there is direct communication between the reservoir and the ground water, the reservoir was one obvious source of chlorinated solvents. The reservoir has been completely emptied and cleaned, and it is not a continuing source of significant contamination.

Based upon current information, the migration of contamination seems to be controlled by the orientation of the discontinuities in the bedrock mass beneath the site. The downgradient wells are located relatively close together, yet MW-1 does not exhibit the same water quality as wells MW-2, MW-3, and MW-3s. This indicates that the ground water plume may be fairly narrow and elongated in the direction of the structural discontinuities.

1.7 History of Response Actions

The State of New York was notified of the existence of chlorinated solvents in the reservoir on February 9, 1987. A hazardous waste contractor was hired by EPT to dispose of the material in the reservoir as an industrial waste. The cleanup began on February 20, 1987 and was conducted by CECOS International of Buffalo, New York and supervised by Radian. The cleanup was conducted in three phases. The first phase consisted of the removal of approximately 150,000 gallons of contaminated water from the reservoir. The second phase was the removal of 47,500 gallons of sludge and debris and 15,000 gallons of water. The third phase consisted of the cleaning of the walls and floor with high pressure water and the removal of 12,500 gallons of wash water and 2,500 gallons of resultant sludge. Details of the cleanup of the reservoir are presented in the "Preliminary Environmental Assessment of the Fire Water Reservoir" dated July 7, 1987.

2.0 TASK 2: PLANS AND MANAGEMENT

2.1 Project Management

EPT will have overall responsibility for the successful and timely completion of this project. They will be aided by an environmental consultant, Radian Corporation, who performed the previous work at the site and is familiar with the physical setting. Radian will design and implement the Remedial Investigation program in consultation with NYSDEC and EPT.

The Remedial Investigation and associated Feasibility Study will be conducted by Radian Corporation of Herndon, Virginia (Radian). An organization chart showing the key project personnel who will be involved in this study is presented in Figure 2-1. Corporate responsibility for the successful execution of the project will be assumed by Mr. Robert Hubbert of EPT and Ms. Kathryn S. Makeig, a Senior Program Manager with Radian. They will ensure that the staff is available for the timely completion of the tasks outlined in this document, and that all necessary corporate resources are brought to bear to complete the work in accordance with the terms of the Consent Order.

The technical aspects of the Remedial Investigation will be directed by Ms. Barbara M. Wong, a Senior Hydrogeologist with Radian. She will be responsible for the day-to-day execution of the project and will coordinate

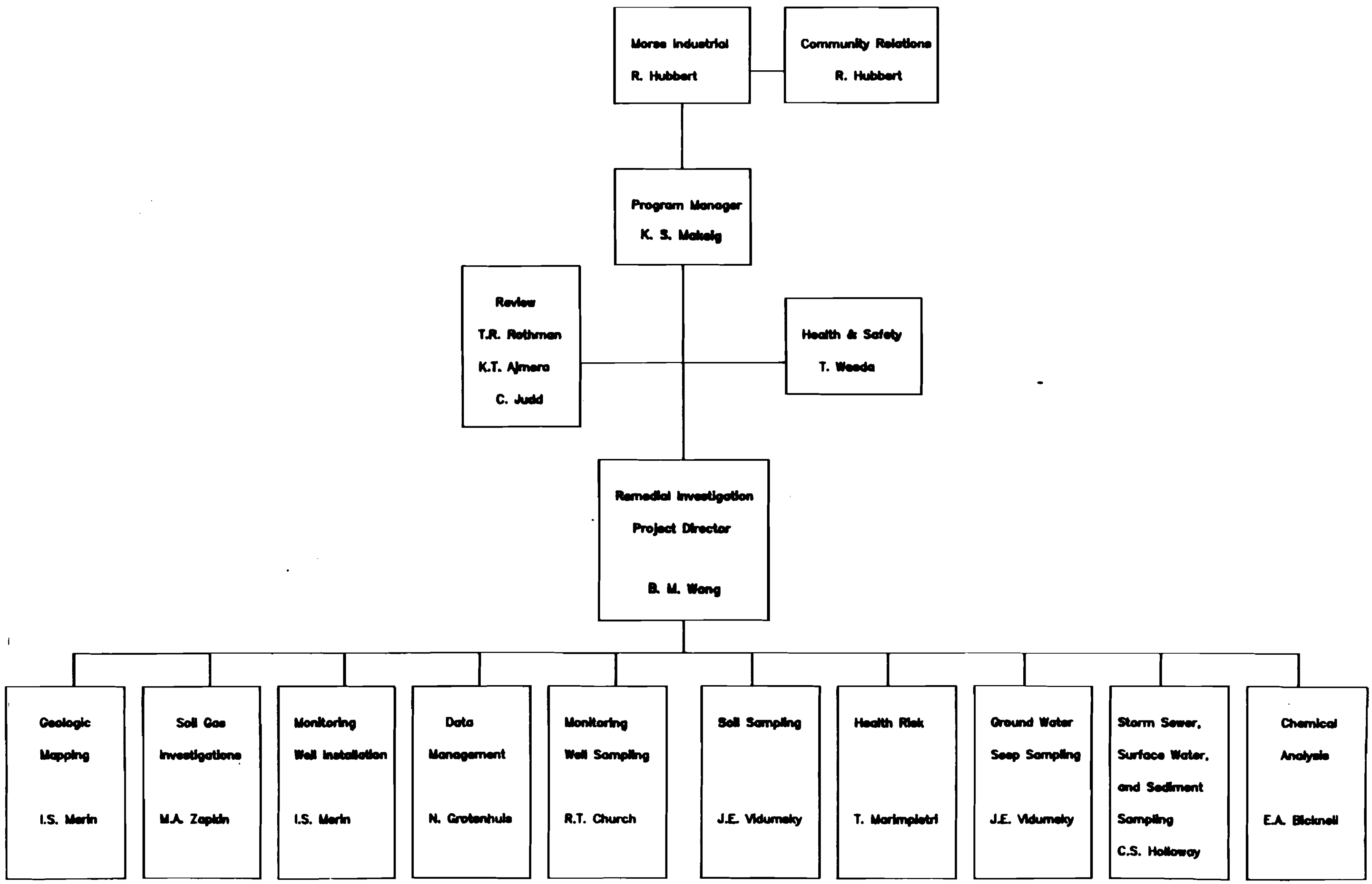


Figure 2–1. Organization Chart

all decision-making and scheduling. She also will be responsible for the management of the budget and meeting the schedules for the Remedial Investigation.

Mr. John E. Vidumsky, a licensed Professional Civil/Environmental Engineer with Radian, will be the Project Director for the Feasibility Study. Although a work plan for the formal Feasibility Study (Tasks 8-14) is not presented here, most of the field data requirements and some of the laboratory testing data for the Feasibility Study will be generated during the Remedial Investigation.

Mr. Thomas Weeda, a Board Certified Industrial Hygienist, will serve as Radian's Health and Safety Officer for the remedial investigation at EPT. Mr. Weeda will be responsible for all health and safety related activities at the site and will report directly to the program manager.

The performance of the Remedial Investigation will require the use of several sub-contractors. A sub-contractor will be used to perform the soil gas monitoring, under the direction of Michael Zapkin, with Radian. A drilling sub-contractor will be used to install the additional monitoring wells under the direction of Radian's Ira Merin, a Senior Geologist. Geologic site mapping will be performed under the direction of Radian's Ira Merin. Monitoring well sampling will be performed under the direction of Radian's Todd Church. Storm sewer, surface water, and sediment sampling will be performed under the direction of Radian's Craig Holloway. A New York State certified laboratory will be used to perform the analytical testing and will be managed by Elizabeth Bicknell of Radian. The coordination of the sub-contractors will be the responsibility of the Remedial Investigation Project Director. Several of the sub-contractors have worked with Radian in the past and the contractual mechanisms are already in place.

The schedule and other relevant project data will be tracked using computer software by Radian's data management specialist, Nancy Grotenhuis. She also will be responsible for compiling the data into the appropriate format for final presentation as described in the Data Management Plan.

Senior Radian technical personnel, Mr. Torsten Rothman and Mr. Kishore Ajmera, will review the activities and serve as consultants to the project. The project team has an established process of formal peer review and project quality specifications that will be followed during this project. These guidelines have been established to detail the procedural and project specifications to ensure a high quality product. The specifications call for the establishment of guidelines, as set forth in this document, project team meetings and periodic review. There is an emphasis on the setting of clear objectives at the onset of the project and the tracking of the completion of project goals.

2.2 Stage 1 Sampling and Analysis Plan

A site-specific Sampling and Analysis Plan (SAP) for the remedial investigation is included in this Work Plan as Appendix A. This plan will be revised, as necessary, for the performance of Stage 2 work.

Sampling protocols for this project were developed with guidance from the following documents:

"Test Methods for Evaluating Solid Waste," USEPA, Office of Solid Waste, Washington, D.C. 20460, SW-846, 3rd edition (November 1986).

"Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants," USEPA, Effluent Guidelines Division, Washington, D.C. 20460 (April 1977).

"Handbook for Sampling and Sample Preservation of Water and Wastewater," USEPA, EMSL, Cincinnati, Ohio 45268, EPA-600/4-82-029 (September 1982).

"Methods for Chemical Analysis of Water and Wastes," USEPA, EMSL, Cincinnati, Ohio 45268, EPA-600/4-79-020 (March 1983).

"Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 49 FR 43234 (October 26, 1984).

Analytical protocols used for this project will be drawn from:

"Test Methods for Evaluating Solid Waste," USEPA, Office of Solid Waste, Washington, D.C. 20460, SW-846, 2nd edition.

"Methods for Chemical Analysis of Water and Wastes," USEPA, EMSL, Cincinnati, Ohio 45268, EPA-600/4-79-020 (March 1983).

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater," USEPA, EMSL, Cincinnati, Ohio 45268, EPA-600/4-82-057 (July 1982).

"RCRA Groundwater Monitoring Technical Enforcement Guidance Document," USEPA, September 1986.

"Guidance on Remedial Investigations Under CERCLA," USEPA 540-G-85-002, June 1985.

2.3 Health and Safety Plan

A site-specific health and safety plan for the remedial investigation of the site is included in this Work Plan as Appendix B. This document describes the health and safety procedures and requirements for the remedial investigation/feasibility study to be performed. This document will apply to field work performed by EPT's contractor and subcontractors. The health and safety plan is intended to ensure that the work performed by Radian and its subcontractors is done in compliance with applicable federal and New York state occupational safety and health regulations. In particular, requirements of the OSHA Hazardous Waste Operations and Emergency Response; Interim Final Rule (29 CFR 1910.120) are addressed.

It may be necessary to revise the Health and Safety Plan if site conditions vary or unanticipated hazards are found. Necessary plan changes that call for more stringent procedures or a higher level of personal protective equipment may be made at any time by the Project Director or Task Leader. Radian's Health and Safety Officer, Thomas Weeda, will be notified immediately about changes to the plan. The Health and Safety Officer has the authority to stop work at the site if it is found that activities are being conducted in an unsafe manner.

Plan changes that would make safety procedures or personal protective equipment requirements less stringent may be made only upon approval of the Project Director after consultation with the Radian Health and Safety

Officer. Plan changes will be put in writing and communicated to field personnel and the Health and Safety Officer, Thomas Weeda, who will report directly to the program manager.

2.4 Data Management Plan

A data management plan that outlines procedures to ensure that the quality and integrity of the data collected during the Remedial Investigation are maintained for use in the feasibility study and/or for any legal or cost recovery actions is presented as Appendix C to this Work Plan.

Two main types of information associated with the Remedial Investigation will be documented. The first type of information comprises technical data that are either required or generated by a specific task. The second type of information consists of data that must be tracked to monitor, manage, and document the actual performance of the tasks. Protocols established by EPA as referenced in the National Enforcement Investigation Center Policies and Procedures Manual (U.S. EPA, 1986) and the Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (U.S. EPA, 1980) will be followed. The plan will specifically address procedures for documenting field measurements and observations, sample identification and chain-of-custody, and document control inventory, storage, and filing systems.

2.5 Community Relations Plan

A community relations plan is not included in this scope of work. EPT has handled the community and public relations programs concerning their site in the past and will continue to do so for the Remedial Investigation Program described in this work plan.

Bob Hubbert (Plant Manager) will be the contact at EPT. The community relations program will be coordinated through Mr. Hubbert and John Andersson, Tompkins County Health Department.

3.0 TASK 3: STAGE 1 SITE INVESTIGATION

A site investigation will be conducted to characterize the EPT property and its potential hazard to human health and the environment. The data gathered during this investigation will support the development and evaluation of remedial action alternatives during the Feasibility Study.

3.1 Primary Source Identification

Because the remedial investigation centers around ground water contamination by chlorinated solvents, an understanding of the history of their use and storage at the plant could lead to an identification of possible sources of contamination. The earliest recorded use of chlorinated solvents at the facility was in 1967. Because past records are not detailed enough to specifically locate every area where solvents were used or may have been released, the identification of sources will be geared toward the location of primary source areas only. The only known source that has been identified to date is the reservoir. Although this is no longer an active source, there may still exist a plume of contamination originating there.

Several techniques will be employed to identify primary sources at the site including soil gas monitoring, ground water monitoring, soil sampling and natural ground water seep sampling. Soil gas monitoring is a screening technique that can cover a large area relatively quickly and inexpensively. It can be used to locate the areas of concentrated soil gases that may be associated with a contaminant plume in the subsurface. Ground water monitoring, soil sampling, and natural ground water seep sampling, are more specific and will give information about a more limited area. These techniques can be used to more definitively locate source areas.

Primary source areas will be located on a map. Plant records will be reviewed to ensure that there are no inconsistencies that would draw a particular source into question. The data collected at the site also will be used to verify whether the identification of a particular source is consistent with the site chemistry.

3.2 Feasibility Study Requirements

The available information on the EPT site is summarized in Section 1.0, Description of Current Situation. Based on this information, it is anticipated that the following general categories of remedial alternatives will be addressed in the feasibility study:

- o Ground water extraction and/or interception, and surface treatment for volatile organics, and
- o Soil remediation in areas with oil contamination.

The data required to evaluate these categories of remedial alternatives will be obtained during the remedial investigation phase of the study. The activities which will be undertaken to obtain the required data are discussed in the following paragraphs.

Ground Water Extraction and Treatment for Volatile Organics

The information required to effectively evaluate alternatives for ground water extraction and treatment include definition of the plume of contamination, concentrations of contaminants within the plume, response of the local aquifer to ground water pumping, and the effectiveness of applicable ground water treatment technologies.

The areal and vertical extent of the plume of contamination will be investigated using a network of ground water monitoring wells. The wells will be strategically placed to yield the maximum amount of information about the extent of the plume. The placement of the monitoring wells and the rationale for selecting monitoring well locations is discussed in detail in Section 3.3.3, Monitoring Well Network.

Information concerning the concentrations of contaminants within the plume will be obtained during the monitoring well sampling and analysis program. Samples of ground water will be collected from each of the ground water monitoring wells and analyzed to determine the concentrations of the contaminants of interest. Details of the monitoring well sampling program are presented in Section 3.4.2, Monitoring Well Sampling.

The response of the local aquifer to ground water pumping will be investigated during the second stage of study using a pump test analysis. This test involves pumping ground water out of a centrally located well for a period of two to three days and monitoring the changes in ground water elevation in the extraction well and in the surrounding wells. The information obtained from this analysis will be used to evaluate the effectiveness of various ground water extraction strategies.

In order to evaluate the effectiveness of various treatment technologies, a treatability study will be performed using samples of ground water from the EPT Site during Stage 2 of the study. The details of the proposed treatability study will be discussed in the Stage 2 Work Plan.

Soil Remediation in Areas With Oil Contamination

The information required to effectively evaluate soil remediation alternatives for areas found to be contaminated with oil includes definition of the areal and vertical extent of contamination, and the concentrations of contaminant constituents in the soil. This information will be obtained during the soil sampling and analysis program, which is discussed in detail in Section 3.4.3, Soil Sampling.

The approximate extent of visible contamination will be delineated by visual examination of soil borings. Split spoon samples, collected in the borings, will be examined for visible oil contamination. The areal extent of visible contamination will be plotted on drawings of the affected areas.

In areas where oil contamination is visible, soil samples will be collected and analyzed for petroleum hydrocarbons and PCBs. Selected samples from below and outside of the zones of visible contamination also will be analyzed for the same parameters. The resulting data will be used to evaluate various remediation alternatives which could be applicable to identified zones of oil contamination.

3.3 Hydrogeologic Characterization

Ground water is the primary pathway for the migration of contaminants on and around the EPT property. The nature and extent of ground water contamination will be characterized during the Remedial Investigation, and information regarding the hydraulic properties of the aquifer will be assembled during the performance of Stage 2 so that appropriate remedial alternatives can be evaluated.

In order to characterize the hydrogeology of the site, field data will be obtained and aquifer properties will be measured. These data will be incorporated into a hydrogeologic model of the site during Stage 2. Boundary conditions will be identified and migration pathways will be defined. In order to perform the characterization, the following activities will be performed during Stage 1 of the investigation:

- o Soil gas will be monitored to help identify sources, plume boundaries, and aid in the location of well placement;

- Geologic mapping will be performed to aid in an understanding of the occurrence of fractures and their relationship to ground water movement;
- Ground water monitoring wells will be installed in order to obtain ground water samples and to measure the static water levels; and
- The storm and sanitary sewers will be sampled and soil gas will be monitored around them to see if they are acting as interceptors of shallow, contaminated ground water flow.

3.3.1 Geologic Site Mapping

Bedrock at the EPT site is a fractured siltstone and ground water movement through this media is influenced by the fractures. This rock contains three types of fractures: nearly horizontal fractures that parallel bedding, and two sets of nearly vertical fractures. At this time it has not been established how deep this siltstone extends nor how deep the fractures extend.

As part of the remedial investigation, Radian will develop a conceptual model of the geology of the site. This will include describing the lithology and structural configuration of the strata and the nature of bedrock fractures on site as these parameters relate to the movement of ground water.

On-site field reconnaissance will be performed and extended to selected areas adjacent to the site to analyze the nature, spacing, and orientation of fractures in bedrock, and describe the structural configuration and the lithology of the strata on the site. Existing aerial photography of the site will be used to help identify major zones of fractures that are present.

Outcrops of bedrock located on-site and at selected areas off-site will be examined. The nature, orientation, spacing, and vertical and horizontal extent of bedrock fractures, and the structural configuration of the strata will be described using a bruton compass.

The nature and spacing of fractures and the depth at which fractures are visible in cores of bedrock obtained from monitoring wells will be investigated. This analysis will be performed on continuous cores obtained from the 100-foot wells. These observations will be recorded in the field by a Radian geologist and the cores will be stored by EPT.

3.3.2 Soil Gas Monitoring

Soil gas sampling surveys were performed at the site between November 17 and December 7, 1987 in order to provide screening data on the extent of any subsurface contamination. Specifically, this survey technique was used to accomplish the following objectives:

- Estimate the boundaries of vapor plume(s);
- Provide data to refine the siting of ground water monitoring wells;
- Evaluate the extent of contaminant migration off-site, if any; and
- Aid in the identification of subsurface contamination source(s), if any.

Soil gas sampling involves inserting a probe into the ground and extracting a sample of vapor present in the soil. In this way plume boundaries can be identified without the site disturbances, cost, or time delays associated with installation of numerous ground water monitoring wells.

Samples extracted were analyzed using on-site gas chromatography to provide immediate data which could then be used to design the subsequent sampling program.

Volatile organic compounds were identified and their concentrations quantified at parts per billion levels. The presence of volatile organics in the sample means that there are volatiles present in the vadose zone and possibly in the ground water below.

Soil gas was surveyed at 100 sample points along selected lines at regular intervals and along the sewers. Field duplicate samples were taken at approximately 20% of the sample points, for a total of 118 samples. The location of sampling points is generally shown on Figure 3-1. Because soil gas monitoring had already been performed at a number of locations on the property, the location of the additional lines was used to supplement the information that had already been gathered.

Line D of the soil gas monitoring program, as shown on Figure 3-1, represents a line approximately 2,350 feet long along the north side of the

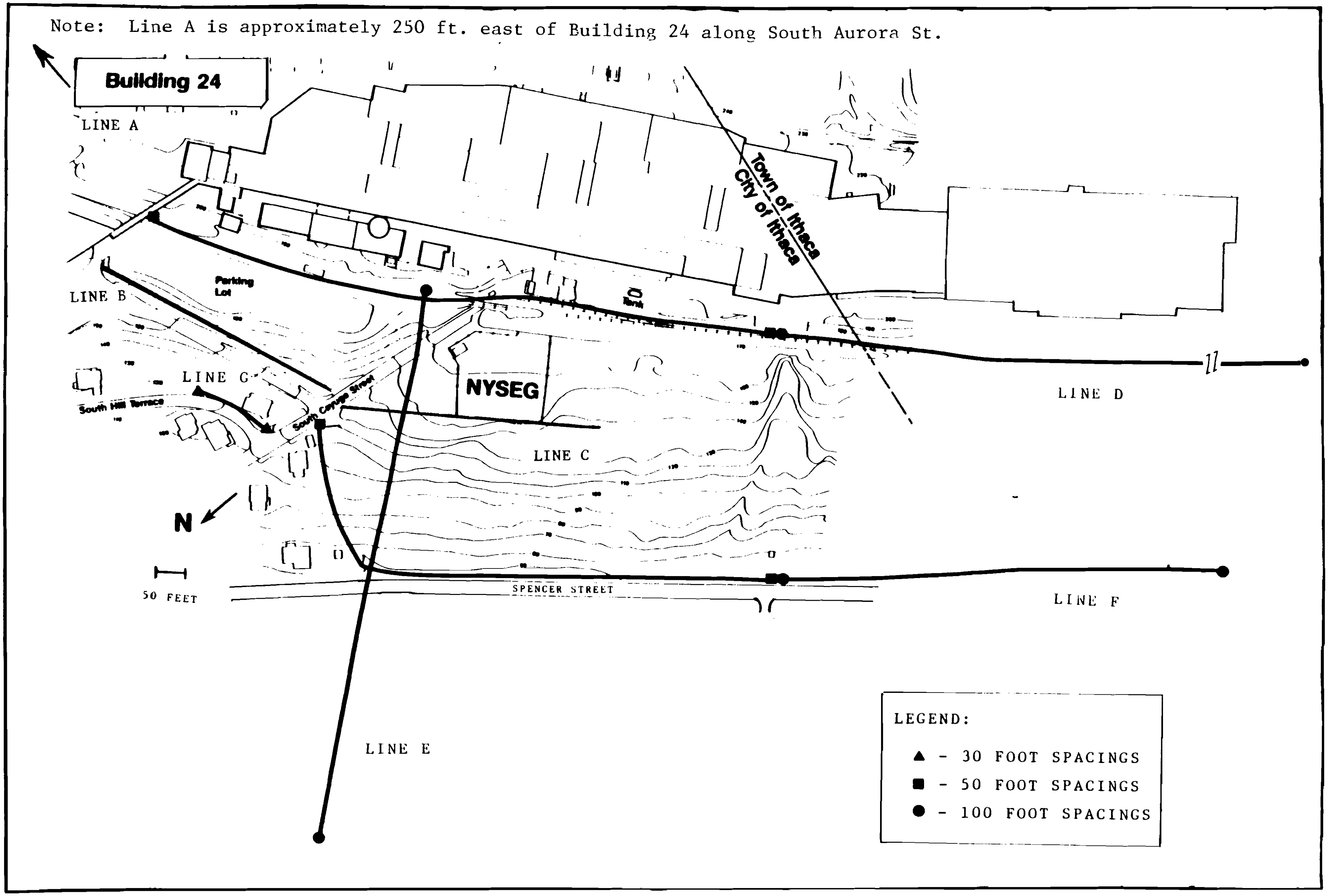


Figure 3-1. SITE MAP SHOWING SOIL GAS SAMPLING LOCATIONS

buildings. Soil gas samples were taken at approximately 50-foot intervals along the entire length of the building adjacent to the fire water reservoir. Spacing between sampling points was increased to 100 feet to the far western end of the building complex. This represented 35 sample points.

Line E represents a line approximately 1,000 feet long that runs roughly perpendicular to Line D in a downgradient direction toward Six Mile Creek. This line was oriented along the "axis" of the highest readings in the area east of the NYSEG station. Soil gas sampling results from the previous work and from Line D were used to modify Line E. Soil gas samples were taken at 100-foot intervals starting near the building and continued in a down-gradient direction until the selected organic compounds were detected at background levels in three successive samples. Based on this criteria the length of Line E was finalized in the field. Line E represented 18 sample points.

Line F extended north (downhill) from South Cayuga Street toward Spencer Street along the southwestern property boundary of the houses along South Cayuga Street. This line then continued to the west parallel to Spencer Street. This line was approximately 1,750 feet long and represented 27 sample points. Sampling points were spaced 50 feet apart along the portion of the line extending from South Cayuga Street to the downslope projection of the buildings adjacent to the reservoir. The sampling points along the remaining western portion of this line were spaced at 100 feet.

Line G was located along the western portion of South Hill Terrace. This line will consisted of three sample locations spaced at 30 feet beginning at the intersection with South Cayuga Street.

Four sample locations were selected southeast of the plant to represent background conditions. In addition to soil gas samples taken at regular intervals along these lines, 13 soil gas samples were taken at additional locations. These locations were selected after a review of the field data and used to further define plume boundaries.

The on-site analytical equipment consisted of a portable gas chromatograph (GC) with multiple detectors housed in a field van. The soil gas samples were directly injected into the GC for immediate analysis.

The samples were analyzed for the following compounds:

- trichloroethylene,
- trans + cis-1,2-dichloroethylene(s),
- 1,1-dichloroethane,
- tetrachloroethylene,
- methylene chloride,
- 1,1,1-trichloroethane,
- benzene,
- toluene, and
- xylene.

Additional details on the soil gas sampling and analytical procedures are presented in the Sampling and Analysis Plan.

3.3.3 Monitoring Well Network

Thirteen new monitoring wells will be installed during the Stage 1 investigation and used in conjunction with the five existing wells to monitor the water levels and ground water quality at the site. The well locations have been selected based on the results of the preliminary site investigation and soil gas monitoring. The locations shown in Figure 3-2 and described below will be finalized in the field based on consideration of specific site factors such as accessibility, the presence of utilities, etc. The proposed locations have been selected to provide the maximum amount of information concerning the vertical and horizontal extent of the contaminant plume as well as hydraulic head distributions, both spatially and with depth. The installation of the Stage 1 wells can be conducted concurrently with geologic mapping and other site activities because their locations were selected to fill data gaps identified in the preliminary investigation of the site. A total of seven Stage 2 wells are proposed to complete the investigation. Although their tentative locations are shown on Figure 3-3, their exact locations and depths will be selected once the analytical results from the sampling of the Stage 1 wells have been interpreted and the need for specific data has been identified. Table 3-1 summarizes the type and depth of wells that will comprise the Stage 1 and 2 monitoring networks.

The first well to be drilled during the Stage 1 investigation will be a 100-foot deep well in the vicinity of the existing wells MW-3 (shallow

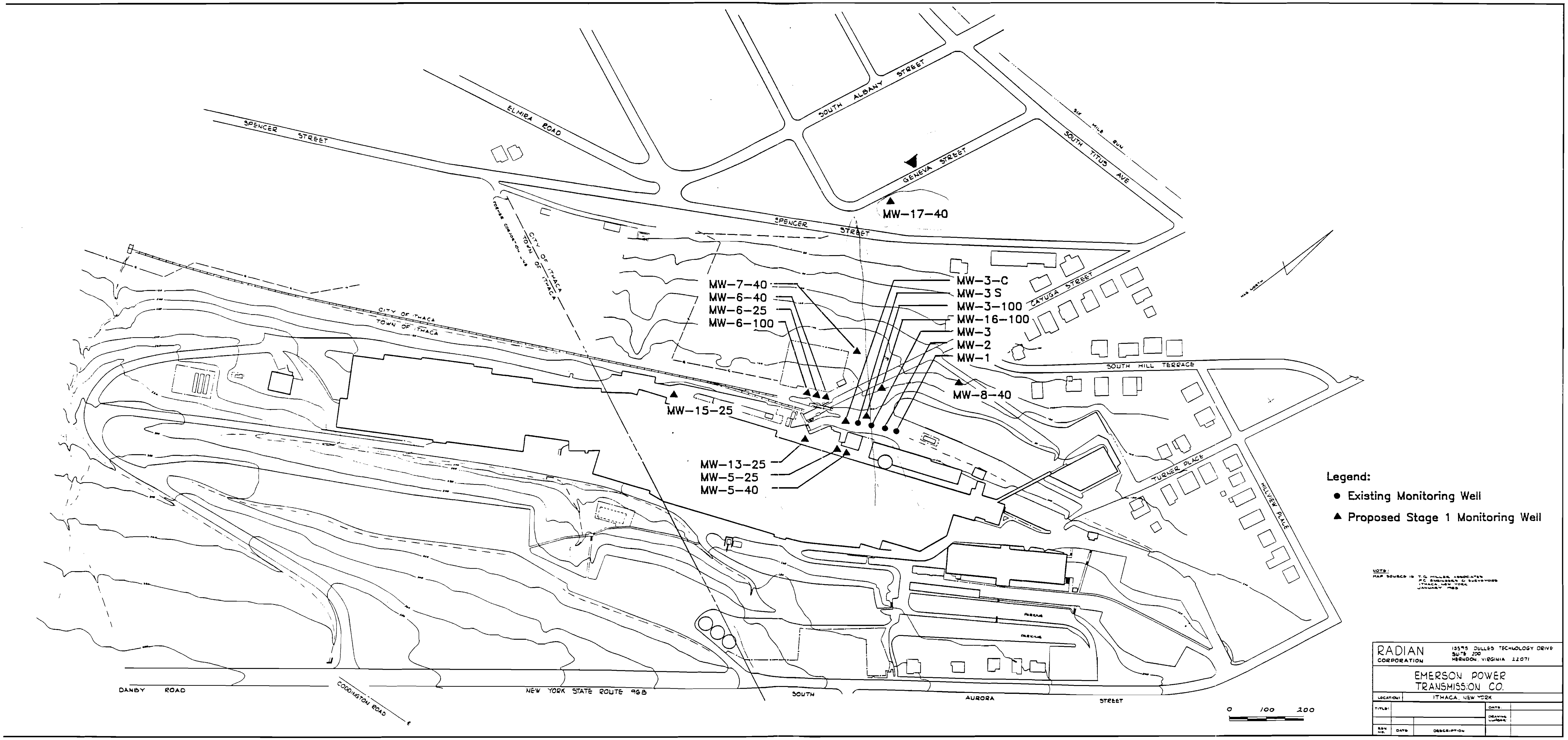


Figure 3–2:
Proposed Locations of
Stage 1 Monitoring Wells

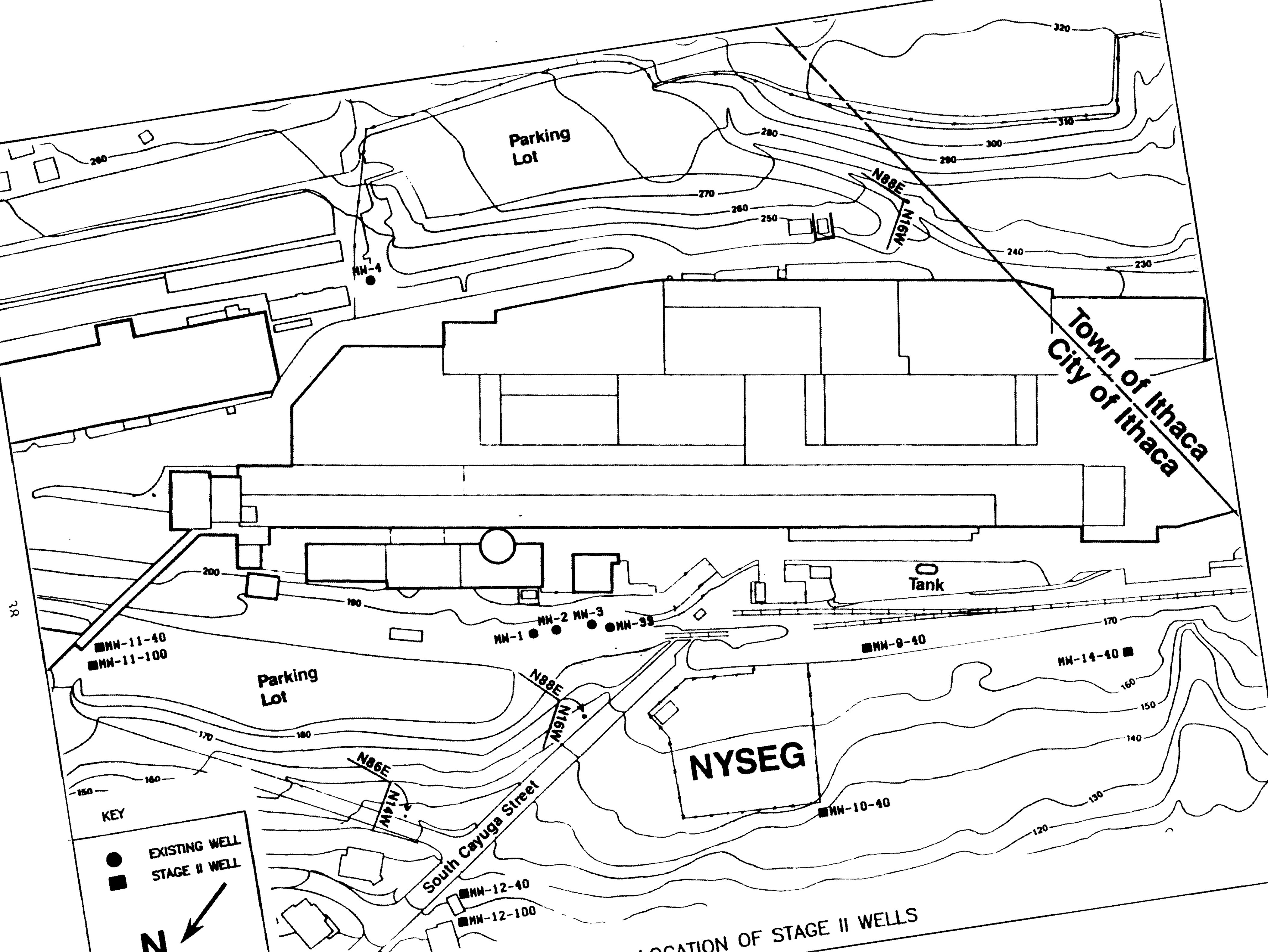


FIGURE 3-3. LOCATION OF STAGE II WELLS

Table 3-1

SUMMARY OF NEW MONITORING WELLS TO BE INSTALLED DURING STAGE 1

Well Type	Approximate Depth (ft)	Drilling Method: Air Rotary	Drilling Method: Auger/Core	Total
Intermediate	100	MW-3-100	MW-3-c MW-6-100 MW-16-100	4
Shallow Bedrock	40	0	MW-5-40 MW-6-40 MW-7-40 MW-8-40 MW-17-40	5
Overburden	25	0	MW-5-25 MW-6-25 MW-13-25 MW-15-25	4
SUMMARY OF NEW MONITORING WELLS TO BE INSTALLED DURING STAGE 2				
Intermediate	100	0	MW-11-100 MW-12-100	2
Shallow Bedrock	40	0	MW-9-40 MW-10-40 MW-11-40 MW-12-40 MW-14-40	5
	TOTAL	1	19	20

bedrock) and MW-3s (overburden). Because these existing wells show contamination in the upper portion of the aquifer, a deeper well at the same location would be helpful in defining the lower limit of the contamination in the aquifer. Well MW-3-100 will be drilled by the air rotary method to minimize the amount of time that the borehole will be standing open. The hole will be logged by an inspection of the drill cuttings. Depths at which circulation is lost, if any, will be noted to aid in identifying areas of the greatest fracturing. The well will consist of two-inch diameter stainless steel casing with twenty feet of screen. Appendix A has a detailed account of the drilling specifications, which describes the proposed well construction methods, materials, and configurations in greater detail.

Well MW-3-100 will be sampled immediately after well development takes place. The ground water sample will be appropriately preserved in the field and immediately shipped to Radian's analytical laboratory for the performance of a Method 601/602 analysis. The results of this analysis will be made available to the project team within 48 hours. Based on the analytical results from well MW-3-100, a well designated MW-3-c will be installed adjacent to MW-3-100. If contaminants are found to exceed a NY Guidance Value of 10 ppb trichloroethylene in well MW-3-100, then MW-3-c and the remaining two intermediate depth wells of Stage I will be drilled to a depth greater than 100 feet, subject to DEC approval. If contaminants are not found to exceed this guidance value in well MW-3-100, then the intermediate depth wells will be drilled to a depth of 75 feet. The design of the monitoring well network will be adjusted, subject to DEC approval, to intercept the same hydraulic horizon or the most likely depth of the plume.

A cluster of wells comprised of an overburden (25 feet) and shallow bedrock (40 feet) well will be installed at the southwest end of the reservoir, between the reservoir and the main plant buildings. Because these wells are upgradient of the reservoir, they will provide useful information for the identification of primary sources. These wells are designated as MW-5-25 and MW-5-40 on Figure 3-2. Continuous split spoon sampling will be performed in the overburden while drilling well MW-5-25.

An overburden (MW-6-25), shallow bedrock (MW-6-40) and intermediate depth (MW-6-100) well will be installed in a cluster west of the MW-3 cluster, in the scrap metal loading area. These wells will aid in the delineation of the western extent of the contamination and will be helpful in the identification of other potential source areas. The overburden well MW-6-25 will have a screened interval that extends above the water table to intercept any floating constituents that may be present. As previously mentioned, intermediate depth wells are tentatively designed to extend to a depth of 100 feet. Wells designated as 100 feet deep will be installed to monitor the same ground water zone and will be individually designed in the field.

One well (MW-7-40) will be installed downhill from the plant at the northeast corner of the NYSEG station (Figure 3-2), and will be in the shallow bedrock. This well is located in what appears to be the most likely place where a ground water plume of contaminants would be, based on the soil gas that has already been done and the structure of the bedrock.

One shallow bedrock well, MW-8-40, will be located on the uphill side of the private home nearest to the northern property boundary, just east of South Cayuga Street. The test interval in this well will be at a depth below the basement of the houses in the immediate vicinity and would provide information regarding the potential impact of contaminated ground water on those residents.

One overburden well (MW-13-25) will be installed on the driveway adjacent to the main plant building near the past location of the TCE purification still. This well MW-13-25 will be screened both above and below the water table to detect floating petroleum products, should they be present.

One overburden well (MW-15-25) will be installed approximately midway along the length of the north side of the main plant buildings. This location was selected based on the levels of trichloroethane, tetrachloroethylene and trans-1,2-dichloroethylene detected in this area above background levels during recently completed soil gas monitoring. This well will provide information on the western limit of the main area of concern.

One intermediate depth well (MW-16-100) will be installed on the east side of south Cayuga Street, directly east of the NYSEG station. This well is located downslope of the MW-3 well cluster, at which significant levels of contaminants have been detected in ground water from existing wells. This location is in what appears to be a likely place for migration of contaminants in ground water, based on the recently completed soil gas monitoring. Trichloroethylene, trichloroethane, and trans-1,2-dichloroethylene were detected in concentrations above background levels in this vicinity.

One shallow bedrock well (MW-17-40) will be installed on the east side of Geneva street, directly downslope of the main area of concern at the plant. This location was also selected to be within a potential migration pathway as defined by levels of trans-1,2-dichloroethylene detected during the soil gas surveys. Information on ground water quality obtained from this location can aid in defining the present downgradient limit of contaminant movement, if any.

The 13 wells described above will be installed while further investigation of the site is ongoing. Table 3-2 presents some details as to their construction. Their locations have been selected based on current knowledge of areas of known or suspected contamination and the results of soil gas monitoring. The advantage to installing these wells first is that other sampling and site investigation activities can be conducted simultaneously, which will decrease the total project duration.

A minimum of seven additional wells will be installed in a second Stage of the site investigation. Their installation will take place after the Stage 1 data have been interpreted and a Stage 1 report prepared. A detailed

Table 3-2

SUMMARY OF CONSTRUCTION DETAILS

Well Depth (ft)	Well Casing Diameter	Intake Interval (ft)	Total Screen Length (ft)
100	2"	20	20
40	4"	>20	Openhole
25	2"	10	10

description of the installation method and configuration will be presented in the Stage 2 Work Plan.

Drilling Procedures for Shallow Bedrock Wells

The five new, Stage 1 shallow bedrock wells will be installed to a maximum depth of 40 feet. They will be drilled in a method similar to the existing shallow wells at the site to seal them off from water in the overburden. These wells will be installed using a 6 5/8-inch outside diameter hollow stem auger down to the top of bedrock. Bedrock will be defined as auger refusal or a material that requires greater than 100 blows to advance the split spoon six inches. Soil samples will be collected at 5-foot intervals (except in those boreholes otherwise specified) in a standard split spoon and stored in glass sample jars that are marked with the borehole number and sample interval. Each sample will be screened with an organic vapor monitoring device and the information will be recorded on the geologic log sheet.

After augering to bedrock, the auger flights will be withdrawn and a 6-inch temporary steel casing will be inserted in the borehole. The inside of the casing will be cleaned out with a tricone roller bit. An initial 5-foot rock core will be extracted using a 3-inch diameter (N size) core barrel. The resulting core hole will then be reamed out with a 5 5/8-inch roller bit creating a rock socket. Permanent casing will then be installed and grouted into place following the removal of the temporary casing. After sufficient time for the grout to set up, rock coring will continue through the casing to a final depth anticipated to be no greater than 40 feet. The resulting core hole will remain as an open hole well. Rock core samples will be stored in wooden core boxes that are labeled by the bore hole number and sample interval. The eight shallow wells will be constructed of 4-inch inside diameter, flush-jointed schedule 5, 304 stainless steel casing. The grout will be a Type I Portland Cement/Bentonite gel slurry with a maximum mixing ratio 6:1.

Drilling Procedures for Overburden Wells

Four new overburden wells will be installed. These will be drilled in the overburden to a maximum depth of 25 feet at the locations shown on Figure 3-2. These wells will be drilled by a 6-5/8-inch outside diameter hollow stem auger to the top of bedrock or a depth of 25 feet, whichever is shallower. A 10-foot section of 10-slot, 2-inch inside diameter, 304 stainless steel screen section with riser will be then installed through the augers to the bottom of the hole. The height of the screened section will be sufficient to straddle the static water level and to allow for fluctuations in water level. A clean, coarse sand pack will fill the annulus around the screen to a height approximately 2 feet above the top of screen. A 2-foot layer of bentonite will be placed on top of the sand pack. The remaining annular space will be grouted to the land surface following removal of the temporary casing.

Drilling Procedures for Intermediate Depth Wells

Four intermediate depth wells will be installed during Stage 1. One well, MW-3-100, will be installed using air rotary and the remaining three will be installed by augering through the overburden and rock coring through bedrock. The depth of the remaining three intermediate wells will be determined after ground water obtained from MW-3-100 is analyzed (see previous discussion).

In order to obtain bedrock cores that can be used to correlate the stratigraphy of the site and to investigate horizontal fracture density with depth, three of the new intermediate depth wells will be installed using an auger rig and coring equipment. The wells will be installed by augering through the overburden with 8-inch outside diameter hollow stem augers. Split spoon samples of the overburden will be obtained every 5 feet or when a change in lithology is encountered. The augers will be withdrawn when the top of bedrock is encountered. A temporary 8-inch casing will be installed through the overburden. A 3-inch diameter core barrel (size N) will be used to core to the final depth of the hole and the core will be logged by the field geologist. A 6-inch tricone roller bit will be used to ream out the borehole to final depth.

The intermediate depth holes will be cased with 2-inch stainless steel riser pipe and 20 feet of screen. The rise will have a 2-foot stickup above the land surface. The screened section in these wells will be continuous slot over the entire 20-foot section. All of the cored wells will have coarse sand around the screen annulus to a height of 2 feet above the top of the screen. A 2-foot bentonite seal will be placed at the top of the filter pack and the remainder of the annulus will be tremie grouted to the surface with Type I Portland Cement/Bentonite gel of a maximum ratio of 6:1, following the removal of the temporary casing.

Well MW-3-100 will be installed using air rotary drilling with a 6-inch tricone roller bit. Once again, a 6-inch temporary casing will be used to case off the overburden and the hole will be advanced through it to final depth. The casing materials and installation technique will be the same as for the other three intermediate depth wells.

Additional Procedures

Drill rig equipment will be steam cleaned prior to each workday and in between work at well sites. Well screens, casings and caps will be steam cleaned prior to installation. Borehole cuttings will be collected in 55-gallon drums; other wastes from drilling operations will be collected in plastic bags. Each well will be developed until the fine materials are removed from the well casing. The development water will be collected in a 55-gallon drum and retained until a chemical analysis can be performed on the samples from each well. Development will be accomplished by a means deemed most suitable for the site conditions by the Radian geologist. Acceptable development methods include bailing with a clean teflon bailer, suction lift, and compressed air.

A steel protective casing with locking cap will be installed around the casing at each well. A permanent label will be affixed to each well that will specify well identification number, total depth and date installed.

Water level measurements will be taken in all completed wells at the beginning and end of each working day. Elevations will be measured to the nearest 0.05 inches. This information will be recorded on the geologic log and/or the log of daily activities. All wells will be developed by pumping or bailing once they have been completed. After well development, rising head permeability measurements will be taken on selected wells to calculate hydraulic conductivity. This information will be used in the design of the pump test analysis discussed in the following section.

3.3.4 Sewer Line Transport Determination

The storm and sanitary sewers will be evaluated as part of the Stage 1 study. The EPT sanitary sewer discharge to the City of Ithaca POTW is monitored on a quarterly basis. Sampling of the sanitary sewer during Stage 1 will take place at the regularly scheduled sampling time in order to avoid duplication of effort.

Water and sediment samples will be collected from two storm sewers which carry runoff from the plant, for a total of four samples. Access to the storm sewers will be through manholes. Figure 3-4 is a map of the sewer systems at the plant and the sampling locations are shown as MH1 and MH2.

Because sewer lines may be surrounded by a bed of relatively permeable material, contaminated vapors or ground water may tend to flow in a direction parallel to the sewer line. To investigate this potential mechanism of transport, soil gas samples will be collected from 10 locations above the 8-inch sanitary sewer line which runs beneath the driveway on the downhill side of the main plant building to Turner Place and South Cayuga Street. The soil gas samples will be analyzed for the constituents listed in Section 3.3.2.

3.4 Sampling and Analysis

3.4.1 Surface Water, Sediment, and Natural Ground Water Seeps

Selected surface water, associated sediment, and natural ground water seeps at the plant will be sampled to provide additional data concerning the distribution of contaminants. Two surface water and two sediment samples will be taken from the channelized surface water adjacent to Spencer Street directly downhill from the plant. Stream sediment and water also will be collected from an upstream and downstream location of the stream which runs

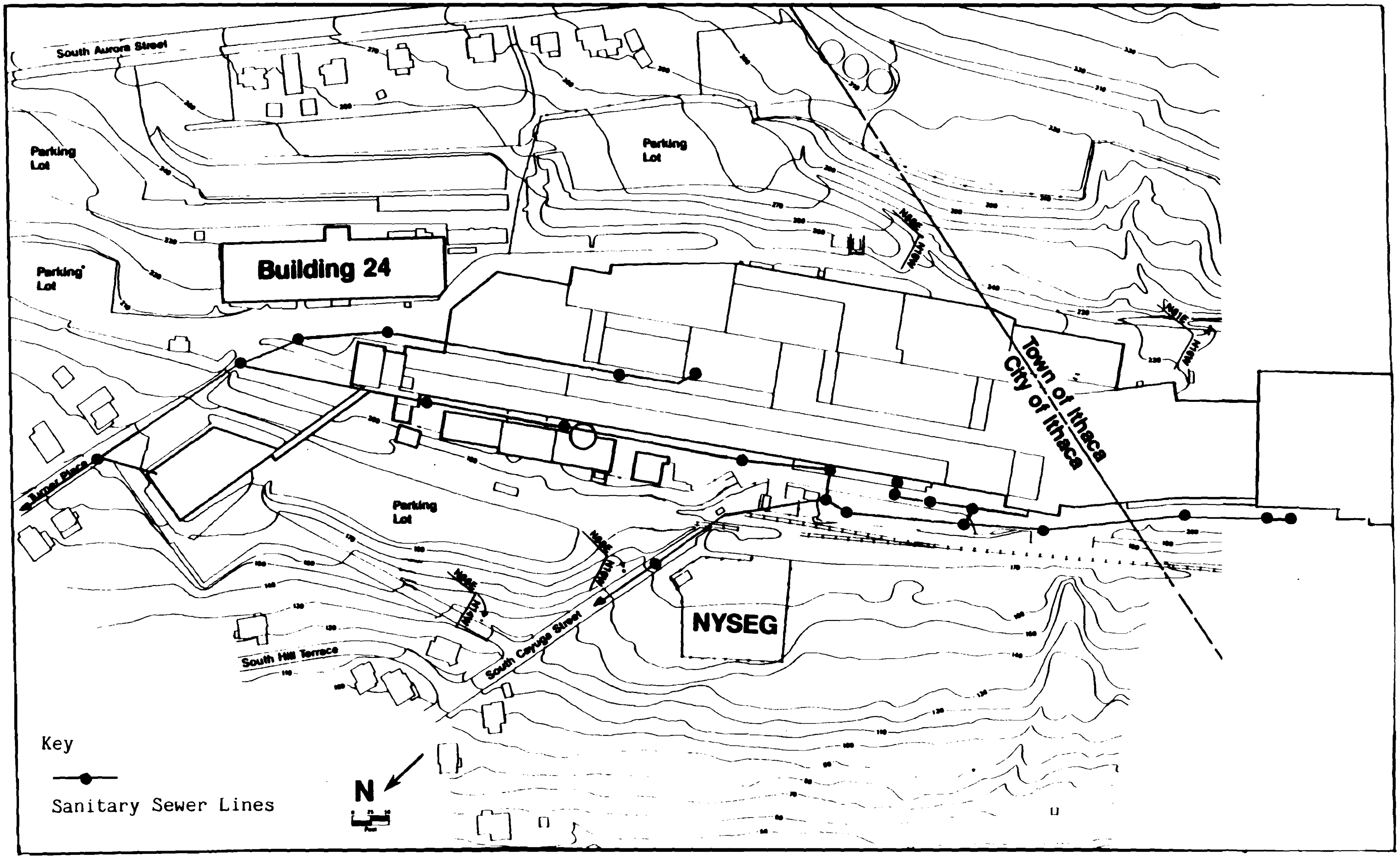


Figure 3-4. Location of Sewer Lines

along the western boundary of the plant site and from the stream which flows across the plant site through the NYSEG right-of-way.

Ground water from 10 natural ground water seeps downgradient from the plant will be sampled, if possible, to characterize the ground water quality as it intersects the land surface. Some of these natural seeps are along Spencer Street, outside of the plant boundaries. Only natural seeps that are flowing will be sampled, which may mean that fewer than 10 will be found to sample.

The surface and ground water seepage samples will be analyzed for halogenated and aromatic volatile organic compounds and total petroleum hydrocarbons along with pH and temperature measurements taken in the field. The two ditch sediment samples and two sediment samples will be composited into a single sample from each of the three locations and will be analyzed for PCBs.

3.4.2 Monitoring Well Sampling

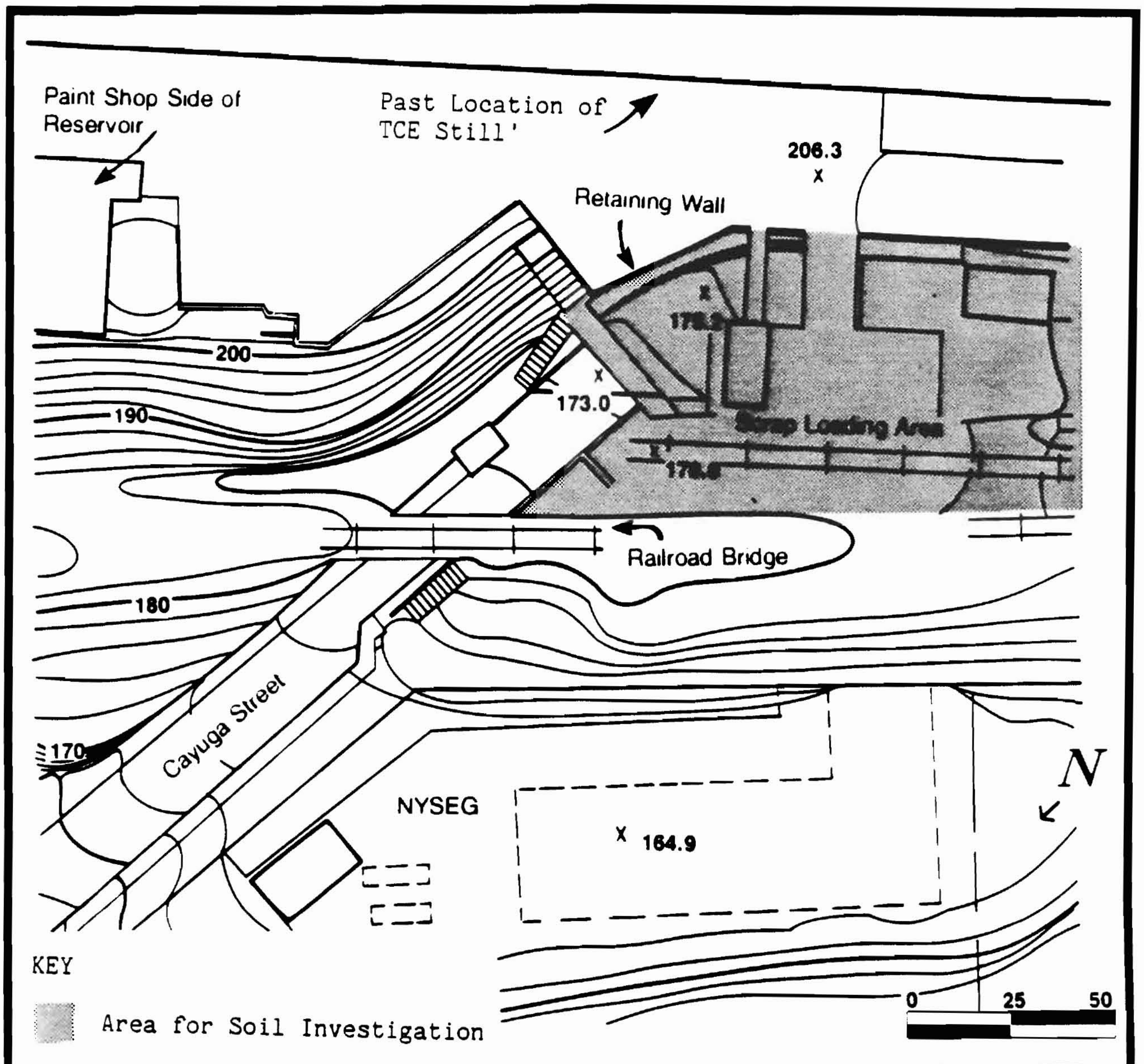
Samples of ground water will be collected from each of the monitoring wells by means of a dedicated sampler and analyzed for halogenated and aromatic volatile organic compounds and total petroleum hydrocarbons along with pH, temperature, and specific conductivity measurements taken in the field. For samples from wells MW-3, MW-6-40, and MW-5-40, the New York Hazardous Substance List parameters will be analyzed during the initial round of sampling. The Sampling and Analysis Plan should be consulted for further details. The locations of the monitoring wells and the rationale for selecting these locations is presented in Section 3.3.3, Monitoring Well Network.

After a well is installed, it will be developed in order to remove materials introduced during drilling. Prior to sampling, the monitoring well will be purged of water until the pH, temperature, and specific conductivity are constant (approximately three well volumes) or until the well goes dry. A more detailed description of the sampling activities will be presented in the Sampling and Analysis Plan discussed in Section 4.3.1.

3.4.3 Soil Sampling

Part of the EPT property have been targeted for soil sampling due to the suspected presence of oil contamination in the soil. This area is at the head of South Cayuga Street in the vicinity of the railroad bridge. A drawing of the railroad bridge area is presented in Figure 3-5.

The area is an inactive scrap loading area on the downhill side of South Cayuga Street. From 1955 until the early 1970's (during the operation of the plant by a prior owner), oily scrap was loaded into railroad cars in this area. Oil from this scrap is known to have escaped onto the ground, and accumulated in a catch basin on South Cayuga Street. This area also is near a utility substation which may have contained dielectric fluid with PCBs.



Project: *Project No.:*	**RAILROAD BRIDGE AREA**	Figure 3- 5

RADIAN CORPORATION

Twelve boreholes will be drilled using a hollow stem auger in the soils in the inactive scrap loading area. Three will be within and nine outside of the visibly contaminated zone. The three boreholes drilled in the contaminated area will be drilled to a depth four feet below visible contamination. A total of three samples of visibly contaminated soils will be collected within the visibly contaminated zone and will be sent to the laboratory for analysis. A total of three soil samples will be collected in these same boreholes below the visibly contaminated zone and sent to the laboratory for analysis.

Nine borings will be drilled outside of the area of visible contamination. Soils will be sampled continuously to a depth of four feet or to where the visible contamination deeper in the soil samples ends. Four of these soil samples will be sent to the laboratory for analysis. The soil samples from both areas that are selected to be sent to the laboratory will be analyzed for PCBs and total petroleum hydrocarbons. One sample from each area also will be analyzed for volatile organic compounds by EPA Methods 8010 and 8020. This program may be adjusted in the field, based upon what is found during the exploration.

3.5 Seepage Observations

During the Stage 1 investigation, a daily inspection of the areas at the northwest retaining walls between the skimmer house and the gas meter house will be made. This inspection will be for the purpose of identifying pipes that are actively flowing. These pipes, if found to be flowing during the Stage 1 investigation, will be sampled once at the time they are found to be flowing. The pipes in this area that were not flowing during the Stage 1 investigation will be sampled once in April if found to be flowing at that time. If the flows from the sampled pipes are found to be at background concentrations or exhibit water quality consistent with that of the natural seeps in the vicinity, no further investigation of the pipes in this area will be done, and these pipes may be plugged or capped at EPT's discretion.

3.6 Reservoir Monitoring

The water levels in the fire water reservoir will be measured and recorded on a weekly basis for the duration of the remedial investigation. One sample of water from each of the two compartments of the reservoir water will be collected during the Stage 1 monitoring well sampling and will be analyzed for volatile organic compounds by EPA Methods 601/602 and for petroleum hydrocarbons.

4.0 TASK 4: SITE INVESTIGATION ANALYSIS

EPT, with the aid of their consultant, will prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality (e.g., QA/QC procedures have been followed) to design the Stage 2 investigation, and to support the feasibility study.

The results and data from the Stage 1 site investigation will be organized and presented in accordance with the data management plan described in Section 2.4 as it appears in Appendix C. Radian will analyze these data and develop a summary of the type and extent of contamination at the site, where possible, and a plan to collect further data needed to characterize the contamination at the site. The summary will describe the quantities and concentrations of specific chemicals and background levels at the site and will identify specific areas to be addressed and types of data that need to be collected during the Stage 2 investigation.

4.1 Stage 1 Reporting

A Stage 1 report will be prepared at the conclusion of the first stage of study with the results the work performed during this phase of the project. The report will include a full description of site activities, the results of the analysis of the samples, a description of the site geology and hydrogeology, and a characterization of the probable distribution and source(s) of chlorinated solvents and petroleum hydrocarbons identified in the ground water on the EPT property. The report also will contain maps to describe the geology and hydrogeology of the site.

4.2 Stage 2 Work Plan Preparation

EPT will prepare a Work Plan for the final Stage 2 investigation. Included with this work plan will be a schedule for the completion of the project. This report will be submitted to NYDEC for their review and comment prior to the finalization of the Stage 2 Work Plan.

4.3 Proposed Stage 1 Schedule

Included with this work plan is a schedule for the completion of the Stage 1 work (see Figure 4-1). This schedule presents target dates for completion of project milestones. The Remedial Investigation will begin shortly after the signing of a Consent Order with the NYSDEC.

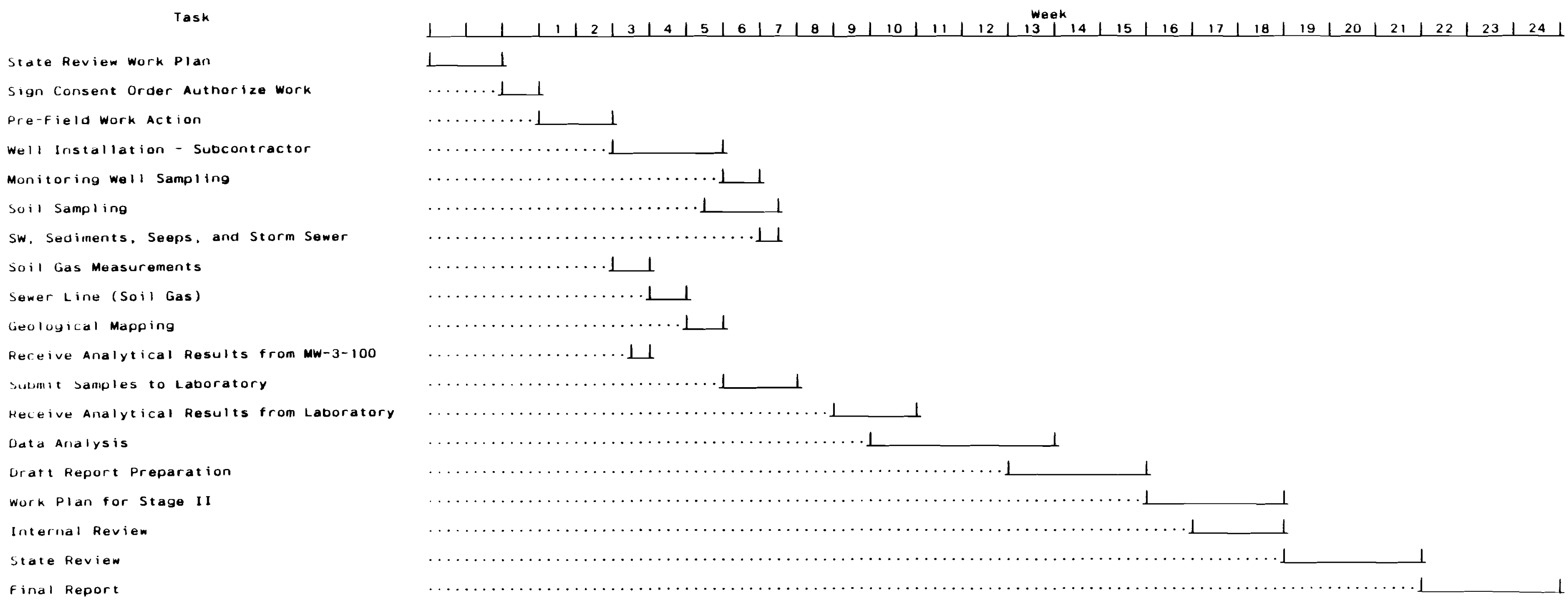


Figure 4-1

SCHEDULE FOR STAGE I

5.0 SCHEDULE

We anticipate that Stage I activities will occur over a 24-week period as outlined in Figure 4-1. This schedule assumes that field activities will not be delayed by inclement weather conditions or by weather conditions that could create a hazard to the field crew. Assuming that permission can be obtained to install wells and conduct a soil gas survey off-site, field work will be initiated two weeks after authorization to begin work. Eighteen weeks after the program is authorized, a draft report will be submitted to the New York State DEC. A final report will be submitted to the NYSDEC three weeks after EPT receives all comments from the NYSDEC regarding the draft report.