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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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WORK PLAN FOR NEW YORK STATE ELECTRIC AND GAS CORPORATION TO INVESTIGATE FORMER COAL GASIFICATION SITES: PENN YAN

TRC Environmental Consultants, Inc.

TRC Project No. 3366-N61

June 30, 1986

Revision 1

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

TRC Environmental Consultants, Inc. (TRC) is pleased to submit our work plan and associated fee proposal to New York State Electric and Gas Corporation (NYSEG) for the Penn Yan site (Figure 1-1). In the preparation of our work plan we have taken into consideration all provided data relative to the site in addition to general geologic data gathered for the site area. Due to the undefined extent of contamination, the NYSEG Tasks 3, 4, and 5 were not revised from the Geneva work plan. The Task 3 field program costs are provided for the specified program recognizing that modifications will be required at a later date. The overall program organization for multiple site investigations has been previously provided to NYSEG.

The Project Director responsible for overseeing all site investigations at multiple sites is Mr. Jeffrey W. Bradstreet, PhD. Overall Project Coordinator for this site investigation is James E. Gould, P.E. The Project Manager for this site investigation is John Kubiczki and the senior technical review for this project will be provided by John Palmer, P.G. Field investigation activities will be managed by Carl Mohrbacher.

Qualifications and experience for these staff have been previously provided.

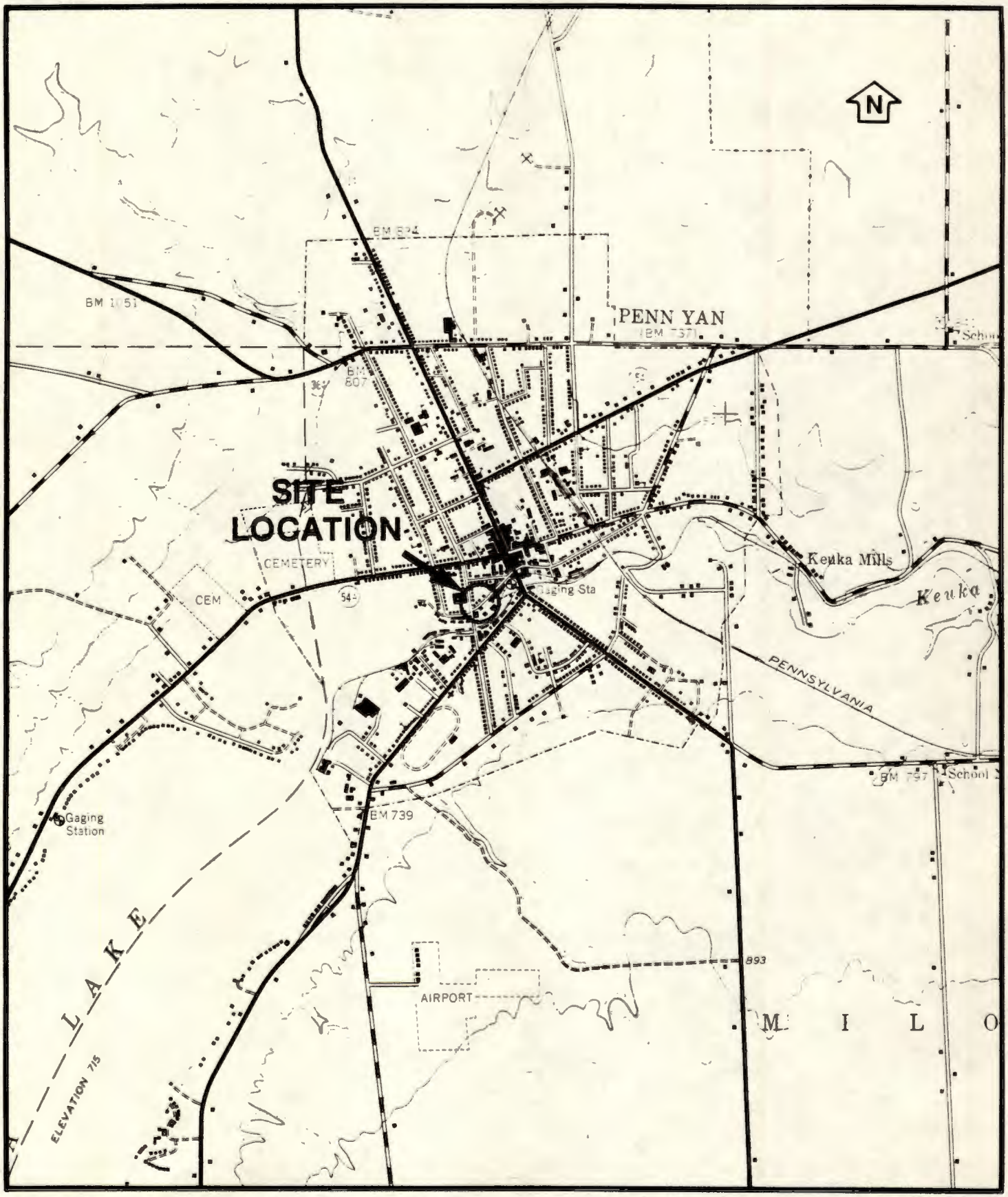

Figure 1-1. Penn Yan Site Location Map

2.0 SCOPE OF WORK - PENN YAN

2.1 Task 1 - Preliminary Site Evaluation

2.1.1 Develop Comprehensive Site History

The objective of this subtask is to prepare a concise history of site activities during the plant's years of operation to help locate potential accumulations of waste materials. Data developed during this subtask will be used in finalizing the field investigation sampling plan.

To carry out this subtask, TRC will review NYSEG files, obtain and review historic aerial photographs, review site plan topographic maps, review existing site contamination data, and interview knowledgeable parties. Available site historic data from local historians and historical publications will also be obtained and utilized as source information for site history. Because maps of the old site layouts may not be available, the archive search will focus on locating maps and on identifying disposal practices and any information relating to the liquid waste discharge or tar storage or disposal.

In addition to contacting the appropriate NYSEG personnel, TRC will contact various state and federal agencies to obtain the available regional and more site specific information. Prior to contacting these agencies, TRC will submit a list of the proposed agency contacts to the NYSEG Project Coordinator, allowing a NYSEG representative to make the initial contact. These contacts will include NYSDEC and USGS for geologic and hydrologic information, SCS for soil information and aerial photographic data centers. In addition, the railroad will be contacted early in Task 1 to request permission to work on and around the railroad tracks during Task 2. Also the present property owners will be contacted at the same time to acquire permission to conduct Task 2 field activities. These initial contacts will be made by a NYSEG representative.

TRC will work with the NYSEG area manager or his designee and the NYSEG project manager to identify people potentially knowledgeable about past site operations. It is likely that the most information about site activity will be obtained from past or present NYSEG employees or employees or owners of adjacent properties. Of particular interest in the interviews will be information regarding waste disposal practices and information regarding the nature of the holder designs.

2.1.2 Project Air Quality Assessments

TRC staff will evaluate potential sources of air pollution (gas phase organic contaminants) from the site using information obtained during the preparation of a site history and existing air quality data available for the site. This initial information will provide a preliminary qualitative screening of potential contaminant sources identifying location, type, quantity, and potential for health hazard.

During the site reconnaissance, TRC staff will survey and establish "hot spot" locations (including an evaluation of indoor air quality in buildings on-site) using an HNu photoionization gas monitor and/or the Century Organic Vapor Analyzer (OVA). This survey will be completed by a site walk-over and logging instrument readings. No actual air samples will be collected during Task 1 activities. Both the HNu and OVA have been shown to be effective monitoring devices at other former coal gasification sites. This screening method will quickly characterize background levels of organic emissions in ambient air. One purpose of the site reconnaissance is to provide visual observation of contamination areas (areas of discolored soil, stressed vegetation, etc.), identify probable sampling locations (air spaces above ground water monitoring wells, leachate areas, gas vents, concentration in buildings, etc.), and identify a background control sampling point (upwind

site). These locations will be recorded on a site map and field-marked with stakes for further sampling to be conducted during Task 2.

Working with the data collected during this task, TRC staff will provide a qualitative assessment of the air contamination expected during Task 2 site investigation and later work on-site.

2.1.3 Perform Site Reconnaissance

TRC will prepare a site specific supplement to the general Health and Safety Plan (HASP), subject to approval by NYSEG, prior to conducting any field work. The HASP will detail all aspects of health and safety specifications to be used while conducting the site investigation.

TRC has performed the preliminary site visit required to finalize the Health and Safety Plan. TRC and selected subcontractors will perform a site reconnaissance necessary for other Task 1 investigations. The purposes of this reconnaissance are:

- to familiarize the site investigation team with the layout of the Penn Yan site so that final plans can be developed for the detailed investigation;
- to perform a preliminary geophysical survey of the property in and around the site for the location of buried waste material, plumes, and/or geologic conditions controlling the paths of migration; and
- to identify work areas (site command post, decontamination zones, drilling sites, and entry/egress zones) to be used during the drilling portions of the program.

Team members doing the site reconnaissance will include TRC's project manager or field operations manager, and may also include a chemist, a senior field geologist, a project engineer, a representative of the land surveying subcontractor, and a representative of the drilling subcontractor. A field office, to be identified in the HASP, will be located with the appropriate decontamination, site entry, and exit zones. TRC has assumed that a trailer will be required for a field office.

2.1.3.1 Geophysical Investigations

Geophysical investigations at the Penn Yan site will be conducted as part of Task 1 - Preliminary Site Evaluation. The specific geophysical methods that will, or may, be used at the Penn Yan site are presented in Table 2-1. Under the site reconnaissance phase (Phase I) of this task, a site walk-over and some background and basic geophysical data will be acquired.

2.1.3.1.1 Phase I Site Reconnaissance - This phase will consist of a walk-over reconnaissance of the site and an assessment of surface and subsurface conditions. As part of the the Phase I program, two days of EM-31 continuous conductivity profiling will be completed. The EM-31 profiling will be used to evaluate the extent of conductive materials on-site as well as possible migration of conductive contamination.

It is also recommended that seismic refraction profiling be included in Phase I if feasible. The objective of the seismic refraction profiling is to define the depths to the glacial till layer which may be present and the depth to bedrock. It is recommended that one day of refraction profiling be allocated to obtain an approximately 1500 foot long profile along the railroad track.

Once the data from the geophysical survey has been evaluated and the apparent subsurface anomalies are identified, TRC will decide on the final locations for the test pits and other field sampling to be conducted in Task 2. This information will be summarized in the Task 1 report.

As a matter of protocol during all site investigations, TRC will perform an atmosphere survey using a lower explosive limit/oxygen deficiency meter and an OVA or HNu. Data from a site survey using this instrument will be used for pre-investigation site background ambient concentrations, for identifying

TABLE 2-1

SELECTION OF GEOPHYSICAL METHODS

GEORPHYSICAL METHOD	METHOD USES	METHOD LIMITATIONS	METHOD SELECTION
Seimic Refraction	To delineate zones of varying density, i.e., depth to dense till layer, bedrock.	Data collection is slow, not usefule in delineation of contaminants.	will not use - bedrock and till expected to be greater than 100 feet, are not prolific aquifers and do not require delineation.
Electrical Resistivity	To vertically and horizontally profile zones of varying conductivity, e.i., zones of different geologic conditions and/or zones of contamination (if conductive contaminants).	Data collection is slow, interference from industrial/ urban areas reduces reliability of data.	May use - if preliminary geophysical survey indicates conditions are favorable and other more cost-effective methods can not be used.
Ground Penetrating Radar	To vertically delineate sub-surface structures or zones of varying density.	Limited to maximum penetration of 25 feet - radar is "blinded" if near surface materials are highly conductive (clay, asphalt paving, concrete).	Will not use - much of site is covered by pavement or highly compacted soils - both highly conductive.
Terrain Conductivity	To verically and horizontally profile zones of varying con-ductiviity, i.e., zones of different geologic conditions and/or zones of contamination (if conductive contaminants).	EM-31 has fixed loop spacing and can not do vertical profiling. Interference from cultural areas may affect results.	Will use - EM-31 will be used to make preliminary reconnaissance. Em-34 may be used to make vertical profiles.

areas exhibiting vapor emissions from buried waste, and for defining the levels of protection required during the future borings program.

Among the logistical considerations to be reviewed during the reconnaissance are items such as:

- Site security during well drilling operations.
- TRC and subcontractor employee protection on-site during Tasks 2 and 3 operations.
- Obstructions to the movement of drill rigs while on-site.
- Visible site utilities. Local utilities will be contacted to locate buried onsite utilities.
- Drilling and washing fluids (including water used in borehole advancement, water from steam cleaning operations, and all water generated from decontamination of sampling equipment) generated during the site investigation will be allowed to percolate into the ground. A small quantity of acetone (less than one quart per day) if required during decontamination procedures, will be used over catch basins and allowed to evaporate in a secure area.
- Best method of shipping samples to the analytical laboratory.
- Names and phone numbers of key people who will need to be contacted during the drilling program.

2.1.4 Preliminary Land Use/Health Risk Assessment

Preliminary land use/health risk assessment data will be developed and evaluated as required to insure that the field sampling program will generate appropriate data for health risk assessment.

Land use data developed from aerial photographs and U.S.G.S. topographic maps will be used to estimate potential sensitive receptors within one mile of the Penn Yan site. Water supply data within this area will also be developed including information on current water use.

A preliminary health risk evaluation will be conducted to insure that all appropriate data will be developed in the field sampling program. This will include potential critical site contaminants and site data requirements to evaluate potential exposure pathways and receptors.

2.1.5 Prepare Task 1 Report

At the conclusion of Preliminary Site Evaluation, TRC will prepare a report summarizing the work undertaken, the methodologies used, results obtained, and recommendations for Task 2. The report will also include a site plot plan (1 inch = 50 feet) and a Field Sampling Plan (FSP) for Task 2. This report will be issued as a draft report for NYSEG review and comment, followed by a final version.

The Task 1 Report will contain the following key sections:

1.0 Introduction	Description of the purpose, scope, and objectives of the preliminary site evaluation.
2.0 Site History	Description of the history of operations at the site as obtained by research, interviews, and photography.
3.0 Site Setting	Discussion of geology, area water use, and land use based on available information.
4.0 Preliminary Site Data	Definition of the results of the reconnaissance survey including the results of the geophysical survey, initial air quality data, and available soil and water quality data.
5.0 Conclusions and Recommendations	Presentation of the preceding sections in a summary fashion. Specific recommendations and their method of implementation will be discussed in the field sampling plan.

Accompanying the Task 1 Report will be the plot plan which will illustrate the following:

- Topography
- Geophysical survey data
- Suspected plume location (if determined by the geophysical survey)
- Surface building and physical features
- Location of air quality assessment locations (see 2.1.2) and qualitative assessment of air contamination expected during Task II.

A preliminary assessment of the probable environmental and human health risks associated with the site will be completed as part of Task 1 and will be submitted under a separate cover. The assessment will assess the site in terms of potentially critical contaminants, exposure pathways and receptors, and a definition of data required to adequately conduct a final risk assessment.

The FSP will provide the methods by which Task 2 will be undertaken, including the specification and rationale for test pits, wells, air quality investigations, and other sampling locations. Table 2-2 is the preliminary table of contents of the proposed FSP to be developed for the Penn Yan site. Based on the results of Task 1, revisions to the current Task 2 field investigation will be made as appropriate.

2.2 Task 2 - Initial Test Pit Program/Well Installation/Sample Analysis

As detailed in the previous section, TRC will include an FSP for the site investigation at the Penn Yan site as part of the Task 1 documentation. This document will serve as a field reference for the locations of sampling points, the preservation procedures, field investigation specifications, and the types of field data necessary to complete the initial monitoring program.

The purpose of the initial monitoring program at the site is to help determine the following:

1. The presence of contaminatation on-site.
2. The approximate horizontal and vertical extent of the contamination.
3. General impacts of contaminants on ground water quality.
4. The routes of contaminant migration.
5. The extent to which on-site or off-site receptors may be exposed to contamination.
6. Potential public health and environmental impacts.

TABLE 2-2

PENN YAN COAL GASIFICATION PLANT - FIELD SAMPLING PLAN

TABLE OF CONTENTS

Task 2 will incorporate the eight subtasks which are described below.

2.2.1 Perform Borehole Drilling, Well Installation, and Test Pit Excavations

The following sections detail the proposed test pit excavations and borehole drilling and well installation activities.

2.2.1.1 Test Pits

A program of test pit investigations, soil borings and well installations will comprise the Task 2 field investigation program. Figure 2-1 illustrates preliminary locations for test pits and monitoring wells. These locations will be finalized after completion of Task 1. Approximately twenty (20) test pits will be excavated to the ground water level (approximately 10 to 15 feet below land surface). Based on TRC's experience at the Elmira and Geneva sites, this number will adequately sample a site the size and shape of the Penn Yan site. From a drawing furnished by NYSEG, a portion of a brick foundation or wall for a tank is located northwest of the old gas works building. Included in the 20 test pits, are four proposed test pits surrounding the structure. Although, this may seem like a large number, clustering of the test pits in areas of holders, purifiers, tar tanks, etc will result in requiring 20 (or more) during Task 2 activities. The use of test pits provides rapid identification of visible soil contamination, allows for screening of subsurface soils with an OVA/HNu for volatile organic emissions (thereby detecting non-visible contaminated soil for laboratory analysis), and allows a better definition of near surface geology to define potential pathways for contamination migration. At each test pit a soil sample will be collected for laboratory analysis for the parameters indicated on Table 2-3. Approximately one soil sample per test pit will be chemically analyzed.

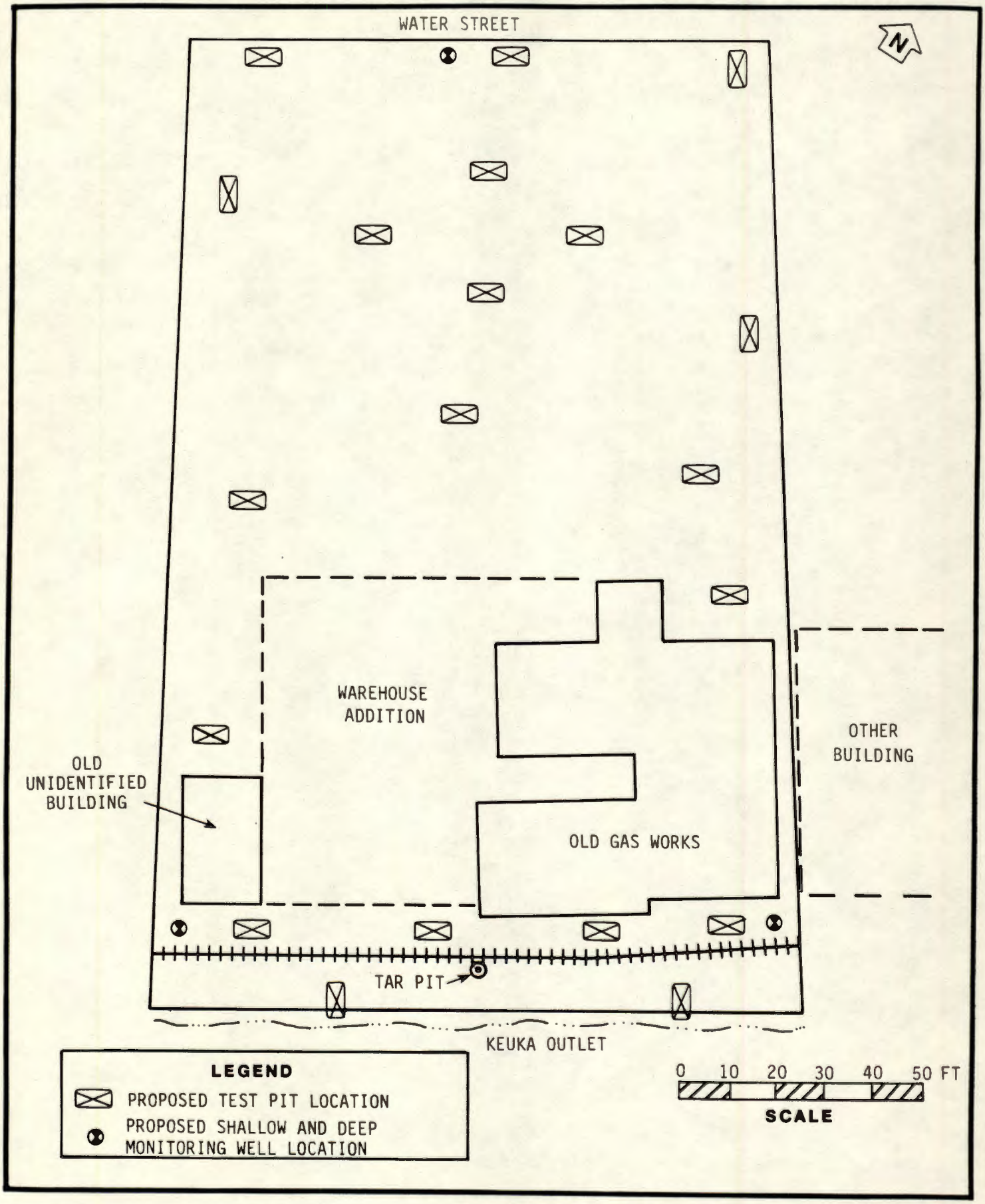

Figure 2-1. Proposed Test Pit and Monitoring Well Locations at Penn Yan Site.

TABLE 2-3

SOIL, GROUND WATER, AND SURFACE WATER SAMPLE ANALYSES

Methods for Groundwater/Surface Water Analysis

Parameter	Reference	Method No.[1]
Iron	EPA Water and Waste	200.0 (prep)
	EPA Water and Waste	236.1[2] (analysis)
Zinc	EPA Water and Waste	200.0 (prep)
	EPA Water and Waste	289.1[2] (analysis)
Ammonia (Organic Nitrogen)	EPA Water and Waste	351.3
Sulfate	EPA Water and Waste	375.2[3]
TOC	EPA Water and Waste	415.1
Total Cyanide	EPA Water and Waste	335.2
Ferro-ferric Cyanide	EPA Water and Waste	
Purgeable Aromatics	40 CFR Part 136	602
Phenols (non-chlorinated)	40 CFR Part 136	604
Polyaromatic Hydrocarbons	40 CFR Part 136	610

Methods for Soil/Sediment Samples

Parameter	Reference	Method No.[1]
Iron	EPA Water and Waste	236.1[4]
Zinc	EPA Water and Waste	289.1
Ammonia (Organic Nitrogen)	EPA Water and Waste	351.3
Sulfate	EPA Water and Waste	375.2[3]
Total Cyanide	Standard Methods, 16 ed.	412 B
Ferro-ferric Cyanide	Standard Methods, 16 ed.	412[5]
Purgeable Aromatics	40 CFR Part 136	602[6]
Phenols (non-chlorinated)	40 CFR Part 136	604[7]
Polyaromatic Hydrocarbons	40 CFR Part 136	610[8]

1 Methods referenced are approved by New York State. Methods noted in footnotes will be utilized as indicated, but are not, as yet, approved by the State.

2 Ground water samples analyzed as dissolved metals and surface water samples analyzed as total metals.

3 Samples will be generated using an EP Toxicity Leachate (use distilled water only with no pH adjustment).

4 Samples will be digested according to SW 846 Method 3050.

5 Samples will be generated with an alkaline leaching process as described on p. 330 of Standard Methods, 16th Edition.

6 Samples will be analyzed using head space techniques (see SW 846 Method 8020).

7 Samples will be extracted according to SW 846 Method 8040.

8 Samples will be extracted according to SW 846 Method 8100.

During the test pit excavation, the pit and excavated soils will be monitored for organic vapor emissions. Those soils exhibiting elevated volatile organic emissions will be collected in a sample jar for laboratory analysis.

In areas where test pits are "clustered" near potential contamination areas, the selected sample location will alternate from a shallow sample (0-1 foot depth) with an elevated OVA reading to a deeper sample just above ground water elevation. This process will provide information relative to the variation of contaminant concentrations with depth to assess 1) vertical contaminant migration and migration potential and 2) to provide risk data relative to direct contact with surface soils.

At test pit locations which are not "clustered," the sample collected for analysis will be the deepest sample exhibiting an organic emission. This will allow the assessment of the contaminant concentration at that depth. If the HNu or OVA readings are greater near the top of the soil column (near ground surface), the analysis of the deeper sample will indicate the concentration of contaminants after it has migrated a certain distance. Additionally, it will indicate the concentration of contaminants in the soil in the vicinity of the water table.

At test pit locations where no significant variation in organic emissions is noted, a composite soil sample will be analyzed.

Twenty soil samples have been assumed for analysis. At two different test pit locations on the site, significantly contaminated soil will be tested for priority pollutants, excluding pesticides, to identify potential site contaminants. These are important data relative to health risk if all constituents of concern are to be identified.

It should be noted that conducting test pit operations within the site area may prove to be difficult due to building access requirements by the present owner. Weekend work may be required in order to minimize disruptions.

2.2.1.2 Drilling and Well Installation

A total of six monitoring wells are proposed for the Task 2 field investigation. The wells will be located in three multi-depth clusters as site conditions allow. The multi-depth clusters will consist of drilling and installation of two wells at each location. The deep well will be installed in the deeper permeable geologic formation and the shallow well installed in the vicinity of the water table. One cluster will be upgradient and two downgradient of potential site contamination as site conditions allow (see Figure 2-1). The shallow wells are designed to detect any floating, immiscible compounds and any other soluble ground water contamination. The deep wells will be placed in a deeper permeable geologic formation to identify any migration pathway that could transmit contaminants to the Keuka Outlet.

Published geologic information available for the Penn Yan site indicates rock is greater than 120 feet below grade; consequently, no rock borings are proposed. Available stratigraphic information indicates the unconsolidated sediments are high transmissivity sands and gravels confined by silts and clays. The sands and gravels appear to be at a depth of 80-100 feet. The deep wells will be installed to monitor the water quality in the sands and gravels. The deep monitoring wells are assumed to be installed using spun casing to a depth of 90 feet for costing purposes.

The test pits and borings (completed as monitoring wells) will be performed by TRC's drilling subcontractor (Empire Soils Investigations, Inc.). A TRC geologist/ hydrogeologist will provide full-time supervision of the drilling, soil sampling, and well installation. TRC and the drilling contractor, will maintain separate logs for each hole.

Drilling and sampling will be performed by hollow stem auger with continuous split spoon sampling. Based on the regional geology, spun casing will be required to advance the boring for the deeper wells. All split spoon

soil samples collected during the well drilling will be screened with an HNu photoionizer or OVA and then retained. All samples will be described in detail noting the physical characteristics and the nature of any contaminants. The sampling spoon will be cleaned between samples to prevent cross-contamination as outlined below:

- Scrub with water and detergent (alconox),
- Scrub and rinse with tap water,
- Rinse with acetone (only if contaminants can not be easily removed with above scrub), and
- Rinse with distilled water.

Drilling tools will be steam cleaned between wells to prevent cross-contamination between borings. Throughout the drilling program, TRC will follow its Technical Standard T/S 974, Procedure for Logging Subsurface Conditions During Test Borings and Well Drilling. Strict adherence to the Health and Safety Plan will be exercised during all drilling and soil extraction work.

As mentioned previously, the six boreholes will be used to install 2 inch ID stainless steel cased wells. Each well will be cased with stainless steel casing with a 15 foot stainless steel screened section. The screened section for shallow wells will be positioned so that the water table will always be within the screened interval. This is important so as to be able to collect both the immiscible floating fraction and the dissolved fraction of the coal tar. Each well will be constructed according to the drilling specifications previously provided.

Once the wells are installed, TRC will monitor ground water levels daily while on-site and before each ground water sampling episode. These data will be used to generate a water table contour map. A description of TRC's

procedure to monitor ground water levels is found in Technical Standard 975, Field Procedures for Collection of Ground Water Samples at Hazardous Waste Sites. From the contour map it will be possible to determine ground water flow directions and hydraulic gradients in the water table aquifer along with potential plume definition when the water quality data is plotted on these maps.

Permeability data will be collected from each monitoring well using a constant head or a falling head test. Using the permeability data in conjunction with hydraulic gradients and other aquifer properties, TRC will conduct a hydraulic analysis on the site to determine direction of ground water flow and flow rates.

After the wells have been installed and before the permeability tests are run, well development will proceed to clean the silt from the well and allow good transmission of ground water through the sand pack annulus. Development will be performed by pumping and surging the well with a high capacity pump. At least one hour of development time is anticipated for each well. TRC may monitor the ground water conductivity during the development phase to determine when steady state conditions are reached.

It is not presently anticipated that the drilling activities will cause access problems for the present site owners.

2.2.2 Surveying

It is strongly recommended that the site base map be prepared prior to Task 1. Upon completion of the well installations, TRC will have its surveying contractor perform the necessary survey to locate the test pits (horizontally) and wells (horizontally and vertically) on the plot plan prepared during Task 1. The plot plan will show the property lines of the

Penn Yan site with all adjacent properties, including the northern portion of the Keuka Outlet. Property boundaries will be approximated from tax maps.

A detailed site map with a scale of 1 inch equals 50 feet and a contour interval of 2 feet will be prepared. All final survey maps will be sealed by a New York licensed professional land surveyor.

Mapping will be used to generate an accurate record of the location of all pertinent aspects of the Penn Yan site and adjacent areas. This will include but not be limited to:

- Approximate property boundaries and ownership
- Access roads
- Buildings and structures
- Location, elevation, and depth of all wells
- Surface water sampling locations
- Borings
- Disposal areas
- Geophysical survey grids and anomalies
- Water table
- Contaminated areas
- Key concentration data
- Rail and utility areas

2.2.3 Ground Water Sampling

Ground water from the six monitoring wells at the Penn Yan site will be sampled quarterly beginning at least one week after well installation is completed. The well upgradient of the contaminated area and the one most likely to contain the most contaminated ground water (shallow wells) will be analyzed for priority pollutants, excluding pesticides. For costing purposes, a quarterly sampling program has been assumed for all six monitoring wells for those parameters in Table 2-3. To maintain proper Quality Assurance/Quality Control (QA/QC), the required number of laboratory spilt samples will be collected and analyzed during the quarterly sampling periods.

TRC will perform the sampling of these wells following our quality assurance procedure T/S 975, Field Procedures for Collection of Ground Water

Samples at Hazardous Waste Sites. All required field forms are documented in the procedure. Once collected, pH and conductivity will be measured, and the samples taken for metals will be field filtered before preservation to remove suspended sediment that may interfere with determining true levels of dissolved metals. TRC's Technical Standard T/S 976, Filtering of Water Samples for Dissolved Metals Analysis will be followed. The determination of dissolved metal concentration in the local ground water is important in determining which metals are those most likely to be transported away from the site by regional flow.

All samples will be placed in laboratory prepared sample holding bottles and sent in iced containers to the analytical laboratories using TRC Technical Standard T/S 980, Shipping Procedures for Water and Soil Samples at Hazardous Waste Sites. Technical Standard T/S 958, Chain of Custody Procedures, will be used for all samples taken from the Penn Yan site.

2.2.4 Surface Water/Sediment Sampling

Ground water from the site is most probably discharging to the Keuka Outlet that parallels one site boundary. This discharge may present a pathway for constituents of concern to enter the environment. Therefore surface water and sediment sampling will take place along the outlet. Sample collection will occur from the most downstream sampling location towards the most upstream sampling location. At the locations of surface water sampling, a stream sediment sample (one sampling event) will also be collected for analysis. Surface water samples (3) and sediment samples (3) will be analyzed for parameters listed in Table 2-3.

Prior to stream sampling, the bank of the watercourse will be completely inspected to observe any visible contamination. Bottom sediments will be disturbed to check for coal tar globules. This inspection will determine the

location of the sampling points. Evidence of a leachate plume, evidence of stressed vegetation resulting from contamination, and/or staining of the stream banks will be used to aid in locating sampling points. Sampling will take place at least 24 hours after the stream survey to insure that all suspended sediment has been washed out.

Stream sampling will be performed quarterly on the same dates that the ground water samples are collected. All procedures will follow TRC Technical Standard T/S 972, Field Procedures for Collection of Surface Water and Sediment Samples at Hazardous Waste Sites. Using MA7CD/10 and MA7CD/30 low flow information and the water quality data collected during the field investigation, an evaluation of the applicability of the NYSDEC ambient water quality criteria (filing date July 3, 1985) or TOGS 84-W-38, as applicable, will be made.

2.2.5 Identify and Map Land Uses

The objective of this subtask will be to identify all potentially sensitive receptors within one-half mile of the site. To accomplish this, a reconnaissance survey will be carried out and receptor locations mapped on enlargements of 7.5 minute topographic quadrangle sheets or reproducible aerial photographs. Hospitals, nursing homes, schools, and recreation areas will be located.

These locations will be confirmed by field observations as well as visits of the town health department and planning agencies. At the time of the visit with these agencies, copies of town plans, zoning maps, and other relevant information will be obtained for use in Task 4 - Risk Assessment.

General information regarding topography, wetlands, vegetative cover, flood plains, and the occurrence of flood events will be derived from U.S.

Geological Survey topographic maps, HUD flood insurance maps, the U.S. Geological Survey, the U.S. Department of Agriculture, and the NYSDEC.

A description of the existing land ownership patterns for the area will be prepared based upon a review of the appropriate tax maps and field observations. From this information, adjacent land uses that could contribute to any ground or surface water contamination on the site will be identified and described.

2.2.6 Study Human Health Risk

The principal risk assessment activity for various contaminants occurs under Task 4 and is discussed in Section 2.4. This study will be undertaken if the preliminary site evaluation (Task 1) and other elements of Task 2, particularly the ground water, surface water and air sampling, indicate this to be a potential issue. The overall goal of this phase of the preliminary health risk analysis is to:

- Identify site contaminants associated with the coal gasification process.
- Identify the potential exposure routes and associated anticipated doses.
- Evaluate chemical toxicity and associated health risk.

In addition to considering human health effects, this task will address impacts to the aquatic and terrestial ecosystem.

2.2.7 Air Quality Sampling Program

TRC will undertake a program to determine the nature and extent of air contamination at the Penn Yan site. The objective of the investigation is to

characterize baseline air quality conditions on and in the vicinity of the site. The preliminary air monitoring sampling program is discussed as part of the site reconnaissance task (Section 2.1.2).

The air sampling proposed for the Penn Yan site is in a phased approach. Task 1 will allow for efficient and effective qualitative identification of the air contaminants that are present on or in the vicinity of the site. Task 2 will quantify these air contaminants during the soils investigation stage. These analyses will provide data to evaluate specific air quality impacts associated with remedial action alternatives and provide recommendations for measures to control any adverse air quality impacts.

The air quality sampling program will be designed to monitor gas phase organic contaminants. The sampling will include portable samplers and stationary monitoring to measure concentrations of gas phase organic contaminants at locations both on-site and off-site. During this sampling, TRC will provide a portable meteorological monitoring system to determine local meteorological conditions (define wind speed and direction, temperature, humidity etc). Real-time meteorological data will be measured continuously and will be utilized during the placement of the samplers to ensure that the potential sources are monitored. The design of the sampling network will be based on the previous sampling efforts and the preliminary site visit results as well as the adjacent land use for potential sources of organic contaminants. In addition, the present use of the site with respect to potential receptors will be considered in designing an air monitoring program.

The locations to be monitored by TRC include several locations for monitoring gas phase organic contaminants (upwind and downwind of sources on-site identified in Task 1), possible locations include existing buildings, one background site, and one collocated site. A collocated site involves concurrent sampling at one location utilizing two samplers operating

simultaneously in the same air/sensor interface. This is performed to confirm the quality of the sampling methodology.

The approach and methods for the air quality investigations will be the same and equivalent to those described in the following EPA compilations:

- "Standard Operating Procedures for Sampling Gaseous Organic Air Pollutants for Quantitative Analysis Using Solid Adsorbents" (EPA EMSL/RTP-SOR EMD-018)
- "Standard Operating Procedures for the GC/MS Determination of Volatile Organic Compounds Collected on Tenax" (EPA EMSL RTP-SOP-EMD-014)
- "Sampling and Analysis of Toxic Organics in the Atmosphere" (ASTM PCN 04-721000-19)

There are two types of ambient air monitoring utilized at inactive coal gasification sites. The first type involves the use of portable instrumentation that gives real-time results while the second involves the use of stationary sampling equipment to obtain longer duration or time averaged samples at set locations; samples are subsequently analyzed by laboratory instrumentation. The portable air samplers are used for screening sampling to develop a qualitative analysis or for a worker protection program. The stationary samples collecting time averaged samples are used to characterize and quantify the air quality impact from a site.

TRC proposes to use a portable air sampler for performing the screening analysis. Either the HNu photoionization gas analyzer, or the Century OVA (Organic Vapor Analyzer) will be utilized.

The stationary ambient air monitoring samples are used near the point of anticipated maximum contaminant concentrations and for background (upwind) areas. At least 6 samples will be taken on MSA dosimeters for analysis with GC to determine points of high concentration. The dosimeters (diffusion samplers) used for screening on-site will be chemically desorbed with carbon

disulfide and analyzed by using capillary gas chromatography equipped with a flame ionization detector (FID), a photoionization detector (PID), or an electron capture detector (ECD). The dosimeter consists of a charcoal based badge-like device (the MSA organic vapor dosimeter) which will absorb the organic contaminants.

Fifteen samples will be collected on Tenax tubes for analysis by gas chromatography or gas chromatography/mass spectrometry (GC/MS). A low flow portable pump will be used to draw ambient air through the solid absorbent.

TRC will utilize standard sampling and sample preparation/preservation procedures in performing the sampling. These procedures will include but not be limited to:

- pre-cleaning sampling sorbent,
- pre- and post-test calibration of sampling pumps,
- sealing, labeling, and storing the sample.

At the analytical laboratory (off-site), the sampling tubes will be thermally desorbed and qualitatively screened by using GC/MS. Qualitative identification will be made by a computerized library search that compares the sample compound mass spectrum to the 31,000 member National Bureau of Standards (NBS) special library. This qualitative analysis includes a semi-quantitative determination of the concentrations of up to 10 compounds that may be present on the sample collection media.

2.2.8 Task 2 Report

TRC will provide NYSEG with a draft report upon completion of the work elements in Task 2, including the review and validation of the analytical data from the soil and water samples collected at Penn Yan. Within one month following completion of the respective field investigations, copies of boring logs, permeability tests, and chemical analyses will be transmitted to NYSEG. The draft report will summarize the project through Task 1 and Task 2, providing NYSEG with the following in the form of appendices:

- Boring logs and well construction details
- Permeability data and calculations of ground water flow
- Geophysical data and findings presented in figures and logs
- Ground water contour map
- Site map
- Chemical analysis results
- Summaries of nature, migration potential, behavior, and location of waste materials found at the site

This will include data regarding chemical solubility, adsorption properties, partitioning coefficients, vapor pressure, etc., to evaluate various chemical mobility properties.

The report will provide a clear understanding based on both the historical review and the field investigation as to the conditions and potential problems associated with the previous coal gasification processes. Conclusions and recommendations for future study will be presented. These will serve as the basis for the expanded problem definition program, the information needed to provide a conceptual design and the preliminary risk assessment.

2.3 Task 3 - Expanded Problem Definition Program

Task 3 is identical to the Elmira and Geneva scopes of work. There is currently no basis for further modification of this task. However, it is anticipated that some changes will be made after completion of Task 2 activities.

2.3.1 Installation of Additional Wells and Exploratory Borings

The Task 2 report will include a number of recommendations for additional site samples in order to completely define the nature of coal tar contamination at the site. This work will be designed to define the full extent of contamination and migration routes to allow a comprehensive risk assessment and the development and evaluation of remedial measures.

It has been assumed that eight monitoring wells will be installed under Task 3. TRC has assumed the Task 3 program to be as outlined in the November 1984 specification for the Elmira Site (8 borings at 40 feet and 8 wells at 40 feet). It is recognized that, based on the results of Task 2, modifications to this program will be required. Additional test pits will be recommended if the full lateral extent of contamination is not defined in Task 2. Exploratory borings will be used to define the vertical extent of soil contamination. Using a portable organic vapor analyzer during the continuous sampling of exploratory borings, the extent of contamination can be defined. Soil quality analysis has not been included but may be required to define the extent of vertical contamination. Upon completion of an exploratory boring, TRC will grout each hole from the bottom.

During Task 3 TRC will provide the following to NYSEG:

- Full-time supervision of the boring and well installation contractor.
- Rock coring, where applicable, to determine any contamination of bed rock.
- Soil sampling where appropriate (continuous sampling is assumed).
- Permeability tests in all wells using the same methods as in Task 2.
- Surveying and location on the site maps of all additional borings and wells.

2.3.2 Sampling of the Additional Wells and Surface Water

After the additional eight monitoring wells have been installed, TRC will allow one month to pass before sampling. This will allow the ground water quality to return to steady state conditions. Sampling will be conducted according to the following TRC technical standards:

1. T/S 975 - Field Procedures for Collection of Ground Water Samples at Hazardous Waste Sites
2. T/S 976 - Filtering of Water Samples for Dissolved Metals Analysis

Other previously identified technical standards for shipping and chain of custody will also be utilized. These additional wells and the initial six wells will be sampled twice.

In addition to the ground water sampling, TRC will sample the same three surface water locations as sampled in Task 2 during the two additional ground water sampling episodes. All quality assurance procedures used in Task 2 will remain standard for Task 3.

2.3.3 Determine Organic Emission Rate

This task is included in the cost tables and is consistent with the Geneva work plan. If during the air quality sampling program (Task 2), significant organic emissions are detected, TRC will perform further air sampling and analysis to determine the emission rates from several locations on the site. TRC will use an emission isolation-type flux chamber to make direct measurement of the emissions. This type of system uses an enclosure device (flux chamber) to sample gaseous emissions from the surface of the site. Concentrations of total hydrocarbon are monitored continuously from the chamber outlet using a Century OVA. Samples are collected for subsequent gas

chromatographic (GC) analysis once a steady-state emission rate is obtained. Specific chemical species that could be encountered include benzene compounds, poly aromatic hydrocarbons (PAH), benzo(a) pyrene, naphthalene, etc.

2.3.4 Land Use Report

This subtask is slightly different from the Elmira proposal in that it specifically addresses the tasks in the NYSEG RFP. A description of the existing land use of the site and surrounding areas will be prepared. The land uses will be depicted on a map and discussed in sufficient detail to provide an understanding of the setting. The map will show the current development and use of the site, show the surrounding land uses within a one-half mile radius of the site, and identify all potentially sensitive land uses (e.g., schools, playgrounds, hospitals, nursing homes, recreation areas, etc.) within a one mile radius of the site.

The description will be qualitative in nature, but quantitative information will be provided as appropriate to support the qualitative description. The description will identify the on-site and adjacent uses including residential, commercial, industrial, transportation, agricultural, mineral extractive, and recreational and will provide a characterization of the type and use intensity such as residential type and density, transportation patterns, and types of industrial and commercial uses.

In addition to the developed land uses, the description will also include general information related to topography, wetlands, vegetative cover, the presence of a flood plain, and occurrence of flood events. Adjacent land uses that could contribute to any ground or surface water contamination on the site will also be identified and described.

A description of the existing land ownership patterns for the site and the adjacent areas will be prepared based upon a review of the appropriate tax maps. All contacts with local officials and agencies will be controlled by NYSEG in accordance with the guidance provided by TRC.

A description of the existing zoning of the site and surrounding areas will be prepared based upon a review of all applicable zoning ordinances and zoning maps.

2.3.5 Task 3 Report

Upon completion of the Task 3 sampling and analysis program, TRC will prepare a draft report which will include all project information, data, summaries, and conclusions and recommendations for Task 1 through Task 3 inclusive. The inclusion of the Task 3 data to Task 2 will provide a comprehensive description of the nature of coal tar contamination at the site.

2.4 Task 4 - Risk Assessment

This task is identical to the Elmira scope of services. TRC will conduct a health and environmental risk assessment which will include the subtasks described in the following sections.

2.4.1 Hazard Identification

This step sets the boundaries for further analysis. Particular chemicals or chemical classes are identified as present which (a) have the potential for health or environmental effects and (b) have the potential for migration resulting in human or ecological exposure.

2.4.2 Dose-Response Assessment

This step is not site specific and is largely accomplished through a review of the literature. In the simplest (and by far the most common) description, the relationship is characterized by a single number, the potency, which is the ratio of "response" to "dose". The human health assessment should consider at least carcinogenic and noncarcinogenic (toxic), teratogenic, and other reproductive effects.

2.4.3 Exposure Assessment

This is the principal point in the analysis where site specific features enter. Human and ecological exposure can be either before, during, or after remediation. Assessment during remediation should include the effects of construction activity such as emission of fugitive volatiles or dust.

2.4.4 Risk Characterization

In its most simple cases, risk characterization includes a comparison of exposures with accepted criteria or standards for protecting human health. For noncarcinogens when regulatory standards are absent, comparison may be made with "no observed effect levels" (NOELs). For environmental effects exposures can be compared with known exposure levels for acute and chronic toxicity to biota. Finally, for carcinogens and teratogens risk includes a careful description of the specific effect as well as estimates of probability for the nearby pollution and the most exposed and/or most vulnerable individuals. Risk characterization should also include uncertainty estimates and may include comparison with other common risks of living.

To illustrate TRC's proposed method of approach, described below are some specific classes of compounds and exposure patterns which may be of interest

for the Penn Yan site. These specifics are, of course, likely to be changed by the results of the site investigations and sampling program.

In Step 1 the compound or classes of compounds of interest are selected based on their presence and potential for harm. This is illustrated for coal gasification sites in Table 2-4 (USWAG 1984; Wilson and Stevens, 1981). Physical properties such as vapor pressure, solubility, octanol-water partition coefficient, etc., determine the media (air, water, soil, and biosphere) of greatest interest for different classes of compound, as illustrated in Table 2-5.

Figure 2-2 illustrates some exposure pathways that may be of interest at the Penn Yan site. The pathways shown connect different outdoor and indoor environmental compartments and culminate in the exposure mechanism leading to various body compartments: inhalation/lungs, ingestion/gut, dermal contact/ local or circulatory system. These pathways may now be matched with classes of compounds shown in Table 2-5. For example, inhalation pathways 1-4 would be of greatest interest for light aromatics, PAH's and phenolics. For the compounds of interest, potency values may be found from the literature. Estimating exposure can be accomplished through standard factors such as used by EPA as shown in Table 2-6. A dermal absorption factor is not shown as this varies greatly with chemical as well as exposure location on the body.

Using these standard factors and potency estimates, risk, or lack thereof, will be determined for the following:

- the average individual in the population near each site
- the most exposed individuals
- any sensitive sub-populations
- aquatic or terrestrial ecologies.

TABLE 2-4

COAL GAS COMPOUNDS PRESENTING DIFFERENT TYPES OF HAZARD

Carcinogens	Acute and/or Chronic Toxicity	Ecosystem Damage
• PAH	• Phenolics	• Phenolics
• Light Aromatics (Benzene)	• Light Aromatics	• PAH
• Trace Metals	• Cyanides	• Light Aromatics
	• Inorganic Sulfur	• Inorganic Sulfur
	• Trace Metals	

TABLE 2-5

ENVIRONMENTAL MEDIA OF MOST CONCERN FOR COAL GAS COMPOUNDS

Air	Water	Soil	Biota
• Light Aromatics	• Phenolics	• PAH	• PAH
• Spent Oxides (Sulfur Compounds including H_2S)	• Spent Oxides (Cyanides and Sulfur Compounds)	• Trace Metals • Spent Oxides	
• Phenolics	• Trace Metals	• Tars	

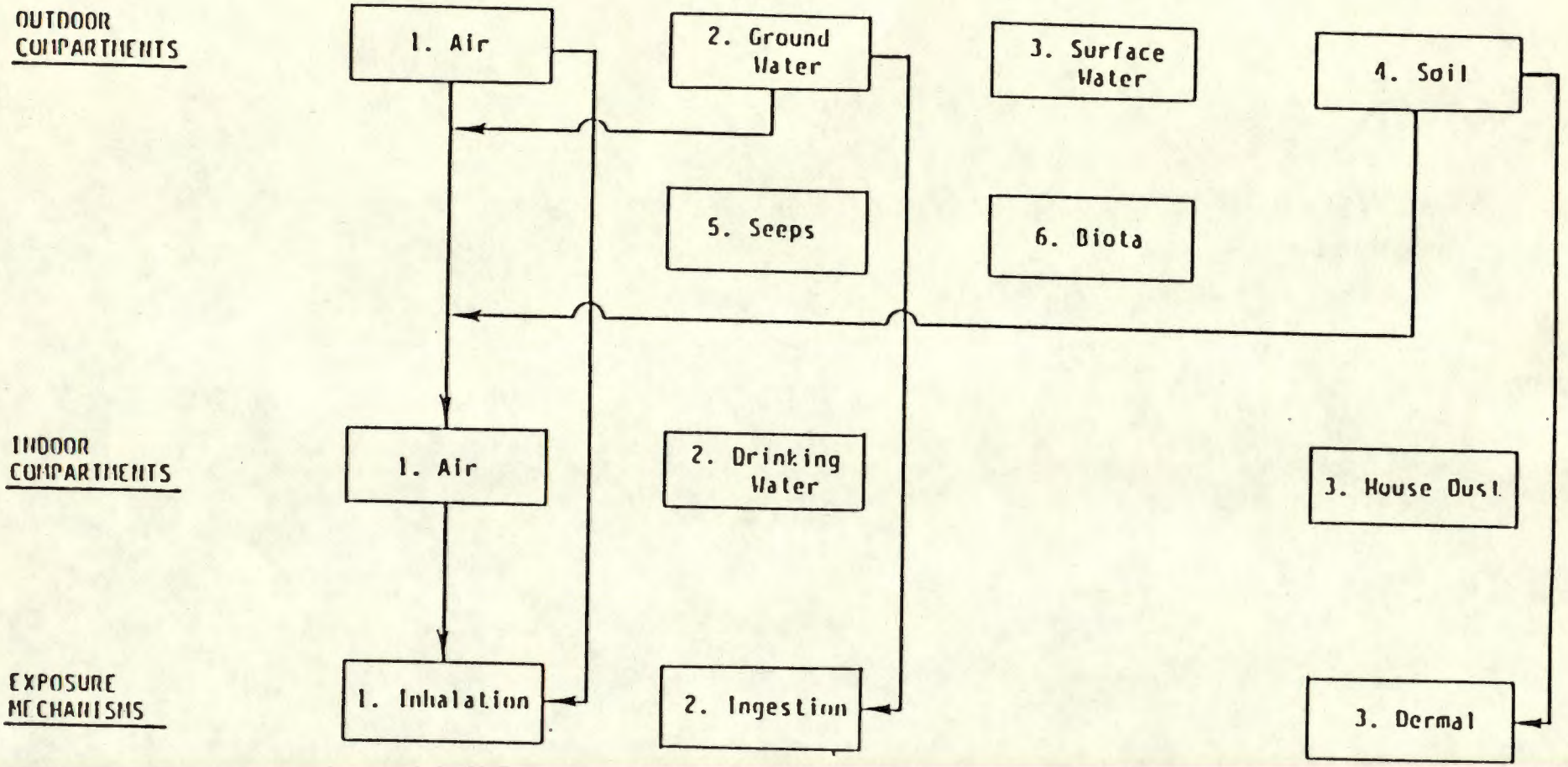

Figure 2-2

Potential Exposure Pathways

TABLE 2-6

STANDARD FACTORS USED BY EPA

Adult Weight	65 kg
Exposed Skin (Summer Clothing)	0.3 M^2
Water Consumption	2 liters/day
Volume of Air Breathed	23 liters/day
Fish Consumption	6-5 gm/day

The purpose of the Risk Assessment task is either to: (a) document that mitigation measures are unwarrented or (b) serve as an input to the choice of appropriate remedial measures. To this end, risk assessment may be carried out for any of the following scenarios:

- Present Situation
- No Action - Future Situation
- During Construction/Remediation
- Post Construction

The results of the Risk Assessment will be furnished as a Draft Report for NYSEG's review and as a Final Report following incorporation of comments.

2.5 Task 5 - Conceptual Design

This task is identical to the Elmira scope of work except for site specific modifications pertaining to the Penn Yan site.

2.5.1 Response Objectives and Criteria

Upon authorization from NYSEG, identification and evaluation of remedial alternatives will be undertaken.

TRC will establish remedial alternative objectives based on the following:

- Levels of lateral and vertical contamination in the soil
- Levels of lateral and vertical contamination in the ground water
- Levels of air contamination
- Levels of surface water contamination
- Rate of contaminant migration
- Health risk assessment

2.5.2 Identification of Remedial Alternatives

This involves the establishment of remedial responses to meet objectives, the identification of appropriate remedial technologies, and incorporation of objectives and technologies into site specific remedial alternatives. An important aspect will be to identify site specific conditions and the chemical contaminants which may limit or promote the effectiveness or feasibility of remedial technologies. Table 2-7 summarizes site and waste characteristics which will be evaluated for the site as part of the remedial alternative identification.

Important data which will directly affect the feasibility of various remedial alternatives, that will be provided from Task 3, will include:

- Location and volume of waste and contaminated soil (if any) and its geologic setting (e.g., it is situated above or below the ground water table).
- The horizontal and vertical limits of ground water contaminant plumes (if any) relative to the site boundaries and the rate of migration.
- The identified soil, ground water, or surface water contaminants and concentrations relative to regulatory standards, health risk, environmental mobility, and treatability.
- Aquifer hydrogeologic properties relative to the feasibility of plume containment via pumping and ground water gradient controls via pumping or drains.
- Geologic data regarding any impermeable horizontal confining layer relative to vertical encapsulation techniques.

Based on TRC's initial review of the information for the Penn Yan site, the following is a discussion of tentative alternative remedial measures which may be evaluated. Additional data developed during field investigations will result in modification/expansion of these alternatives.

TABLE 2-7

SITE AND WASTE CHARACTERISTICS WHICH WILL BE EVALUATED
DURING REMEDIAL ALTERNATIVE IDENTIFICATION

Site Characteristics

- Site volume, area
- Site geologic/hydrologic conditions
- Climatologic data
- Aquifer properties
- Site configuration, drainage, vegetation
- Degree of contamination

Waste Characteristics

- Waste quantity and composition
- Safe concentrations
- Toxicity, persistence, ignitability
- Compatibility with other chemicals
- Volatility, solubility, and density
- Treatability

2.5.2.1 Contaminant Removal and Disposal

This remedial alternative consists of excavation of contaminated soils and waste products. Feasible disposal options include transportation to a secure licensed landfill, incineration, and recycling/reuse. Landfilling excavated waste material at a developed on-site secure landfill, although possible, may not be practical for the Penn Yan site based on the current site usage, space limitations, and regulatory requirements.

This remedial alternative typically is high in cost. It is most applicable for small to moderate volumes of well identified waste product or contaminated soil. The advantage of the technique is that it removes the source of contamination from the site thereby minimizing future potential environmental and/or legal liabilities.

2.5.2.2 Surface Controls

This remedial alternative consists of constructing a surface seal/cap over identified areas of contaminated soil or waste material. Surface sealing/capping in association with site grading and revegetation accomplishes the following:

- Reduces infiltration and corresponding leachate production.
- Promotes surface water runoff/minimizes run on, thereby further reducing infiltration.
- Reduces air emissions.
- Eliminates direct contact exposure.

The advantages of capping/sealing include low relative cost, ease of implementation, and reduction of ground water contamination. Potential disadvantages include long term liability considerations (because contamination is not removed or treated) and the pre-empted land use impacts required to maintain the seal or cap's integrity.

From a technical standpoint, sealing/capping is most appropriate where the contaminated soil/waste is located above the ground water table and leachate production is limited to periods of rainfall infiltration.

2.5.2.3 Vertical Encapsulation

Impermeable vertical barriers may be used to isolate wastes and contaminated soil and ground water to prevent contaminated ground water from leaving the site and to direct ground water flow around the waste/contaminated soil thereby preventing contamination. Slurry walls are the technology that is most suitable in sand and gravel formations as opposed to grout curtains (effective in porous bedrock).

Soil classification and sampling will be conducted during the Task 2 and 3 boring programs to determine if any impermeable confining layers are present. Although slurry walls have been installed to depths of over 150 feet, installation of walls over 75 feet are difficult technically.

2.5.2.4 Ground Water Contamination Controls

The proposed detailed field investigations will fully define the extent of ground water contamination (if any) at the site. The following ground water contamination controls will be evaluated if ground water contamination exists and is determined to be a health risk.

2.5.2.4.1 Ground Water Table Depression - Based on TRC's experience at sites with similar potential waste characteristics, conditions in which waste product and contaminated soils are located below the water table result in increased ground water contamination versus a dry hydrogeologic setting. Therefore, a remedial alternative in which the waste and/or contaminated soil was located below the water table would be to artificially manipulate and

lower the ground water level to below the waste material. Ground water then would not come in contact with the waste or contaminated soil, and leachate production would be minimized. This remedial technology is typically used in conjunction with site capping/sealing to further reduce leachate production.

The ground water table at the site appears to be in the order of 10 to 12 feet below grade. Remedial technologies to be evaluated to assess technical feasibility will include pumping wells and collection drains.

2.5.2.4.2 Plume Containment/Ground Water Treatment - This alternative intercepts contaminated ground water followed by treatment and discharge to the aquifer or surface water. As a sub-alternative the contaminated ground water could be discharged to nearby sanitary sewer lines and treated at the municipal treatment facilities.

Plume containment systems to be evaluated will include 1) well point systems (suction lifts less than 20 feet), 2) pumping wells, or 3) collection trench drains to direct contaminated ground water to a storage tank.

The design of a well point or pumping well plume containment system (or ground water depression system) if determined feasible would require aquifer pumping tests to determine technical feasibility.

Similarly, if ground water treatment were determined to be a potential feasible alternative, treatability testing would be required for design. Granular Activated Treatment systems are capable of providing adequate treatment for PAH compounds. Similar testing would be required to determine water compatibility and treatability if a discharge to a municipal wastewater treatment plant were proposed. Hydraulic capabilities would also require evaluation. (Costs for these tests are not provided.)

2.5.2.5 Biodegradation

Biodegradation of coal tar wastes and contaminated soils, although currently in the development stage, has potential as a remedial alternative. Biological treatment of creosote and pentachlorophenol contaminated soils has been partially successful at a wood treating facility in Maryland. This method of biodegradation mixed coal tar contaminated wastes and soils with sewage treatment plant sludge to accelerate biological degradation. In-situ treatment of PAH compounds by enhanced biodegradation techniques (addition of nutrients and oxygen) has not been overly successful to date. The feasibility of biodegradation will be evaluated.

Other alternatives such as incineration of contaminants and product recovery will be evaluated if determined cost-effective and technically feasible.

2.5.2.6 No Action

If waste contamination is not identified at the site or is minimal and there is no potential threat to human health, no action may be appropriate. Site security and long-term monitoring may be part of a no action plan. The no action alternative will be evaluated for comparative purposes at the site.

2.5.3 Evaluation Criteria

In performing the assessment of the identified alternatives, twelve criteria are proposed. These are subject to modification based on input from NYSEG. A numerical value will be assigned for each criteria in order to rank remedial alternatives at each site. The following is a listing of the criteria proposed followed by a description:

- Capital construction cost
- Operation and maintenance cost
- Technical performance

- Technical reliability
- Level of cleanup/problem resolution
- Implementation/construction
- Time to achieve remediation
- Worker health and safety during construction
- Short-term environmental impacts
- Long-term environmental and public health impacts
- Land use impacts
- Regulatory issues

2.5.3.1 Costs

Capital and operation costs will be developed for each feasible remedial alternative. Costs will be based on past TRC cost estimating experience for remedial design, published estimating guides, NYSEG input, and estimates from contractors.

Capital costs will include the following:

- Costs of land acquisition or obtaining permanent easements
- Land and site development costs
- Costs of buildings and services
- Equipment costs
- Replacement costs
- Engineering expenses
- Construction expenses
- Legal fees and license and permit costs
- Contingency allowances
- Startup costs
- Costs of anticipated health and safety requirements during construction

Care will be taken to ensure that all applicable cost components are considered in the capital cost estimate.

Operation and maintenance costs will include the following where applicable:

- Operating labor costs
- Maintenance materials and labor costs
- Costs of auxiliary materials and energy
- Purchased service costs
- Disposal costs
- Administrative costs

Present worth analysis will be conducted for each alternative. Sensitivity analysis will be conducted to assess capital and operation and maintenance cost uncertainties in addition to interest rate uncertainties. This will determine potential impacts on alternative ranking. Costs will be presented in tabular form.

2.5.3.2 Technical Performance

This includes evaluation of the effectiveness and useful life of remedial alternatives. The remedial alternative is evaluated in terms of its ability to perform the desired function. The applicability of the alternative to site conditions is evaluated as it relates to its technical performance. Useful life considers the service life of the alternative until replacement is required.

2.5.3.3 Technical Reliability

This considers operation and maintenance requirements and previously demonstrated reliability of the alternative. Past documented performance of the technology for similar site conditions is evaluated. The technical and operational complexities of the alternative are considered as related to functional reliability. Where further studies or bench-scale/pilot plant studies would be required to demonstrate the performance of an alternative, these are so noted.

2.5.3.4 Level of Cleanup

This considers the degree of cleanup achieved by the remedial action. The most complete remediation technology is the most highly desired. An assessment is made relative to the completeness of cleanup.

2.5.3.5 Implementation/Construction

This considers the ability to construct a remedial alternative based on site-specific constraints such as depth to bedrock, site access, existing land use, waste characteristics, and water table elevations. Construction problems that may ultimately impact site remediation objectives are identified.

2.5.3.6 Time to Achieve Remediation

The time to construct/implement the remedial alternative is estimated. Also considered is the time required from start-up of the remedial alternative until desired remedial response objectives are achieved.

2.5.3.7 Worker Health and Safety During Construction

This considers the safety of workers and nearby neighborhoods or other potential receptors during construction of the remedial alternatives. Air quality impacts due to emissions during site remediation are evaluated relative to workers and area residents. Direct contact exposure to workers is also considered. Estimated levels of personnel protection are provided for each alternative.

2.5.3.8 Short-Term Environmental Impacts

Short-term environmental impacts which may be associated with site remedial construction include:

- Potential increase in air emissions during site/waste excavation and disposal.
- Potential release of contaminants to surface waters or ground water during excavation.
- Potential adverse impacts due to site construction and associated sediment migration.

2.5.3.9 Long-Term Environmental Impacts

This evaluation considers the effectiveness of the alternative in addressing the site response objectives relative to environmental and public health remediation.

2.5.3.10 Land Use

This considers the potential use of the site for development after site remediation.

2.5.3.11 Regulatory

The degree to which site remediation alternatives comply with applicable regulatory requirements is evaluated. This includes, for example, CERCLA, RCRA, the Clean Water Act, and the Clean Air Act. All required permits associated with site remediation would be identified.

2.5.4 Recommendation of Selected Alternative

TRC will recommend the alternative determined to be most cost-effective and environmentally sound resulting from the above evaluation and ranking matrix procedure. The rationale for recommending the selected alternative will be developed, indicating the advantages over the other alternatives considered. The selection that results from the above analysis will be the lowest cost alternative that is technically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health and welfare and the environment. Schematic diagrams of the evaluated alternatives will be provided.

2.5.5 Graphic Plans of Selected Alternative

TRC will prepare a graphic illustration of the selected remedial alternative. The plans and final report of the selected alternative will include:

- selected engineering approach in detail
- design and construction schedule
- applicable design criteria and performance expectations
- preliminary site layouts
- operation and maintenance requirements
- budget cost estimates including operation and maintenance costs
- safety plan (impacts on cost)
- additional design information (if required)
- long term monitoring requirements.

2.6 Analytical Program

The analysis of water and air samples from the Penn Yan site investigation will be performed by NYSEG's analytical laboratory located in Binghamton, N.Y. For QA/QC purposes, duplicate samples will be analyzed by TRC's laboratory in East Hartford, CT. TRC will use CompuChem Laboratories of Research Triangle Park, North Carolina for those analyses requiring mass spectrometer instrumentation and for confirmatory analyses of split samples. TRC will analyze one duplicate sample out of every ten samples taken with a minimum of one duplicate sample for each sample medium (i.e., groundwater, surface water and test pits). Once the NYSEG lab assumes full responsibility for laboratory analyses, the role of the TRC lab will become QA/QC oriented. This will result in a decrease in laboratory costs for TRC's laboratory and will be realized by NYSEG.

Refer to Table 2-8 for the analytical methodologies with limits of detection for the analysis of water samples taken throughout this project.

TABLE 2-8

ANALYTICAL TECHNIQUES AND LIMITS OF DETECTION

Parameter	Analytical Technique	Limit of Detection
Volatile Organics	Method 624	10 (ppb) except for acrolein and acrylonitrile at 100 ppb
Acid Extractable Organics	Method 625	25 ppb except for 4,6-dinitro-o-cresol and 2,4-dinitrophenol at 250 ppb
Base-Neutral Extractable Organics	Method 625	10 ppb(1)
PCBs	Method 608	10 ppb
Cyanides	Method 335.3	0.01 ppm
Phenols	Method 420.2	0.02 ppm
Metals	Flameless AAS Technique*	0.05 ppm
Method 602 Aromatics	Method 602	10 ppb
Method 610 Poly Aromatic Hydrocarbons	Method 610	10 ppb

(1) Except for benzo(ghi)perylene, dibenzo(ah)anthracene, and indeno(1,2,3-CD)pyrene at 25 ppb.

*USEPA, Analysis of Water and Waste Water (1974, 1979).

2.7 References

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Wilson, D.C., and C. Stevens, "Problems Arising from the Redevelopment of Gas Works and Similar Sites," Report No. AERE-R 10366, AERE Harwell, Environmental and Medical Sciences Division, Oxfordshire, England, November 1981.

3.0 DELIVERABLES

Due to the extended time frame and number of deliverables anticipated on this project, we have outlined below a listing of those which TRC will provide NYSEG during the investigation at the Penn Yan site:

Technical Reports	Deliverable Schedule
1. Health and Safety Plan (HASP) & Field Sampling Plan	9/1/86
2. Task 1 Draft Report with plot plan and field work plan	9/1/86
3. Task 1 Final Report*	10/15/86
4. Task 2 Boring Logs and Permeability Test Results (once)	11/1/86
5. Task 2 Chemical Analysis Results of Water Quality in the 6 monitoring wells and the 3 surface water samples (quarterly)	12/1/86, 3/1/87, 6/1/87, & 9/1/87
6. Task 1 and 2 Draft Reports	10/1/87
7. Tasks 1 and 2 Final Reports*	11/15/87
8. Task 3 Boring Logs and Permeability Test Results (once)	12/15/87
9. Task 3 Chemical Analysis Results of Water Quality in the monitoring wells and the surface water samples (twice)	2/1/88, 5/1/88
10. Tasks 1 through 3 Draft Reports	6/1/88
11. Tasks 1 through 3 Final Reports*	7/15/88
12. Task 4 Draft Report	6/1/88
13. Task 4 Final Report*	7/15/88
14. Task 5 Draft Report	7/1/88
15. Task 5 Final Report*	9/1/88

* Assumes one month for NYSEG Review.

Management Reports and Meetings

1. Monthly Progress Reports (25 total)

2. Progress Meetings:
   - 4 in Binghamton
   - 4 at the Penn Yan site
   - 4 at TRC, East Hartford

3. Meetings with government agencies:
   - 4 in the Penn Yan area

4.0 PROJECT SCHEDULE

TRC has designed a project schedule which follows that outlined in Section 9 of the Request for Proposal. Figure 4-1 presents the overall schedule which will take 25 months to complete.

Task 1 will commence within the first week of authorization to proceed from NYSEG (July 7, 1986 assumed).

Task 2, the initial sampling and boring program, will begin in September, 1986 with the final sampling round continuing into September, 1987.

Task 3 will start in September 1987 and be completed in May, 1988. Task 4 and Task 5 will start in May and June 1988 respectively, with the project being completed by July 1988.

TABLE 4-1

NYSEG PROJECT SCHEDULE
PENN YAN SITE

TASKS	1986						1987												1988											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PROJECT START	*																													
TASK 1 - START	*																													
Preliminary Site Visit	#																													
Site Reconnaissance	#																													
Mapping		#																												
Task 1 report		##D																												
TASK 2 - START			*																											
Site Setup			#																											
Task 2 Field Work			###																											
Assess Risk						####																								
Quarterly Well Sampling				#			#			#			#																	
Quarterly Analysis				#			#			#			#																	
Task 2 Report													#####	###D																
TASK 3 - START														*																
Site Setup														#																
Task 3 Field Work														###		#														
Analysis																			#####			#####								
Task 3 Report																						##D								
TASK 4 - START																			*											
Task 4 Report																			##D											
TASK 5 - CONCEPTUAL DESIGN																			*											
Tasks 1-5 Report																			##D											

EXPLANATION:
* TASK INITIATION
# PERIOD OF WORK PERFORMANCE
D DELIVERABLE