Report for the

PRIORITIZATION OF FORMER

MANUFACTURED GAS PLANT SITES

BINGHAMTON - COURT STREET, N.Y.

Submitted To:

NEW YORK STATE ELECTRIC & GAS COMPANY
4500 VESTAL PARKWAY EAST
P.O. BOX 3607
BINGHAMTON, N.Y. 13902-3607

Prepared by:

STATE OF NEW YORK
WILLIAM GARY CHRISTOPHER
61930
LICENSED PROFESSIONAL ENGINEER

ENGINEERING-SCIENCE, INC.
290 Elwood Davis Road
Suite 312
Liverpool, New York 13088

Prepared by: George H. Moreau
George H. Moreau

Reviewed by: Susan K. Fullerton, P.E.
Susan K. Fullerton

Reviewed by: Charles A. Spiers
Charlie A. Spiers

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FACT SHEET

BINGHAMTOM - COURT STREET MGP SITE

NYSEG Contacts

Corporate: James C. Hylind, NYSEG, 4500 Vestal Parkway East, P.O. Box 3607, Binghamton, N.Y. 13902-3607. Phone: (607) 729-2551.

Local: Dennis R. Urgento Binghamton Division Manager, NYSEG, 4425 Old Vestal Road, Binghamton, NY 13903. Phone: (607) 729-2574.

Location

The Binghamton-Court Street site is located on the northeast corner of the intersection of Court Street and Brandywine Ave. It is bordered by Court Street and the Susquehanna River on the south, Brandywine Avenue on the west, the Delaware Lackawanna and Western Railroad on the north, and the Columbia Transmission property on the east.

Site Owner

Current site owners are New York State Electric and Gas and Patricia Merwin and Phyllis Raterink.

Site Description

The site consists of an unpaved lot surrounded by restrictive fencing. It is approximately six acres in size and is accessible from Court Street.

Site History and Background

During the period 1888 to about 1952, the site was occupied by a manufactured gas plant, and after 1952 a natural gas processing plant, both owned and operated by Columbia Gas of New York and its predecessors. Residue disposal practices for the MGP are not well documented, however some residues are known to have been removed from the site during the demolition of the #4 gas holder in 1969. Documentation is not available for residue disposal from the other holders on-site.

Years of Operation

The site operated as a manufactured gas plant from 1888 to about 1952, when it was converted completely to natural gas distribution.

Processes Used

Water gas production from 1888 to the 1930's; carburetted water gas from the 1930's until after the 1940's when the process was converted to oil gas. Gas manufacturing reportedly ceased in 1952.

Land Use History

Following MGP operations, the site was cleared of most MGP structures and now consists of a fenced, unpaved lot used for gas pipe storage, employee parking and temporary storage of excavated earth materials and asphalt.

Findings

Low levels of polycyclic aromatic hydrocarbons (PAHs) were detected in several of the surface soil samples on-site. Volatile organic compounds and PAHs were detected in a sediment sample from the Susquehanna River, south of the site. An infrared fingerprint analysis indicates the sample contained a mixture of carburetted water gas tar and heavy coal tar hydrocarbons. Based on the surface soil and sediment contamination, and the proximity of the site to the Binghamton municipal water supply intakes located on the south side of the Susquehanna River across from the site, additional investigation at this site is warranted.

EXECUTIVE SUMMARY

INTRODUCTION

NYSEG wishes to take a responsible approach in addressing potential threats associated with past MGP operations. For this reason, NYSEG has undertaken a site evaluation and prioritization program to identify and rank current threats posed by former MGP sites. This program involved data compilation, field sampling to characterize and quantify surficial direct exposure pathways on-site, and inspection at the sites, followed by application of a site ranking model developed by the Electric Power Research Institute (EPRI). This computer-based ranking system provides a quantitative measure of the current risks posed by the site and a relative ranking of the need for further detailed evaluation or remediation at the site.

The scope of work was developed to meet the following objectives:

- Determine if there is any imminent threat to human health or environment.
- Establish a relative ranking of former MGP sites.

This report presents the results for the Binghamton-Court Street MGP site (NYSEG Code CGBS). The site is located at the intersection of Court Street and Brandywine Ave. in the City of Binghamton, NY. The site is currently owned by NYSEG, Phyllis Raterink and Patricia Merwin and consists of a fenced, unpaved lot. MGP operations occurred on-site from approximately 1888 to 1952.

INVESTIGATION RESULTS

ES collected four surface water samples, three sediment samples and seven surface soil samples, including two field duplicate samples. All samples were analyzed for chemicals associated with former MGP sites such as volatile and semivolatile organic compounds, metals and cyanide.

Surface Water Results

Three surface water samples were collected from the Susquehanna River downstream (SW-3), adjacent to the site (SW-2), and upstream (SW-1). A field duplicate, designated SW-4, was collected at the same location as SW-3 to measure the representativeness of the sampling methods.

Volatile and semivolatile organic compounds were not detected in the surface water samples. Five metals and cyanide were detected in the surface water samples. The five metals are aluminum, iron, lead, manganese, and zinc. With the exception of zinc, the upstream (SW-1) concentrations were up to an order of magnitude higher than the downstream concentrations.

The concentrations of aluminum and iron for all sample locations exceeded the applicable Class A (drinking water) standards, however the concentrations were highest in the upstream sample (SW-1). Class A standards for other metals were not exceeded in the downstream samples. A low concentration of cyanide was detected in SW-2, at a concentration below the Class A standard.

These results show no impact on surface water quality in the Susquehanna River attributable to the site. The generally good agreement between the results for SW-3 and the duplicate SW-4 suggest the sampling methods yielded representative samples.

Sediment Results

Three sediment samples were collected at the same locations as the surface water samples. Two volatile organic compounds, ethylbenzene (98 ppm) and total xylenes (48 ppm) were detected in SED-2. Ten PAHs including two carcinogenic PAH compounds (CPAHs) were also detected in SED-2, at individual compound concentrations ranging from 120 ppm to 980 ppm. The total concentration of PAHs in SED-2 is 4230 ppm and of CPAHs is 250 ppm. The types and concentrations of volatile and semivolatile organic compounds is consistent with observations of an oily substance which was released from the sediment during sampling of SED-2.

Because of the historically industrial land use in the area, and the presence of other volatile and semivolatile sources upstream in the Susquehanna River, it is difficult to definitively determine the source of contamination at SED-2. The analytical results indicated that the sample did not contain significant amounts of natural petroleum components and did not exhibit the characteristic "fingerprint" that is normally observed in petroleum products.

A second "fingerprinting" technique was performed using infrared (IR) methods, in an attempt to identify whether the material is related to coal tar residue. Those results indicate the material is consistent with carburetted water gas tar and heavy coal tar hydrocarbons.

The other sediment samples, SED-1 and SED-3, contained only low levels of di-n-butylphthalate, a common laboratory contaminant, and pyrene in SED-1 at 0.33 ppm.

Nine metals were detected in the sediment samples; the concentrations for all were well within the referenced naturally-occurring ranges. Cyanide was not present above the detection limit in any of the sediment samples.

Surface Soil Results

Six surface soil samples were collected at the former MGP site in suspected source areas such as the former holder and tank locations. A field duplicate sample was collected at SS-3 and designated SS-7. A background sample was collected from the west side of Brandywine Avenue and designated SS-6.

Volatile organic compounds were not detected in any surface soil samples. Semivolatile organic compounds were detected in all surface soil samples, but only three samples contained PAHs or CPAHs. Although there are other sources of PAHs and CPAHs in this industrial setting, their presence is considered an indicator of MGP residues because the background sample did not contain PAHs or CPAHs.

Although the PAHs and CPAHs pose a direct contact threat, the concentrations are low and the site is fenced off and not likely to be accessed by small children or other persons.

Eleven metals and cyanide were detected in one or more surface soil samples. The concentrations of all metals were well within the referenced naturally-occurring ranges. Total cyanide was present above the detection limit only in SS-1 (at 11 ppm); it was not detected in the amendable form, however (Table 4.3).

SSPS RANKING

The SSPS ranking scores for the Binghamton-Court Street site are as follows:

	Actual Risk	Perceived Risk	Clean-Up
Primary Scores:	6.4	13.1	12.0
Secondary Site Scores			
Groundwater:	0.0	0.0	
Surface Water:	3.3	29.8	
Direct Contact:	9.9	13.1	
Air:	7.3	9.7	

These scores are considered preliminary since many assumptions were made, and default values were used, in scoring the site. For instance, the groundwater score is not based on site-specific data, but rather on statistical data derived from many former MGP sites. The SSPS groundwater scores for the Binghamton-Court Street site are low because there are no municipal water supply wells within five kilometers downgradient of the site, which is a principal criterion for the SSPS scoring. Despite the low SSPS groundwater scores, it is noteworthy that the site is situated over a significant aquifer which is used regionally as a drinking water source. To properly evaluate the Binghamton-Court Street SSPS scores, they must be compared to other sites similarly scored using the same general assumptions and default values.

CONCLUSIONS AND RECOMMENDATIONS

The most significant finding from the data collected from this site is the presence of oily residue in the sediments of the Susquehanna River. Although the source of the residue cannot be definitively determined, the fingerprint analysis indicates the residue is consistent with a carburetted water gas coal tar. The presence of contaminated sediments is significant because the municipal water supply for Binghamton includes surface water intakes within 600 feet of this site. However, it is important to note that the surface water data indicate the site is not impacting water quality in the Susquehanna River.

The principal concern for this site is the fact that it is situated within a sensitive environmental location, that is, near a Class A surface water body and within 600 feet of the surface water intakes for the municipal water supply system. Although there is no evidence to conclusively show that the site has adversely impacted the river or the municipal water supply, any evidence of contamination on-site must be carefully evaluated with respect to its nature, extent and possible migration pathways. For this reason, additional investigation of the Binghamton-Court Street site is warranted to ensure that the identified surface soil and sediment contamination does not pose a threat to the municipal water supply system or other receptors. The additional investigation should focus on defining the vertical and horizontal extent of the surface soil contamination detected on-site, and investigate whether subsurface sources of contamination remain due to the former presence of MGP structures.

SECTION 1

INTRODUCTION

The manufactured gas plant (MGP) industry was an essential and extremely beneficial component of urban America for almost a century. The industry was primarily concerned with the production of gas for lighting and heating. Some secondary production of chemical by-products, for use as fuel sources or chemical feedstocks for other phases of American industry, also occurred. By providing a centralized and economical source of fuel for public lighting as well as for private domestic use, the industry prospered by providing major benefits to public safety and urban and industrial development.

The industry began in the early 1800's, continued through the mid-nineteenth century, peaked in late 1800's through the 1920's, and essentially disappeared by the 1960's as alternate sources for lighting and heating became available. The nature and type of operations used to generate manufactured gas varied and evolved over time, giving rise to gas of differing quality and some variation in residues and by-products. Since closure, many former MGP sites have been sold for commercial, industrial, or residential development, and a few have been retained by utility companies for alternate uses. Although distributed throughout the country, MGP sites were located primarily in the northeastern and upper midwestern states in response to climate, population density, and commercial and industrial needs.

At many former MGP facilities, past operations have resulted in a range of residues and by-products being left on-site. Some of these residues may be a source of concern to human health and the environment. The New York State Electric and Gas Corporation (NYSEG) has undertaken a voluntary program to identify, evaluate, and prioritize sites based on the potential health and environmental concerns posed by the sites. Engineering-Science, Inc. (ES) has been contracted to assist in this voluntary effort to identify and address these potential problem areas.

ES' participation has included site reconnaissance, sampling, and data evaluation at a number of sites previously used for MGP operations. Data collected at several sites has been used to prioritize, by means of a proprietary and computer-based site ranking methodology, each site in terms of the need for further and more detailed investigation. The main thrust of the data collection and site ranking program has been the identification of direct exposure pathways and impacts associated with residues which may still remain at some sites.

This report describes the reconnaissance, sampling, data evaluation, and ranking program at the Binghamton-Court Street site where an MGP operated from 1888 to about 1952, after which operations were fully converted to natural gas storage and distribution. The MGP was never owned or operated by NYSEG, however the responsibility for the former MGP site was recently assumed by NYSEG, through the acquisition of Columbia Gas of New York.

REPORT ORGANIZATION

This report consists of four sections. The first section contains introductory material describing the overall program and the nature of the impacts to human health and the environment associated with residues which may be found at former MGP sites. A brief history of the site and related background information is also provided. Section 2 describes program methodology, including the computer-based system used to identify and rank the potential human health and environmental impacts associated with the site. The results of this computer methodology form the basis for determining the priority and methods for further site investigation. The scope of work in Section 3 provides a summary of site activities and the specific procedures used to collect the analytical data used as inputs to the site ranking computer model. Section 4 presents a summary of site results including analytical results, the results of computer prioritization, and the identification of on-site residues offering a direct exposure potential. A fact sheet which summarizes site background information, operational history and processes, and historical land use is included as a preface to the report.

PROJECT ACTIVITIES

Although not present at all sites, MGP by-products and residues remain at or near some MGP facilities in accordance with generally-accepted practices of the time. Some of these residues can represent a potential human health hazard from direct exposure. The mere presence of these materials at former MGP sites is not, however, a necessary indication that a significant human or environmental threat is present. The existence of such a potential impact will depend on the type, quantity, and nature of the material present. Also, such residues are often buried or otherwise separated from direct exposure pathways. These residues, therefore, usually do not present a direct contact hazard unless disturbed or exposed in some way, or unless they have entered groundwater or surface waters that are used locally.

The primary objectives of this MGP prioritization program are two-fold: identify concerns at the individual sites and establish priorities for further investigation. In meeting these objectives, NYSEG has concentrated on evaluating direct exposure pathways as the most reliable indicators of the potential impacts at the site and the need for further investigative response. Where direct exposure pathways are not present, remedial action may be deferred.

Site prioritization has been carried out using the results of the Electric Power Research Institute (EPRI) Site Screening and Priority-Setting System (SSPS). The SSPS is a computer-based ranking system which addresses a wide range of individual site characteristics and provides internal weighting factors to establish severity of impacts and the need for follow-on response. The SSPS generates a listing of scores for each site, providing a uniform format to determine and compare overall risks between sites.

DESCRIPTION OF PROCESSING STEPS AND WASTE TYPES FROM MGP OPERATIONS

The following description of processing steps and waste types from MGP operations is drawn primarily from "Management of Manufactured Gas Plant Sites, Volume 1, Wastes and Chemicals of Interest," Gas Research Institute (GRI-87/0260.1), October 1987.

Description of Processing Steps

The MGP industry involved diverse operations and gas production feedstocks. All systems used the same fundamental sequence of operations including:

- Gas Production and Heat Recovery
- Tar-Oil-Water Separation
- Gas Clean-up
- Wastewater Treatment
- Tar-Hydrocarbon Processing

Using these basic processing steps, one of three general gas production processes were used depending on the primary gas production feedstock. These processes included:

- Coal carbonization,
- Water gas or carburetted water gas (CWG), and
- Oil gasification

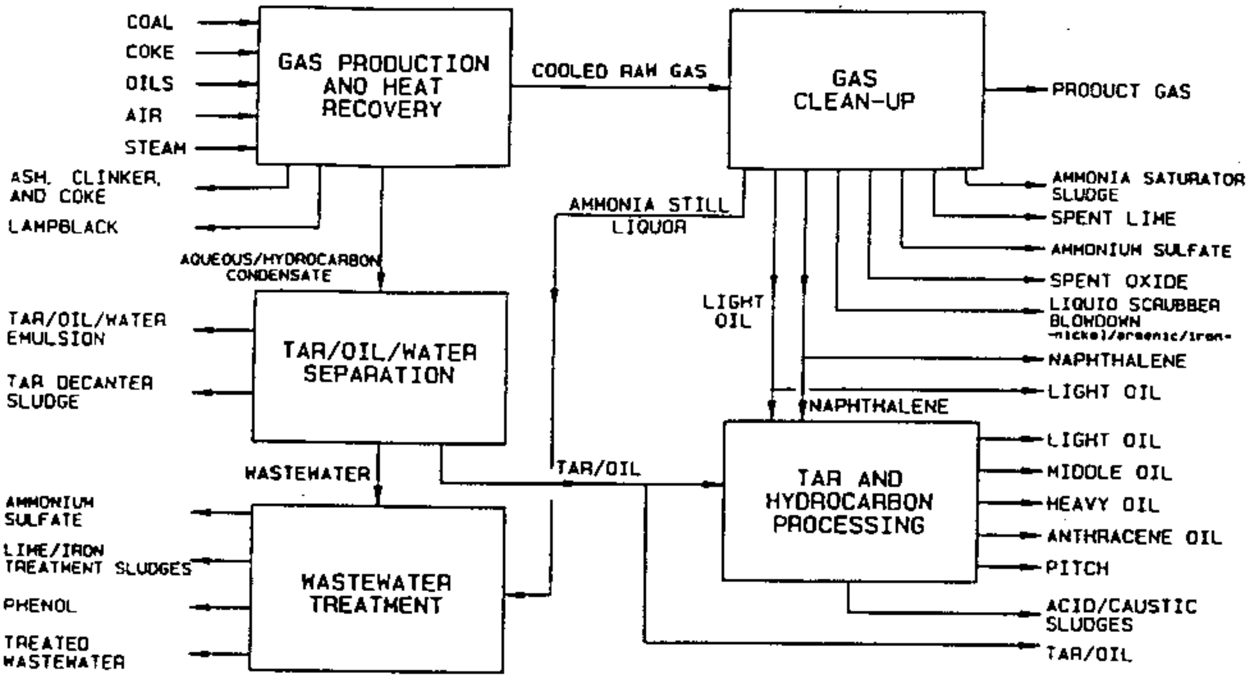
A generic process diagram for each of the primary production processes, utilizing the five basic steps previously described, is shown in Figure 1.1. Each of these steps is described below.

Gas Production and Heat Recovery - The three gas production processes used volatilization to produce gas. Processes differed in the nature of the raw material used for gas production, the nature of the heating process, and the nature of the spent by-products.

In the coal carbonization process, only coal was used in gas production. Solid end products from coal carbonization, depending on the extent of gas production, could consist of coal, coke, or ash. Coal ash may have been high in metals including iron, copper, lead, zinc, and others. In the CWG process, the coal or coke used to produce gas was reduced to ash, and petroleum products (which were subsequently "cracked") and steam were added to increase the BTU value of the gas. Various petroleum products, without coal or coke, were used in the oil gasification process.

After being produced, the gas was passed through heat recovery cooling and condensation for the removal of condensible impurities. Substantial quantities of

GENERIC PROCESS AND ENVIRONMENTAL FLOWSHEET: MANUFACTURED GAS PRODUCTION,



SOURCE:
MANAGEMENT OF MANUFACTURED GAS PLANT SITES.-
VOLUME 1, WASTES AND CHEMICALS OF INTEREST,
GAS RESEARCH INSTITUTE OCTOBER, 1987

ammonia were also known to be present in the aqueous condensate from the raw MGP gas.

Tar-Oil-Water Separation - The hydrocarbons and quench water, water evolved from the gas production material and carry over solids, often formed emulsions after condensation. These emulsions were not common to coal carbonization systems, but were fairly common in CWG and oil gasification systems. These emulsions were primarily associated with petroleum stocks used either as feedstock to the oil gas process or as a carburetion oil in the CWG process. In coal gas systems, tar separation/decantation often evolved hydrocarbons which settled as a heavy, semi-solid sludge in the bottom of the separator.

The nature of the recovered hydrocarbons varied with the feedstock used. Coal tar was the primary hydrocarbon by-product from the coal carbonization process and contained a wide diversity of compounds, many with very high molecular weight. Primary components of coal tar consisted of light oils (benzene, naphtha, etc.), middle oils (tar oils, phenols, tar bases, naphthalenes), heavy oils (methyl napththales), anthracene oil, and pitch. Tars from the other processes also contained high concentrations of many of the same compounds.

Wastewater Treatment - Wastewater treatment was employed to remove organic and inorganic contaminants from process and quench waters. Treatment was usually limited to the aqueous stream from the tar-oil-water separator. For coal carbonization processes, ammonia liquor from gas clean-up operations was often included with separator water prior to treatment.

Wastewater treatment was often rudimentary and consisted primarily of precipitation reactions (with lime or ferric sulfate) to remove organic and inorganic solids. For ammonia (i.e., coal carbonization streams) waters, organic extraction was sometimes practiced for phenol recovery. Treated wastewater was generally discharged to local sewers or to surface waters; solid residues, containing high concentrations of metals and organics, may have remained on-site, following generally accepted practices of the time.

Gas Clean-Up - Gas clean-up operations were sometimes employed depending on the number of contaminants and the intended use of the product gas. Clean-up was often required for coal carbonization gasses because both organic and inorganic impurities had to be removed to ensure proper combustion.

Coal carbonization, CWG, and oil gasification products were treated for removal of light oil and naphthalene by scrubbing with a hydrocarbon wash oil, or passing the gas through metal vessels containing wood chips.

Inorganics were normally stripped from the product gas using lime, ferric oxide and/or wood chips. These "purifier box" steps removed sulfur from the gas but also concentrated the cyanide present in the coal carbonization product gas. Other metals were also likely to be present on these spent adsorbents.

Aqueous-based processes were also used for gas clean-up, chiefly for removal of sulfur. High ammonia liquors from the tar-oil-water separator, subsequently discharged to wastewater treatment, were often used for sulfur removal. Other sulfur removal liquors were also used and periodically discharged as their removal capacity became exhausted. Metal catalysts were often used in these liquors and included arsenic, nickel, and iron.

Characteristics of By-Products from MGP Operations

Table 1.1 provides a summary of the residual materials which may have been generated at the former MGP sites. A wide range of characteristics and concentrations is possible at various sites within each of these product matrices. Differences arise due to the raw feedstock used and the variant treatment and gas production processes employed. Specific and detailed information in the types of by-products which may be present at any one site is difficult to determine.

ES has developed some general guidelines on the chemical characteristics of the residues expected at MGP sites. In general, five major classes of chemicals may be present as shown in Table 1.2. The actual chemical make-up of each of the residues depends on the process and raw feedstock used.

Of the major chemical classes and individual compounds identified, several are significant in terms of quantities generated and concentrations present. Polycyclic aromatic hydrocarbons (PAHs), a common component of the major organic residuals from all combustion operations, are typically expected to be most widely present. This is because high concentrations were present in the residues, and PAHs do not freely migrate and tend to biodegrade slower than many other organic compounds.

High concentrations of volatiles are less frequently encountered because they have higher rates of biodegradation, mobility, and volatilization. All of these factors tend to decrease concentrations, especially over the long period since MGP operations at the site ceased. Phenolic compounds also tend to be more biologically degradable and mobile than the PAHs. The presence of phenolic compounds is an indicator of residuals from coal carbonization. Significant quantities of phenol were not generated in the CWG or oil gas processes.

The inorganic materials present have a number of sources including the feedstock, purifier residues and other residues from gas clean-up. The presence of these materials is indicative of the coal carbonization process. Although all the metallic compounds listed in Table 1.2 may be present, those which may be present in large quantities include aluminum, iron, nickel, chromium, copper, and lead. Sulfur and cyanide may also be present if purifier residues remain on-site.

COURT STREET SITE HISTORY AND BACKGROUND

The former manufactured gas plant site, now known as the Binghamton-Court Street site, is located at the northeast corner of the intersection of Court Street and Brandywine Avenue in the City of Binghamton, Broome County, New York.

The history of the site dates back to 1888, when the Binghamton Gas Light Company bought the land in May and constructed a manufactured gas plant by October of that year (Lawyer, 1900). The Binghamton Gas Light Company then

TABLE 1.1

COMMON RESIDUAL MATERIALS AT FORMER MGP SITES(1)

Free tars, oils, and lampblack (from oil gasification)
Organic residues in soils, surface water, or groundwater
Metals in purifier residues
Mixed wastes and fill
Organics and metals in sediments

(1) From "Management of Manufactured Gas Plant Sites, Volume 1, Wastes and Chemicals of Interest, Gas Research Institute, October 1987".

TABLE 1.2

CHEMICAL COMPONENTS OF MGP RESIDUES(1)

Inorganics	Metals	Volatile Aromatics	Phenolics	Polycyclic Aromatic Hydrocarbons
Ammonia	Aluminum	Benzene	Phenol	Acenaphthene
Cyanide	Antimony	Ethyl Benzene	2-Methylphenol	Acenaphthylene
Nitrate	Arsenic	Toluene	4-Methylphenol	Anthracene
Sulfate	Barium	Total Xylenes	2,4-Dimethylphenol	Benzo(a)-anthracene
Sulfide	Cadmium			Benzo(a)pyrene
Thiocyanates	Chromium			Benzo(b)fluoranthene
	Copper			Benzo(g,h,i)perylene
	Iron			Benzo(k)fluoranthene
	Lead			Indeno(1,2,3-cd)pyrene
	Manganese			Chrysene
	Mercury			Dibenz(a,h)anthracene
	Nickel			Dibenzofuran
	Selenium			Fluoranthene
	Silver			Fluorene
	Vanadium			Naphthalene
	Zinc			Phenanthrene
				Pyrene
				2-Methylnaphthalene

(1) From "Management of Manufactured Gas Plant Sites, Volume I, Wastes and Chemicals of Interest, Gas Research Institute, October 1987."

moved their gas manufacturing operation to this site from their original Washington Street location.

In November 1887, the Binghamton Gas Light Company consolidated with the Brush-Swan Electric Light and Power Company, forming the Binghamton Gas and Electric Company. The Binghamton Gas and Electric Company was sold to the Binghamton Gas Works in April 1898 (Lawyer, 1900). In 1957, the Binghamton Gas Works and the Keystone Gas Company merged to form Columbia Gas of New York.

During the period from 1888 until the 1930's, the plant manufactured gas using the water gas process. During the 1930's, the plant was converted to the carburreted water gas process, and storage and distribution of natural gas began at the site. During the 1940's, the oil and gas process was in use. By the mid-1950's, the facility had been completely converted to natural gas storage and distribution.

During its period of operations, the plant consisted of four large steel gas holders (see Figure 1.2), one of which may have been an inground holder (Marean, 1990). The No. 4 holder was 205-feet tall and was a landmark for the Binghamton area from the time of its construction in 1926 until it was dismantled in 1969. The gas plant also consisted of several oil storage tanks and process buildings, which were also dismantled during or since 1969. There is no conclusive information regarding the disposition of the holders and associated residue following demolition, although some MGP residues were known to have been landspread on open ground at a site in nearby Johnson City. Columbia Gas of New York retained possession of the western part of the former MGP site until 1991, when it was purchased by NYSEG. Columbia Gas sold the eastern part of the former MGP site in 1973.

Years of Operation

The site operated as a manufactured gas plant from 1888 to approximately 1952, when it was converted completely to natural gas distribution. The facility was dismantled in 1969.

Processes Used

The water gas process was used from 1888 until the 1930's, when the carburetted water gas process came into use, and later in the 1940's the oil gas process was used. Gas manufacturing reportedly ceased in 1952.

Land Use History

Following use as a MGP, the site has remained a fenced, unpaved lot, used for equipment storage. The surrounding land use has historically been commercial and industrial. A gas station was located on the south side of Court Street across from the site as early as 1926, according to Sanborn maps (Appendix C). The City of Binghamton Department of Public Works Garage and Repair Shop and the former Binghamton Light, Heat and Power Company have been located adjacent to the east side of the former Binghamton-Court Street MGP. An oil refinery and subsequently a scrap yard have been located adjacent to the north side of the former MGP, across the railroad tracks. There are presently, and have historically been, numerous industrial and commercial facilities located to the north, east and west of

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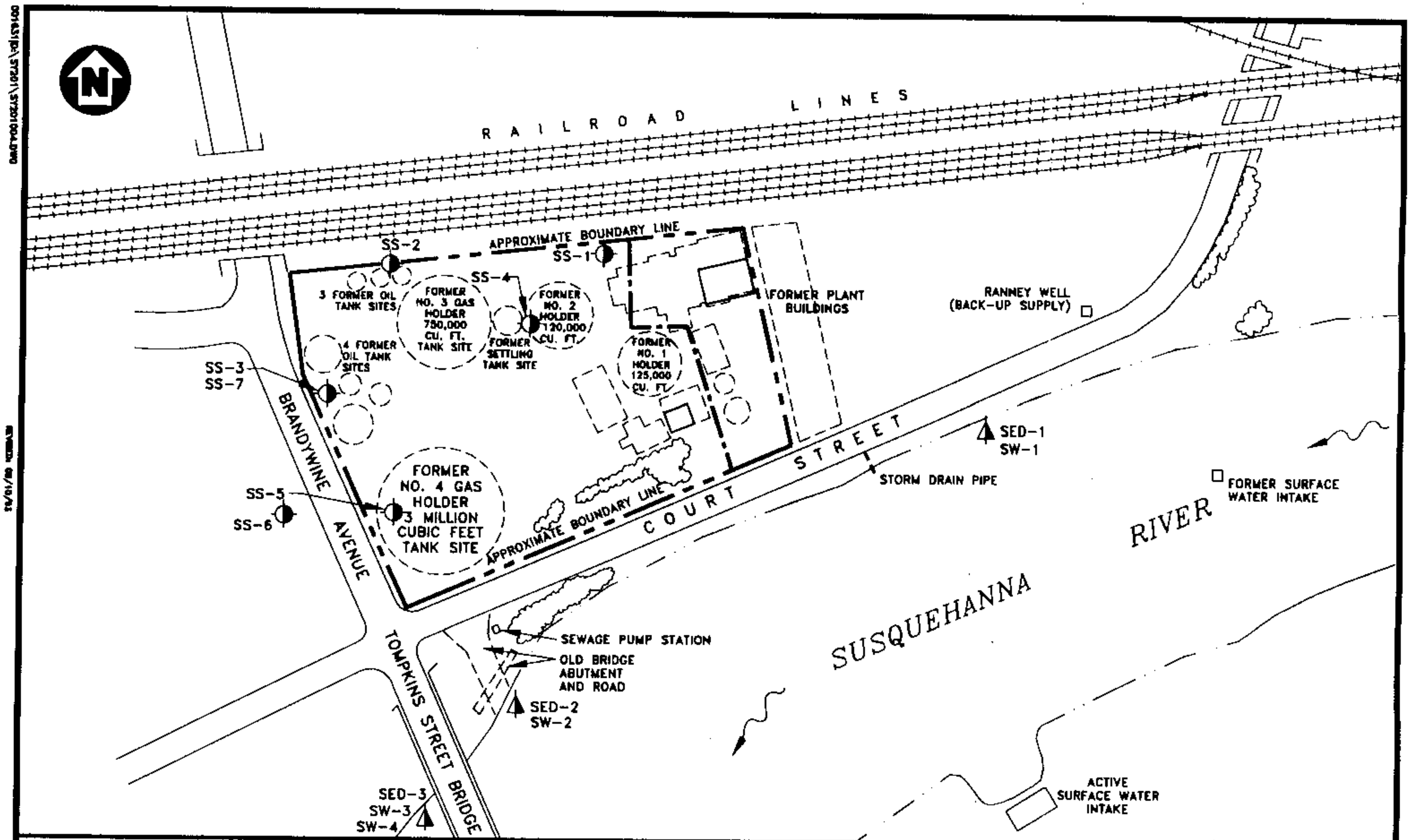


LEGEND

[ ]	FORMER STRUCTURES
— - —	APPROXIMATE PROPERTY LINE, OTHER PROPERTY LINES COINCIDE WITH SITE BOUNDARY LINE
SS-1 ◐	SURFACE SOIL SAMPLE LOCATION
SED-3 SW-3 ▲	SEDIMENT SAMPLE LOCATION/ SURFACE WATER SAMPLE LOCATION

APPROXIMATE SCALE

200 0 200 FT.

200'

Binghamton-Court St. (CGBS)

TASK I SAMPLE LOCATIONS

NYSEG
Binghamton, New York

ES ENGINEERING-SCIENCE

FIGURE 1.2

the former MGP. These land uses present numerous possible sources of surface and subsurface contamination. Many of these potential sources are expected to be upgradient of the Binghamton-Court Street MGP site because the Susquehanna River flows westerly on the south side of the site, just across Court Street.

Environmental Setting

The approximately six acre site is bordered to the south by Court Street and the Susquehanna River; to the west by Brandywine Avenue; to the north by the Delaware Lackawanna and Western Railroad (Conrail) tracks; and to the east by Ebonex property. The eastern part of the former MGP is owned by Patricia Merwin and Phyllis Raterink and leased to Columbia Transmissions.

The former site is now a mostly vacant, unpaved, fenced lot used for equipment and materials storage. The site is flat and surface runoff follows no specific route. The site is located over the former Brandywine Canal Extension of the former Utica- Binghamton Canal. The Brandywine Extension was constructed to connect with the Pennsylvania-Susquehanna Canal, but was never used. The canal was closed and filled in 1875, prior to purchase and development of the site as an MGP. A 1885 Sanborn map shows the presence of a small creek in the site vicinity, but after development of the site in 1888, no evidence of the creek or former canal was apparent.

The most significant environmental feature in the site vicinity is the Susquehanna River. In the site vicinity, the Susquehanna River is westerly-flowing and is approximately 400 feet wide. The river is a Class A surface water body, suitable as a drinking water source. The municipal drinking water supply source is a combination of wells and surface water from the Susquehanna River, and serves over 60,000 people. The surface water intake is within 600 feet of the south side of the Binghamton-Court Street site, opposite the east end of the site.

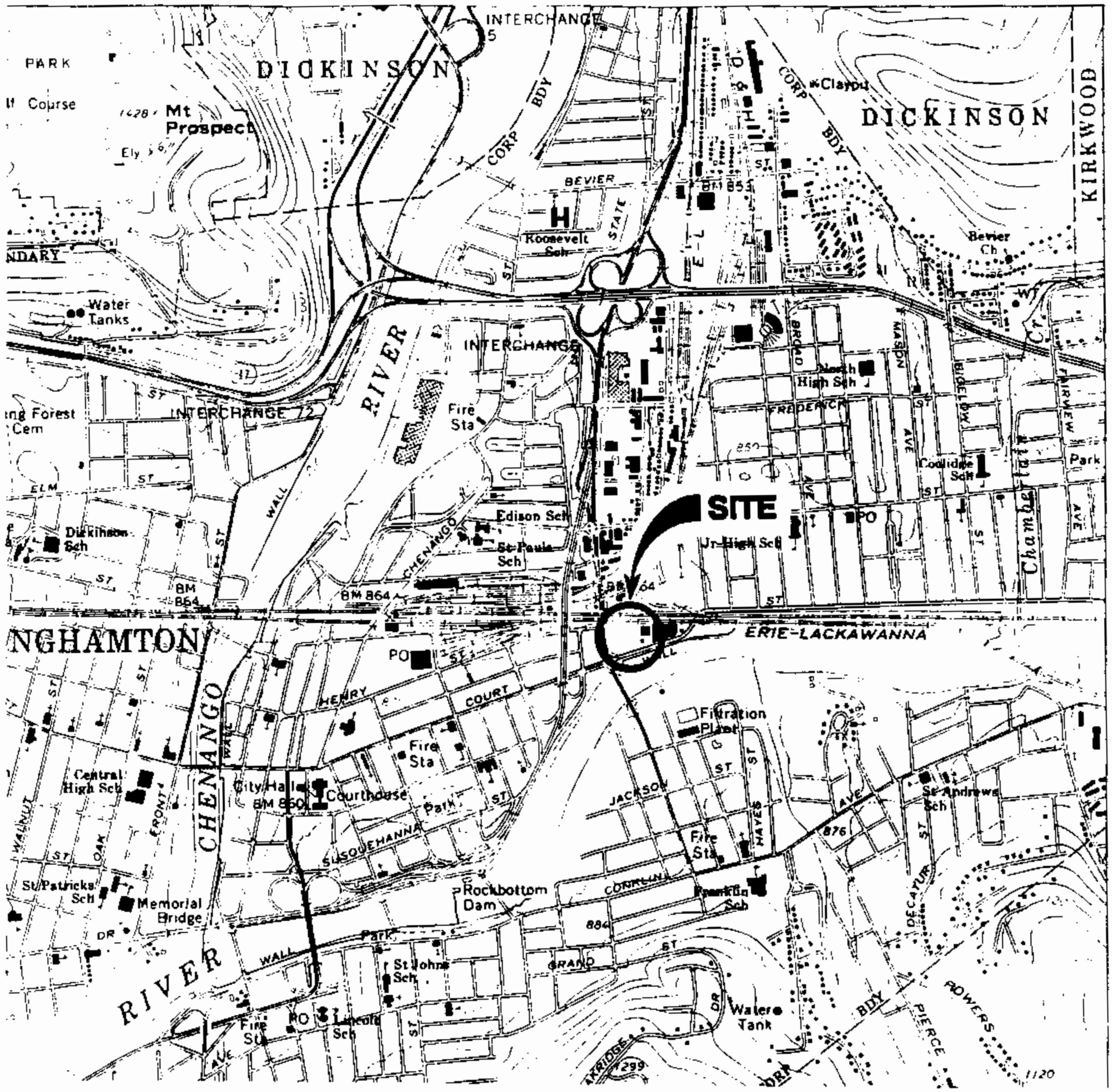
A municipal water supply well, called a Ranney well, is located on the north side of Court Street, approximately 500 feet east of the former MGP site. Over the past several years, volatile organic compounds (trichloroethene, 1,1,1-trichloroethane) have been detected at low concentrations in this well. The source of these contaminants has not been documented, however NYSDEC Spill Response Bureau had investigated the situation, installed two monitoring wells nearby, and found no evidence of an outside contamination source (Peterson, 1991). Reportedly, diesel fuel had leaked from a storage tank in the well pump house, causing the observed contamination.

The Ranney well is operational and used as a back-up supply for the Binghamton municipal water system (Huray, 1991). The Ranney well is reportedly about 50 feet deep and has lateral feeder lines which extend, at an approximate depth of 20 to 25 feet, toward the Susquehanna River. These feeder lines extend approximately 70 to 130 feet toward the south-southeast to south-southwest.

The nearest sensitive environment is a freshwater wetland located about two miles north of the site, across the Chenango River. The Chenango River is located approximately 4,000 feet northwest of the site, and flows south into the

Susquehanna River at a point 1.5 miles southwest of the site. Figure 1.3 shows the site in relation to the surrounding area.

FIGURE 1.3



BASE MAP : U.S.G.S. 7.5 TOPOGRAPHIC MAP
BINGHAMTON WEST QUDRANGLE
NEW YORK-BROOME COUNTY (1966)

SCALE

0 2000 4000 FT.

2000 FT.

QUADRANGLE LOCATION

LATITUDE : 42° 06' 15"
LONGITUDE : 75° 53' 45"

ENGINEERING-SCIENCE

SITE LOCATION

Binghamton, Court Street (CGBS)
NYSEG
Binghamton, New York

SECTION 2

METHODOLOGY

This section describes the Site Screening and Priority-Setting System (SSPS) used during this MGP prioritization project. The description is taken from a draft report which describes the SSPS and provides a case-study application (Setting Priorities Among Contaminated Sites, Draft Report, May 1989, Decision Focus, Inc., Los Altos, California).

The SSPS is a screening tool that allows utilities to assign risk-based priorities among their sites. User-supplied information determines scores for various site attributes. These values are combined to form final scores that an environmental manager can use to compare sites. The SSPS is a menu-driven program designed for IBM-compatible PCs.

To help utilities organize and plan actions at former and existing MGPs, the Electric Power Research Institute (EPRI) developed the SSPS as a priority-setting tool to facilitate a first-level screening of sites. The goal of the screening is to divide the sites into two groups:

- sites where the risks are highest
- sites where the risks are lower and actions can be deferred

Priority-setting is a first step in the overall risk management process. On the basis of this first screening, attention and resources can be directed to high-priority sites. During a first screening, no attempt is made to determine what the ultimate level of remedial action should be; rather, sites are identified which require a more complete investigation and risk analysis.

The structure and assumptions incorporated in the SSPS are similar to those of the U. S. Environmental Protection Agency's (USEPA's) Hazard Ranking System (HRS), the system used by the USEPA to determine which waste sites to list on the Superfund National Priorities List. However, the SSPS has been modified to include more of the information that is typically available when a utility is beginning to set priorities among its sites, and the SSPS follows more closely risk analysis principles.

Similar to the HRS, the SSPS develops subscores for each of four exposure pathways: surface water, groundwater, air, and direct contact. The subscores account for various site characteristics such as site size and current land use, waste containment, nearby surface water and groundwater use, soil and hydrological factors, net precipitation, wind speed, waste characteristics, and the population which could potentially be exposed.

From the subscores, the SSPS creates three different scores: actual risk, perceived risk, and cleanup effort. Each of these scores represents a different set of concerns that may be important in setting priorities. The actual risk score corresponds to the health risk posed by the site to the surrounding community. The perceived score is a measure of the level of public concern that the site is likely to generate and the potential economic and legal impacts resulting from that concern. This score is similar to the actual risk score, but strongly emphasizes those site and community characteristics that will be of most concern to the public. The cleanup effort score represents the anticipated cost of remediating the site. This latter score has little value beyond very rough cost estimation because the nature and extent of contamination at the site has yet to be fully characterized.

For this MGP prioritization project a revised and unpublished version of the SSPS was used. The revised version includes additional data inputs and a revised format for calculating waste quantities, among other items. The scoring is being provided to NYSEG on disk and a summary of the data inputs and scoring rationale is provided in Appendix F of this report. Appendix F identifies the site-specific data used in the scoring and the default values used when site-specific data were not available.

In general terms, the SSPS should be interpreted as providing priority rankings of groups of sites, as opposed to rankings based on absolute scores. Since this is a first level screening, groups of sites are identified as having low, moderate, and high risks relative to one another. Evaluation of the individual pathway scores can be used to distinguish differences in sites having essentially the same risk score and to determine at which sites remediation can be most effectively or cost-efficiently implemented.

The SSPS ranking scores obtained for the Binghamton-Court Street site are:

	Actual Risk	Perceived Risk	Clean-Up
Primary Scores:	6.4	13.1	12.0
Secondary Scores			
Groundwater:	0.0	0.0	
Surface Water:	3.3	29.8	
Direct Contact:	9.9	13.1	
Air:	7.3	9.7	

These scores are preliminary because many assumptions were made and default values were used. The groundwater scores are low because there are no municipal water supply wells within five kilometers downgradient of the site, which is a principal criterion for the SSPS scoring. However, the site is situated over a significant aquifer which is used regionally as a drinking water source. Refer to Section 4 and Appendix F for more details of the SSPS scoring.

SECTION 3

SCOPE OF WORK

INTRODUCTION

The scope of work at the Binghamton-Court Street site consisted of five parts:

Part 1 - Literature and Records Search
Part 2 - On-Site Evaluation
Part 3 - Site Survey and Mapping
Part 4 - Sampling and Analysis
Part 5 - Report Preparation

In addition to these parts, a program preparation part was performed which included preparing a site-specific Health and Safety Plan (HASP) (presented in Appendix A), and a project-specific Quality Assurance Project Plan (QAPP) (presented in Appendix B). The basis for the scope of work at each site is described in the Work Plan presented in Appendix C.

The objectives and descriptions of the activities for Parts 1 through 5 are described in this section.

PART 1-LITERATURE AND RECORDS SEARCH

There were two objectives for this part: to develop a history of ownership and land use for the former MGP site property, and to generate site characterization data for the SSPS scoring.

Most of the available site information was made available by NYSEG either by direct delivery of documents to ES or by review of NYSEG's central files in Binghamton, N.Y. ES staff also visited the local historical society for information concerning the plant history, as well as the Broome County library, Syracuse University, and the Binghamton City Engineers office. The subcontract surveyor, Modi Associates, reviewed the local deed information to determine property lines of the site during the period of MGP operations. A brief history of the Binghamton-Court Street MGP site was presented in Section 1.

Additional research was performed by ES to develop the data base for the SSPS scoring. A summary of the types of information developed for the SSPS data base is presented in Table 3.1.

PART 2 - ON-SITE EVALUATION

The Binghamton-Court Street site is located on Court Street in the City of Binghamton, Broome County, New York. Access to the site is possible along Court

TABLE 3.1

SSPS DATA BASE

REQUIRED INFORMATION AND SOURCES

Type of Information	Source
Local Geologic Information	USGS Reports NYSGS Reports NYS Museum and Science Services Bulletins Soil Surveys Groundwater Resources Reports
Groundwater Use	County Health Departments New York State Health Department Atlas of Community Water System Sources Groundwater Resources Reports
Soil Type, Characteristics	Soil Surveys
Aquifers	NYSDEC Publications USGS Publications Groundwater Resources Reports
Land Use	Local/County Records U.S. Department of the Interior (Historic Places, National Parks) Broome County Historical Society City of Binghamton Engineering Dept. City of Binghamton Building Construction Bureau S.U.N.Y. Binghamton Library Broome County Public Library Soil Conservation Service
Surface Water Use	NYSDEC (6NYCRR)
Population	Census Data
Wetlands	NYSDEC Wetlands Maps
Precipitation	Climatic Atlas of the U.S.
Endangered Species	NYSDEC Wildlife Resources Center
Toxicity/Persistence Data	USEPA; Sax, 1984

Street. The western part of the former MGP site is presently owned by NYSEG and the eastern part is owned by Patricia Merwin and Phyllis Raterink. The former MGP site is bordered by Court St. and the Susquehanna River on the south, Brandywine Ave. on the west, the Delaware Lackawanna and Western Railroad on the north and the property of Ebonex on the east. The Court St. site covers approximately six acres and consists of a fenced, unpaved lot, presently used for material and equipment storage.

The initial site visit for this investigation was conducted on June 12, 1991 by Mr. Randy Youngman (ES) and Mr. James Hylind (NYSEG). The examination was limited to the NYSEG property and identified surface soil, surface water and sediment sampling locations.

PART 3 - SITE SURVEY AND MAPPING

Modi Associates, a licensed land surveyor, performed a property survey identifying property boundaries, sampling locations, and existing structures. A topographic base map with a scale of one inch to fifty feet and one-foot contour interval, drawn to NYSEG CADD/sketch standards (including those originally specified in the project proposal and those later identified by NYSEG on December 19, 1990), was prepared. The base map and surveyor field notes are presented in Appendix D. The base map presents a current site plan depicting the structures, sample locations, and pertinent off-site features such as nearby residences, streets and known utilities.

During the site survey, an on-site reference point was established to allow identification of the exact locations from which samples were collected. This was done to allow revisions and additions to the base map to be made should additional investigations be conducted at the site in the future. A USGS datum at the southwest corner railroad bridge abutment over Brandywine St. was used for vertical elevations.

PART 4 - SAMPLING AND ANALYSIS

The objective of Part 4 was to provide representative samples and analyses to determine the potential for direct exposure to hazardous contaminants at the site. Field samples were collected only from those matrices which presented direct exposure pathways.

Surface water and sediment samples were collected upstream of the site, adjacent to the site, and downstream of the site, to assess whether there is a direct exposure pathway present. The sampling methodology, equipment decontamination procedures, and analytical protocols for Part 4 are described in detail in the project QAPP (Appendix B). Dedicated sampling apparatus was used for each sample location, and no sample equipment decontamination occurred on-site. The analytical methods utilized are presented on Table 3.2. Sample locations are given in Figure 1.2. All analyses were performed by the ES-Berkeley, California laboratory (ESBL).

TABLE 3.2

SUMMARY OF ANALYTICAL METHODS

Water Matrix	
Volatile Organics	EPA Method 624
Semivolatile Organics	EPA Method 625
Metals:	
Mercury	EPA Method 7470
Lead	EPA Method 7421 (GF)⁽¹⁾
Chromium	EPA Method 7191 (GF)
Iron, zinc, aluminum, cadmium, antimony, copper, cobalt, manganese, and nickel	EPA Method 200.7 (ICP)⁽²⁾
Cyanide (Total and Amenable)	EPA Method 335
Soil and Sediment Matrices	
Volatile Organics	EPA Method 8240
Semivolatile Organics	EPA Method 8270
Metals:	
Mercury	EPA Method 7471
Lead	EPA Method 7421
Chromium	EPA Method 7191
Iron, zinc, aluminum, cadmium, antimony, copper, cobalt, manganese, and nickel	EPA Method 6010
Cyanide (Total and Amenable)	EPA Method 9010

(1) Graphite Furnace Method
(2) Inductively - Coupled Plasma Method

Surface Water Sampling

Three surface water grab samples were collected from the Susquehanna River, downstream (at SW-3), adjacent to the former MGP site (at SW-2), and upstream (at SW-1). The objective of the surface water sampling was to determine whether the former MGP site is impacting surface water quality in the Susquehanna River. The samples were collected in accordance with the QAPP and HASP on October 3, 1991 by ES personnel, and observed by J. Hylind of NYSEG.

Sample containers provided by ESBL were dipped beneath the water surface to collect the surface water samples. Additional surface water samples were collected at the same locations and analyzed in the field for pH, specific conductivity and temperature. These results are presented in the field sampling forms in Appendix D.

The samples were collected from the north shoreline of the Susquehanna River, at the downstream location first, and each sample was collected while standing downstream of the actual location, to avoid any impacts caused by wading into the stream. Sample SW-4 was a field duplicate of SW-3, and was collected for quality control purposes.

Sediment Sampling

Three sediment grab samples were collected at the same locations as the surface water samples, from the upper six inches of the stream bed using a precleaned stainless steel spoon. The spoons were dedicated to each sample location. The objective of the sediment sampling was to determine whether the former MGP site had contaminated sediments in the Susquehanna River. Since there was no visual evidence of contamination prior to sampling, grab samples were collected.

During sampling, rocks and vegetative material were discarded, and care was exercised to avoid losing the fine materials which tend to disperse when disturbed. The samples were placed into bottles provided by ESBL. The downstream samples were collected first, and persons sampling the sediment stood downstream of the actual sampling point to avoid any impacts caused by wading into the stream. During the sampling of SED-2, disturbance of the sediment released an oily sheen and visual evidence of an oil residue. An aliquot of this material was separately analyzed to determine the nature of the oily waste substance. The results are discussed in Section 4.

Surface Soil Samples

Seven grab surface soil samples were collected by ES on October 3, 1991. Six grab surface soil samples (SS-1, SS-2, SS-3, SS-4, SS-5, and SS-7) were collected near the former locations of MGP structures, such as the holders and tanks previously present on-site. Sample SS-7 was a field duplicate of soil sample SS-3 for quality control purposes. Surface soil sample SS-6 was collected west of the site, across Brandywine Avenue, as a background sample. The purpose of all surface soil samples was to determine whether a direct exposure pathway exists in surface soil associated with the former MGP site. The soil samples were collected with dedicated, decontaminated stainless steel spoons and placed in sample bottles supplied by ESBL.

Air Monitoring

A Photovac photoionization detector (PID) was used to monitor for volatile organic compounds present in the air. This monitoring was performed as a health and safety measure during on-site field work. Air in the breathing zone (four to five feet above the ground) was monitored during sampling activities as a preliminary means of determining the presence of volatile organic compounds.

The PID was calibrated daily to a standard of 100 ppm isobutylene. The PID is equipped with a 10.6 ev lamp, suitable for detecting most volatile organic compounds commonly found at MGP sites such as toluene, xylene, ethylbenzene, and benzene. Because the PID is not calibrated to all of these specific compounds, it provides readings of total ionizables present (i.e volatile organic compounds with a ionization potential at or below 10.6 ev) relative to the isobutylene standard. The readings that the PID provides are best used for background-downgradient comparisons. No readings above background were detected during the on-site sampling.

Quality Assurance/Quality Control

The sampling program at the Binghamton-Court Street site consisted of surface soil, surface water and sediment sampling. In addition to these media, several types of quality control samples were collected to document the representativeness, precision and accuracy of the sampling and analytical methods. These samples included a trip blank, field duplicates and matrix spike, and matrix spike duplicate samples.

A trip blank, consisting of organic-free water, was prepared by ESBL and accompanied the sample bottle shipments at all times. The trip blank was analyzed for volatile organic compounds to measure the impact of sample shipping and handling on sample integrity.

A duplicate surface water sample was collected at SW-3 and assigned the designation SW-4, and a duplicate surface soil sample was collected at SS-3 and designated SS-7. The duplicate samples were analyzed for the same parameters as the other samples to measure the representativeness of the sampling methods.

Matrix spike (MS) and matrix spike duplicate (MSD) samples of surface water were collected at location SW-2. The MS and MSD samples were analyzed for the same parameters as the other samples to allow the laboratory to identify analytical interferences caused by the sample matrix. The laboratory interprets the MS/MSD results and qualifies the sample results accordingly by assigning "flags" to the data.

Prior to performing on-site sampling, all sampling equipment was precleaned by successive rinses with detergent (Alconox) water, distilled water, methanol, and distilled water. No on-site decontamination occurred.

PART 5 - REPORT PREPARATION

This report was prepared to summarize the work effort, present results, including any discovery of an imminent threat to human health or the environment, and present the SSPS input data and scores.

SECTION 4

DATA ASSESSMENT

INTRODUCTION

This section presents the results and interpretations of the analytical data collected at the Binghamton-Court Street site. ES collected four surface water samples, three sediment samples and seven surface soil samples, including two field duplicate samples. All samples were analyzed for chemicals associated with former MGP sites such as volatile and semivolatile organic compounds, metals and cyanide. The analytical results are summarized in Tables 4.1 through 4.3. The sample locations and total PAH concentrations are shown on Figure 4.1. A complete listing of results is presented in Appendix E.

ES-Syracuse personnel assessed laboratory-reported sample holding times and laboratory and trip blank results. All analytical holding times were met. Laboratory and trip blanks were assessed to determine whether chemicals that are commonly used during laboratory handling and processing of samples were accidently introduced to the samples. Suspected laboratory contaminants were not indicated to be present based on the analytical results. Some concentrations are flagged as estimated ("J") because the values are approximate, being less than the analytical detection limit. These data are considered valid.

Surface Water Results

Three surface water samples were collected from the Susquehanna River downstream (SW-3), adjacent to the site (SW-2), and upstream (SW-1). A field duplicate, designated SW-4, was collected at the same location as SW-3 to measure the representativeness of the sampling methods. A summary of the analytes detected in the surface water samples is presented on Table 4.1.

Volatile and semivolatile organic compounds were not detected in the surface water samples. Five metals and cyanide were detected in the surface water samples. The five metals are aluminum, iron, lead, manganese, and zinc. In all cases but zinc, upstream (SW-1) concentrations were equal to or greater than the downstream concentrations. The concentrations in all downstream samples were below the applicable Class A surface water standards, with the exception of aluminum and iron. The concentrations of aluminum and iron for all sample locations exceeded the applicable Class A standards, however the concentrations were highest in the upstream sample (SW-1). A low concentration of cyanide was detected in SW-2, at a concentration below the Class A standard.

These results show no impact on surface water quality in the Susquehanna River attributable to the site. The generally good agreement between the results for

Table 4.1
New York State Electric & Gas
Binghamton – Court St. Site
Surface Water (ppm)
Analytical Results

Parameter	Class A Standard (1)	SW-1	SW-2	SW-3	SW-4
Volatile Organics		N.D.	N.D.	N.D.	N.D.
Semivolatile Organics		N.D.	N.D.	N.D.	N.D.
Metals					
Aluminum	0.1 (A)	0.91	0.66	0.46	0.22
Antimony	NS	<0.06	<0.06	<0.06	<0.06
Cadmium	0.01	<0.005	<0.005	<0.005	<0.005
Chromium	0.05	<0.01	<0.01	<0.01	<0.01
Cobalt	0.005 (A)	<0.05	<0.05	<0.05	<0.05
Copper	0.2	<0.025	<0.025	<0.025	<0.025
Iron	0.3	1.6	1.3	0.65	0.28
Lead	0.05	0.0085	0.0044	<0.003	<0.003
Manganese	0.3	0.33	0.23	0.09	0.045
Mercury	0.002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	*	<0.04	<0.04	<0.04	<0.04
Zinc	0.3	0.026	0.022	0.029	0.029
Cyanide:					
Total	0.1	<1	0.097	<1	<1
Amenable	0.1	N.A.	0.045	N.A.	N.A.

FOOTNOTES:

(1)NYSDEC TOGS 1.1.1 dated September 25, 1990. Standards for protection of human health. (A)–Aquatic life value.

N.D. Not Detected.

N.A. Not Analyzed.

* Standard based on hardness; data not collected.

Table 4.2
New York State Electric & Gas
Binghamton – Court St. Site
Sediment Samples (ppm)
Analytical Results

Parameter	Natural Occur. Ranges (1)	SED–1	SED–1RE	SED–2	SED–3	SED–3RE
Volatile Organics						
Ethylbenzene		N.D.	N.D.	98	N.D.	N.D.
Total Xylenes		N.D.	N.D.	48	N.D.	N.D.
Semivolatile Organics						
Naphthalene		N.D.	N.D.	980	N.D.	N.D.
2–Methylnaphthalene		N.D.	N.D.	180	N.D.	N.D.
Acenaphthene		N.D.	N.D.	710	N.D.	N.D.
Fluorene		N.D.	N.D.	250	N.D.	N.D.
Phenanthrene		N.D.	N.D.	920	N.D.	N.D.
Anthracene		N.D.	N.D.	200	N.D.	N.D.
Di–n–butylphthalate		1.8	1.5	N.D.	1.6	N.D.
Fluoranthene		N.D.	N.D.	270	N.D.	N.D.
Pyrene		0.33	0.34	470	N.D.	N.D.
* Benzo(a)anthracene		N.D.	N.D.	120	N.D.	N.D.
* Chrysene		N.D.	N.D.	130	N.D.	N.D.
Total PAH		0.33	0.34	4,230	N.D.	N.D.
Total CPAH		N.D.	N.D.	250	N.D.	N.D.
Metals						
Aluminum	700 – >100,000	9,500	N.A.	9,800	8,100	N.A.
Antimony	<1 – 10	<12	N.A.	<12	<12	N.A.
Cadmium	0.01 – 7	<1	N.A.	<1	<1	N.A.
Chromium	1 – 2,000	13	N.A.	12	11	N.A.
Cobalt	<3 – 70	<10	N.A.	<10	<10	N.A.
Copper	1 – 700	23	N.A.	60	17	N.A.
Iron	100 – >100,000	22,000	N.A.	21,000	18,000	N.A.
Lead	<10 – 700	35	N.A.	96	28	N.A.
Manganese	50 – 50,000	990	N.A.	620	420	N.A.
Mercury	0.02 – 5.1	0.36	N.A.	<0.1	<0.1	N.A.
Nickel	<5 – 7,000	18	N.A.	16	17	N.A.
Zinc	<5 – 3,500	99	N.A.	110	76	N.A.
Cyanide:						
Total		<1	N.A.	<1	<1	N.A.
Amenable		N.A.	N.A.	N.A.	N.A.	N.A.

FOOTNOTES:

(1) Ranges for New York State soils from U.S.G.S. Professional Paper 1270, 1984.

N.D. Not Detected.

N.A. Not Analyzed.

RE Sample reanalyzed at a greater dilution factor.

* Carcinogenic PAH

Table 4.3
New York State Electric & Gas
Binghamton – Court St. Site
Surface Soil Samples (ppm)
Analytical Results

Parameter	Natural Occur. Ranges (1)	SS–1	SS–1RA	SS–2	SS–3	SS–4	SS–5	SS–6	SS–7
Volatile Organics		N.D.	N.A.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Semivolatile Organics									
Diethylphthalate		2.8 J	2.8 J	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Phenanthrene		3.5 J	3.4 J	4.8 J	N.D.	N.D.	N.D.	N.D.	N.D.
Anthracene		3.5 J	3.4 J	4.7 J	N.D.	N.D.	N.D.	N.D.	N.D.
Di–n–butylphthalate		8.9 J	8.6 J	30	0.78	0.97 J	0.2 J	0.24 J	N.D.
Fluoranthene		6.1 J	5.9 J	7 J	N.D.	N.D.	N.D.	N.D.	N.D.
Pyrene		N.D.	N.D.	8.9 J	N.D.	0.35 J	N.D.	N.D.	N.D.
* Benzo(a)anthracene		N.D.	N.D.	4.2 J	N.D.	N.D.	N.D.	N.D.	N.D.
* Chrysene		N.D.	4.6 J	4.8 J	N.D.	N.D.	N.D.	N.D.	N.D.
bis(2–Ethylhexyl)phthalate		N.D.	N.D.	N.D.	N.D.	N.D.	0.16 J	0.17 J	0.14 J
* Benzo(b)fluoranthene		N.D.	N.D.	6 J	N.D.	N.D.	N.D.	N.D.	N.D.
Total PAH		13.1	17.3	40.2	N.D.	0.35 J	N.D.	N.D.	N.D.
Total CPAH		N.D.	4.6	15	N.D.	N.D.	N.D.	N.D.	N.D.
Metals									
Aluminum	700–>100,000	6900	N.A.	9600	7600	11000	6900	12000	7000
Antimony	<1–10	<12	N.A.	<12	<12	<12	<12	<12	<12
Cadmium	0.01–7	1.1	N.A.	<1	<1	<1	<1	<1	<1
Chromium	1–2,000	21	N.A.	14	9.6	16	9.2	13	8.8
Cobalt	<3–70	21	N.A.	<10	<10	11	<10	<10	<10
Copper	1–700	74	N.A.	32	19	28	21	15	18
Iron	100–>100,000	150000	N.A.	27000	20000	34000	18000	23000	19000
Lead	<10–700	120	N.A.	190	13	36	15	49	14
Manganese	50–50,000	540	N.A.	520	360	860	400	700	380
Mercury	.02–5.1	0.29	N.A.	0.73	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	<5–7,000	33	N.A.	17	13	24	14	18	14
Zinc	<5–3,500	250	N.A.	160	51	69	60	80	49
Cyanide:									
Total		11	N.A.	<1	<1	<1	<1	<1	<1
Amenable		<1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

FOOTNOTES:

(1) Ranges for New York State soils from U.S.G.S. Professional Paper 1270, 1984.

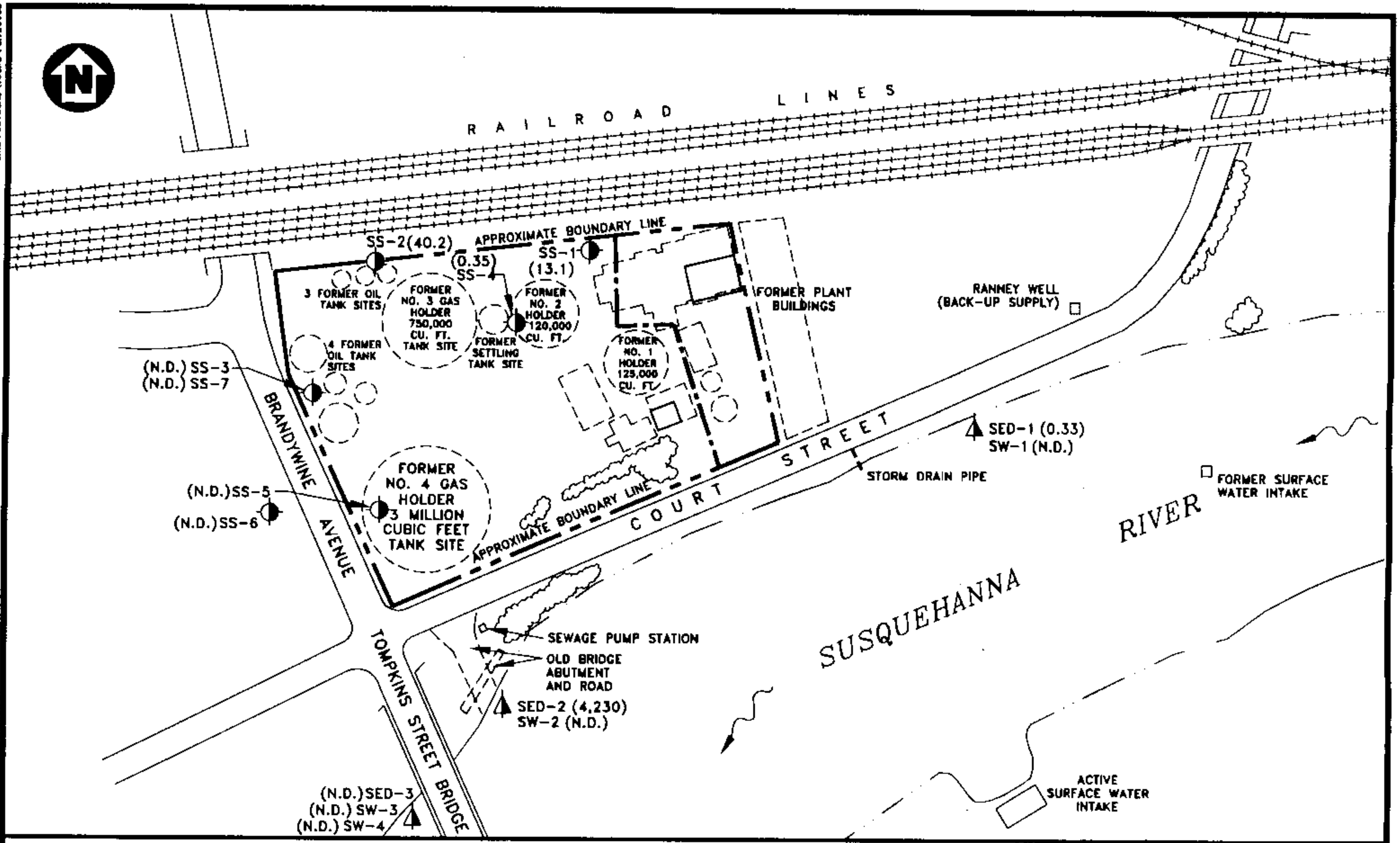
N.D. Not Detected.

N.A. Not Analyzed.

RA Sample reanalyzed at a greater dilution factor.

* Carcinogenic PAH

J Estimated value – concentration is below analytical detection limit.



LEGEND

▭	FORMER STRUCTURES
— · —	APPROXIMATE PROPERTY LINE, OTHER PROPERTY LINES COINCIDE WITH SITE BOUNDARY LINE
SS-1 ◐	SURFACE SOIL SAMPLE LOCATION
SED-3 SW-3 ▲	SEDIMENT SAMPLE LOCATION/ SURFACE WATER SAMPLE LOCATION
(40.2)	CONCENTRATION OF TOTAL PAHs IN PPM.

APPROXIMATE SCALE

200 0 200 FT.

200'

Binghamton–Court St. (CGBS)

TASK I SAMPLE LOCATIONS

NYSEG
Binghamton, New York

FIGURE 4.1

ES ENGINEERING-SCIENCE

001631\D\ST201\ST201004.DWG

REVISED: 08/10/93

SW-3 and the duplicate SW-4 suggest the sampling methods yielded representative samples.

Sediment Results

Three sediment samples were collected at the same locations as the surface water samples. The sediment results are summarized on Table 4.2.

Two volatile organic compounds, ethylbenzene (98 ppm) and total xylenes (48 ppm) were detected in SED-2. Ten PAHs including two carcinogenic PAHs (CPAHs) were also detected in SED-2, at individual compound concentrations ranging from 120 ppm to 980 ppm. The total concentration of PAHs in SED-2 is 4230 ppm and of CPAHs is 250 ppm. The types and concentrations of volatile and semivolatile organic compounds is consistent with observations of an oily substance which was released from the sediment during sampling of SED-2.

Because of the historically industrial land use in the area, and the presence of other volatile and semivolatile sources upstream in the Susquehanna River, it is difficult to definitively determine the source of contamination at SED-2. It is noteworthy that a storm sewer discharges to the river upstream of SED-2, posing another potential source of contamination. In an effort to identify whether the contamination present in sample SED-2 was a petroleum product such as gasoline or fuel oil, a gas chromatograph (GC) "fingerprint" analysis was performed. These results indicated that the sample did not contain significant amounts of natural petroleum components and did not exhibit the characteristic "fingerprint" that is normally observed in petroleum products. These results suggest the material present in SED-2 may have not originated from a release of gasoline, fuel oil, or other types of petroleum product, and could be related to MGP residue, given the presence of PAHs in the sample.

A second "fingerprinting" technique was performed using infrared (IR) methods, in an attempt to identify whether the material is related to coal tar residue. Those results indicate the material is consistent with carburettted water gas tar (refer to fingerprint results report in Appendix E).

The other sediment samples, SW-1 and SED-3, were relatively free of organic compounds. SED-1 contained one PAH, pyrene, at 0.33 ppm. SED-3 contained only one organic compound, di-n-butylphthalate at a concentration similar to that present in SED-1 (1.6 and 1.8 ppm, respectively). Di-n-butylphthalate is a common laboratory contaminant and is not related to MGP residues and was not present in SED-2.

Nine metals were detected in the sediment samples; the concentrations for all were well within the referenced naturally-occurring ranges. The concentrations of metals do not suggest the former MGP site has impacted sediments in the Susquehanna River. There is a slight increase in the concentrations of copper and lead in SED-2, but it is not clear whether this condition is related to the oily substance observed at that location.

In summary, the observation of oily residue at SED-2 was confirmed by the presence of volatile and semivolatile organic compounds in the sample. An IR fingerprint analysis was conducted to determine whether the residue may be related to coal tar. These results indicate the material is consistent with carburetted water gas coal tar.

It is noteworthy that, despite the contamination present in SED-2, similar contaminants were not present in the surface water sample (SW-2) from the same location. An oily sheen did appear on the water surface after the sediment was disturbed, but those contaminants were not detected in the surface water samples.

Surface Soil Results

Six surface soil samples were collected at the former MGP site in suspected source areas such as the former holder and tank locations. A field duplicate sample was collected at SS-3 and designated SS-7. A background sample was collected from the west side of Brandywine Avenue and designated SS-6. The surface soil sample results are summarized on Table 4.3.

Volatile organic compounds were not detected in any surface soil samples. Semivolatile organic compounds were detected in all surface soil samples, but only three samples contained PAHs or CPAHs. Although there are other sources of PAHs and CPAHs in this industrial setting, their presence is considered an indicator of MGP residues because the background sample did not contain PAHs or CPAHs. The highest concentrations of PAHs (40.2 ppm) and CPAHs (15 ppm) were in SS-2, collected near the railroad tracks where coal residue is still present. Sample SS-1 contained 13.1 ppm PAHs and sample SS-4 contained 0.35 ppm PAHs. SS-1 was also located near the railroad tracks and SS-4 was located near the former No. 2 gas holder.

Although the PAHs and CPAHs pose a direct contact threat, the concentrations are low and the site is fenced off and not likely to be accessed by small children or the public.

Eleven metals and cyanide were detected in one or more surface soil samples. The concentrations of all metals were well within the referenced naturally-occurring ranges. In general, there was no discernible pattern of significantly higher concentrations between samples; the concentrations among all samples were generally within an order of magnitude. It is noteworthy that SS-1 contained the highest concentrations for most metals, and SS-2 was somewhat elevated with respect to lead and mercury. These locations, near the railroad tracks, also had the highest concentrations of PAHs. The elevated levels in SS-1 and SS-2 may be due to the coal residue present in that area, and the train traffic nearby. Although these samples have slightly elevated levels of PAHs and some metals, the results do not indicate an imminent public health threat attributable to the site via the surface soil pathway exists, given the low concentrations and site access restrictions.

SSPS RANKING

The SSPS ranking scores for the Binghamton-Court Street site are as follows:

	Actual Risk	Perceived Risk	Clean-Up
Primary Scores:	6.4	13.1	12.0
Secondary Site Scores			
Groundwater:	0.0	0.0	
Surface Water:	3.3	29.8	
Direct Contact:	9.9	13.1	
Air:	7.3	9.7	

These scores are considered preliminary since many assumptions were made, and default values were used, in scoring the site. For instance, the groundwater score is not based on site-specific data, but rather on statistical data derived from many former MGP sites. To properly evaluate the Binghamton-Court Street SSPS scores, they must be compared to other sites similarly scored using the same general assumptions and default values.

The Binghamton-Court Street scores reflect the fact that direct contact with surface soil and sediments is the principal exposure pathway, for both actual and perceived risk, based on the available data. Direct contact includes skin contact with contaminated soil, ingestion of contaminated soil, and inhalation of contaminated fugitive dust. Additional site-specific groundwater data is the most significant "data gap", since default values were used to enter data for groundwater quality downgradient of the site. Since the site is situated over a significant aquifer, and groundwater is used for drinking water in the site vicinity, additional site-specific groundwater data would provide a more definitive assessment of the actual and perceived risks for the site. The SSPS groundwater scores are low because there were no identified municipal drinking water wells within five kilometers downgradient of the site. The distance to drinking water wells is a principal criterion in the SSPS scoring.

CONCLUSIONS AND RECOMMENDATIONS

The most significant finding from the data collected from this site is the presence of oily residue in the sediments of the Susquehanna River. Although the source of the residue cannot be definitively determined at this time, there is no evidence to rule out the former MGP site as a potential source. The presence of contaminated sediments is significant because the municipal water supply for Binghamton includes backup supply wells and active surface water intakes within several hundred feet of this site. However, it is important to note that the surface water data indicate the site is not impacting water quality in the Susquehanna River. Likewise, it is important to note that the contamination detected over the past several years in the Ranney well (located north of Court Street, 500 feet east of the former MGP site) is related to solvent-based volatile organic compounds such as 1,1,1-trichloroethane, trichloroethene, etc. The contaminants detected in the

Ranney well were not detected during this MGP sampling program, and are not typically associated with MGP residues.

The principal concern for this site is the fact that it is situated within a sensitive environmental location, that is, near a Class A surface water body and the intakes for the municipal water supply system. Although there is no evidence to conclusively show that the site has adversely impacted the river or the municipal water supply, any evidence of contamination on-site must be carefully evaluated with respect to its nature, extent and possible migration pathways. For this reason, additional investigation of the Binghamton-Court Street site is warranted to ensure that the surface soil and sediment contamination detected (if MGP-related) does not pose a threat to the municipal water supply system or other receptors. The additional investigation should focus on defining the vertical and horizontal extent of the soil contamination detected on-site, and investigate whether subsurface sources of contamination remain due to the former presence of holders, tanks and other structures. The potential for subsurface sources of contamination to pose a risk of impact on groundwater quality and a risk of exposure via the Ranney well (should it be placed on active status) and/or the surface water intakes should be investigated. Because of the proximity of the site to the Susquehanna River, and the general hydrogeologic setting in the site vicinity, it is very possible that groundwater beneath the site could be discharging to the river. It appears that this site is suited to applying indirect investigative techniques (geophysical and soil vapor surveys) and direct techniques (soil borings and monitoring well installations).

REFERENCES*

Lawyer, 1990: Binghamton It's Settlement, Growth and Development 1800-1900. William S. Lawyer, Editor, Century Memorial Publishing Co. 1900

Marean, 1990: Interoffice Memorandum to file from J.B. Marean dated July 16, 1990.

Huray, 1991: Telephone conversations with Andy Huray-Binghamton City Water and Sewer Department, December 4, 1991, and March 13, 1992.

Peterson, 1991: Telephone conversation with Gary Peterson NYSDEC Region 7, Kirkwood Office, December 4, 1991.

*Copies provided following this page.

$5,000 capital, and with Clinton F. Paige, F. E. Ross and James R. Holman as its first board of directors. This company is not now in business.

The Standard Pharmacal company was incorporated April 16, 1895, with $20,000 capital, for the purpose of manufacturing and selling the Standard remedies which during recent years have attracted considerable attention in circles where proprietary medicines are most used. The first directors of the company were A. Lee Tiffany, W. S. Overton, A. E. Magoris and George Fowler.

The Star Electric company was incorporated December 4, 1896, with an authorized capital of $100,000, by George S. Beach, Clarence S. Beach, Samuel H. Chase and Herman W. Doughty. The company manufactures and deals in all electrical specialties, the works being at Nos. 277–79 Front street; the officers are George S. Beach, president; Clarence S. Beach, secretary and manager, and H. W. Doughty, treasurer.

In addition to the manufacturing interests referred to on preceding pages incidental mention also may be made of the Eureka Awning and Tent Co., F. G. Barbour, manager; E. H. Titchener & Co., manufacturers of blind staples and wire goods; The Binghamton Cigar Box Co., at No. 4 South street and Joseph W. Lacy's cigar box factory, on Water street; H. I. Haring, brass founder; the Magoris Cactus Fibre Brush Co., of Rossville; Persels & Mack, harness manufacturers, an old and well established industry; The Bunn Cigar Rolling Machine Co.; The Binghamton Electrical Construction Co., Charles F. Terhune, president, and L. M. Blanding, secretary and treasurer; The Binghamton Gas Engine Co., M. L. Deyo, president, D. H. Carver, vice-president, and H. A. Miles, secretary and treasurer; The Binghamton Lithograph Co., Charles S. Case, proprietor; Harris' Flavoring works, F. E. Harris, proprietor; The Binghamton Glove Co., F. J. Bryant, proprietor; Joles & Brown, glove makers; The Parlor City Glove and Mitten Co.; The Rossville Acid works, also known as The Binghamton Chemical Co., John O. Porter, proprietor; The Independent Match Co., C. M. Stone, president, and C. H. Webster, secretary and treasurer; Frank Beman's organ factory, an industry of far more importance than outward appearances indicate; The Binghamton Computing Scale Co.; The Binghamton Whip Co., Lucius Woodruff, proprietor; The Binghamton Wire works, David Campbell, proprietor; Wm. P. Davis' Wire works.

The Binghamton Gas Light Company was organized under a charter

BINGHAMTON ITS SETTLEMENT GROWTH AND DEVELOPMENT
1800 - 1900 WILLIAM S. LAWYER, EDITOR
CENTURY MEMORIAL PUBLISHING CO, 1900

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dated July 23, 1853, with $50,000 capital. The first directors wer
William R. Osborne, Charles McKinney, Jacob Morris, Edward Tomp
kins, Lemuel H. Davis, John Lee and Dwight E. Ray. The board wa
organized in August, 1853, with Jacob Morris president, and Williar
R. Osborne, secretary and treasurer. The company's works were locate
at the foot of Washington street, and were maintained in that localit
until October, 1888, when they were removed to the head of Cour
street. The new site was purchased on May 2, of that year, and th
buildings were erected immediately afterward.

The Binghamton Gas Light company and the Brush-Swan Electri
Light and Power company, the latter having been formed in the mear
time, were consolidated November 18, 1887, forming the Binghamto
Gas and Electric company. This arrangement was continued, th
company furnishing both gas and electric light to city consumer
until May 10, 1890, when the electric department was sold to George
Morse and others and was eventually merged into the Binghamton Ge
eral Electric company, of which mention has been made.

In the meantime, however, the Binghamton Gas and Electric con
pany sold its stock, plant and works to the Binghamton Gas works, th
latter having been incorporated April 1, 1898, with an authorized cap
tal of $750,000, and an actual capital of $450,000. The directors of th
new corporation were (and are) James W. Manier, William G. Phelp
Charles M. Stone, George F. O'Neil, Charles C. Jackson, George
Dunn, Sigmund J Hirschmann, M. C. McMillin and W. F. Dout
wirt. The officers were (and are) M. C. McMillin, president; Jam
W. Manier, vice-president; Robert W. Manier, treasurer; W. F. Dout
wirt, secretary, and Fred. B. Wheeler, general manager.

The company has about 33 miles of main pipe and about 3,000 g
consumers in the city. General Manager Wheeler has laid fifteen mi
of main pipe within the last fourteen months. The first superintende
of the works was Harris G. Rodgers, whose service in that capacity
gan in 1853. This position was filled by competent men until the
fice was finally abolished, and that of general manager established
its place. Mr. Wheeler is the only person who has filled the position
general manager.

In this connection it is interesting to note the succession of preside
of the company from the time the works were originally established
1853, viz.: Jacob Morris, 1853–57; Charles McKinney, 1857–58; Sh
man D. Phelps, 1858–62; Charles McKinney, 1862–69; Sherman

NYSEG

Interoffice Memorandum

New York State Electric & Gas Corporation
Binghamton, New York 13903

July 16, 1990

GEMIO -90-596
File: GEM 800 GEMG

To: File

From: J.B. Marean

Subject: Columbia Gas of New York (CNY)

The following is a summary of the environmental information obtained as part of the one day visit to Columbia Gas Company offices in Columbus, Ohio. The visit included a management presentation by Columbia Gas and access to information in a Data Room.

MANAGEMENT PRESENTATION AND FOLLOW-UP CONFERENCE CALL

NOTE: Conference call attendees
J.B. Marean NYSEG
M. Psareas HLA
M.W. O'Oonnell Columbia Gas Columbus,Ohio (CGO)
O. Schwaertzwalder CGO
J. Hayes Columbia Gas System Service Corporation,
Wilmington, Delaware (CGSSC)
M.J. Atherton CGSSC

1. The participation in the IPP activities with Anitec and Frito-Lay will result in the construction of two 8 inch pipelines of 24,300 and -15,000 feet respectively. This activity has Article VII implications.

2. All mercury regulators are gone from the CNY system. CNY followed the disposal practice specified by their disposal firm (Mercury Refining Company of Albany, NY). The disposal firm provided containers to hold and ship the mercury.

3. One former Manufactured Gas Plant (MGP) site was stated as being the responsibility of CNY. When further questioned on this site or possible other sites in their service territory no other MGP sites were identified as known. The possibility of other sites was pursued based on the language found in the franchise book (copy requested) made available in the Data Room. The franchises for several communities refers to the ability to distribute and supply **mixed and/or artificial** gas. When questioned on the meaning of mixed and/or artificial gas it was the feeling of M. Atherton that was manufactured gas. They were not

aware of the possibility of using the franchises as a possible source to identify the possible existence of MGP sites. When queried on the corporate family tree of CNY, the response was:
"CNY was formed in 1957 from the merger of Keystone Gas Company with the Binghamton Gas Works. The predecessor companies, which were acquired by Columbia in the late 1920's provided gas service to the Olean and Binghamton areas since prior to the turn of the century."

The family tree issue was found to be somewhat more complicated than that, during a review of information in the Data Room, as discussed below. Several questions (attached) were generated while in the Data Room to attempt to clarify the issue of MGP sites for CNY.

4. Testing of pipeline liquids for PCB's began in 1981. Pipeline liquids that required disposal were sent for incineration to Rollins or Chem Waste Management. At Present all PCB-contaminated liquids removed from the pipelines are stored at the property across Brandywine Avenue from the Binghamton General Office property. The liquid currently in storage is scheduled for disposal in the near future.

5. An inspection by NYSDEC recently occurred at the CNY Binghamton Service Center. A copy of this report was requested.

6. It was stated that all disposal activities of CNY for wastes other than the standard office/plastic pipe type waste was by either recycling (mercury) or incineration (pipeline liquids).

7. Underground Storage tanks (UST) are only located at the Binghamton Service Center location. A further discussion of UST's is provided below in the Data Room discussion section.

8. CNY has no permits, consent orders, or records of decision.

DATA ROOM

A Revised Data Room Index was provided (attached), based on the index, all records in section VI. Environmental were reviewed. All the information in this file is being copied and will be sent to NYSEG and HLA. The highlights from this review are as follows:

Report No. 1 - Community Right to Know Report

The only items reported were gasoline and diesel tanks at the Binghamton Service Center location, and propane storage tanks at the Binghamton and Johnson City Propane Plants.

Report No. 2 Underground Storage Tanks

The Binghamton Service Center presently has three tanks. A former diesel tank was temporarily closed in 1989, and is scheduled to either be brought back in service or permanently closed in 1990.

The Walton Service Center previously had three 4000 gallon gasoline tanks and one 500 gallon used oil tank. These were all empty when CNY acquired the property from a gasoline service station in September 1981. The gasoline tanks were subsequently filled with a concrete slurry and the used oil tank was removed in September 1986. In the interim the tanks were not used by CNY.

Report No. 3 Inventory of Waste Handlers and Oisposal Facilities

This report confirmed the use of Rollins, Chem Waste Management, and Mercury Refining Company as noted above. In Addition, the use of Safety-Kleen Oil, Wilkes-Barre, Pa. (717/825-8134) to handle and ship solvents to Petro Conn, Modena, Pa. (215/357-1839) was identified.

Report No. 4 Hazardous Waste Annual Reports

This report identified pipeline liquids (D001 waste) as the only hazardous waste, handled by CNY. This waste was anticipated to have a flashpoint <140 F., a portion of this waste tested as having PC8 concentrations >50 ppm. making it subject to TOSCA. All pipeline liquids were incinerated. It was apparent from this report that CNY was having some difficulty in disposing of the empty drums which had contained the pipeline liquids.

Report No. 5 An assessment of the Possible Impact of Natural Gas on PC8 levels in Indoor Air

This report was prepared by the NYS Natural Gas Utilities in April 1982. The information in the report has no negative impact on CNY.

In addition to the reports reviewed as outlined above three other items were reviewed:

1. Offering Memorandum of June 5, 1990 (attached)

   This memo provided environmental related information on the corporate tree (quoted above), the distribution territory, the communities served, a statement that CNY was involved with project(s) mandated by EPA, and a statement that Columbia **believes** that CNY is in compliance with all environmental regulations. Columbia was asked to describe the mandatory projects required by EPA (attached).

2. Interoffice Memorandum of 6/29/90

   This memo was to M.W. Odonnell from M.J. Atherton with a subject of Environmental Review of CNY Properties. Restrictions were placed on the distribution of this document, therefore no copies could be made. The highlights for the offices, service centers, and propane plants are summarized below:

Office and Service Center	Source of air emissions	Storage tanks	PCB wastes	Asbestos
Watkins Glen	No	No	No	floor tile
Walton	No	Removed	No	No
Olean	No	No under ground	No	No
Binghamton	Not Stated	3 tanks	storage	102 lin.ft
Propane Plants				
Binghamton	exempt	28 propane 1 methanol	No	removed 1986
Johnson City	exempt	3 odorizer	No	No

Notes:

a. Olean has a 250 gallon above ground diesel tank.

b. Walton generates 2 gallons of used oil each month which is picked up by a used oil reclaimer.

c. Binghamton Office and Service Center

> "The CNY property across Brandywine Avenue from the General Office property was previously used for a gas manufacturing plant. This plant contained an in-ground holder. There is no visual evidence of coal tar or other plant debris on the site or discharges to the Susquehanna River. PCB-contaminated liquids removed from the pipelines are properly stored at the site. The liquid currently in storage is scheduled for proper disposal in the near future."

In addition to the above quote from the M.J. Atherton memo of 6/29/90 on Binghamton they also store used oil in an above ground tank for disposal, and mercury is stored for recycling.

d. Boiler blowdown and sanitary waste from the Binghamton Propane Plant is discharged to the city sewer system.

e. The exempt statement on air emissions at the Binghamton and Johnson City Propane Plants refers to section 201.6(c) of the New York Air Pollution regulations which, in Columbia's opinion, exempts the activity from air permit or certification requirements.

f. Sanitary wastes from the Johnson City Propane Plant are treated by an on-site, 500 gallon septic tank and drain field.

g. Under the heading for the Johnson City Propane Plant, in the M.J. Atherton memo of 6/29/90 the following statement was made:

> "In 1969, coal tar wastes from the dismantling of the Binghamton Gas Manufacturing Plant was spread on the surface of unoccupied land at this site. This land currently supports growth of vegetation, and other than a few lightly stained rocks, there are no visual signs of this material."

3. Franchise Book

Review of the information in the franchise book provided the greatest i~~ncrt~~e insight in the potential environmental liability to NYSEG from the acquisition of CNY. The implied liability of "... mixed and/or artificial gas" was previously discussed. The following is a listing of locations with the franchise date where mixed and/or artificial gas was identified:

Village or Town	County	Franchise Date
Chenango	Broome	8/24/29
Deposit	Delaware	7/30/34
Genessee	Alleghany	3/23/31
Hancock	Delaware	1/14/30
Hornby	Steuben	9/23/40
Johnson City	Broome	8/15/66
Limestone	Cattaraugus	11/23/43
Maine	Broome	2/2/65
Millport	Chemung	11/10/30
Port Dickinson	Broome	1/9/67
Wayne	Wayne	6/10/46
Reading	Schuyler	8/4/37
Starkey	Yates	7/66/67
Tompkins	Tompkins	7/30/34

In addition to those franchises which identified the mixed and/or artificial gas as a potential activity a number of franchises identified or made reference to gas works, gas plants, or manufactured gas. These locations are:

Village or Town	County	Franchise Date
Olean	Cattaraugus	12/23/1880
Dundee	Yates	7/5/27
Endicott	Broome	1/4/27
Hancock	Delaware	9/2/32
Deposit	Delaware	

The final item of interest identified during the review of the franchise book was that of additional details on the CNY corporate tree. At a minimum the CNY corporate tree has a more complicated interrelationship than previously provided by Columbia. The franchise book suggests that the corporate tree would at a minimum be as follows:

I. Columbia of New York

  A. Keystone Gas Company (which was a name change from The Keys Gas company Inc. on 8/1/29)

    1. Consumers Natural Gas Company
    2. Chenango Gas Company Inc.
    3. Manufacturers Gas Company

  B. L.A. Wilkinson d.b.a. Wayne Gas Company

  C. Binghamton Gas Works

Note: Manufacturers Gas Company and Keystone Gas Company are subsidiaries of Columbia Gas and Electric Company.

JBM

J.B. Marean

JBM/kgt

cc: P.G. Carney w/o
T.M. O'Meara w/o
J.C. Hylind w/o
S.C. Snyder w/o
J.B. Patch w/o
T.F. Donnelly - 120 Chenango w/o
P. Komar - Parkway

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO.

FILE DESIGNATION

DATE 12/3/91 TIME 1 00

PHONE CALL FROM BINGHAMTON CITY WATER + SEWER PHONE NO. 607-772-7210

PHONE CALL TO PHONE NO.

CONFERENCE WITH ANDY NURAY: SUPERINTENDANT

PLACE

SUBJECT BINGHAMTON RANNEY WELL DESIGN + SAMPLES. 50 feet w/[illegible]
2-3 yrs ago

- DESCRIBED HIS KNOWLEDGE OF RANNEY WELL DESIGN AND WILL ATTEMPT TO RETRIEVE DESIGN DRAWINGS FROM ENGINEERING DEPT. OF THE CITY.

(RANNEY TYPE WELL CONSTRUCTION/DESIGN DESCRIPTION ATTACHED)

- WILL REVIEW ANALYTICAL DATA FOR RANNEY WELL AND ATTEMPT TO FIND ANYTHING ON PRIORITY POLLUTANT SCAN

- THE WELL IS AN ACTIVE BACK-UP SUPPLY FOR THE CITY.

- A DIESEL ENGINE FUEL LEAK WAS REPORTED TO HAVE CONTAMINATED THE SOURCE AT ONE TIME. REPORTEDLY CAUSED BY THE WELL PUMP ENGINES. NO SPECIFICS WERE IMMEDIATELY AVAILABLE.

- NYSDEC HAS INSTALLED 2 MONITORING WELLS AROUND THE ~~MONITORING~~ SUPPLY WELL AS A SPILL RESPONSE MEASURE. WELL CONST. LOGS AND ANALYTICAL DATA MAY BE AVAIL. FROM GARY PETERSON, NYSDEC REGION 7, KIRKWOOD. (607 773-7763)

12/4 Spoke w/GHM - well is about 50 feet deep with feeders towards/under the river. The surface water intake is almost directly across the river.

SIGNED

ES D. 12 2/81

ES ENGINEERING-SCIENCE
COMPANIES

MEMORANDUM TO FILE

JOB NO. SY201.10
FILE DESIGNATION Corresp- Phone Memo -Backgroun
DATE 3/13/92 TIME 2^{00}

PHONE CALL FROM George Moreau PHONE NO.
PHONE CALL TO Andy Huery- Binghamton Water Dept PHONE NO. 607 722 7210

CONFERENCE WITH
PLACE

SUBJECT

Ranney well is on North side of River, about 1/4 mile east of Tompkins St. bridge. There are 4 Radials extending from 70 to 130 feet out in South-southeast to south-southwesterly directions. None extend past the floodwall. Well is a back up for city water supply, not in use but could be used. Andy assumes the depths of the radials are on the order of 20 to 25 feet.

Surface water intake is in the embayment on the south side of the River. The concrete structure in the middle of the River is an old intake from when the water works were on the North side of the River.

Records with more info are available in the city engineering department. Tino DiAngelo (sp?) is most knowledgeable person with respect to these records. He was laid off, but may be coming back to work in near future.

GMM

SIGNED

ES D. 12 2/81

FR WATER WELL TECHNOLOGY
M. CAMPBELL.
AVAIL. D. JENKINS.

Early public water supplies in the United States also relied upon shallow "infiltration galleries" for their supply. Notable examples are the city of Des Moines, Iowa, which developed an extensive gallery adjacent to the Des Moines River and the city of Columbus, Ohio, which developed a smaller gallery near the confluence of the Olentangy and the Scioto Rivers at an early date. Many other small communities, such as Pella, Iowa, followed a similar course of action. Unfortunately, these early galleries were limited by several factors. For economic reasons they had to be shallow, usually 25 feet deep or less. Due to shallow depths, these galleries had very little storage and so were directly dependent upon constant flow in the adjacent stream for continual recharge. In addition, as a consequence of their limited depth they were more vulnerable to pollution. As pollution and contamination became an increasing factor, the desirability of water treatment became increasingly apparent. Thus, in many cases galleries were abandoned for either deep wells or a surface supply.

A modern concept of the infiltration gallery was introduced by a geologist, Leo Ranney, in 1933. Ranney had developed a system of horizontal boring of hard rock which met limited success in the production of petroleum from shallow sandstones in southeastern Ohio. He adapted his concept to the production of water from unconsolidated sand and gravel aquifers. The method involves projecting a horizontal screen, or "lateral," and simultaneously extracting fine materials from the gravel aquifer, thereby developing the gravel-pack. By combining this development with certain improvements in the method of installing deep, large diameter caissons by the "open-end" method, "galleries" could be economically installed at depths and capacities previously unattainable.[506]

The first "radial collector well" was installed at London, England, in 1933. The second, following soon thereafter, was installed for the Timken Roller Bearing Company in Canton, Ohio. Both of these were operational for over 35 years. Since that time, hundreds of collector wells have been installed throughout Europe, Asia, and North America. Individual innovations and modifications of the basic design have occurred over the past few years.

Collector Well Design

The typical radial collector well is illustrated in Figure 91. The central caisson is a minimum of 13 feet inside diameter with an 18-inch wall thickness. The typical caisson is between 80 and 130 feet in depth, although much deeper units can be and have been installed.

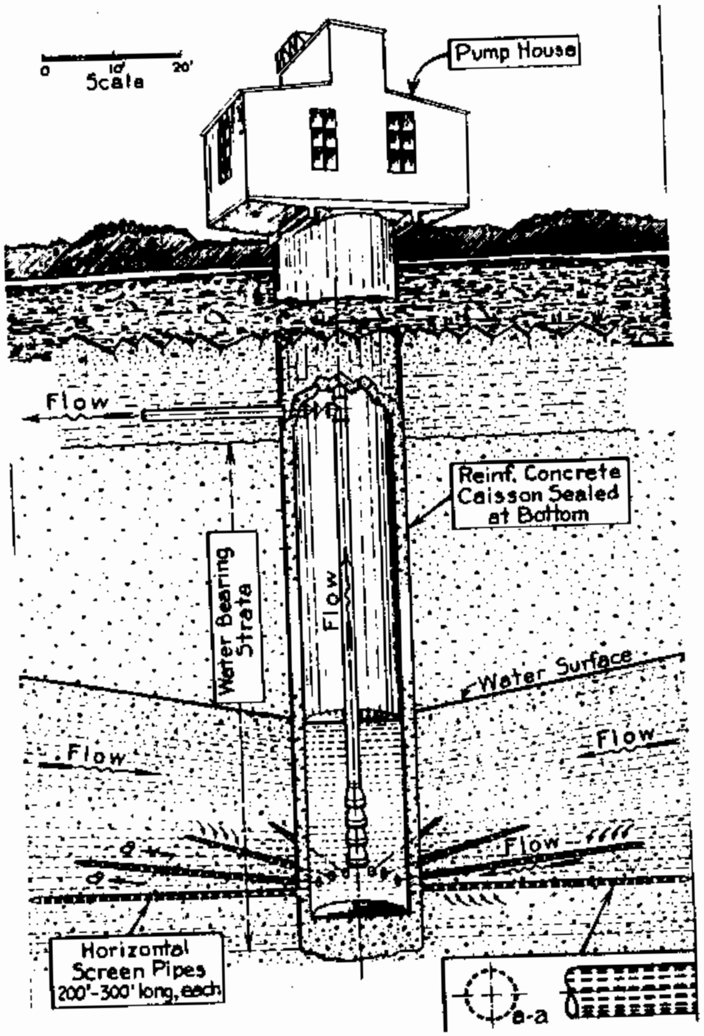


Figure 91 Typical Radial Collector Well (Ranney Water Systems, Inc.)

From near the bottom of the caisson, horizontal screen pipes, o laterals, are projected and developed. The diameter of these horizontal screens normally varies between eight and 24 inches, dependin upon design velocities. Screen entrance velocities are often on th order of one foot per minute, after allowance for partial scree blockage by the gravel present in the aquifer.

The horizontal "laterals" can be projected in either a linear or radia pattern or in a combination of both. If the pattern is linear, th collector well produces ground water with a linear trough or depression that is geometrically analogous to the drawdown produced by a true gallery-type installation.

With a radial projection pattern, the drawdown resulting from production resembles the cone of depression of a standard vertical well with a diameter equal to between 60 and 80 percent of the total span of the laterals but with a slight "nosing" or "mounding" of water between laterals. This mounding is particularly noticeable at the outer extremities of the laterals.

Collector Well Potential

Thus, a collector well in an unconfined aquifer, with no adverse boundary conditions (with laterals averaging 240 linear feet in length in a radial distribution), can be expected to produce water at a rate equivalent to a vertical well with a diameter of [(2 x 240) + 16] x 0.80, or 397 feet. Obviously many factors enter into this comparative consideration. Lateral lengths may range to 300 feet or more. (See Figure 92.)

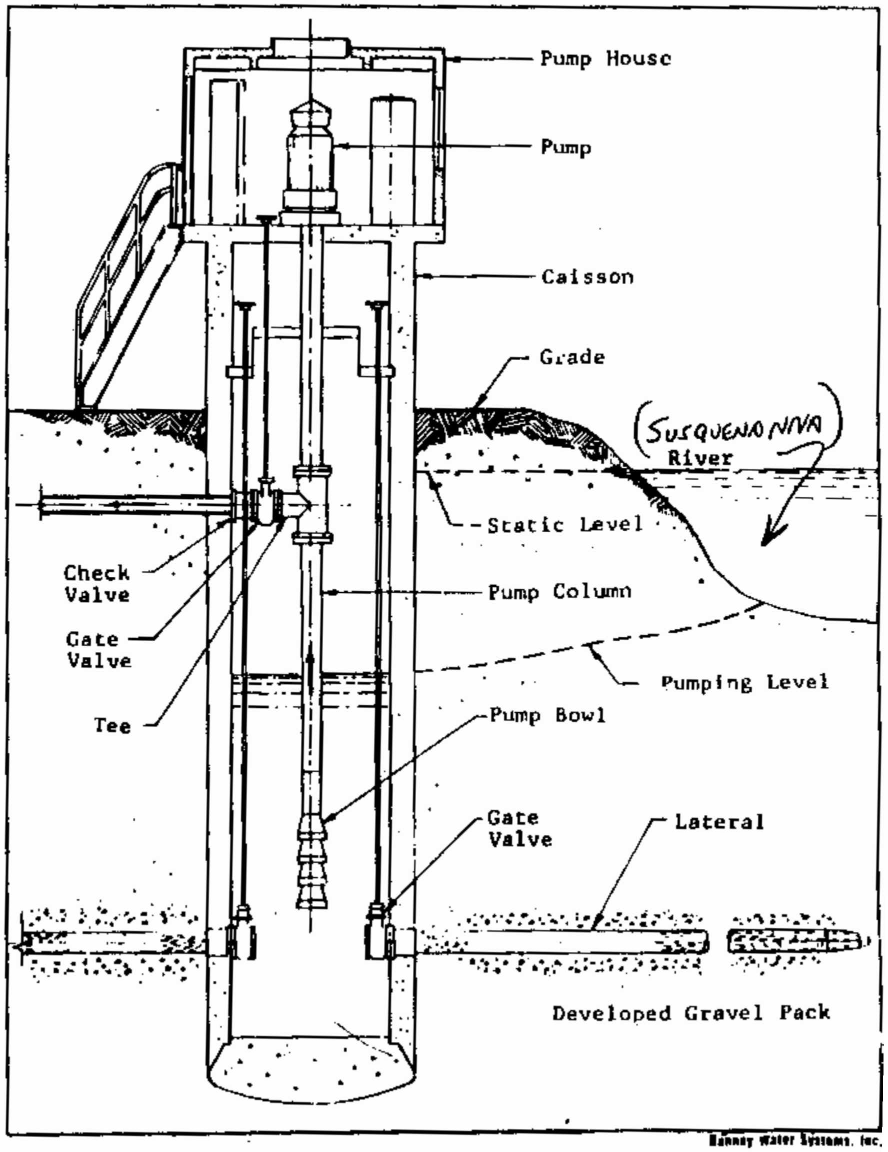
Collectors can be utilized to their maximum advantage when installed adjacent to a surface recharge source.[448] With laterals installed in a semi-radial pattern toward or beneath the surface recharge source, optimum conditions exist for inducing infiltration.

Capacities of collector wells have ranged from 700 gpm to 21,000 gpm, the variation resulting entirely from aquifer characteristics and well design.[247]

In general, the capital cost of a collector well system is similar to the capital cost of a comparably designed vertical well system. Over the past 20 years, amortized costs have averaged slightly less than one cent per thousand gallons of water produced, and the total costs of water to the wellhead including maintenance and lifting costs have averaged just under three cents per thousand gallons. (T. Bennett, pers. com.)

Principal advantages of the collector well systems are as follows:

(1) Favorable capital cost.
(2) Increased pump efficiency resulting in lower lifting costs.
(3) Minimal maintenance due to extremely low screen velocities.
(4) Ease of operation due to centralization of all pumping equipment and controls.
(5) Some degree of quality control due to individual operation of each lateral.
(6) Ability to completely dewater the entire aquifer due to the horizontal installation of the screens at the bottom of the aquifer.
(7) Safety and indestructibility of the supply.



Ranney Water Systems, Inc.

Figure 92 Section of the Radial Collector Well.

Principal disadvantages of collector well installations are as follows:

(1) Inadequate evaluation of recharge prior to construction resulting in declining water levels under conditions of long term heavy pumping.
(2) Increased potential for plugging of intake laterals due to corrosion/incrustation by products.
(3) Difficulty in well development.

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. 54201
FILE DESIGNATION Phone Memo
DATE 12/4/91 TIME

PHONE CALL FROM George Moran PHONE NO.
PHONE CALL TO Gary Peterson NYSDEC Kirkwood PHONE NO. 607 773 7763

CONFERENCE WITH
PLACE

SUBJECT

Gary indicated he recalled the diesel fuel leak problem in the Binghamton Conway Well occurred a couple of years ago. NYSDEC installed monitoring wells, found no contamination, and determined there was no outside source of contamination affecting the well. Gary's feeling is a tank inside the pump house leaked and went directly into the well.

Gary didn't know what the magnitude of the spill was but said it had to be less than 275 gallons because that was the size of the storage tank. He indicated there was a layer of oil on top of the water in the well at one time. He feels the case is closed and his office is not following up any further.

SIGNED

APPENDIX A

HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

The purpose of this health and safety plan is to establish personnel protection standards and mandatory safety practices and procedures for field investigation efforts. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at hazardous waste sites.

The provisions of the plan are mandatory for all on-site personnel. All ES personnel shall abide by this plan. Health and Safety plans must be prepared by subcontractors and they must conform to this plan as a minimum. Alternately, subcontractor personnel may choose to abide by the provisions of the ES plan. All personnel who engage in project activities must be familiar with this plan and comply with its requirements; these personnel must sign-off on the Plan Acceptance Form (Appendix A) prior to beginning work on the site. The plan acceptance form must be submitted to the Office Health and Safety Officer.

1.2 Site Description

Refer to Section 2 of the project work plan.

1.3 Scope of Work

Field tasks to be conducted at the site may include sampling of one or all of the following: surface water/sediment, surface soil, and/or indoor air monitoring.

1.4 Project Team Organization

Table 1 describes the responsibilities of all on-site personnel associated with this project. The names of principal on-site personnel associated with this project are delineated below:

Project Manager: G.H. Moreau

Field Team Leader: To be assigned

Site Health and Safety Officer: To be assigned

2. RISK ANALYSIS

2.1 Chemical Hazards

Potential contaminants which may be encountered while conducting field tasks at the site include heavy metals, polycyclic aromatic hydrocarbons (PAHs), volatile organics, and cyanide. Some relevant properties of these compounds are shown in Table 1. For protection against exposure to heavy metals, dust generation should be minimized. To minimize exposure to PAHs, dust generation should be minimized and disposable latex gloves will be worn. Direct contact with suspected wastes will be avoided.

In addition to the compounds which may be detected on site, some of the solvents used in the processing of samples are potentially hazardous to human health if they are not used properly. Decontamination solvents will not be used on-

TABLE 1

CHARACTERISTICS OF CHEMICALS WHICH MAY BE DETECTED ON SITE

Compound	Method of Detection	Exposure Limit	IDLH	LEL	Odor Threshold
Benzene	PID(1)/CT(2)	1 ppm	2,000 ppm	1.3%	1-100 ppm
Cyanides	CT	5 mg/m3	50 mg/m3	NC(3)	NR(4)
1,2-Dichloroethylene	PID	200 ppm	4,000 ppm	9.7%	275 ppm
Lead	NA(5)	0.15 mg/m3	NR	NR	NR
PAHs	NA	0.2 mg/m3	400 mg/m3	NR	No
PCBs (54% Chlorine)	NA	0.5 mg/m3	5 mg/m3	NC	NR
Trichloroethylene	PID	50 ppm	1,000 ppm	11%	10-120 ppm
Vinyl Cloride	PID/CT	1 ppm6	NR	3.6%	>1,000 ppm
Zinc (Zinc Oxide Dust)NA		5 mg/m3	NR	NR	NR

(1) Photoionization Detector

(2) Colorimetric Tube

(3) Not combustible.

(4) Not reported

(5) None Available

(6) Value is an ACGIH TLV.

site since only dedicated sampling apparatus will be used. Material Safety Data Sheets for these sample processing compounds are included in Appendix B. Some or all of these compounds may be used in the tasks to be performed at the site.

2.2 Physical Hazards

2.2.1 Heat Stress

The use of protective equipment, if required, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 70°F or above. Table 2 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excess heat, one or more of the following techniques will be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) Index from American Conference of Governmental Industrial Hygienist (ACGIH) TLV Booklet can be used.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
- If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
- If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third.
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
- If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
- If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
- Do <u>not</u> permit a worker to wear a semipermeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

2.2.2 Prevention of Heat Stress

Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.

TABLE 2

SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATIZED WORKERS[a]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F -90°F (30.8° - 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°F -87.5°F (28.1° - 30.8°C)		After each 60 minutes of work
77.5°F -82.5°F (25.3° - 28.1°C)		After each 90 minutes of work
72.5°F -77.5°F (22.5° - 25.3°C)		After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour.

[b] Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x 5 sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

[c] A normal ensemble consists of cotton overalls or other cotton clothing with long sleeves and pants.

  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature 50° to 60°F (10° to 16.6°C).
  - Provide small disposable cups that hold about four ounces (0.1 liter).
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat related illness.

2.2.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite.

<u>Hypothermia.</u> Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

<u>Frostbite.</u> Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

2.2.4 Prevention of Cold Related Illness

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors:
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Develop the capability for temperature recording at the site.
- Assure the availability of warm drinks.

Monitoring

Start (oral) temperature recording a the job site:

- At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation).
- As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

3. PERSONNEL PROTECTION AND MONITORING

3.1 Medical Surveillance

Engineering-Science will utilize the services of a licensed occupational health physician with knowledge and/or experience in the hazards associated with the project to provide the medical examinations and surveillance specified herein.

Personnel involved in this operation have undergone medical surveillance prior to employment at ES, and thereafter at 12-month intervals. The 12-month medical examination includes a complete medical and work history and a standard occupational physical, examination of all major organ systems, complete blood count with differential (CBC), and a SMAC/23 blood chemistry screen which includes calcium, phosphorous, glucose, uric acid, BUN, creatinine, albumin, SGPT, SGOT, LDH, globulin, A/G ratio, alkaline phosphates, total protein, total bilirubin, triglyceride, cholesterol, and a creatinine/BUN ratio. Additionally a pulmonary function test will be performed by trained personnel to record Forced Vital Capacity (FVC) and Forced Expiratory Volume in second ($FEV_{1.0}$). An audiogram and visual acuity measurement, including color perception, is provided. The medical exam is performed under the direction of a licensed Occupational Health Physician. A medical certification as to the fitness or unfitness for employment on hazardous waste projects, or any restrictions on his/her utilization that may be indicated, is provided by the physician. This evaluation will be repeated as indicated by substandard performance or evidence of particular stress that is evident by injury or time loss illness on the part of any worker.

3.2 Site Specific Training

The Site Health and Safety Officer will be responsible for developing a site specific occupational hazard training program and providing training to all ES personnel that are to work at the site. This training will consist of the following topics:

- Names of personnel responsible for site safety and health.
- Safety, health, and other hazards at the site.
- Proper use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds at the site.
- Decontamination procedures.

3.3 Personal Protective Equipment and Action Levels

3.3.1 Conditions for Level D

Level D protection will be worn for initial entry on-site and initially for all activities. Level D protection will consist of:

- Coveralls
- Safety boots
- Nitrile outer and PVC inner gloves (must be worn during all sampling activities)
- Hard hat (must be worn during drilling activities)
- Splash goggles (must be worn if a splash hazard is present)
- 5-minute escape SCBA

3.3.2 Conditions for Level C

If any exposure limit is exceeded the personel will retreat.

3.4 Monitoring Requirements

Monitoring for organic vapors in the breathing zone will be conducted with a Photovac-TIP II photoionization detector. A Draeger bellows equipped with the appropriate tubes will be used to monitor for cyanide. Readings will be taken under the following circumstances.

- Upon initial entry onto the site.
- When weather conditions change.

- When work begins on another portion of the site.

Specific monitoring for carcinogenic compounds, namely vinyl chloride and benzene, will not be conducted because of the remote chance that these compounds could be present in significant quantity. Because of the volatility of these compounds, the long period of time (50+ years) since MGP operations ceased, and the fact that only non-intrusive sampling will be practiced, no measurable quantity of these compounds is expected. Furthermore, the subsurface structures in which air will be sampled are distant from the site of actual plant operations. Specific monitoring for vinyl chloride, benzene or other compounds is therefore not considered necessary beyond normal PID screening.

4. WORK ZONES AND DECONTAMINATION

4.1 Site Work Zones

To reduce the spread of hazardous materials by workers from the contaminated areas to the clean areas, zones will be delineated at the site. The flow of personnel between the zones should be controlled. The establishment of the work zones will help ensure that personnel are properly protected against the hazards present where they are working, work activities and contamination are confined to the appropriate areas, and personnel can be located and evacuated in an emergency.

4.1.1 Exclusion Zone

Exclusion zones will be established at the site during any activity when Level C protection is established as a result of conditions discussed in Section 3. Unprotected onlookers should be located 50 feet upwind of drilling or soil sampling activities. In the event that volatile organics are detected in the breathing zone as discussed in Section 3, all personnel within the exclusion zone must don Level C protection.

All personnel within the exclusion zone will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the exclusion or decontamination zones.

4.1.2 Decontamination Zone

Should it be necessary to establish an exclusion zone, the decontamination zone will be utilized. This zone will be established between the exclusion zone and the support zone, and will include the personnel and equipment necessary for decontamination of equipment and personnel (discussed below). Personnel and equipment in the exclusion zone must pass through this zone before entering the support zone. This zone should always be located upwind of the exclusion zone.

4.1.3 Support Zone

The support zone will include the remaining areas of the job site. Break areas, operational direction and support facilities (to include supplies, equipment storage and maintenance areas) will be located in this area. No equipment or personnel will be permitted to enter the support zone from the exclusion zone without passing through the personnel or equipment decontamination station. Eating, smoking, and drinking will be allowed only in this area.

4.2 Decontamination

Due to the low level of contaminants expected, any water used will be disposed of on-site.

4.2.1 Decontamination of Personnel

Decontamination will not be necessary if only Level D protection is used. However, disposable gloves used during sampling activities should be removed and bagged; personnel should be encouraged to remove clothing and shower as soon as is practicable at the end of the day. All clothing should be machine-washed. All personnel will wash hands and face prior to eating and before and after using the restroom.

4.2.2 Decontamination of Equipment

Only dedicated sampling equipment will be used at each site (i.e. decontamination of equipment will not take place on-site, enough sampling equipment will be utilized to collect all samples in a single round of sampling).

Equipment decontamination will take place off-site and will consist of steam cleaning or successive rinses of clean water, alconox solution, clean water, methanol and clean water.

5. SAMPLE SHIPMENT

Samples collected in this study, with the exception of any drum samples, tank samples, or other concentrated wastes, will be classified as research samples. In general, samples collected from streams, ponds, or wells and are not expected to be grossly contaminated with high levels of hazardous materials.

The sample tag will be legibly written and completed with an indelible pencil or waterproof ink. The information will also be recorded in a log book. As a minimum, it will include:

- Exact location of sample
- Time and date sample was collected
- Name of sampler witnesses (if necessary)
- Project codes, sample station number, and identifying code (if applicable.
- Type of sample (if known)
- Tag number (if sequential tag system is used)
- Laboratory number (if applicable)
- Any other pertinent information (CFR 40 261.4)

Info to accompany samples:

1) Sample collectors name, address, phone

2) Laboratory name, address, phone
3) Quantity of sample
4) Date of shipment
5) Description of sample, (ie) Research sample-soil, Research sample-water

5.1 Environmental Samples

Environmental samples will be packaged and shipped according to the following procedure:

Packaging

1. Place sample container, properly identified as research samples and with a sealed lid, in a polyethylene bag, and seal bag;
2. Place sample in a fiberboard container or metal picnic cooler which has been lined with a large polyethylene bag.
3. Pack with enough noncombustible, absorbent, cushioning material to minimize the possibility of the container breaking.
4. Seal large bag.
5. Seal or close outside container

Marking/Labeling

Sample containers must have a completed sample identification tag and the outside container must be marked "Research Sample". The appropriate side of the container must be marked "This End Up" and arrows should be drawn accordingly. No DOT marking labeling is required.

Shipping Papers

No DOT shipping papers are required.

Transportation

There are no DOT restrictions on mode of transportation.

5.2 Hazardous Samples

Drum samples, tank samples, sludge samples, and grossly contaminated soil samples will be shipped as DOT Hazardous Materials. The designation "Flammable Liquid" or "Flammable Solid" will be used. The samples will be transported as follows:

1. Collect sample in a 16-ounce or smaller glass or polyethylene container with nonmetallic teflon-lined screw cap. Allow sufficient air space (approximately 10% by volume) so container is not liquid full at 54 °C (130 °F). If collecting a solid material, the container plus contents should not exceed 1 pound net weight. if sampling for volatile organic analysis, fill VOA container to septum but place the VOA container inside a 16-ounce or smaller container so the required air space may be provided. large quantities, up to 3.786 liters

(1 gallon), may be collected if the sample's flash point is 23 °C (75 °F) or higher. In this case, the flash point must be marked on the outside container (e.g., carton, cooler), and shipping papers should state that "Flash point is 73 °F or higher."

2. Seal sample and place in a 4-mil-thick polyethylene bag, one sample per bag.
3. Place sealed bag inside a metal can with noncombustible, absorbent cushioning material (e.g., vermiculite or earth) to prevent breakage, one bag per can. Pressure-close the can and use clips, tape or other positive means to hold the lid securely.
4. Mark the can with:

   Name and address of originator

   "Flammable Liquid N.O.S. UN 1993"

   (or "Flammable Solid N.O.S. UN 1325)

   NOTE: UN numbers are now required in proper shipping names.

5. Place one or more metal cans in a strong outside container such as a picnic cooler or fiberboard box. Preservatives are not used for hazardous waste site samples.
6. Prepare for shipping:

   "Flammable Liquid, N.O.S. UN 1993" or "Flammable Solid, N.O.S. UN 1325"; "Cargo Aircraft Only (if more than 1 quart net per outside package); "Limited Quantity" or "Ltd. Qty."; "Laboratory Samples"; "Net Weight ~" or "Net Volume ~" (of hazardous contents) should be indicated on shipping papers and on outside of shipping container. "This Side Up" or "This End Up" should also be on container. Sign shipper certification.

7. Stand by for possible carrier requests to open outside containers for inspection or modify packaging. It is wise to contact carrier before packing to ascertain local packaging requirements and not to leave area before the carrier vehicle (aircraft, truck) is on its way.

6. ACCIDENT PREVENTION AND CONTINGENCY PLAN

6.1 Accident Prevention

All field personnel will receive health and safety training as required by 29 CFR 1910.120 prior to the initiation of any site activities. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, regular meeting should be held. Discussion should include:

- Tasks to be performed.
- Time constraints (e.g., rest breaks, cartridge changes).

- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals.
- Emergency procedures.

6.2 Contingency Plan

6.2.1 Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site.
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures, and specific procedures for personal injury and chemical exposure, are described in the health and safety plan.

6.2.2 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Office Health and Safety Representative. The Site Health and Safety Officer or Field Team Leader is responsible for completing the accident report.

6.2.3 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- Another team member (buddy) should signal the Field Team Leader that an injury has occurred.

- A field team member trained in first aid can administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- For less severe cases, the individual can be taken to the site dispensary.
- The Field Team Leader or Site Health and Safety Officer is responsible for making certain that an accident report form is completed. This form is to be submitted to the Office Health and Safety Representative. Follow-up action should be taken to correct the situation that caused the accident.

6.2.4 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedure by signalling to leave the site.
- All personnel in the work area should evacuate the area and meet in the common designated area.
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately.
- Further instruction will then be given by the Field Team Leader.

6.2.5 Procedures Implemented in the Event of a Major Fire, Explosion, or On-Site Health Emergency Crisis

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;
- Complete accident report for and distribute to appropriate personnel.

APPENDIX B

QUALITY ASSURANCE PLAN

QUALITY ASSURANCE PROJECT PLAN

for the

PRIORITIZATION OF FORMER MANUFACTURED GAS PLANT SITES

Prepared For

NEW YORK STATE ELECTRIC AND GAS CORPORATION

JULY 1991

Prepared by

ENGINEERING-SCIENCE, INC.
290 ELWOOD DAVIS ROAD, SUITE 312
LIVERPOOL, NEW YORK 13088

SECTION 1

TITLE PAGE

QUALITY ASSURANCE PROJECT PLAN
for the
PRIORITIZATION OF FORMER MANUFACTURED GAS PLANT SITES

Prepared for

NEW YORK STATE ELECTRIC AND GAS CORPORATION

Prepared By:

ENGINEERING-SCIENCE
290 ELWOOD DAVIS ROAD, LIVERPOOL, NY 13088

CLIENT: New York State Electric and Gas

LOCATION: Binghamton, New York

SECTION 2

TABLE OF CONTENTS

TABLE OF CONTENTS-CONTINUED

TABLE OF CONTENTS-CONTINUED

LIST OF TABLES

LIST OF FIGURES

SECTION 3

PROJECT DESCRIPTION

3.1 INTRODUCTION

NYSEG wishes to take a responsible approach in addressing threats associated with past MGP operations by undertaking a site evaluation and prioritization program to identify and rank current threats posed by former MGP sites. This program will involve data compilation, field sampling and inspection at the sites, followed by application of a site ranking model developed by the Electric Power Research Institute (EPRI). The field sampling program will be focused on characterizing and, to the extent possible, quantifying direct exposure pathways at the site. The data developed as a result of this field program will provide the necessary inputs to the EPRI-developed Site Screening and Priority Setting (SSPS) system. This computer-based ranking system will provide a quantitative measure of the current risks posed by the site and this will provide a relative ranking of the need for further detailed evaluation or remediation at the site.

3.2 OBJECTIVES

The scope of work for each site will include a technical and management effort developed to meet the following objectives:

- Determine if there is any imminent threat to human health or environment.
- Establish a relative ranking of former MGP sites.

3.3 SCOPE OF WORK

The scope of work consists of a program preparation part, incorporating preparation of program-wide planning documents such as this Quality Assurance Project Plan (QAPP) and Health and Safety Plan (subsequently modified to address site specific conditions), and five other parts. The five individual parts to be completed at each site are as follows:

Part 1 - Literature and Records Search
Part 2 - On-Site Evaluation
Part 3 - Site Survey and Mapping
Part 4 - Sampling and Analysis
Part 5 - Report Preparation

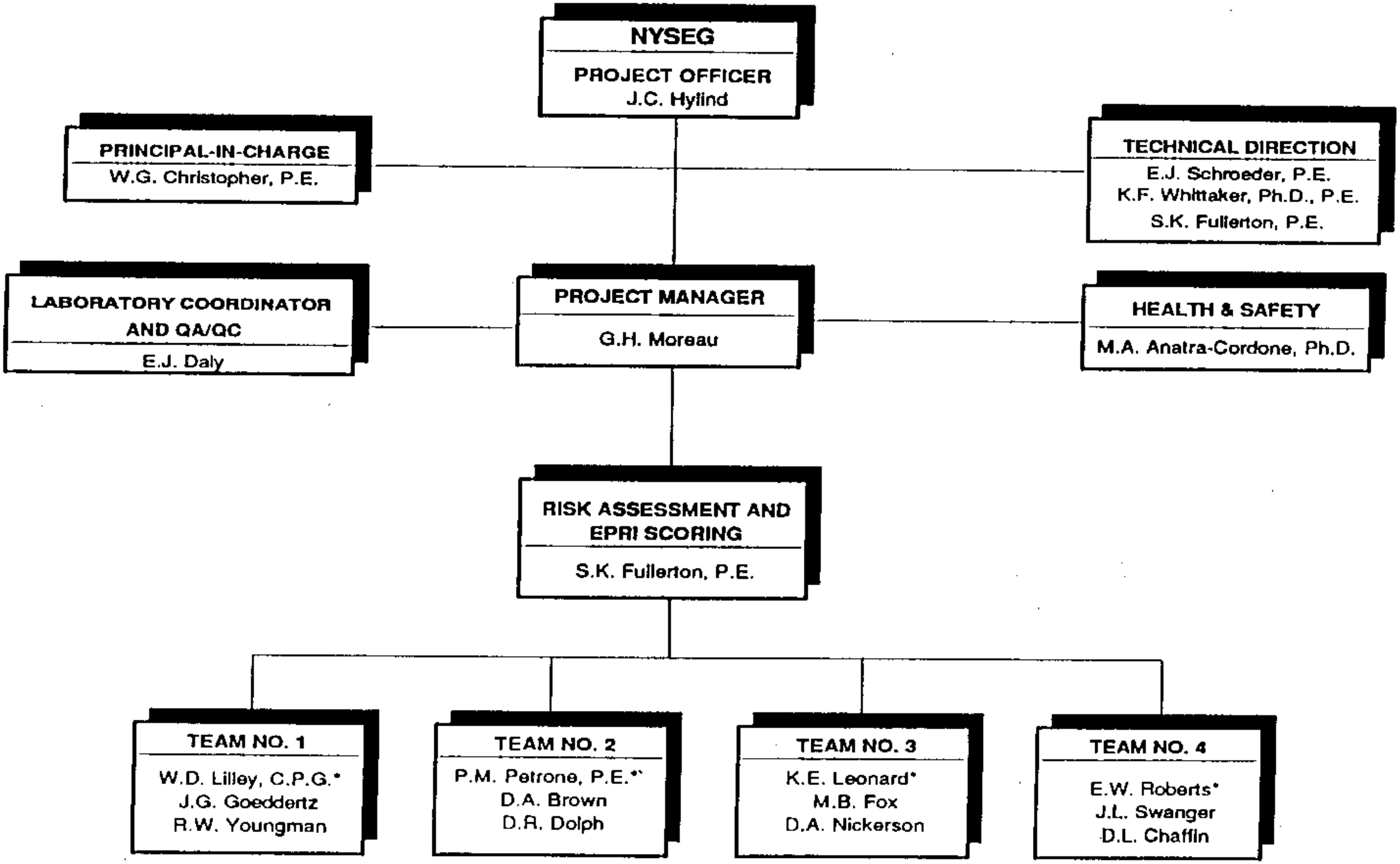
These five parts are described in the project Work Plan which also provides site-specific information for the Court Street, New York site. The site specific information includes information on the site location, size, history, and the number, location, and rationale for collection of samples.

SECTION 4

PROJECT ORGANIZATION

The organization of the project management team and areas of responsibility are shown in Figure 4.1. Specific responsibilities for each key member of the project management team are described in the Management Plan for the project which is available in ES files.

PROJECT ORGANIZATION



* - TEAM LEADER

FIGURE 4.1

SECTION 5

QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

The quality assurance/quality control objectives for all measurement data include representativeness, completeness, comparability, precision, and accuracy. The QA objectives for each of these areas in relation to the operation of field instrumentation are summarized on Table 5.1. Quality Assurance Procedures for the field instruments are presented in Table 5.2. QA objectives related the laboratory chemical analysis are discussed below.

5.1 REPRESENTATIVENESS

Samples taken must be representative of the population, and where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Sampling devices will be precleaned before entering a site by steam cleaning or by rinsing successively with Alconox detergent/water, tap water, methanol and a final rinse with distilled water.

Two types of field "blanks" will be collected at each site and submitted to the laboratory for analysis as follows:

> Trip Blank - A trip blank will be prepared by the laboratory before the sample bottles are sent to the site. It consists of a sample of deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included at each site where sampling and analysis of aqueous samples for TCL volatiles is planned. The trip blank will be analyzed for TCL volatile organic compounds as a measure of the internal laboratory procedures and shipping effects on the sample integrity.
>
> Field Duplicate - A duplicate surface water will be collected, and will be analyzed for the same parameters as the other surface water samples to measure the representativeness of the sampling methods.
>
> Matrix Spike/Matrix Spike Duplicate (MS/MSD) - One MS/MSD will be collected each of surface water and surface soil, and will be analyzed for the same parameters as the other samples to allow the laboratory to identify analytical interferences caused by the sample matrix.

All samples will be packed with ice in coolers and shipped via overnight delivery to the analytical laboratory.

TABLE 5.1

QA OBJECTIVES FOR FIELD INSTRUMENTS

	Parameter			
Objective	**pH**	**Temperature**	**Specific Conductivity**	**Photovac Tip**
Precision(1)	0.1 units	0.1 Degree	±15%	1 ppm
Accuracy scale	±0.05 units	0.5 Degree	±5% of Standard	±1% of the meter
Completeness	90%	90%	90%	90%
Representativeness	Field measurement of field blanks and duplicates(2)			
Comparability	Field measurement of duplicate samples(2)			

(1) Precision will be evaluated by calcuation and comparison of standard deviation.

(2) One duplicate sample per site.

TABLE 5.2
QUALITY ASSURANCE PROCEDURES FOR FIELD ANALYSIS AND EQUIPMENT

Parameter	General	Daily	Quarterly
1. pH Electrode Method	Enter the make, model, serial and/or ID number for each meter in a log book.	1. Calibrate the system against standard buffer solution of known pH value at the start of a sampling run. 2. Periodically check the buffers during the sample run and record the data in the log sheet or book. 3. Be on the alert for erratic meter response arising from weak batteries, cracked electrode, fouling, etc. 4. Check response and linearity following highly acidic or alkaline samples. Allow additional time for equilibration. 5. Check against the closest reference solution each time a violation is found. 6. Rinse electrodes thoroughly between samples and after calibration. 7. Recalibrate after every 5 to 10 samples or after very high or low readings.	Take all meters to the laboratory for maintenance, calibration and quality control checks.

TABLE 5.2--CONTINUED
QUALITY ASSURANCE PROCEDURES FOR FIELD ANALYSIS AND EQUIPMENT

Parameter	General	Daily	Quarterly
2. CONDUCTIVITY	Enter the make, model, serial and/or ID number for each meter in a log book.	1. Standardize with KCl standards having similar specific conductance values to those anticipated in the samples. Calculate the cell constant using two different standards. Cell Constant $= \frac{\text{Standard Value}}{\text{Actual Value}}$ Specific Conductance = Reading multiplied by Cell Constant 2. Rinse cell after each sample to prevent carryover. 3. Recalibrate after very high or low readings or after every 5 to 10 samples.	1. Take all meters to lab for maintenance, calibration and quality control checks. 2. Check temperature compensation. 3. Check date of last platinizing and replatinize if necessary. 4. Analyze NBS or EPA reference standard and record actual vs. observed readings in the log.
3. TIP-II*	Enter make, model and serial number for each instrument in a log book.	1. Zero instrument with span knob set on "5" well upwind of site. 2. Fill calibration bag and calibrate instrument with 100 ppm isobutylene. 3. If "low bat" indicator appears, recharge 16 hours. 4. Recalibrate at mid-day and at the end of the day.	Take all instruments to the laboratory for maintenance, calibration, and quality control checks.

*Total ionizables present.

Adapted from "Handbook for Sampling and Sample Preservation of Water and Wastewater," EPA 600/4-82-029, September 1982.

5.2 COMPLETENESS

The analyses performed must be appropriate and inclusive. The parameters selected for analysis were chosen to meet the objectives of the study.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. The project objectives are to achieve 95% completeness for laboratory data and 90% for field data.

5.3 COMPARABILITY

Consistency in the acquisition, preparation, handling, and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To ensure the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by USEPA-approved methods. The method-specific holding times for various analyses will be strictly adhered to.

5.4 PRECISION AND ACCURACY

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used may include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), calorimetry, atomic absorption spectroscopy (AAS), and gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control.

The requirements of QA/QC are both method-specific and matrix-dependent. The procedures to be used are described on this basis in Sections 8 and 11. The number of duplicate, spiked, and blank samples analyzed will be dependent upon the total number of samples of each matrix to be analyzed.

Quality assurance audit samples will be prepared and submitted by the laboratory QA manager when required by the analytical method. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. The lower end of the analytical range for most analyses is generally accepted to be five times the detection limit. At or above this level, the determination of spike recoveries for metals in water samples will be expected to range from 75 to 125 percent. The recovery of organic surrogate compounds and matrix spiking compounds determined by GC/MS will be compared to the guidelines for recovery of individual compounds as established by the applicable USEPA method protocol.

The quality of results obtained for inorganic ion parameters will be assessed by comparison of QC data with laboratory control charts for each test as applicable.

SECTION 6

SAMPLING PROCEDURES

6.1 INTRODUCTION

Representative sampling of surface water, sediment, surface soil, and air will be conducted as described in the project work plan. The sampling program has been developed for these investigations to provide data necessary to identify and determine if any imminent health hazard exists from migration of contamination or contact with contaminated media. All samples will be handled in accordance with the site-specific Health and Safety Plan and this Quality Assurance Project Plan.

The number of samples collected, the type of container and the sample preservation method depends upon the sample matrix and the analytical parameters desired. The required sample preservation and analytical holding times for water and soil samples will be consistent with those required by the USEPA methods. These holding times, unless otherwise noted, apply to verified time of sample receipt by the analytical laboratory.

The necessary sample containers and preservatives will be provided by the laboratory. Water samples for volatile organic analysis will be collected in glass vials with no air bubbles remaining. Sample labels will be affixed to all containers to identify the sample identification number, the date of collection and any sample preservatives.

After the bottles for a given sample location have been filled, they will be placed in a shipping cooler. Samples requiring cooling (4°C) will be covered with crushed ice in plastic bags or ice packs. Containers will be packed carefully in the cooler to prevent breakage. Each cooler will then be sealed for overnight shipment to the laboratory.

A chain of custody record will be filled out and shall accompany each sample to provide documentation and to track sample possession. Chain of custody procedures are discussed in Section 7.

The following parameters will be measured in the field for water samples: pH, temperature and specific conductivity. Temperature will be measured immediately upon sample collection, as it is subject to the most rapid change. Conductivity and pH will be measured with electronic probes, which will be rinsed with distilled water between each sample.

6.2 SURFACE WATER SAMPLES

Surface water samples will be collected directly into the appropriate sample bottle or into a teflon dipper jar, a Wheaton grab sampler or other sampling apparatus, as appropriate for the site. The equipment will be decontaminated before entering the site with Alconox detergent/water, tap water, methanol and a final rinse with distilled water.

Prior to filling sample bottles, a beaker is filled with the surface water sample. The sample is immediately analyzed for the field parameters, using precalibrated equipment. The water will be discarded and will not be introduced into a sample collection bottle. During the sampling and field testing, Field Surface Sampling Records (Figure 6.1) will be completed. Surface water samples upgradient or upstream will be collected first. The person sampling the surface water shall take care to collect a sample upstream of where he/she is standing so that water quality is not disturbed by wading.

6.3 SEDIMENT SAMPLES

The sediment samples will be collected from the upper six inches of the stream or lake bed using a clean stainless steel spoon or ponar dredge where water is too deep for wading. Rocks and vegetative material will be discarded. Care will be exercised to avoid losing the fine materials which tend to disperse when disturbed. The supernatant, or native water, on top of the final sample will not be removed. An upgradient sediment sample will be collected at the site.

The sampling equipment will be rinsed prior to entering the site and before each sample is acquired with Alconox detergent/water, tap water, methanol and finally distilled water.

6.5 WASTE SAMPLES

Waste samples will be obtained if encountered. Waste sampling will enable direct comparison of soil and water samples to potential source materials. Sample acquisition and test methods for solid and semi-solid waste materials will consist of the same analyses as those described for soil matrix samples.

6.5 AIR QUALITY MONITORING

Air quality monitoring for organic vapors with a Photovac Tip II photoionization detector will be implemented at each location, before, during, and after sampling. The purpose of air quality monitoring is three-fold: 1) to determine whether the use of respirators is needed while on-site, 2) to locate potential "hot-spots" from which vapors may emanate, and 3) to provide evidence regarding the locations of the areas of high contamination.

FIGURE 6.1

FIELD SURFACE SAMPLING RECORD

Site ______________________ Site No. __________ Date: __/__/__

Samplers: ______________________ of ______________________
______________________ of ______________________

SAMPLING: Time __________ ____ a.m.
____ p.m.

Sample Type: ______________________

Sampling Method: ______________________

Depth of Sample: ______________________

Description of Sampling Point:
Drainage Direction: ______________________
Upstream From: ______________________
Downstream From: ______________________
Physical Appearance/Odor: ______________________
____
Wildlife Observed: ______________________

Sampling Description:
Suspended Matter: ______________________
Color/Stain: ______________________
Odor: ______________________
Other: ______________________
Texture: ______________________
Analyze for: ______________________

Retrigerated: Date: __/__/__ Time ____ a.m.
____ p.m.

Field Tests:
Temperature (C°/°F) __________ Weather __________
pH __________ __________
Conductivity __________ __________

Comments: ______________________
____

SECTION 7

SAMPLE CUSTODY

The program for sample custody and sample transfer is in compliance with the applicable USEPA methods. Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples is minimized.

On-site monitoring data will be controlled and entered in permanent log books. Personnel involved in the chain-of-custody and transfer of samples will be trained in the proper procedures prior to implementation.

7.1 FIELD SAMPLE CUSTODY

Sample custody and documentation procedures described in this section will be followed throughout all project sample collection efforts. Components of sample custody procedures include the use of field log books, sample labels and chain-of-custody forms.

7.1.1 Field Log Books

The Project Manager will control all field log books. Each field log book will receive a serialized number and be issued to the field team leader. Field log books will be maintained by the field team leader and other team members to provide a daily record of significant events, observations, and measurements during the field investigation. All entries will be signed and dated.

All information (except chain-of-custody forms) pertinent to field survey and sampling activities will be recorded in the log books. The books will be bound with consecutively numbered pages. Entries in the log book, supplemented by the sampling records, will include at a minimum the following information:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity.
- Purpose of sampling activity.
- Location of sampling activity.
- Name and address of field contact.
- Name and title of field crew.
- Name and title of any site visitors.
- Sample media (e.g., soil, sediment, ground water etc.).
- Sample collection method.
- Number and volume of sample(s) taken.

- Description of sampling point(s).
- Preservatives used.
- Date and time of collection.
- Sample identification number(s).
- Sample distribution (e.g., laboratory).
- Field observations.
- Any field measurements made, such as pH, temperature, conductivity, water level, etc.
- References for all maps and photographs of the sampling site(s).
- Information pertaining to sample documentation such as:
  - Bottle lot numbers
  - Dates and method of sample shipments
  - Chain-of-Custody Record numbers
  - Federal Express (or other carrier) shipment number, location of shipper, and date and time of shipment.

All original data recorded in Field Log Books and Chain-of-Custody Records will be written with waterproof ink. None of these accountable serialized documents will be destroyed.

If an error is made on an accountable document assigned to one individual, that individual will make all corrections simply by crossing a line through the error and entering the correct information. The erroneous information will not be erased. Any subsequent error discovered on an accountable document will be corrected by the person who made the entry. All subsequent corrections will be initialed and dated.

7.1.2 Custody Seals

When sample bottles are shipped to the laboratory, they will be placed in containers sealed with signed custody seals. Clear tape will be placed over the seals to ensure that seals are not accidentally broken during shipment.

7.2 CHAIN-OF-CUSTODY RECORDS

All samples will be accompanied by a chain-of-custody record, an example of which is shown on Figure 7.1. A chain-of-custody record accompanies each sample container from initial selection and preparation at the laboratory, to the field for sample containment and preservation, and through its return to the laboratory. If samples are split and sent to different laboratories, a copy of the chain-of-custody record will be sent with each sample.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
SAMPLERS (Signatures)	

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for lab. by: (Signature)	Date/Time	Remarks	

ENGINEERING-SCIENCE INC.
290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
Telephone: (315) 451-9560

FIGURE 7.

The "remarks" column on this form is used to record specific considerations associated with sample acquisition such as: sample type, container type, and sample preservation methods. The analyses to be performed are written in the diagonal spaces at the top of the form. The number of containers for each type of analysis are written in the appropriate column under the analysis to be performed. When transferring samples, individuals relinquishing and receiving the samples will sign, date and note the time on the record.

The laboratory will maintain one file copy of each record, and the completed original will be returned to the Project Manager. This record will be used to document sample custody transfer from the sampler to a shipper, and to the laboratory.

7.3 SHIPPING OF SAMPLES

Samples will be delivered to the designated laboratory for analysis as soon as practical after collection, and generally within 24 hours of sample collection. Prior to sample shipment, the Field Team Leader (or a designee) will contact the laboratory to inform them of shipments. Shipments will be sent for overnight delivery by common carrier and a bill of lading (such as a Federal Express Airbill) will be used to document sample shipment to the laboratory. Bills of lading will be retained as part of the permanent documentation (as per 40 CFR 261.4).

7.4 LABORATORY SAMPLE CUSTODY

The Project Manager will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample custody program will, at a minimum, meet the following criteria:

- The laboratory will designate a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check the original chain-of-custody and requests for analysis documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody and records the date and time received. Samples are then logged into a data management/sample tracking system.
- Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.

- The samples are stored in a secured area and at a temperature of approximately 4°C if necessary until analyses commence.
- A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
- A copy of the laboratory chain-of-custody form will accompany the analytical report and will become a permanent part of the project records.
- The pH of incoming water samples will be checked by the laboratory when preservatives have been used.

SECTION 8

CALIBRATION PROCEDURES AND FREQUENCY

8.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions, ensuring that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all of the instrument manuals will be maintained on-site by the Field Team Leader. Additional details of instrument calibration and maintenance may be found in Table 5.2.

8.1.1 Portable Photoionization Analyzer

The photoionization analyzer will be a Photovac TIP II, equipped with a 10.6 EV lamp. Calibration procedures are provided in Table 5.2. Calibration will be performed at the beginning and end of each day of use with a standard calibration gas of an approximate concentration of 100 parts per million of isobutylene. If the unit experiences abnormal perturbation or erratic readings additional calibration will be required. All calibration data will be recorded in field notebooks and on calibration log sheets to be maintained on-site.

A battery check will be completed at the beginning and end of each working day. If erratic readings are experienced, the battery will be checked for proper voltage. This information will also be recorded in field notebooks and on the calibration log sheets.

8.1.2 pH Meter

Calibration of the pH meter will be performed at the start of each day of use and as required during the work day as required by this plan. Standard buffer solutions, traceable to the National Institute of Standards and Technology (NIST, formerly the National Bureau of Standards), which bracket the expected pH range will be used. These standards will most likely be pH of 7.0 and 10.0 standard units. The use of the pH calibration and slope knobs will be used to set the meter to display the value of the standard being checked. The calibration data will be recorded in the field book. The meter will be recalibrated after very high (> 10) or very low (< 4) readings.

8.1.3 Specific Conductivity Meter

Calibration checks using the conductivity standard will be performed at the start of each day of use and as required during the work day as required by this plan. The portable conductivity meter will either be calibrated using a reference solution of 0.01 N KCl (specific conductance, 1413 umhos/cm at 25°C) or a calibration resistor on a daily basis. Readings within 5 percent are acceptable. If the unit has a thermometer, it will be calibrated against the field laboratory thermometer on a weekly basis. Specific methods for performing calibration of each of these instruments is provided in Table 5.2 of this plan.

8.2 LABORATORY INSTRUMENTS

Calibration of laboratory equipment will be based on approved, written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records shall be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory shall maintain a factory-trained repair staff with in-house spare parts or shall maintain service contracts with vendors. Calibration procedures and frequencies specified by the USEPA methods have precedence for instrument operation, maintenance, and internal Quality Assurance, unless procedures documented by the analytical laboratory are more stringent than the USEPA methods <u>and</u> are acceptable to USEPA.

SECTION 9

ANALYTICAL PROCEDURES

Sample preparation and analytical procedures shall conform to the applicable USEPA methods. The analytical laboratory proposed for this work is the Engineering-Science, Inc. laboratory in Berkeley, CA. which is a NYSDEC-approved laboratory. Table 9.1 lists the analytical methods.

9.1 VOLATILE ORGANICS (VOA)

For the analysis of water samples for volatile organic compounds (VOCs), no sample preparation is required. A measured portion of the sample is placed in the purge and trap apparatus and the sample analysis is performed by gas chromatography/mass spectrometry, EPA Method 624. Soil samples will be analyzed by Method 8240. The list of volatile organic compounds to be analyzed and the reporting limits to be used by the laboratory is presented in Table 9.2.

9.2 SEMIVOLATILE ORGANIC COMPOUNDS

The extraction procedures used for preparation of water samples for the analysis of semivolatile organic compounds are as described in EPA Method 625. Soil samples will be analyzed by Method 8270. The list of semivolatiles and their reporting limits are presented in Tables 9.3 and 9.4.

The samples will be analyzed as specified in the method. Instrument calibration, compound identification, and quantitation will be performed as described in Section 8 of this document, and in the EPA Method 625.

9.3 METALS

Water, sediment, and soil samples will be analyzed for the metals listed in Table 9.5 and 9.6. The reporting limits for these metals are as also specified in those same tables. The detection limits for individual samples may be higher due to the sample matrix interferences, which will in turn affect the reporting limit. The procedures for these analyses will be as described in the methods referenced on Table 9.1.

TABLE 9.1

SUMMARY OF PROPOSED ANALYTICAL METHODS

Water Matrix	
Volatile Organics	EPA Method 624
Semivolatile Organics	EPA Method 625
Metals:	
Mercury	EPA Method 7470
Lead	EPA Method 7421 (GF)(1)
Chromium	EPA Method 7191 (GF)
Iron, zinc, aluminum, cadmium, antimony, copper, cobalt, manganese, and nickel	EPA Method 200.7 (ICP)(2)
Cyanide (Total and Amenable)	EPA Method 335
Soil and Sediment Matrices	
Volatile Organics	EPA Method 8240
Semivolatile Organics	EPA Method 8270
Metals:	
Mercury	EPA Method 7471
Lead	EPA Method 7421
Chromium	EPA Method 7191
Iron, zinc, aluminum, cadmium, antimony, copper, cobalt, manganese, and nickel	EPA Method 6010
Cyanide (Total and Amenable)	EPA Method 9010

(1) Graphite Furnace Method
(2) Inductively - Coupled Plasma Method

TABLE 9.2

REPORTING LIMITS FOR EPA METHODS 624 (WATER) AND 8240 (SOIL)

Compound	Reporting Limit (ppm)(1)
Chloromethane	0.010
Bromomethane	0.010
Vinyl Chloride	0.010
Chloroethane	0.010
Methylene Chloride	0.005
Acrolein	0.010
Acetone	0.100
Acrylonitrile	0.010
Carbon Disulfide	0.010
Trichlorofluoromethane	0.010
1,1-Dichloroethene	0.005
1,1-Dichloroethane	0.005
trans-1,2-Dichloroethene	0.005
Chloroform	0.005
1,2-Dichloroethane	0.005
2-Butanone	0.100
1,1,1-Trichloroethane	0.005
Carbon Tetrachloride	0.005
Vinyl Acetate	0.050
Bromodichloromethane	0.005
1,2-Dichloropropane	0.005
cis-1,3-Dichloropropene	0.005
Trichloroethene	0.005
Benzene	0.005
Dibromochloromethane	0.005
1,1,2-Trichloroethane	0.005
trans-1,3-Dichloropropene	0.005
2-Chloroethylvinylether	0.010
Bromoform	0.005
2-Hexanone	0.050
4-Methyl-2-pentanone	0.050
Tetrachloroethene	0.005
1,1,2,2-Tetrachloroethane	0.005
Toluene	0.005
Chlorobenzene	0.005
Ethylbenzene	0.005
Styrene	0.005
m/p-Xylene	0.005
o-Xylene	0.005
1,3-Dichlorobenzene	0.005
1,2/1,4-Dichlorobenzene	0.005

(1) Concentrations reported by laboratory in μg/l for water, μg/kg for soil.

TABLE 9.3

REPORTING LIMITS FOR EPA METHOD 625 (WATER)

Compound	Reporting Limit (ppm)[(1)]
N-Nitroso-Dimethylamine	0.010
Phenol	0.010
bis(2-Chloroethyl)ether	0.010
2-Chlorophenol	0.010
1,3-Dichlorobenzene	0.010
1,4-Dichlorobenzene	0.010
Benzyl Alcohol	0.010
1,2-Dichlorobenzene	0.010
2-Methylphenol	0.010
bis(2-chloroisopropyl)Ether	0.010
4-methylphenol	0.010
N-Nitroso-Di-n-Propylamine	0.010
Hexachloroethane	0.010
Nitrobenzene	0.010
Isophorone	0.010
2-Nitrophenol	0.010
2,4-Dimethylphenol	0.010
bis(2-Chloroethoxy)methane	0.010
2,4-Dichlorophenol	0.010
Benzoic Acid	0.050
1,2,4-Trichlorobenzene	0.010
Naphthalene	0.010
4-Chloroaniline	0.010
Hexachlorobutadiene	0.010
4-Chloro-3-Methylphenol	0.010
2-Methylnaphthalene	0.010
Hexachlorocyclopentadiene	0.010
2,4,6-Trichlorophenol	0.010
2,4,5-Trichlorophenol	0.050
2-Chloronaphthalene	0.010
2-Nitroaniline	0.050
Dimethylphthalate	0.010
Acenaphthylene	0.010
2,6-Dinitrotoluene	0.010
3-Nitroaniline	0.050
Acenaphthene	0.010
2,4-Dinitrophenol	0.050
Dibenzofuran	0.010

TABLE 9.3

CONTINUED

Compound	Reporting Limit (ppm)[1]
4-Nitrophenol	0.050
2,4-Dinitrotoluene	0.010
Fluorene	0.010
Diethylphthalate	0.010
4-chlorophenyl-phenylether	0.010
4-Nitroaniline	0.050
4,6-Dinitro-2-methylphenol	0.050
N-Nitrosodiphenylamine	0.010
4-Bromophenyl-phenylether	0.010
Hexachlorobenzene	0.010
Pentachlorophenol	0.050
Phenanthrene	0.010
Anthracene	0.010
Di-n-Butylphthalate	0.010
Fluoranthene	0.010
Pyrene	0.010
Butylbenzylphthalate	0.010
Benzo(a)Anthracene	0.010
3,3'-Dichlorobenzidine	0.020
Chrysene	0.010
bis(2-Ethylhexyl)phthalate	0.010
Di-n-octylphthalate	0.010
Benzo(b)Fluoranthene	0.010
Benzo(k)Fluoranthene	0.010
Benzo(a)Pyrene	0.010
Indeno(1,2,3-cd)Pyrene	0.010
Dibenz(a,h)Anthraene	0.010
Benzo(g,h,i)Perylene	0.010

(1) Water concentrations reported by laboratory in µg/L.

TABLE 9.4

REPORTING LIMITS FOR EPA METHOD 8270 (SOIL)

Compound	Reporting Limit (ppm)(1)
N-Nitroso-Dimethylamine	0.330
Phenol	0.330
bis(2-Chloroethyl)ether	0.330
2-Chlorophenol	0.330
1,3-Dichlorobenzene	0.330
1,4-Dichlorobenzene	0.330
Benzyl Alcohol	0.330
1,2-Dichlorobenzene	0.330
2-Methylphenol	0.330
bis(2-Chloroisopropyl)Ether	0.330
4-Methylphenol	0.330
N-Nitroso-Di-n-Propylamine	0.330
Hexachloroethane	0.330
Nitrobenzene	0.330
Isophorone	0.330
2-Nitrophenol	0.330
2,4-Dimethylphenol	0.330
bis(2-Chloroethoxy)Methane	0.330
2,4-Dichlorophenol	0.330
Benzoic Acid	1.600
1,2,4-Trichlorobenzene	0.330
Naphthalene	0.330
4-Chloroaniline	0.330
Hexachlorobutadiene	0.330
4-Chloro-3-Methylphenol	0.330
2-Methylnaphthalene	0.330
Hexachlorocyclopentadiene	0.330
2,4,6-Trichlorophenol	0.330
2,4,5-Trichlorophenol	1.600
2-Chloronaphthalene	0.330
2-Nitroaniline	1.600
Dimethylphthalate	0.330
Acenaphthylene	0.330
2,6-Dinitrotoluene	0.330
3-Nitroaniline	1.600
Acenaphthene	0.330
2,4-Dinitrophenol	1.600
Dibenzofuran	0.330
4-Nitrophenol	1.600
2,4-Dinitrotoluene	0.330
Fluorene	0.330
Diethylphthalate	0.330

TABLE 9.4

CONTINUED

Compound	Reporting Limit (ppm)(1)
4-Chlorophenyl-Phenylether	0.330
4-Nitroaniline	1.600
4,6-Dinitro-2-Methylphenol	1.600
N-Nitrosodiphenylamine	0.330
4-Bromophenyl-phenylether	0.330
Hexachlorobenzene	0.330
Pentachlorophenol	1.600
Phenanthrene	0.330
Anthracene	0.330
Di-n-Butylphthalate	0.330
Fluoranthene	0.330
Pyrene	0.330
Butylbenzylphthalate	0.330
Benzo(a)Anthracene	0.330
3,3'-Dichlorobenzidine	0.660
Chrysene	0.330
bis(2-Ethylhexyl)phthalate	0.330
Di-n-octylphthalate	0.330
Benzo(b)Fluoranthene	0.330
Benzo(k)Fluoranthene	0.330
Benzo(a)Pyrene	0.330
Indeno(1,2,3-cd)Pyrene	0.330
Dibenz(a,h)Anthracene	0.330
Benzo(g,h,i)Perylene	0.330

(1) Soil concentrations reported by laboratory in μg/kg.

TABLE 9.5

METALS REPORTING LIMITS
FOR
WATER MATRICES

Analyte	Report Limit (ppm) (1)	Method
Aluminum	0.2	ICP
Antimony	0.06	ICP
Cadmium	0.005	GF-AA
Chromium	0.005	GF-AA
Cobalt	0.05	ICP
Copper	0.025	ICP
Iron	0.01	ICP
Lead	0.003	GF-AA
Manganese	0.015	ICP
Mercury	0.0002	CV-AA
Nickel	0.04	ICP
Zinc	0.02	ICP

(1) Water concentrations reported by laboratory in mg/L.

TABLE 9.6

METALS REPORTING LIMITS FOR SOIL MATRICES

Analyte	Report Limit (ppm) (1)	Method
Aluminum	40	ICP
Antimony	12	ICP
Cadmium	1	ICP
Chromium	2	GF-AA
Cobalt	10	ICP
Copper	5	ICP
Iron	20	ICP
Lead	0.6	GF-AA
Manganese	3	ICP
Mercury	0.1	CV-AA
Nickel	8	ICP
Zinc	4	ICP

(1) Soil concentrations reported by laboratory in mg/kg.

SECTION 10

DATA REDUCTION, VALIDATION AND REPORTING

10.1 DATA REDUCTION

10.1.1 Field Data

Field measurements will be made by competent field geologists, engineers, environmental scientists, and/or technicians.

Field data will be validated using four different procedures:

- Routine checks will be made during the processing of data.
- Internal consistency of a data set will be evaluated. This step will involve plotting the data and testing for outliers.
- Checks for consistency of the data set over time will be performed, by visually comparing data sets against gross upper limits obtained from historical data sets, or by testing for historical consistency. Anomalous data will be identified.
- Checks may be made for consistency with data sets obtained from the same volume of soil.

The purpose of these validation checks and tests is to identify outliers, observations that do not conform to the pattern established by other observations. Outliers may be the result of transcription errors or instrument breakdowns, or may be manifestations of a greater degree of spatial or temporal variability than expected.

After an outlier has been identified, a decision concerning its fate must be rendered. Obvious mistakes in data will be corrected when possible, and the correct value will be inserted. If the correct value cannot be obtained, the data may be excluded. An attempt will be made to explain the existence of the outlier. If no plausible explanation can be found for the outlier, it may be excluded, but a note to that effect will be included in the report. Also, an attempt will be made to determine the effect of the outlier when both included and excluded in the data set.

10.1.2 Laboratory Data

The procedures used for calculations and data reduction are specified in each analysis method referenced previously. Raw data are entered in bound laboratory notebooks. A separate book is maintained for each analytical procedure. The data entered are sufficient to document all factors used to arrive at the reported value for each sample. Calculations may include factors such as sample dilution ratios or conversion to dry-weight basis for solid samples. These data are stored in client files and traceable to original entries in bound notebooks. Instrument chart recordings and calculator print-outs are labeled and attached to their respective pages or are cross-referenced and stored in the project file.

About 10 percent of all calculations will be checked from the raw data to final value stages prior to reporting of a group of samples. Results obtained from extreme ends of standard curves generated by linear regression programs will be checked against graphically produced standard curves if the correlation coefficient of a program curve is less than 0.995.

Concentration units will be listed on reports and any special conditions noted. The analysis report includes the unique sample number given each sample, details of sample receipt and report preparation.

10.2 DATA REVIEW AND VALIDATION

Data will be reviewed and validated in terms of analytical holding times according to the analytical method requirements and using EPA guidance as published in:

- "Laboratory Data Validation: Functional Guidelines for Evaluating Inorganics Analyses," July, 1988.
- "Laboratory Data Validation: Functional Guidelines for Evaluating Organics Analyses," February, 1988.

10.3 REPORTING

For all analyses, as a minimum, the laboratory report will show traceability to sample analyzed, and will contain the following information:

- Project identification
- Field sample number
- Laboratory sample number
- Sample matrix description
- Date and time of sample collection
- Analytical method description and reference citation
- Individual parameter results
- Date of analysis (extraction, first run, and subsequent runs)
- Detection limits achieved
- Dilution or concentration factors

Completed copies of the original chain-of-custody records for the appropriate samples will be included in the analytical results reports. The following units shall be used in reporting. Parameters determined in water samples will be reported in units of ppm (mg/L). Organic parameters determined in soil and sediment samples will be reported in units of ppm (mg/Kg) dry weight. Inorganic parameters determined in soil and sediment samples will be reported in units of ppm (mg/Kg) dry weight. The percentage of moisture will be presented with the results of the soil and sediment samples.

Quality control reports will be prepared which summarize the results of samples analyzed by the laboratory for quality control purposes. These reports will summarize all the quality control data results for the samples, including results for method blanks, duplicates, and matrix spikes. Spike concentrations, percent recoveries and relative percent differences will be reported. These reports will be used to prepare a summary quality assurance report.

Completed copies of the chain-of-custody sheets accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the report of analytical testing.

10.4 DATA HANDLING

Two copies of the analytical data will be provided by the laboratory, and sent to the ES-Syracuse office. The Project Manager will immediately arrange for filing of one package, as delivered. The second, or working copy, will be used to generate summary tables. These tables will form the foundation of a working database for assessment of the site contamination condition.

SECTION 11

INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

11.1 QUALITY ASSURANCE BATCHING

Each set of samples will be analyzed concurrently with blanks, matrix spikes (MS) and matrix spike duplicates (MSD) (organic samples), spike duplicates (metals), surrogate spikes and replicates at the frequency required by the analytical methods. For planning purposes, it has been assumed that MS, MSD and spike duplicate samples will be collected for each sample matrix (soil, aqueous) at each site.

11.2 ORGANIC STANDARDS AND SURROGATES

As required by the EPA methods, all standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or earlier based upon data indicating deterioration.

11.3 ORGANIC BLANKS, SPIKED BLANK, AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants. The blank water can be generated by reverse osmosis and Super-Q™ filtration systems, or distillation of water containing $KMn0_4$. The spiked blank is generated by addition of standard solutions to the blank water. The matrix spike is generated by addition of surrogate standard to each sample.

11.4 TRIP AND FIELD BLANKS

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 5 of this QA/QC Project Plan. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of cross contamination of the samples.

11.5 FIELD MEASUREMENTS

Aqueous samples collected during this project will be measured in the field for pH, temperature and specific conductance. Quality control checks for the field instruments are presented in Table 5.2.

SECTION 12

QUALITY ASSURANCE PERFORMANCE AUDITS, SYSTEMS AUDITS, AND FREQUENCY

Quality assurance audits are performed by the project quality assurance group under the direction and approval of the Project Quality Assurance Manager (PQAM). Functioning as an independent body and reporting directly to company quality assurance management the PQAM will plan, schedule, and approve system and performance audits based upon company procedure customized to the project requirements. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). At times, the PQAM may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

12.1 SYSTEM AUDITS

System audits, performed by the PQAM or designated auditors, will encompass evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system-audited. These audits may be performed at least once during the performance of the project. However, if conditions adverse to quality are detected between planned audits, or if the Project Manager requests the PQAM to perform unscheduled audits, these activities will be instituted.

12.2 PERFORMANCE AUDITS

Performance audits may be conducted to determine the accuracy and implementation of the measurement system(s) and parameter(s). As in system audits, the PQAM or assigned alternate will exercise planned and scheduled performance audits with the understanding that unplanned audits may be implemented for reasons stipulated in system audits above. Performance audits are most desirable and may be performed once the measurement systems are operational and initially generating measurement data.

12.3 QA MANAGEMENT ASSESSMENT

In addition to ongoing system and performance audits, quality assurance management assessments will be performed regularly by Engineering-Science. Such assessments will inform both company and project management that overall quality assurance requirements have been properly implemented and audited by the project QA group.

12.4 FORMALIZED AUDITS

Formalized audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formalized audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by lead auditors after gathering and evaluating all resultant data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Noncompliances will be logged, documented, and controlled through audit findings which are attached to and are a part of the integral audit report. These audit finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the PQAM prior to issue. QA verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the PQAM will close out the audit report and findings.

It is the Project Manager's overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily.

SECTION 13

PREVENTATIVE MAINTENANCE PROCEDURES AND SCHEDULES

13.1 PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

13.2 SCHEDULES

Written procedures where applicable will identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools, gauges, etc. shall be performed by qualified personnel.

In the absence of any manufacturer's recommended maintenance criteria, a maintenance procedure will be developed by the operator based upon experience and previous use of the equipment.

13.3 RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories and by the data and sample control personnel when and if equipment, instruments, tools, and gauges are used at the sites. The project QA group may audit these records to verify complete adherence to these procedures.

13.4 SPARE PARTS

A list of critical spare parts will be identified by the operator. These spare parts will be stored for availability and use in order to reduce the downtime. In lieu of maintaining an inventory of spare parts a service contract for rapid instrument repair or backup instruments will be available.

SECTION 14

ASSESSMENT PROCEDURES FOR DATA ACCEPTABILITY

Procedures used to assess data precision and accuracy are in accordance with the applicable EPA methods. Completeness is recorded by comparing the number of parameters initially analyzed for with the number of parameters successfully completed and validated.

Accuracy

The percent recovery (%) is calculated as below:

$$\% = \frac{S_s - S_o}{S} \times 100$$

S_s = Value obtained by analyzing the sample with the spike added.

S_o = The background value, i.e.; the value obtained by analyzing the sample.

S = Concentration of the spike added to the sample.

Precision

The relative percent difference (RPD) is calculated as below:

$$\mathrm{RPD} = \frac{V_1 - V_2}{0.5(V_1 + V_2)} \times 100$$

V_1, V_2 = The 2 values obtained by analyzing the duplicate samples.

SECTION 15

CORRECTIVE ACTION

The following procedures have been established to assure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

15.1 INITIATION OF CORRECTIVE ACTION

When a significant condition adverse to quality is noted at regional, site, laboratory, or subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the site investigation team leaders, project managers, chief scientist, project QA manager, document control supervisors, and involved subcontractor management, as a minimum. Implementation of corrective action is verified by documented follow-up action. All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality.

Corrective actions may be initiated as a result of:

- Nonattainment of predetermined acceptance standards.
- Determination of deficient procedures or data.
- Detection of faulty equipment or instrumentation.
- Poor sample custody documentation (samples and corresponding analytical results not clearly documented and tracked).
- Violation of quality assurance requirements.
- Circumvention of designated approvals.
- System and performance audits.
- Management assessment.
- Laboratory/field comparison studies.

15.2 PROCEDURE DESCRIPTION

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities.

Work is audited at the regional offices, sites, laboratories, and subcontractor locations by the Project QA Manager (PQAM) and/or designated lead auditors. Items, activities, or documents ascertained to be noncompliance with quality assurance requirements will be documented and corrective actions mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the PQAM.

Technicians assigned quality assurance functions at the regional levels will also control noncompliance corrective actions by having the responsibility of issuing and controlling the appropriate Corrective Action Request Form. All project personnel can identify a noncompliance; however, the technician is responsible for documenting, numbering, logging, and verifying the closeout action. It is the Project Manager's responsibility to ensure that all recommended corrective actions are produced, accepted, and received in a timely manner.

The Corrective Action Request (CAR) identifies the adverse condition, reference document(s), and recommended corrective action(s) to be administered. The issued CAR is directed to the responsible manager in charge of the item or activity for action. The individual to whom the CAR is addressed returns the requested response promptly to the technician in charge, affixing his or her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The technician maintains the log for status control of CARs and responses, confirms the adequacy of the intended corrective action, and verifies its implementation. The technician will issue and distribute CARs to specified personnel, including the originator, responsible project management involved with the condition, the Project Manager, involved subcontractor, and the PQAM, as a minimum. CARs are transmitted to the project file for the records.

SECTION 16

QUALITY ASSURANCE REPORTS

The procedure for reporting results was described in Section 10. The frequency of the performance audits and the system audits was described in Section 12.

During the course of the project, the PQAM may prepare at least one quality assurance report which will discuss:

- The periodic assessment of measurement data accuracy, precision and completeness.
- Results of performance audits.
- Results of system audits.
- Significant QA/QC problems and action taken.

A final report prepared at the completion of the project may include a separate section summarizing data quality information.

APPENDIX C

SCOPE OF WORK

SECTION 1

SCOPE OF WORK

INTRODUCTION

This Work Plan consists of two sections, the first of which describes the scope of work. The scope of work includes a program preparation part, for preparation of planning documents such as a Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP), and five other parts. The QAPP has already been completed and will not be discussed here. The HASP has also been completed and modified as appropriate on a site-by-site basis so that a separate HASP is available for each site to be investigated. The following scope of work will therefore concentrate on the five remaining parts to be completed at the site as follows:

Part 1 - Literature and Records Search

Part 2 - On-Site Evaluation

Part 3 - Site Survey and Mapping

Part 4 - Sampling and Analysis

Part 5 - Report Preparation

These five parts are described in this initial section. Section 2 of this Work Plan provides site-specific information including the site location, size, history, and the number, location, and rationale for collection of samples.

OBJECTIVES

The scope of work includes a technical and management effort developed to meet the following objectives:

- Determine if there is any imminent threat to human health or environment.
- Establish a relative ranking of former MGP sites.

SCOPE OF WORK

Program Preparation Part

A Quality Assurance Project Plan (QAPP) and a Health and Safety Project Plan (HASP) have been prepared. The QAPP defines the data quality objectives, sampling and analysis methods, quality control requirements for laboratory and on-site activities, etc. The HASP describes safe work (i.e. sampling and inspection) procedures at the site, on-site monitoring requirements, and methods to conform with relevant OSHA requirements as referenced in 29 CFR 1910.120.

Part 1 - Literature and Records Search

A literature and records search will develop a site history. Upon initial review of available information, it is apparent that relatively little documentation of past site operations exists. Some additional investigation may be required, however, to develop a local historical record noting any description of the operations, processes used, by-products, disposal methods, etc. This may include interviews with present or former employees of NYSEG or Columbia Gas who may have knowledge of the former MGP site. Also included will be a review and summary of local geology and identification of groundwater use in the area, soil type, depth to groundwater, aquifers, present site use, etc. This information will support the Site Screening and Priority Setting (SSPS) score.

The first step in Part 1 will be a comprehensive identification of the most recent reference documents applicable to MGP sites available through National Technical Information Service (NTIS), Gas Research Institute (GRI), and the Electric Power Research Institute (EPRI). This activity will ensure that the most up-to-date information available is incorporated into the program. ES has most of the applicable documents in our possession.

ES will work with NYSEG to generate as complete a site history as possible. NYSEG records will be supplemented by appropriate village, town, or county records which provide information on the site features, operations, disposal methods, etc. Sanborn maps will be used to identify site features dating back to the late 1800's (Attachment A). These maps can be invaluable for determining locations of former structures and therefore likely locations of on-site waste disposal. Sanborn maps and other sources will also be used to develop a composite historical site plan, showing additional on-site features and structures over time which may also indicate potential waste sources.

Another excellent source of information is historical aerial photography. There are several agencies in New York State, including the Department of Transportation and Soil Conservation Service, that have readily-available aerial photographs taken over the past several decades. ES will contact and, if appropriate, visit the central photographic files of these agencies to determine what relevant photographs are available. Most of these photographs will not show the site during its operating period, but may identify where structures were, when they were razed, and identify areas of stressed vegetation or other useful indicators of past waste disposal operations.

Another critical component of Part 1 will be the compilation of the database for the SSPS system scoring. This compilation will rely on data sources such as New York State Wetlands Maps, New York State Department of Transportation Topographic Maps, New York State Atlas of Community Water System Sources and others. ES also has access to the resources of the Syracuse University library system (including the on-line computer database) to obtain U.S. census data, Sanborn maps, regional geology and groundwater resources reports and surface water basin reports. A summary of the major database information requirements and sources is presented in Table 1.1.

TABLE 1.1

REQUIRED INFORMATION AND SOURCES

Type of Information	Source
Local Geologic Information	USGS Reports NYSGS Reports NYS Museum and Science Services Bulletins Soil Surveys Groundwater Resources Reports
Groundwater Use	County Health Departments New York State Health Department Atlas of Community Water System Sources Groundwater Resources Reports
Soil Type, Characteristics	Soil Surveys
Aquifers	NYSDEC Publications USGS Publications Groundwater Resources Reports
Land Use	Local/County Records U.S. Department of the Interior (Historic Places, National Parks) Broome County Historical Society City of Binghamton Engineering Dept. City of Binghamton Building Construction Bureau S.U.N.Y. Binghamton Library Broome County Public Library Soil Conservation Services Aerial Surveys
Surface Water Use	NYSDEC (6NYCRR)
Population	Census Data
Wetlands	NYSDEC Wetlands Maps
Precipitation and Climatic Data	Climatic Atlas of the U.S.
Endangered Species	NYSDEC Wildlife Resources Center
Toxicity/Persistence Data	USEPA; Sax, 1984

Part 2 - On-Site Evaluation

An on-site visual evaluation has established areas warranting further study and has identified specific sampling locations. NYSEG owns the site and will arrange access to the site prior to any on-site activities. All field personnel will receive health and safety training as required by 29 CFR 1910.120.

The on-site evaluation consisted of a careful and comprehensive "walk-over" of all areas of the site on June 13, 1991 as well as inspection of adjacent properties or structures where additional sampling may be warranted. Annotated photographs (a minimum of three perspectives) will document conditions and sampling protocols at each site. Any obvious signs of MGP activities or residues on-site (e.g., tarry soil, blue/green stained soil, MGP odors, sheens, stressed vegetation, etc.) were noted and incorporated into site sampling protocols.

Area managers, their representatives or Environmental Matters Group (EMG) staff should be present for on-site activities. ES will not commence any on-site inspection or sampling unless specific approval of the date and time for site inspection/sampling has been received by the NYSEG area manager or corporate contact. All contact with the public will be made by NYSEG personnel.

Part 2 will provide critical information on the present site condition, identification of potential migration pathways, and confirmation of data gathered during Part 1. ES will utilize our established Site Inspection Report and Checklist to ensure that our site visit investigated on-site features, visual evidence of contamination or potential waste sources, on-site and surrounding land use, potential migration pathways, and other conditions needed to both assess imminent risks to human receptors and to complete the SSPS site ranking methodology. The site visit allowed confirmation and revision as necessary of existing maps showing public water supplies, utility locations (i.e., buried pipelines, sewers, or other migration conduits) and other on-site and nearby features.

The site inspection also noted site conditions which could impact the use of soil vapor surveys or other geophysical methods which might be used if the site warrants further investigation in the future. Photoionization detector (PID) monitoring over the site did not indicate the presence of volatile organic compounds in the breathing zone (four to five feet above ground).

Part 3 - Site Survey and Mapping

A licensed land surveyor will perform a property survey of the site with a base map and sketches identifying property boundaries, sampling locations and former or existing structures. Surveyor field notes will be included in an appendix of the final report and will also be made available on computer disc (as requested in the original RFP) according to a format specified by NYSEG. A topographic base map on a scale of one inch to fifty feet with one foot contour intervals, and drawn to NYSEG CADD/sketch standards, will be prepared. NYSEG specifications will be included in the final report. The base map will be used to present a composite historical site plan and a current site plan depicting the present site features, the sample locations, and pertinent off-site features such as nearby residences, streets, known utilities, etc.

During the site survey, an on-site datum will be referenced to allow identification of the exact locations from which samples were collected. This will also allow revisions and additions to the base map to be made should additional investigations be conducted at the site in the future. The surveyor will use a USGS datum for vertical evaluations. If one is not available in close proximity to the site, an assumed datum will be used.

Part 4 - Sampling and Analysis

Part 4 will provide representative samples and analyses to determine the potential for direct exposure to hazardous contaminants at the site. Field samples will be collected only from those matrices which present direct exposure pathways. The surface soil and sediment samples will be collected to identify the direct contact pathway hazards. The surface water samples will be collected to identify direct contact and possible ingestion pathway hazards. Data collection, sampling and analysis will be inclusive of and consistent with all the requirements of the SSPS ranking program, supplied on a proprietary basis by NYSEG. NYSEG will supply default answers to appropriate questions as directed by the SSPS software.

The sampling methodology, equipment decontamination procedures and analytical protocols have been described in detail in the project QAPP. The surface soil and sediment samples will be collected with stainless steel trowels, bucket augers, or split spoons, depending on the site conditions. A ponar dredge will be used to obtain sediment samples where it is necessary to sample in deep water. The surface water samples will be collected by dipping the sample bottle beneath the water surface, if the water is deep enough, or by using a small glass or stainless steel beaker jar. Surface water samples will be collected from near the banks of the water body, and attempts will be made to composite the sample throughout the depth of the water. It is anticipated that a small boat may be used to obtain sediment and surface water samples due to water depth and access considerations.

The surface water and sediment samples will be collected on-site, downstream or downgradient of the site to determine if the site is contributing to contamination in the area. Visual evidence, odors, elevated PID readings or other evidence that contamination is present will be evaluated to assess whether there is a direct exposure pathway present. If visual evidence indicates the presence of MGP residues, a sample of that material will also be collected. However, residue sampling and analysis has not been budgeted at the present time. Annotated photos from three perspectives will be taken at each sampling event/site.

The analytical methods to be utilized are presented on Table 1.2.

Appropriate quality control samples will be collected, consistent with the requirements of the SSPS, the analytical methodology and the QAPP. At a minimum, it is anticipated that a trip blank will be prepared and analyzed by

TABLE 1.2

SUMMARY OF PROPOSED ANALYTICAL METHODS

Water Matrix	
Volatile Organics	EPA Method 624
Semivolatile Organics	EPA Method 625
Metals	
Hg	EPA Method 7470
Pb	EPA Method 7421 (GF)(1)
Cr	EPA Method 7191 (GF)
Fe, Zn, Al, Cd, Sb, Cu, Co, Mn, Ni	EPA Method 200.7 (ICP)(2)
CN (Total and Amenable)	EPA Method 335
Soil and Sediment Matrices	
Volatile Organics	EPA Method 8240
Semivolatile Organics	EPA Method 8270
Metals	
Hg	EPA Method 7471
Pb	EPA Method 7421
Cr	EPA Method 7191
Fe, Zn, Al, Cd, Sb, Cu, Co, Mn, Ni	EPA Method 6010
CN (Total and Amenable)	EPA Method 9010(3)

(1) Graphite Furnace Method
(2) Inductively - Coupled Plasma Method
(3) Completed by NYSDEC-approved lab

Method 624 to determine the influence of bottle preparation and shipping on sample integrity. Sampling duplicates of the water and soil matrixes will be analyzed. In addition, matrix spike (MS) and matrix spike duplicate (MSD) water and soil samples will be collected and analyzed for all applicable analytical parameters. The MS and MSD samples will allow the laboratory to perform a quality control analysis to identify analytical interferences caused by the sample matrix.

The analytical data package will include the analytical results and quality control data summaries. This level of documentation and reporting will be necessary should the reports be submitted for agency review. Raw data, chromatographs, etc. will not be included, however they will be available from the laboratory at additional cost should that data be requested by NYSEG.

Part 5 - Reporting

A brief, but detailed report will be generated for the site summarizing the work effort, noting any discovery of an imminent threat to human health or the environment, summarizing the SSPS ranking results, and referencing all data. Appendices to the report will include field data, surveyor notes, sampling data, analytical data, QA/QC, and the Health and Safety Plan. The analytical data and survey field notes will be included on floppy disk in NYSEG's database format. In addition to the text, a concise single page fact sheet for the site will be included in the report.

The report will contain copies of the specific references used to develop the SSPS ranking to demonstrate what information was used and how it was used to score the site.

Two copies of the draft report will be presented to NYSEG for review and comment. ES will provide seven copies of a final report incorporating NYSEG's comments as appropriate.

SCHEDULE

Once access to the site is arranged, the sampling activities can take place within 7 days of notice to proceed by NYSEG. The analytical turnaround time for the results is anticipated to be 30 to 35 days. Once the analytical results are received, a draft report will be prepared and sent to NYSEG within four weeks.

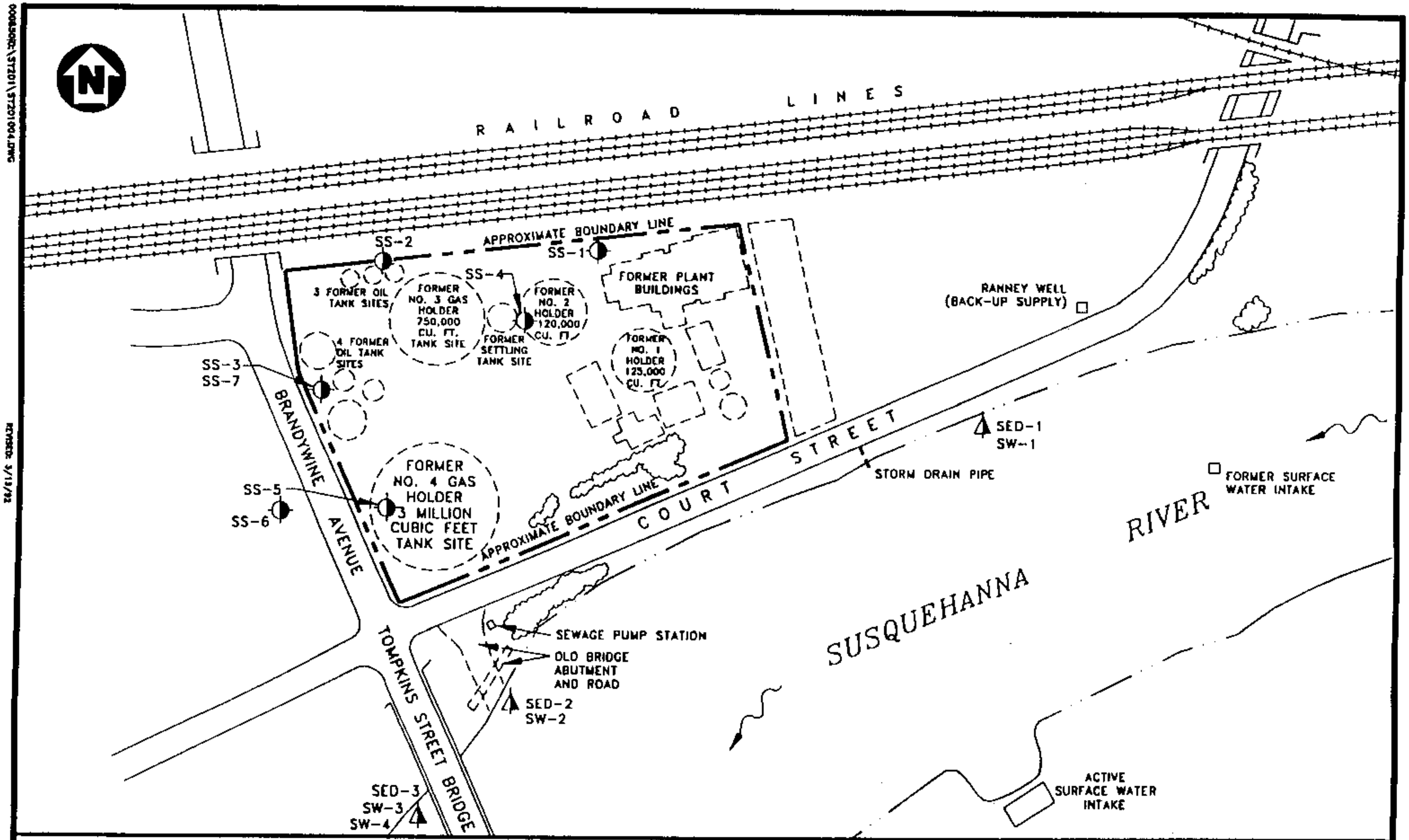
SECTION 2

SITE SPECIFIC INFORMATION

The Binghamton-Court St. site is located at the intersection of Court St. and Brandywine Ave. in the City of Binghamton, Broome County, NY. The site is presently owned by NYSEG and consists of a fenced, unpaved lot bounded by Court St. on the south, Brandywine Ave. on the west, the Delaware Lackawanna and Western Railroad on the north and the property of Columbia Transmission Company on the east. During the period from 1888 to 1969, the site was the location of a manufactured gas plant and a natural gas processing plant owned and operated by the Binghamton Gas Works (BGW) and Columbia Gas of New York, the successor to BGW. Waste disposal practices for the MGP are not known, however some residues are known to have been removed from the site during the demolition of the #4 gas holder in 1969.

Field samples will be collected to characterize the site. Soil and water samples will be obtained both on-site and at background locations. A total of six surface soil samples will be obtained from the site and a background location. Approximate soil sample locations are shown on Figure 2.1. Soil sample locations are intended to represent areas of possible contamination due to distinct phases of the manufactured gas production process. Samples of the top six inches of surface soil will be collected from the former locations of the distribution holder, relief holders, oil storage tanks, and coal shed. Three surface water and three sediment samples will be obtained from the Susquehanna River (upgradient, adjacent to the site, and downgradient from the site). Sediment samples are to be collected from the same locations as the surface water samples.

A summary of field and quality control samples is presented in Tables 2.1 and 2.2 respectively.



LEGEND

SS-1 ◑ SURFACE SOIL SAMPLE LOCATION

SED-3 SW-3 ▲ SEDIMENT SAMPLE LOCATION/ SURFACE WATER SAMPLE LOCATION

APPROXIMATE SCALE

200 0 200 FT.

200'

Binghamton–Court St. (CGBS)

TASK I SAMPLE LOCATIONS

NYSEG
Binghamton, New York

FIGURE 2.1

ES ENGINEERING-SCIENCE

0008LSGRC\572013\57201004.DWG

REVISED: 3/13/92

TABLE 2.1
SUMMARY OF FIELD SAMPLES

BINGHAMTON - COURT ST. SITE

Indoor Air	Sediment	Surface Water	Surface Soil	Total
0	3	3	6	12

Soil, sediment, and waste material samples to be analyzed for volatile (EPA Method 8240) and semivolatile (EPA Method 8270) organic compounds, metals and cyanide, surface water samples to be analyzed for volatile (EPA Method 624) and semivolatile (EPA Method 625) organic compounds, metals and cyanide.

TABLE 2.2
SUMMARY OF QUALITY CONTROL SAMPLES

BINGHAMTON - COURT ST. SITE

Trip Blank	Field Duplicates Water	Field Duplicates Soil	Wash Blank	Matrix Spike/Matrix Spike Duplicates* Water	Matrix Spike/Matrix Spike Duplicates* Soil
1	1	1	-	1	1

Notes: Trip Blank to be analyzed by EPA Method 624.

* Number of pairs shown on table (i.e. 1 pair equals 2 samples).

ATTACHMENT A

NYSEG MAP SEARCH

COURT ST.

Supplied Location: Site is situated between Court Street and the Susquehanna River on the south, Brandywine Avenue on the west, the Delaware Lackawanna and Western Railroad on the north, and the property of Columbia Gas Company on the east.

Search of Maps:

Map 1876 Found sketch of Whitneys Farm, Broome Co. Historical Society #FF-A-19

Map 1876 Found combination map of Broome County, New York from New York State County Histories and Atlas.

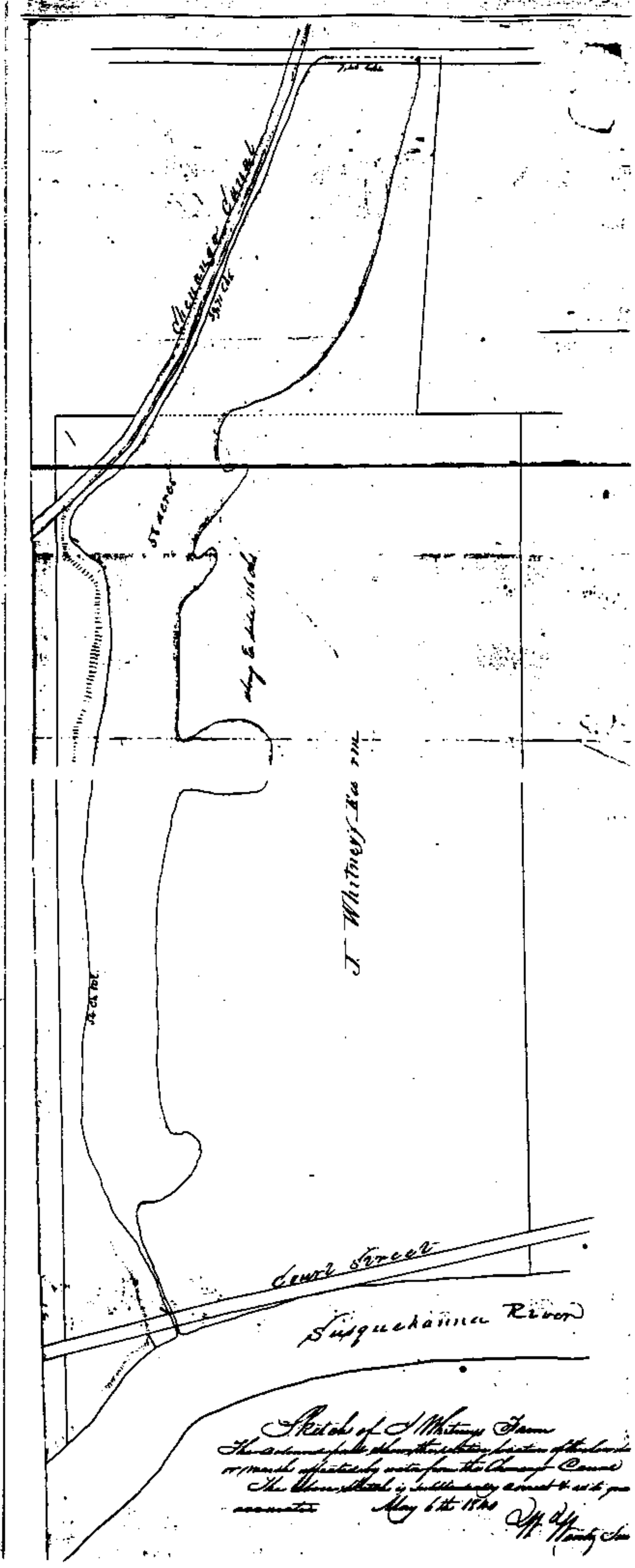
Map 1891 Found Sanborn map 5775, June 1891, Page 28, Parcel #220. (Showing oil refinery)

Map 1898 Found Sanborn map 5775, 1898, Page 27, Parcel #4.

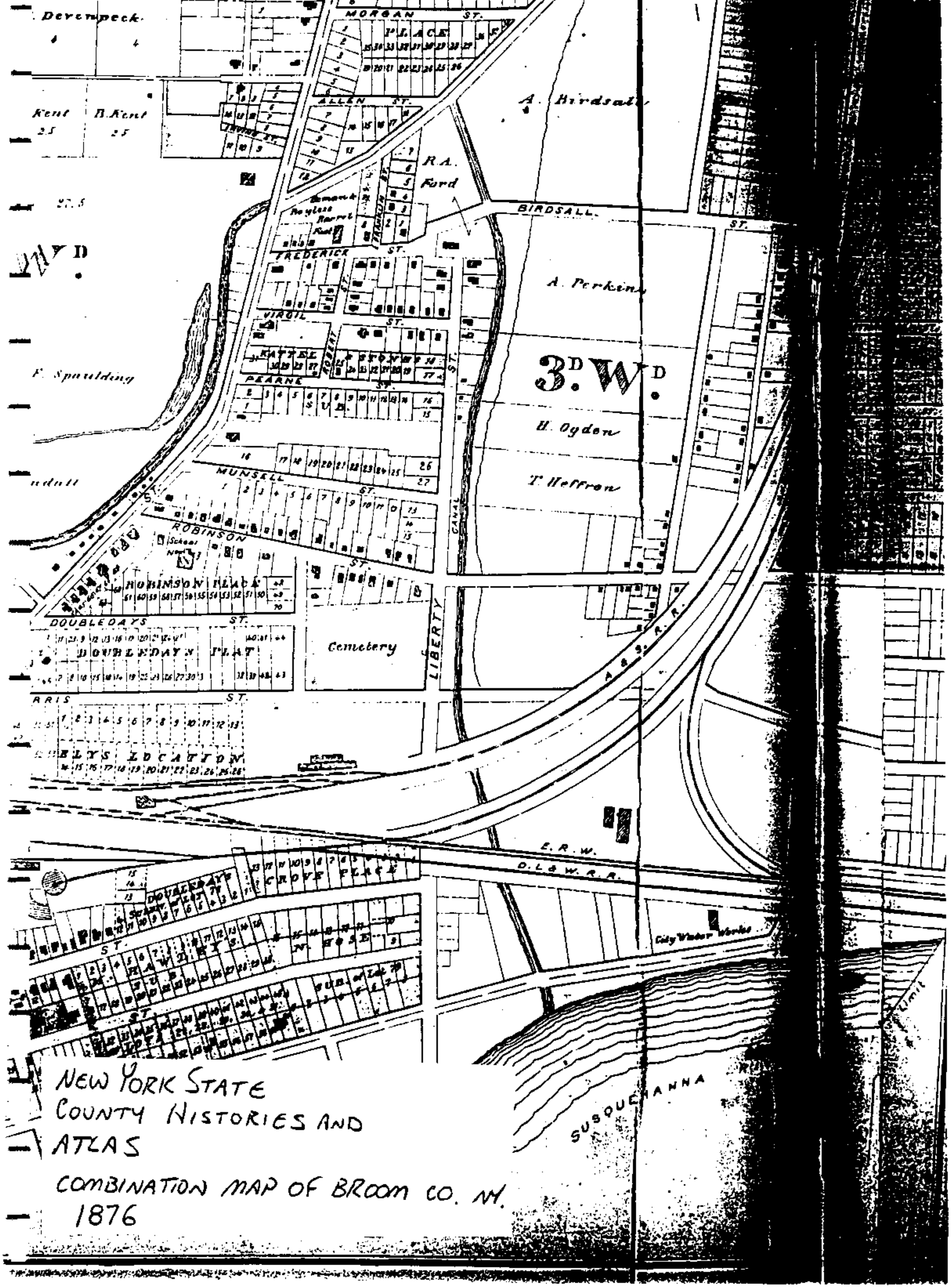
Map 1918 Found Sanborn map 5775, 1918, Page 67, (showing water gas plant)

Map 1926 Shows gasoline station at corner of Court and Tompkins Streets.

1876



Sketch of J Whitney Farm
The [illegible] of the [illegible]
or marsh [illegible] water from the Chenango Canal
The above sketch is [illegible]
[illegible] May 6th 1840



NEW YORK STATE
COUNTY HISTORIES AND
ATLAS

COMBINATION MAP OF BROOM CO. NY.
1876

BINGHAMPTON

BROOME Co.

NEW YORK

INCLUDING

LESTER-SHIRE

PUBLISHED BY the

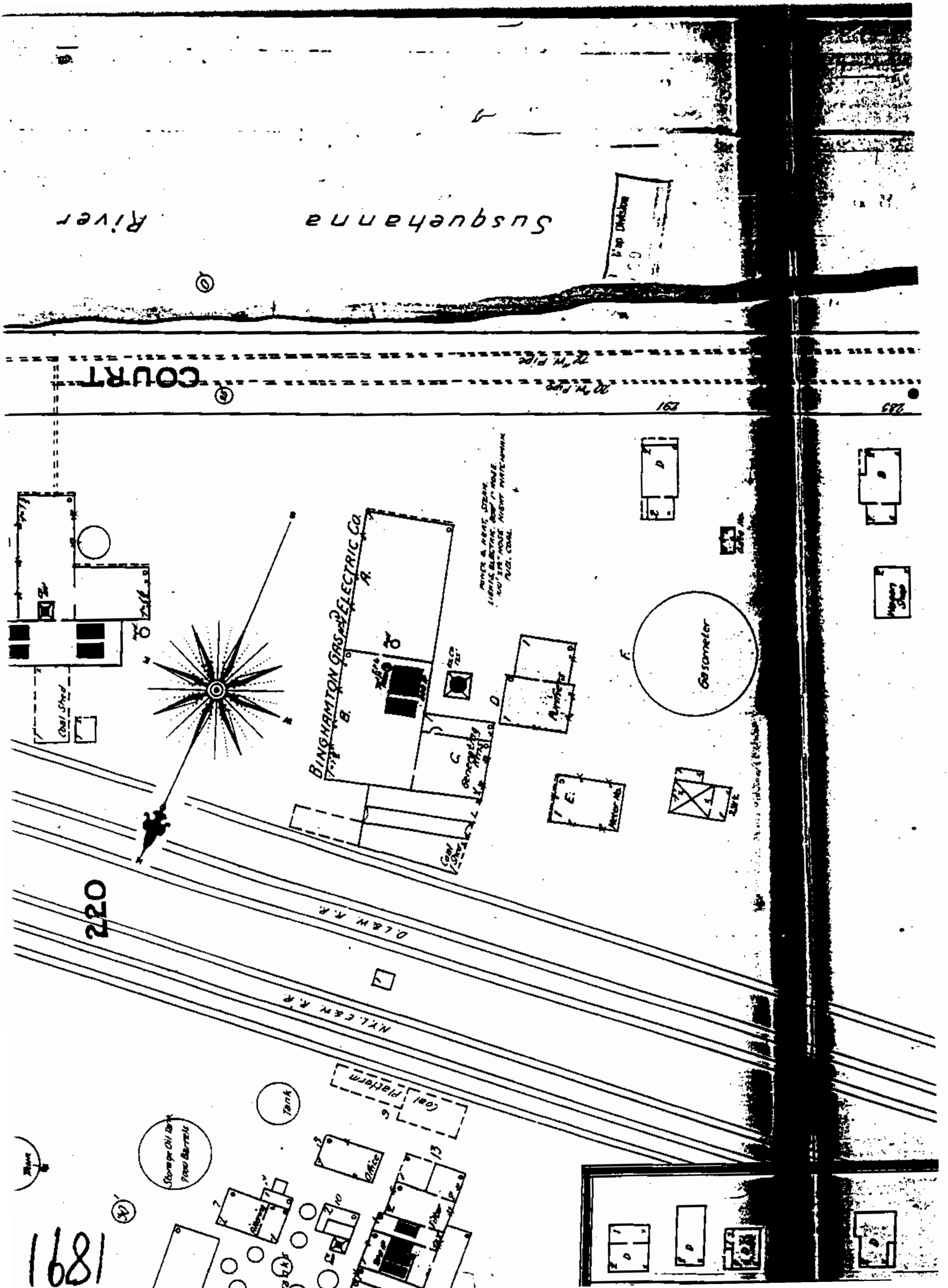
SANBORN-PERRIS MAP CO.

LIMITED

117 BROADWAY NEW YORK

SCALE 50 FT. TO AN INCH

June 1891

Susquehanna
River
COURT
22" W. Pipe
20" W. Pipe
162
223
BINGHAMTON GAS AND ELECTRIC CO.
A.
B.
C.
D.
E.
F.
Generating Rms.
POWER & HEAT, STEAM.
LIGHTS, ELECTRIC. 1" HOSE.
100' 2½" HOSE. NIGHT WATCHMAN
FUEL, COAL.
Purifiers
Gasometer
Meter Ho.
Coal Shed
Coal Shed
Wagon Shop
D.L.& W. R.R.
N.Y.L.E.& W. R.R.
220
Platform
Coal
Tank
Storage Oil Tk 700 Barrels
Office
Tank
Tank

1891

INSURANCE MAPS

Binghamton

Broome County [illegible]

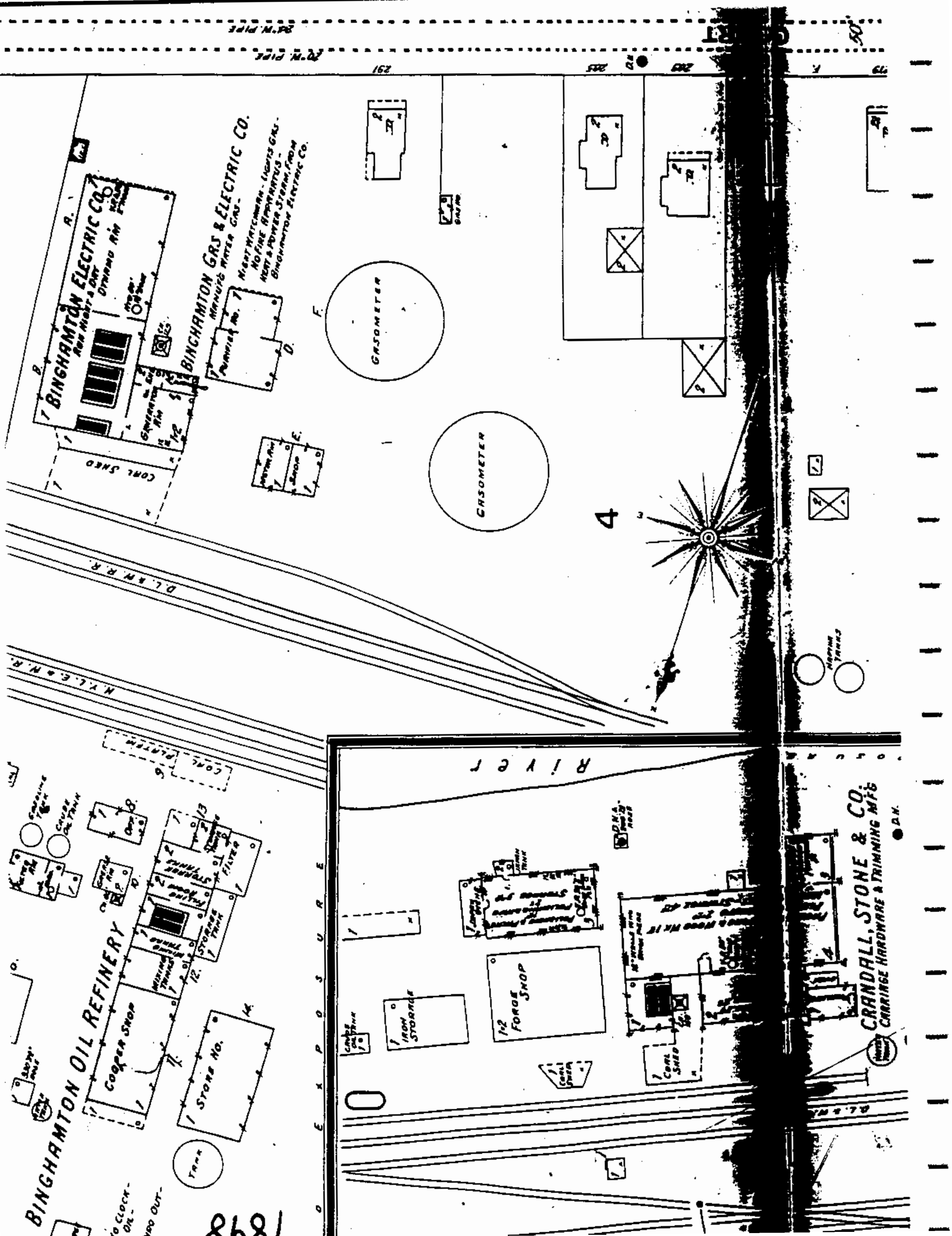
NEW YORK

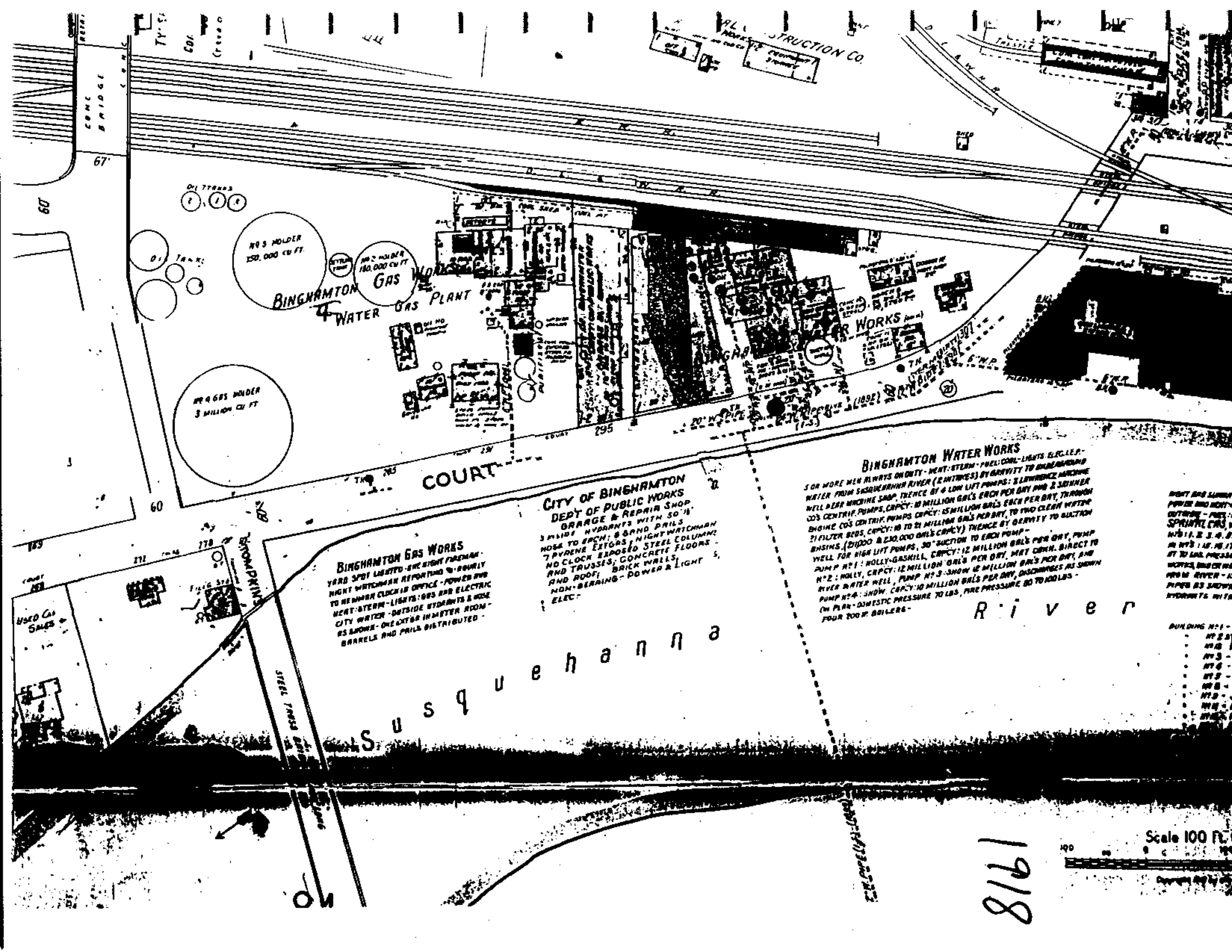
Sanborn-Perris Map Co. Limited

SCALE 50 FEET TO AN INCH

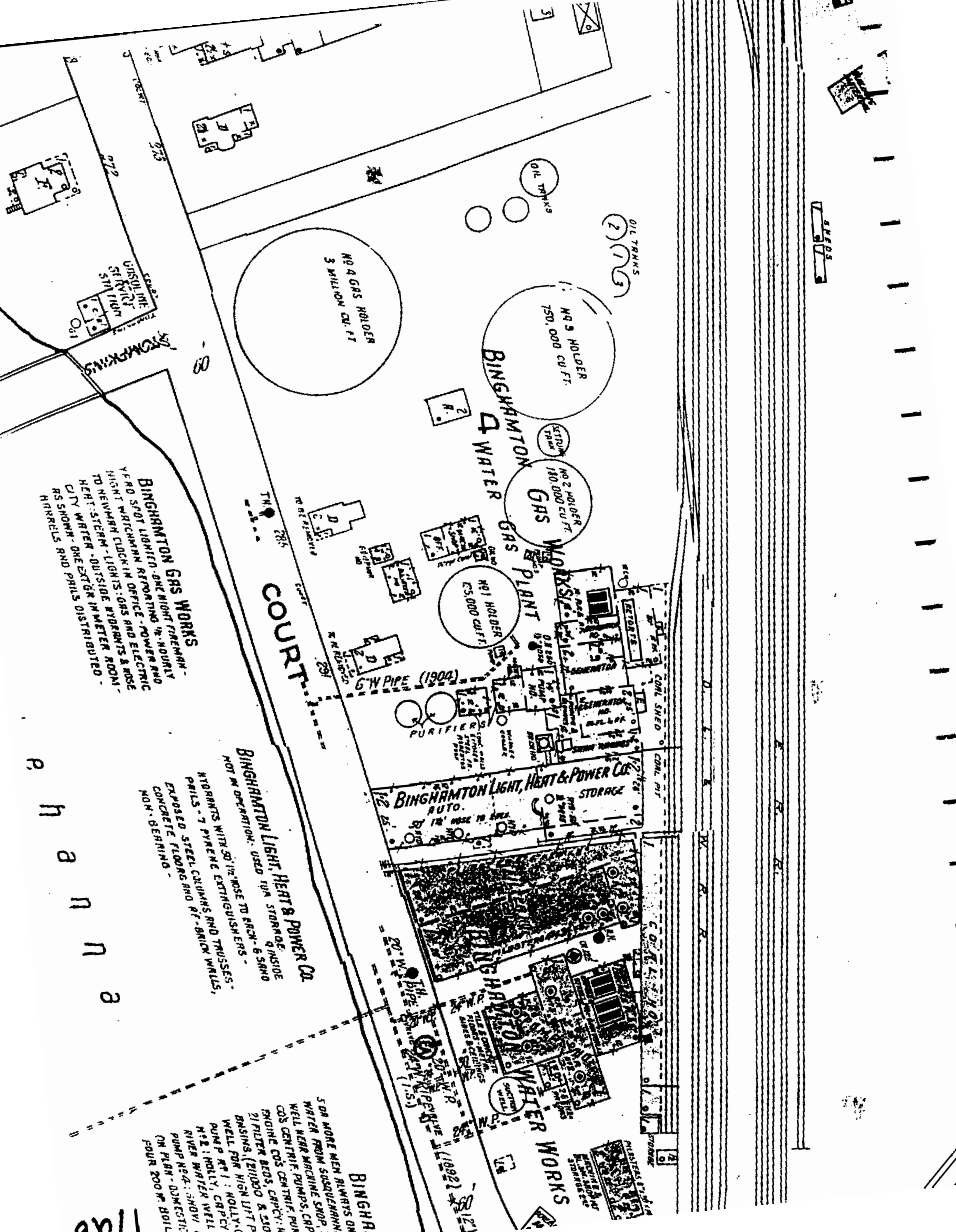
115 BROADWAY NEW YORK

1898


W. Pipe
W. Pipe
BINGHAMTON ELECTRIC CO.
Run Night & Day
Dynamo Rm
Generator Rm
Coal Shed
BINGHAMTON GAS & ELECTRIC CO.
Manuf'g Water Gas.
Night Watchman - Lights Gas - No Fire Apparatus - Heat & Power Steam from Binghamton Electric Co.
Purifier No. 1
Gasometer
Gasometer
4
D.L. & W. R.R.
N.Y.L.E. & W. R.R.
Coal Platform
River
Exposure
BINGHAMTON OIL REFINERY
Cooper Shop
Store Ho.
Tank
Gasoline Tank
Crude Oil Tank
Filter
Mixing Tanks
Storage Tank
Iron Storage
Forge Shop
Crude Oil Tank
Coal Shed
Naphtha Tanks
CRANDALL, STONE & CO.
Carriage Hardware & Trimming Mf'g
1898


COURT
BINGHAMTON GAS WORKS
WATER GAS PLANT
No 4 GAS HOLDER 3 MILLION CU FT
No 3 HOLDER 250,000 CU FT
No 2 HOLDER 150,000 CU FT
OIL TANKS
CONC BRIDGE
67
60
60
295
TOMPKINS
STEEL TRUSS BRIDGE
USED CAR SALES
PURIFIERS
WATER WORKS
BINGHAMTON WATER WORKS
5 OR MORE MEN ALWAYS ON DUTY - HEAT: STEAM - FUEL: COAL - LIGHTS: ELEC. LE.P. - WATER FROM SUSQUEHANNA RIVER (2 INTAKES) BY GRAVITY TO SUBMERGED WELL NEAR MACHINE SHOP, THENCE BY 4 LOW LIFT PUMPS: 2 LAWRENCE MACHINE CO'S CENTRIF. PUMPS, CAPCY: 10 MILLION GAL'S EACH PER DAY AND 2 SKINNER ENGINE CO'S CENTRIF. PUMPS CAPCY: 15 MILLION GAL'S EACH PER DAY, THROUGH 21 FILTER BEDS, CAPCY: 18 TO 21 MILLION GAL'S PER DAY, TO TWO CLEAR WATER BASINS, (211,000 & 230,000 GAL'S CAPCY) THENCE BY GRAVITY TO SUCTION WELL FOR HIGH LIFT PUMPS, 30" SUCTION TO EACH PUMP - PUMP No 1: HOLLY-GASKILL, CAPCY: 12 MILLION GAL'S PER DAY, PUMP No 2: HOLLY, CAPCY: 12 MILLION GAL'S PER DAY. WET CONN. DIRECT TO RIVER WATER WELL, PUMP No 3: SNOW 12 MILLION GAL'S PER DAY, AND PUMP No 4: SNOW. CAPCY: 10 MILLION GAL'S PER DAY, DISCHARGES AS SHOWN ON PLAN - DOMESTIC PRESSURE 70 LBS, FIRE PRESSURE 80 TO 100 LBS - FOUR 200 H.P. BOILERS -
CITY OF BINGHAMTON
DEPT OF PUBLIC WORKS
GARAGE & REPAIR SHOP
3 INSIDE HYDRANTS WITH 50 ft HOSE TO EACH; 6 SAND PAILS
7 PYRENE EXTGRS; NIGHT WATCHMAN NO CLOCK. EXPOSED STEEL COLUMNS AND TRUSSES; CONCRETE FLOORS AND ROOF; BRICK WALLS, NON-BEARING - POWER & LIGHT ELEC.
BINGHAMTON GAS WORKS
YARD SPOT LIGHTED - ONE NIGHT FIREMAN - NIGHT WATCHMAN REPORTING HOURLY TO NEWMAN CLOCK IN OFFICE - POWER AND HEAT: STEAM - LIGHTS: GAS AND ELECTRIC CITY WATER - OUTSIDE HYDRANTS & HOSE AS SHOWN - ONE EXTGR IN METER ROOM - BARRELS AND PAILS DISTRIBUTED -
Susquehanna River
CONSTRUCTION CO.
Scale 100 Ft.

1918


BINGHAMTON GAS WORKS
YEAR SPOT LIGHTED · ONE NIGHT FIREMAN -
NIGHT WATCHMAN REPORTING ½ HOURLY
TO NEWMAN CLOCK IN OFFICE · POWER AND
HEAT: STEAM · LIGHTS: GAS AND ELECTRIC
CITY WATER · OUTSIDE HYDRANTS & HOSE
AS SHOWN · ONE EXT'GR IN METER ROOM -
BARRELS AND PAILS DISTRIBUTED -
BINGHAMTON LIGHT, HEAT & POWER CO.
NOT IN OPERATION: USED FOR STORAGE.
HYDRANTS WITH 50' 1½" HOSE TO EACH · 6 SAND PAILS · 7 PYRENE EXTINGUISHERS · 4 INSIDE
EXPOSED STEEL COLUMNS AND TRUSSES ·
CONCRETE FLOORS AND RF · BRICK WALLS,
NON · BEARING -
BINGHAMTON GAS PLANT
BINGHAMTON GAS WORKS
BINGHAMTON LIGHT, HEAT & POWER CO.
BINGHAMTON WATER WORKS
NO 4 GAS HOLDER 3 MILLION CU. FT
NO 3 HOLDER 750,000 CU. FT.
NO 2 HOLDER 180,000 CU. FT.
NO 1 HOLDER 25,000 CU. FT.
OIL TANKS
SETTLING TANK
PURIFIERS
GENERATOR
RETORTS
COAL SHED
COAL PIT
STORAGE
AUTO.
50' 1½" HOSE TO EACH
6" W. PIPE (1904)
20" W. PIPE
24" W. P.
SUCTION WELL
SHEDS
COURT
TOMPKINS
D. L. & W. R. R.
COAL TRESTLE
TK.
TH.
295
291
80
50'
373
372
e h a n n a
BINGHA
5 OR MORE MEN ALWAYS ON
WATER FROM SUSQUEHANNA
WELL NEAR MACHINE SHOP
CO'S CENTRIF. PUMPS, CAP
ENGINE CO'S CENTRIF. PUM
21 FILTER BEDS, CAP'CY
BASINS, (21,000 & 20
WELL FOR HIGH LIFT P
PUMP Nº 1: HOLLY, C
Nº 2: HOLLY, CAP'CY
RIVER WATER WELL
PUMP Nº 4: SNOW
ON PLAN · DOMESTIC
FOUR 200 HP BOIL

APPENDIX D

BASE MAP AND FIELD NOTES

NYSEG CADD/SKETCH STANDARDS

1.0 PURPOSE

To establish and identify basic Drawing requirements for Vendors and/or Outside consultants to follow in providing drawings to the NYSEG Generation Dept.

2.0 DRAWINGS

Ultimately most drawings produced by outside parties are indexed, microfilmed, distributed and maintained per NYSEG Generation Dept. documentation procedures. Due to this the following guidelines are required of outside firms to follow in regard to submitting their drawings and/or sub-vendor or third party drawings which will be submitted as final drawings to NYSEG.

2.1.1 DRAWING SIZES

All drawing sizes are in increments of 8 1/2 x 11 inches as shown in Fig No. 1. (The exceptions are the special sizes as shown).

NYSEG Drawing Size Designation	Overall size in inches
S	8 1/2 x 11
SS	11 x 17
B	17 x 22
C	22 X 34
D	34 X 44
DD	11 x 34
R	34 x By any lgth over 44"
(Special sizes)	
Bills of Mat'l	11 x 17
Circuit Schedules	11 x 22

Fig No. 1

2.1.2 Drawing Requirements

Each drawing requires certain basic information such as:

A. Border lines (all 4 sides)

B. Title block & vendor dwg no.

C. Approval and signature panels

D. Revision block

E. Scale (if req"d)

F. Cross reference info

G. Purchase order, Job and Shop order numbers if applicable.

H. A blank area 1/2" x 4" long in the lower right hand corner of Dwg for future entry of NYSEG dwg/and or filing number.
(Drawing Numbers may be furnished upon request).

2.1.3 Microfilming requirements.

All drawings both manual and computer generated documents shall be prepared for eventual microfilming. Drawings shall conform to microfilming standards as specified by the American National Standards Institute per (ANSI) Standard Y14.1.

2.1.4 Multisheet Drawings

Standard cut sheet sizes S, SS, B, C, D etc; are preferred over extended roll sizes. When a standard sheet is not large enough to contain all the required information a multisheet drawing should be used in lieu of a roll size drawing.

2.1.5 Drawing Submittals

All drawings submitted to NYSEG shall be via a Document Transmittal Form stating the Drawing number, Title, Revision level and disposition of the drawing. All Drawings submitted are to be of Archival quality on a reproducible material such as Vellum, sepia or Mylar material.

2.1.6 MICROFILM APERTURE CARDS

All drawings submitted in micrographic form shall be a 35 MM Silver or diazo negative mounted in a 3.25" x 7.375" manila aperture card. The card shall contain all pertinent information such as:

A. Drawing number
B. Sheet no.
C. Revision level
D. Drawing title
E. Plant or location

2.1.7 CADD

All CADD drawings shall be furnished on magnetic tape at 1600 BPI (Bits Per Inch) in Intergraph VMS Backup Format. All drawings submitted via CADD shall be fully compatible, contiguous and interpreted by NYSEGS Generation Dept Intergraph CADD System.
(For Cadd systems other then Intergraph please contact the Generation Dept. CADD System personnel).

Standard NYSEG drawing formats, Font and Cell libraries containing standard symbology for Electrical, I&C, Civil and Mechanical Drawings may be furnished upon request.

APPENDIX E

ANALYTICAL DATA

&

LABORATORY PERSONNEL/CERTIFICATION INFORMATION

Laboratory Director: Richard L. Merrell (see enclosed resume)

Certification Information: See enclosed certification of Approval from **NYSDOH**

Biographical Data

RICHARD L. MERRELL

Lab Director

EXPERIENCE SUMMARY

Twenty-five years experience in analytical chemistry with 17 years in laboratory management. Responsible for all operations of 3 chemistry labs within a region employing over 200 people with annual sales over 12 million. Analytical laboratory experience includes combined gas chromotography-mass spectrometry, gas chromotography, mass spectrometry, thermal analysis, infrared spectrometry, wet chemical analysis and physical testing.

EXPERIENCE RECORD

1989-Date	Engineering-Science, Inc. **Director - Berkeley Lab.** Responsible for overall management of ES lab services including overall profitability.
1987-1989	IT - Corporation. **Regional Lab Director.** Responsible for overall management of the Western region including profitability.
1983-1987	IT - Corporation. **Lab Manager.** Responsible for overall management of the Cerritos lab including profitability.
1977-1983	IT - Corporation. **Lab Manager.** Responsible for lot production and scheduling, salary and personnel administration and policy.
1972-1977	IT - Corporation. **Group Leader - Mass Spectrometry.** Responsible for all aspects of the operation of the mass spectrometry groups.
1968-1972	IT - Corporation. **Chemist.** Performed a variety of analyses using MS, GC, GC-MS, IR and thermal analyses.
1967-68	Shell Chemical Co. **GC Section Supervisor.** Supervised and scheduled several technicians in the GC area that were performing routine analyses.
1966-67	Shell Chemical Co. **Chemist.** Calibrated and repaired process GCs used for process control in a styrene and butadine plant.
1965-66	Chevron Research. **Lab Technician.** Performed many physical and wet chemical analyses of crude oil, core samples and soil samples.
1963-64	General Dynamics. **Lab Technician.** Performed many wet chemical analyses on electroplating solutions.

EDUCATION

B.S. in Chemistry, 1966, Brigham Young University, Provo, Utah

BART - Warm Springs Project - 1991

Mr. Merrell as Laboratory Director of the Engineering Science Berkeley Laboratory (ESBL), Mr. Merrell has had overall responsibility for ESBL's analytical portion of the project. The project technically includes various organic and inorganic analysis. He is responsible to assure that the analytical quality of the project is maintained as well as being responsible for managing the project so all the data is delivered to the client on schedule, complete and within financial budgets.

Purity/Wastech and Selma/Wastech, SITES Projects 1989-1990

Mr. Merrell has had overall responsibility for ESBL's analytical portion of these SITES projects. He is responsible to assure that the analytical quality of the project is maintained according to the project's specific QAPP. Also, he is responsible for managing the project so all the data is delivered to the client on schedule, complete, and within financial budgets.

The project technically included total analysis of the waste for organic and inorganic characterization. Also the waste was treated and analyzed by the Toxic Characteristic Leaching Procedure (TCLP) and the California Assessment Manuals (CAM) Leaching procedure to determine how effective the treating procedure was in stablizing the waste.

Moffett Naval Air Station 1987-1989

Mr. Merrell as the Western Regional Laboratory Director for International Technology Analytical Services (ITAS) was responsible for development and implementation of the sampling and analysis plan at the Moffett Naval Air Station, as part of their HAZWRAP program. His Field Analytical Service group worked with the ITAS laboratories to establish the methods, detection limits, holding times, QC criteria, sample containers, and preservatives that were specifically required for the project. The project was a multi-million dollar analytical project that involved the analysis of both soils and waters for a wider variety of parameters including volatile organic compounds (VOC), base neutral acid extractable (BNA), HSL metals, PCBs and anions.

HAZWRAP Projects 1987 to Present

Mr. Merrell as both the Western Regional Laboratory Director of ITAS and the Laboratory Director of ESBL has had overall analytical responsibilities for many HAZWRAP projects similar in scope of work to the Moffett Naval Air

Station outlined above. These sites included Offutt AFB, Rickenbacker ANGB, Duluth ANGB, Castle AFB, Concord Naval Weapons Station, Mare Island, Mather AFB, McClellan AFB and San diego Naval Facilities.

Rocky Mountain Arsenal 1987-1989

Mr. Merrell as the Western Regional Laboratory Director of ITAS had overall responsibility for the analytical portion of the Rocky Mountain Arsenal F Basin clean up and the review of the QA/QC and sampling and analysis plans. The analysis included primarily air monitoring samples for many HSL volatile and base neutral/acid extractable organics and several metals. This was to ensure the safety of the workers and surrounding residents. Many rapid turn around analysis were necessary on this project.

U.S. Environmental Protection Agency Contract Laboratory Program (EPA CLP) 1980-1989

Mr. Merrell as the Laboratory Manager of IT Cerritos Laboratory and later the Western Regional Laboratory Director of ITAS had overall responsibility for the laboratory's performance in the CLP program. His IT Cerritos laboratory has been a participant in the CLP since its inception in 1980. The Cerritos laboratory has had as many as 13 bid lots at one time. They were required to perform full organic CLP analysis on as many as 390 water and soil samples per month from known or suspected hazardous waste sites. These analyses for HSL compounds includes volatile organics, base neutral/acid extractable organics, pesticides and PCBs. CLP protocols are designed to be stand alone legally defendable methodologies and are currently used when the most rigorous QA/QC requirements are needed.

PROPERTY OF
NEW YORK STATE DEPARTMENT OF HEALTH

DAVID AXELROD, M.D. *COMMISSIONER*

Expires 12:01 AM April 1, 1991
ISSUED September 20, 1990

INTERIM CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

(Issued in accordance with the Laws of New York State)

pursuant to Section 502 of the Public Health Law

Laboratory ID. Number 11178

Director: Mr. Richard Merrell

Laboratory Name: Engineering Science, Inc.
Number & Street: 600 Bancroft Way
City,State,Zip : Berkeley CA 94710
VALID AT THIS ADDRESS ONLY

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/SOLID AND HAZARDOUS WASTE

All approved subcategories and/or analytes are listed below:

Characteristic Testing :
    Corrosivity
    Ignitability
    Reactivity
    Toxicity - Metals Only
Nitroaromatics Isophorone (ALL)
Phthalate Esters (ALL)
Purgeable Aromatics (ALL)

Miscellaneous :
    Cyanide, Total
    Hydrogen Ion (pH)
    Sulfide (as S)
Metals I (ALL)
Polynuclear Aromatic Hydrocarbons (ALL)
Priority Pollutant Phenols (ALL)
Purgeable Halocarbons (ALL)

Acrolein and Acrylonitrile (ALL)
Chlorinated Hydrocarbon Pesticides
Chlorinated Hydrocarbons (ALL)
Haloethers (ALL)
Metals II (ALL)
Polychlorinated Biphenyls (ALL)

Herbert W. Dickerman, M.D., Ph.D.
Director
Wadsworth Center for Laboratories and Research

PROPERTY OF

NEW YORK STATE DEPARTMENT OF HEALTH

DAVID AXELROD, M.D. *COMMISSIONER*

Expires 12:01 AM April 1, 1991
ISSUED September 20, 1990

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Number & Street: 600 Bancroft Way
City,State,Zip : Berkeley CA 94710

Director: Mr. Richard L Merrell

VALID AT THIS ADDRESS ONLY

is hereby APPROVED as an Environmental Laboratory for the category

NON-POTABLE WATER

All approved subcategories and analytes are listed on the attached addendum

Herbert W. Dicke

Herbert W. Dickerman, M.D., Ph.D.
Director
Wadsworth Center for Laboratories and Research

FORM LR 23.F

REIEC
REMEDIATION
TECHNOLOGIES INC

3040 William Pitt Way
Pittsburgh, PA 15238
Telephone: (412) 826-3340
Facsimile: (412) 826-3409

December 18, 1991

Mr. George Moreau
Engineering Science Syracuse
290 Elwood Davis Road
Suite 312
Liverpool, NY 13088

Dear Mr. Moreau:

As requested, your sample designated SED-2 has been examined by infrared spectral (IR) techniques for characterization of organic components.

Due to the presence of soil, aggregate, and water in the sample, extraction with a carbon disulfide/sodium sulfide mixture was required to isolate the organics.

The carbon disulfide extracts were found by IR to consist primarily of polynuclear aromatic hydrocarbons (PAHs), consistent for a mixture of a carburetted water gas tar and "heavy" coal-tar hydrocarbons (e.g., heavy oil or the extractable material from a topped coke oven tar (road tar)).

Semi-quantitative extraction data indicates the CS_2 solubles to be approximately 0.8 weight percent of the original sample (semi-quantitative due to the heterogeneous nature of the sediment).

If you have any questions concerning this analysis, please do not hesitate to call me.

Sincerely yours,

REMEDIATION TECHNOLOGIES, INC.

Ronald E. Keffer

Ronald E. Keffer
Associate Principal

REK:las

RETEC
REMEDIATION
TECHNOLOGIES INC

3040 William Pitt Way
Pittsburgh, PA 15238
Telephone: (412) 826-3340
Facsimile: (412) 826-3409

March 11, 1992

Mr. George Moreau
Engineering Science Syracuse
290 Elwood Davis Road
Suite 312
Liverpool, NY 13088

Dear Mr. Moreau:

In order to offer more definition to the IR analysis of your sample SED-2 more information about the site would have to be known. It is evident from the analysis that the material consists of a mixture of carburetted water gas tar. The carburetted water gas tar is easily identified by the presence of cyclic olefinic hydrocarbons and the absence of dibenzofurans. There is also the presence of minor aliphatic hydrocarbon structures which are always present in the carburetted water gas tar.

The "heavy" coal-tar hydrocarbons (e.g., heavy oil or the extractable materials from a topped coke oven tar (road tar)) was identified to contain "rich" polynuclear aromatics (esp. pyrenes) which is consistent with a road tar product. The presence of minor aliphatic hydrocarbons further identify this material to be consistent for a mixture of a carburetted water gas tar and a road tar.

All of the IR analyses are referenced and compared to a library of IR spectra used to identify the components. This library of spectra contains hundreds of coal-base related products and by-products as well as manufactured gas plant by-product components.

The results discussed above are consistent with actual samples collected from these sites.

I hope this answers your questions. If you have any further concerns, please do not hesitate to call me.

Sincerely yours,

REMEDIATION TECHNOLOGIES, INC.

Ronald E. Keffer

Ronald E. Keffer
Associate Principal

REK:trf

cc: File: E30-673-997

ES
ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 11/1/91

Work Order No.:3333

Client: George Moreau
ES Syracuse/ NYSEG
290 Elwood Davis Road
Liverpool, NY. 13088

Date of Sample Receipt: 10/4/91

Your water samples identified as:

CGBS-SW-1
CGBS-SW-2
CGBS-SW-3
CGBS-SW-4

were analyzed for semivolatile organics by EPA Method 625, volatile organics by EPA Method 624, 12 client specified metals and total cyanide. Sample CGBS-SW-2 was also analyzed for amenable cyanide.

Finally your water sample identified as:

CGBS TP

was analyzed for volatile organics by EPA Method 624.

The analytical reports for the samples listed above are attached.

A PARSONS COMPANY

LEGEND FOR ORGANIC RESULT QUALIFIERS

U	The compound was analyzed for but not detected.
J	The value reported is an estimated concentration. This is used when: 1. The mass spectral data indicate the presence of a compound that meets identification criteria, but the result is less than the reporting limit; 2. Estimating the concentration for tentatively identified compounds (TICs) where a 1:1 response is assumed.
C	This is used for pesticide results where identification has been confirmed by GC/MS.
B	The analyte is found in the associated blank as well as in the sample.
A	A TIC is a suspected aldol-condensation product.
E	This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.
D	This flag identifies a compound whose reported analytical result is calculated from a greater dilution than the primary analysis. The actual dilution used to calculate the analytical result is reported either on the report or in the case narrative.
N	Indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search. It is applied to all TIC results.

VOLATILE ORGANICS CASE NARRATIVE
WORK ORDER NO. 3333
EPA METHOD 624

These five water samples were analyzed for volatile organics by EPA Method 624. CLP compounds, spiking amounts, and QC acceptance criteria were used for the internal standards, surrogates, and matrix spike/spike duplicates.

All samples were analyzed within Data Validation Technical Holding Times.

Two blanks wereanalyzed with these samples and met CLP acceptance criteria for internal standard areas, surrogates and contamination.

The continuing calibration checks (CCC) used for quantifying these samples met CLP acceptance criteria.

All internal standard areas were within CLP acceptance criteria.

All surrogate recoveries were within CLP acceptance criteria.

All matrix spike/spike duplicate recoveries and relative percent differences were within CLP acceptance criteria.

All blank spike/spike duplicate recoveries and relative percent differences were within CLP acceptance criteria.

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: 3333-01

Date Analyzed: 10/08/91

Client ID: CGBS_SW-1

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/L
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst: S.C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: 3333-02

Date Analyzed: 10/08/91

Client ID: CGBS_SW-2

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/L
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: 3333-03

Date Analyzed: 10/08/91

Client ID: CGBS_SW-3

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/L
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst: S. C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: 3333-04

Date Analyzed: 10/10/91

Client ID: CGBS_SW-4

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst: J.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: 3333-05 Date Analyzed: 10/08/91

Client ID: CGBS_TP % Moisture: NA

Matrix: WATER Level:LOW Dilution Fact: 1.0

Compound	Analytical Results ug/L
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst: Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: MWVM1911008

Date Analyzed: 10/08/91

Client ID: VBLANK

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/L
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst: J.C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3333

Laboratory ID: MWVH1911010

Date Analyzed: 10/10/91

Client ID: VBLANK

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

WATER VOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3333

DATE ANALYZED: 10/08/91

LEVEL: LOW

LABORATORY ID	S1 (DCE)	S2 (TOL)	S3 (BFB)	Total Out
MWVM1911008	101	99	99	0
3333-01	97	94	97	0
3333-02	91	99	104	0
3333-02MS	90	95	96	0
3333-02MSD	92	96	101	0
3333-05	95	101	104	0
3333-03	90	93	99	0

	QC LIMITS
S1(DCE)= 1,2-Dichloroethane-d4	(76-114)
S2(TOL)= Toluene-d8	(88-110)
S3(BFB)= Bromofluorobenzene	(86-115)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST: S.C

Quality control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

WATER VOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3333

DATE ANALYZED: 10/10/91

LEVEL: LOW

LABORATORY ID	S1 (DCE)	S2 (TOL)	S3 (BFB)	Total Out
MWVM1911010	104	95	105	0
3333-04	111	94	109	0

	QC LIMITS
S1(DCE)= 1,2-Dichloroethane-d4	(76-114)
S2(TOL)= Toluene-d8	(88-110)
S3(BFB)= Bromofluorobenzene	(86-115)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST: S. C

Quality control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

Matrix Spike/Spike Duplicate Recovery

Volatile Organics

Work Order: 3333

Analysis Date: 10/08/91

QC Sample : 3333-02

Matrix: WATER

Instrument: VMS-1

Units: ug/L

Level: LOW

Cor. Fact: 1

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,1-Dichloroethene	0	50	54	108
Trichloroethene	0	50	49	98
Benzene	0	50	50	100
Toluene	0	50	48	95
Chlorobenzene	0	50	52	103

Compound	Conc. MSD	Percent Recovered	RPD	Criteria RPD	Criteria %REC
1,1-Dichloroethene	55	110	2	14	(61-145)
Trichloroethene	49	98	0	14	(71-120)
Benzene	52	104	4	11	(76-127)
Toluene	50	99	4	13	(76-125)
Chlorobenzene	55	110	6	13	(75-130)

ANALYST:

Quality Control:

* = Value Outside QC Limit

$$\text{Percent Recovered} = \frac{\text{Conc. MS}|\text{MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

ES-ENGINEERING SCIENCE, INC.

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Matrix Spike/Spike Duplicate Recovery

Volatile Organics

Work Order: 3333

Analysis Date: 10/03/91

QC Sample : MWVM1911003

Matrix: WATER

Instrument: VMS-1

Units: ug/L

Level: LOW

Cor. Fact: 1

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,1-Dichloroethene	0	50	53	106
Trichloroethene	0	50	46	93
Benzene	0	50	52	104
Toluene	0	50	52	103
Chlorobenzene	0	50	54	107

Compound	Conc. MSD	Percent Recovered	RPD	Criteria RPD	%REC
1,1-Dichloroethene	47	95	12	14	(61-145)
Trichloroethene	50	99	7	14	(71-120)
Benzene	52	105	0	11	(76-127)
Toluene	49	99	5	13	(76-125)
Chlorobenzene	51	102	5	13	(75-130)

ANALYST: S.C.

Quality Control:

* = Value Outside QC Limit

$$\text{Percent Recovered} = \frac{\text{Conc. MS|MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

SEMIVOLATILE ORGANICS CASE NARRATIVE
WORK ORDER NO. 3333
EPA METHOD 625

These water samples were analyzed for semivolatile organics by EPA Method 625. CLP compounds, spiking amounts, and QC acceptance criteria were used for the internal standards, surrogates, and matrix spike/spike duplicates.

All samples were analyzed within Data Validation Technical Holding Times.

One blank was analyzed with this sample and met CLP acceptance criteria for internal standard areas, surrogates and contamination.

The continuing calibration checks (CCC) used for quantifying this sample met CLP acceptance criteria.

All internal standard areas were within CLP acceptance criteria.

All surrogate recoveries were within CLP acceptance criteria.

All matrix spike/spike duplicate recoveries and relative percent differences were within CLP acceptance criteria.

All blank spike/spike duplicate recoveries and relative percent differences were within CLP acceptance criteria.

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-01

Date Analyzed: 10/07/91

Client ID: CGBS_SW-1

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
N-Nitroso-Dimethylamine	20 U
Phenol	20 U
bis(2-Chloroethyl)ether	20 U
2-Chlorophenol	20 U
1,3-Dichlorobenzene	20 U
1,4-Dichlorobenzene	20 U
Benzyl Alcohol	20 U
1,2-Dichlorobenzene	20 U
2-Methylphenol	20 U
bis(2-chloroisopropyl)Ether	20 U
4-Methylphenol	20 U
N-Nitroso-Di-n-Propylamine	20 U
Hexachloroethane	20 U
Nitrobenzene	20 U
Isophorone	20 U
2-Nitrophenol	20 U
2,4-Dimethylphenol	20 U
bis(2-Chloroethoxy)methane	20 U
2,4-Dichlorophenol	20 U
Benzoic Acid	50 U
1,2,4-Trichlorobenzene	20 U
Naphthalene	20 U
4-Chloroaniline	20 U
Hexachlorobutadiene	20 U
4-Chloro-3-Methylphenol	20 U
2-Methylnaphthalene	20 U
Hexachlorocyclopentadiene	20 U
2,4,6-Trichlorophenol	20 U
2,4,5-Trichlorophenol	50 U
2-Chloronaphthalene	20 U
2-Nitroaniline	50 U
Dimethylphthalate	20 U
Acenaphthylene	20 U
2,6-Dinitrotoluene	20 U
3-Nitroaniline	50 U
Acenaphthene	20 U
2,4-Dinitrophenol	50 U
Dibenzofuran	20 U
4-Nitrophenol	50 U

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-01

Date Analyzed: 10/07/91

Client ID: CGBS_SW-1

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
2,4-Dinitrotoluene	20 U
Fluorene	20 U
Diethylphthalate	20 U
4-Chlorophenyl-phenylether	20 U
4-Nitroaniline	50 U
4,6-Dinitro-2-Methylphenol	50 U
N-Nitrosodiphenylamine	20 U
4-Bromophenyl-phenylether	20 U
Hexachlorobenzene	20 U
Pentachlorophenol	50 U
Phenanthrene	20 U
Anthracene	20 U
Di-n-Butylphthalate	20 U
Fluoranthene	20 U
Pyrene	20 U
Butylbenzylphthalate	20 U
Benzo(a)Anthracene	20 U
3,3'-Dichlorobenzidine	40 U
Chrysene	20 U
bis(2-Ethylhexyl)Phthalate	20 U
Di-n-octylphthalate	20 U
Benzo(b)Fluoranthene	20 U
Benzo(k)Fluoranthene	20 U
Benzo(a)Pyrene	20 U
Indeno(1,2,3-cd)Pyrene	20 U
Dibenz(a,h)Anthracene	20 U
Benzo(g,h,i)Perylene	20 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-02

Date Analyzed: 10/07/91

Client ID: CGBS_SW-2

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
N-Nitroso-Dimethylamine	20 U
Phenol	20 U
bis(2-Chloroethyl)ether	20 U
2-Chlorophenol	20 U
1,3-Dichlorobenzene	20 U
1,4-Dichlorobenzene	20 U
Benzyl Alcohol	20 U
1,2-Dichlorobenzene	20 U
2-Methylphenol	20 U
bis(2-chloroisopropyl)Ether	20 U
4-Methylphenol	20 U
N-Nitroso-Di-n-Propylamine	20 U
Hexachloroethane	20 U
Nitrobenzene	20 U
Isophorone	20 U
2-Nitrophenol	20 U
2,4-Dimethylphenol	20 U
bis(2-Chloroethoxy)methane	20 U
2,4-Dichlorophenol	20 U
Benzoic Acid	50 U
1,2,4-Trichlorobenzene	20 U
Naphthalene	20 U
4-Chloroaniline	20 U
Hexachlorobutadiene	20 U
4-Chloro-3-Methylphenol	20 U
2-Methylnaphthalene	20 U
Hexachlorocyclopentadiene	20 U
2,4,6-Trichlorophenol	20 U
2,4,5-Trichlorophenol	50 U
2-Chloronaphthalene	20 U
2-Nitroaniline	50 U
Dimethylphthalate	20 U
Acenaphthylene	20 U
2,6-Dinitrotoluene	20 U
3-Nitroaniline	50 U
Acenaphthene	20 U
2,4-Dinitrophenol	50 U
Dibenzofuran	20 U
4-Nitrophenol	50 U

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-02

Date Analyzed: 10/07/91

Client ID: CGBS_SW-2

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
2,4-Dinitrotoluene	20 U
Fluorene	20 U
Diethylphthalate	20 U
4-Chlorophenyl-phenylether	20 U
4-Nitroaniline	50 U
4,6-Dinitro-2-Methylphenol	50 U
N-Nitrosodiphenylamine	20 U
4-Bromophenyl-phenylether	20 U
Hexachlorobenzene	20 U
Pentachlorophenol	50 U
Phenanthrene	20 U
Anthracene	20 U
Di-n-Butylphthalate	20 U
Fluoranthene	20 U
Pyrene	20 U
Butylbenzylphthalate	20 U
Benzo(a)Anthracene	20 U
3,3'-Dichlorobenzidine	40 U
Chrysene	20 U
bis(2-Ethylhexyl)Phthalate	20 U
Di-n-octylphthalate	20 U
Benzo(b)Fluoranthene	20 U
Benzo(k)Fluoranthene	20 U
Benzo(a)Pyrene	20 U
Indeno(1,2,3-cd)Pyrene	20 U
Dibenz(a,h)Anthracene	20 U
Benzo(g,h,i)Perylene	20 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-03

Date Analyzed: 10/07/91

Client ID: CGBS_SW-3

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
N-Nitroso-Dimethylamine	20 U
Phenol	20 U
bis(2-Chloroethyl)ether	20 U
2-Chlorophenol	20 U
1,3-Dichlorobenzene	20 U
1,4-Dichlorobenzene	20 U
Benzyl Alcohol	20 U
1,2-Dichlorobenzene	20 U
2-Methylphenol	20 U
bis(2-chloroisopropyl)Ether	20 U
4-Methylphenol	20 U
N-Nitroso-Di-n-Propylamine	20 U
Hexachloroethane	20 U
Nitrobenzene	20 U
Isophorone	20 U
2-Nitrophenol	20 U
2,4-Dimethylphenol	20 U
bis(2-Chloroethoxy)methane	20 U
2,4-Dichlorophenol	20 U
Benzoic Acid	50 U
1,2,4-Trichlorobenzene	20 U
Naphthalene	20 U
4-Chloroaniline	20 U
Hexachlorobutadiene	20 U
4-Chloro-3-Methylphenol	20 U
2-Methylnaphthalene	20 U
Hexachlorocyclopentadiene	20 U
2,4,6-Trichlorophenol	20 U
2,4,5-Trichlorophenol	50 U
2-Chloronaphthalene	20 U
2-Nitroaniline	50 U
Dimethylphthalate	20 U
Acenaphthylene	20 U
2,6-Dinitrotoluene	20 U
3-Nitroaniline	50 U
Acenaphthene	20 U
2,4-Dinitrophenol	50 U
Dibenzofuran	20 U
4-Nitrophenol	50 U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-03

Date Analyzed: 10/07/91

Client ID: CGBS_SW-3

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
2,4-Dinitrotoluene	20 U
Fluorene	20 U
Diethylphthalate	20 U
4-Chlorophenyl-phenylether	20 U
4-Nitroaniline	50 U
4,6-Dinitro-2-Methylphenol	50 U
N-Nitrosodiphenylamine	20 U
4-Bromophenyl-phenylether	20 U
Hexachlorobenzene	20 U
Pentachlorophenol	50 U
Phenanthrene	20 U
Anthracene	20 U
Di-n-Butylphthalate	20 U
Fluoranthene	20 U
Pyrene	20 U
Butylbenzylphthalate	20 U
Benzo(a)Anthracene	20 U
3,3'-Dichlorobenzidine	40 U
Chrysene	20 U
bis(2-Ethylhexyl)Phthalate	20 U
Di-n-octylphthalate	20 U
Benzo(b)Fluoranthene	20 U
Benzo(k)Fluoranthene	20 U
Benzo(a)Pyrene	20 U
Indeno(1,2,3-cd)Pyrene	20 U
Dibenz(a,h)Anthracene	20 U
Benzo(g,h,i)Perylene	20 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-04

Date Analyzed: 10/07/91

Client ID: CGBS_SW-4

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
N-Nitroso-Dimethylamine	20 U
Phenol	20 U
bis(2-Chloroethyl)ether	20 U
2-Chlorophenol	20 U
1,3-Dichlorobenzene	20 U
1,4-Dichlorobenzene	20 U
Benzyl Alcohol	20 U
1,2-Dichlorobenzene	20 U
2-Methylphenol	20 U
bis(2-chloroisopropyl)Ether	20 U
4-Methylphenol	20 U
N-Nitroso-Di-n-Propylamine	20 U
Hexachloroethane	20 U
Nitrobenzene	20 U
Isophorone	20 U
2-Nitrophenol	20 U
2,4-Dimethylphenol	20 U
bis(2-Chloroethoxy)methane	20 U
2,4-Dichlorophenol	20 U
Benzoic Acid	50 U
1,2,4-Trichlorobenzene	20 U
Naphthalene	20 U
4-Chloroaniline	20 U
Hexachlorobutadiene	20 U
4-Chloro-3-Methylphenol	20 U
2-Methylnaphthalene	20 U
Hexachlorocyclopentadiene	20 U
2,4,6-Trichlorophenol	20 U
2,4,5-Trichlorophenol	50 U
2-Chloronaphthalene	20 U
2-Nitroaniline	50 U
Dimethylphthalate	20 U
Acenaphthylene	20 U
2,6-Dinitrotoluene	20 U
3-Nitroaniline	50 U
Acenaphthene	20 U
2,4-Dinitrophenol	50 U
Dibenzofuran	20 U
4-Nitrophenol	50 U

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: 3333-04

Date Analyzed: 10/07/91

Client ID: CGBS_SW-4

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
2,4-Dinitrotoluene	20 U
Fluorene	20 U
Diethylphthalate	20 U
4-Chlorophenyl-phenylether	20 U
4-Nitroaniline	50 U
4,6-Dinitro-2-Methylphenol	50 U
N-Nitrosodiphenylamine	20 U
4-Bromophenyl-phenylether	20 U
Hexachlorobenzene	20 U
Pentachlorophenol	50 U
Phenanthrene	20 U
Anthracene	20 U
Di-n-Butylphthalate	20 U
Fluoranthene	20 U
Pyrene	20 U
Butylbenzylphthalate	20 U
Benzo(a)Anthracene	20 U
3,3'-Dichlorobenzidine	40 U
Chrysene	20 U
bis(2-Ethylhexyl)Phthalate	20 U
Di-n-octylphthalate	20 U
Benzo(b)Fluoranthene	20 U
Benzo(k)Fluoranthene	20 U
Benzo(a)Pyrene	20 U
Indeno(1,2,3-cd)Pyrene	20 U
Dibenz(a,h)Anthracene	20 U
Benzo(g,h,i)Perylene	20 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: MWBNA911004

Date Analyzed: 10/07/91

Client ID: SBLANK

% Moisture: NA

Matrix: WATER

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
N-Nitroso-Dimethylamine	20 U
Phenol	20 U
bis(2-Chloroethyl)ether	20 U
2-Chlorophenol	20 U
1,3-Dichlorobenzene	20 U
1,4-Dichlorobenzene	20 U
Benzyl Alcohol	20 U
1,2-Dichlorobenzene	20 U
2-Methylphenol	20 U
bis(2-chloroisopropyl)Ether	20 U
4-Methylphenol	20 U
N-Nitroso-Di-n-Propylamine	20 U
Hexachloroethane	20 U
Nitrobenzene	20 U
Isophorone	20 U
2-Nitrophenol	20 U
2,4-Dimethylphenol	20 U
bis(2-Chloroethoxy)methane	20 U
2,4-Dichlorophenol	20 U
Benzoic Acid	50 U
1,2,4-Trichlorobenzene	20 U
Naphthalene	20 U
4-Chloroaniline	20 U
Hexachlorobutadiene	20 U
4-Chloro-3-Methylphenol	20 U
2-Methylnaphthalene	20 U
Hexachlorocyclopentadiene	20 U
2,4,6-Trichlorophenol	20 U
2,4,5-Trichlorophenol	50 U
2-Chloronaphthalene	20 U
2-Nitroaniline	50 U
Dimethylphthalate	20 U
Acenaphthylene	20 U
2,6-Dinitrotoluene	20 U
3-Nitroaniline	50 U
Acenaphthene	20 U
2,4-Dinitrophenol	50 U
Dibenzofuran	20 U
4-Nitrophenol	50 U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3333

Date Extracted: 10/04/91

Laboratory ID: MWBNA911004

Date Analyzed: 10/07/91

Client ID: SBLANK

% Moisture: NA

Matrix: WATER

Level: LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/L
2,4-Dinitrotoluene	20 U
Fluorene	20 U
Diethylphthalate	20 U
4-Chlorophenyl-phenylether	20 U
4-Nitroaniline	50 U
4,6-Dinitro-2-Methylphenol	50 U
N-Nitrosodiphenylamine	20 U
4-Bromophenyl-phenylether	20 U
Hexachlorobenzene	20 U
Pentachlorophenol	50 U
Phenanthrene	20 U
Anthracene	20 U
Di-n-Butylphthalate	20 U
Fluoranthene	20 U
Pyrene	20 U
Butylbenzylphthalate	20 U
Benzo(a)Anthracene	20 U
3,3'-Dichlorobenzidine	40 U
Chrysene	20 U
bis(2-Ethylhexyl)Phthalate	20 U
Di-n-octylphthalate	20 U
Benzo(b)Fluoranthene	20 U
Benzo(k)Fluoranthene	20 U
Benzo(a)Pyrene	20 U
Indeno(1,2,3-cd)Pyrene	20 U
Dibenz(a,h)Anthracene	20 U
Benzo(g,h,i)Perylene	20 U

Analyst:

Group Leader:

WATER SEMIVOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3333

DATE ANALYZED: 10/07/91

LEVEL: LOW

LABORATORY ID	S1 NBZ	S2 FBP	S3 TPH	S4 PHL	S5 2FP	S6 TBP	TOT OUT
MWBNA911004	64	67	68	74	76	74	0
3333-01	64	69	57	61	59	71	0
3333-02	66	75	68	49	61	75	0
3333-02MS	66	70	67	64	65	73	0
3333-02MSD	55	63	61	59	59	75	0
3333-03	56	59	68	63	64	74	0
3333-04	62	65	63	61	62	72	0

	QC LIMITS
S1(NBZ)= Nitrobenzene-d5	(35-114)
S2(FBP)= 2-Fluorobiphenyl	(43-116)
S3(TPH)= Terphenyl-d14	(33-141)
S4(PHL)= Phenol-d5	(10-94)
S5(2FP)= 2-Fluorophenol	(21-100)
S6(TBP)= 2,4,6-Tribromophenol	(10-123)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST:

Quality Control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

Matrix Spike/Spike Duplicate Recovery

Semivolatile Organics

Ext. Date : 10/04/91

Analysis Date: 10/07/91

Work order: 3333

Matrix: WATER

QC Sample : 3333-02

Units: ug/L

Instrument: EMS-1

Cor. Fact: 2

Level: LOW

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,2,4-Trichlorobenzene	0	50	35	70
Acenapthene	0	50	36	72
2,4-Dinitrotoluene	0	50	32	64
Pyrene	0	50	36	71
N-Nitrosodipropylamine	0	50	34	68
1,4-Dichlorobenzene	0	50	34	68
Pentachlorophenol	0	75	53	70
Phenol	0	75	49	65
2-Chlorophenol	0	75	48	65
4-Chloro-m-cresol	0	75	46	61
4-Nitrophenol	0	75	35	47

Compound	Conc. MSD	Percent Recovered	RPD	Criteria RPD %REC
1,2,4-Trichlorobenzene	29	59	18	28 (39-98)
Acenapthene	34	68	6	31 (46-118)
2,4-Dinitrotoluene	32	63	1	38 (24-96)
Pyrene	33	67	7	31 (26-127)
N-Nitrosodipropylamine	30	60	12	38 (41-116)
1,4-Dichlorobenzene	29	58	16	28 (36-97)
Pentachlorophenol	54	72	3	50 (9-103)
Phenol	44	59	9	42 (12-89)
2-Chlorophenol	45	60	7	40 (27-123)
4-Chloro-m-cresol	47	63	2	42 (23-97)
4-Nitrophenol	42	55	16	50 (10-80)

ANALYST:

Quality Control:

* = Value Outside QC Limits

$$\text{Percent Recovered} = \frac{\text{Conc. MS|MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

CASE NARRATIVE
WORK ORDER NO.3333
INORGANICS

Chromium was analyzed using ICP-atomic emission rather than graphite furnace atomic absorption. The detection limit requirement was met using this method.

Amenable cyanide was analyzed only if total cyanide was found in any of the samples.

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG

Work Order: 3333
Matrix: WATER

Client's ID:	CGBS SW-1	CGBS SW-2				
	1104	1022				
Sample Date:	10/03/91	10/03/91				
% Moisture:	NA	NA				
Lab ID:	3333.01	3333.02				
	I	Y				
Parameter	Results		Method	Normal Report Limit	Units	Date Analyzed
Aluminum	0.91	0.66	ICP	.2	mg/L	10/15/91
Antimony	ND	ND	ICP	.06	(PPM)	10/15/91
Cadmium	ND	ND	ICP	.005	in	10/15/91
Chromium	ND	ND	ICP	.01	Water	10/15/91
Cobalt	ND	ND	ICP	.05	"	10/15/91
Copper	ND	ND	ICP	.025	"	10/15/91
Iron	1.8	1.3	ICP	.1	"	10/15/91
Lead	0.0085	0.0044	GF-AA	.003	"	10/10/91
Manganese	0.33	0.23	ICP	.015	"	10/15/91
Mercury	ND	ND	CV-AA	.0002	"	10/11/91
Nickel	ND	ND	ICP	.04	"	10/15/91
Zinc	0.028	0.022	ICP	.02	"	10/15/91
Amenable CN	NR	.045	Color	.02	"	10/14/91
Total CN	ND	.097	Color	.02	"	10/10/91

NR- Not Required, Total Cyanide was Not Detected
ND- Not Detected

ANALYST: ____________ GROUP LEADER: ____________

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG
Work Order: 3333
Matrix: WATER

Client's ID:	CGBS SW-3	CGBS SW-4				
	0945	0955				
Sample Date:	10/03/91	10/03/91				
% Moisture:	NA	NA				
Lab ID:	3333.03	3333.04				
	I	I				
Parameter	-----------Results	------------	Method	Normal Report Limit	Units	Date Analyzed
Aluminum	0.46	0.22	ICP	.2	mg/L	10/15/91
Antimony	ND	ND	ICP	.06	(PPM)	10/15/91
Cadmium	ND	ND	ICP	.005	in	10/15/91
Chromium	ND	ND	ICP	.01	Water	10/15/91
Cobalt	ND	ND	ICP	.05	"	10/15/91
Copper	ND	ND	ICP	.025	"	10/15/91
Iron	0.65	0.28	ICP	.1	"	10/15/91
Lead	ND	ND	GF-AA	.003	"	10/10/91
Manganese	0.09	0.045	ICP	.015	"	10/15/91
Mercury	ND	ND	CV-AA	.0002	"	10/11/91
Nickel	ND	ND	ICP	.04	"	10/15/91
Zinc	ND	ND	ICP	.02	"	10/15/91
Amenable CN	NR	NR	Color	.02	"	10/14/91
Total CN	ND	ND	Color	.02	"	10/10/91

NR- Not Required, Total Cyanide was Not Detected
ND- Not Detected

ANALYST: J. Lute

GROUP LEADER:

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG

Work Order: 3332, 3333
Matrix: WATER

Client's ID: Prep Blank

Sample Date:
% Moisture: NA
Lab ID: Prep Blank

Parameter	Results	Method	Normal Report Limit	Units	Date Analyzed
Aluminum	ND	ICP	.2	mg/L	10/15/91
Antimony	ND	ICP	.06	(PPM)	10/15/91
Cadmium	ND	ICP	.005	in	10/15/91
Chromium	ND	ICP	.01	Water	10/15/91
Cobalt	ND	ICP	.05	"	10/15/91
Copper	ND	ICP	.025	"	10/15/91
Iron	ND	ICP	.1	"	10/15/91
Lead	ND	GF-AA	.003	"	10/10/91
Manganese	ND	ICP	.015	"	10/15/91
Mercury	ND	CV-AA	.0002	"	10/11/91
Nickel	ND	ICP	.04	"	10/15/91
Zinc	ND	ICP	.02	"	10/15/91
Amenable CN	ND	Color	.02	"	10/14/91
Total CN	ND	Color	.02	"	10/10/91

ND- Not Detected

ANALYST: ______________________ GROUP LEADER: ______________________

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS QC SUMMARY - LAB CONTROL SAMPLE - WATER

Work Order:	3332, 3333	% Moisture:	NA
Lab ID of LCS:		Matrix:	Water
ICP:	425.68A LCS		
GF-AA:	425.69A LCS	Units:	mg/L
Mercury:	377.953A LCS		Water

Parameter	Date Analyzed LCS	LCS Result	Conc Added	% Rec LCS	-QC Limits- -- % Rec -- Low	High
Aluminum ICP	10/15/91	2.167	2	108	80	120
Antimony ICP	10/15/91	.493	.5	99	80	120
Cadmium ICP	10/15/91	.057	.05	115	80	120
Chromium ICP	10/15/91	.200	.2	100	80	120
Cobalt ICP	10/15/91	.497	.5	99	80	120
Copper ICP	10/15/91	.248	.25	99	80	120
Iron ICP	10/15/91	1.046	1	105	80	120
Lead GF	10/10/91	.0192	.02	96	74	133
Manganese ICP	10/15/91	.494	.5	99	80	120
Mercury CV	10/11/91	.00107	.001	107	80	120
Nickel ICP	10/15/91	.494	.5	99	80	120
Zinc ICP	10/15/91	.518	.5	104	80	120
Amenable CN	10/14/91	.199	.2	99	80	120
Total CN	10/10/91	.212	.2	106	80	120

ANALYST: ______ Date 10-23-91 REVIEWER: ______ Date 10/23/91
File:M1QCLCSW

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS QC SUMMARY - LAB CONTROL SAMPLE - WATER

Work Order:	3332, 3333	% Moisture:	NA
Lab ID of LCS:		Matrix:	Water
ICP:	425.68B LCS		
GF-AA:	425.69B LCS	Units:	mg/L
Mercury:	377.953B LCS		Water

Parameter	Date Analyzed LCS	LCS Result	Conc Added	% Rec LCS	-QC Limits- -- % Rec -- Low	High
Aluminum ICP	10/15/91	2.160	2	108	80	120
Antimony ICP	10/15/91	.486	.5	97	80	120
Cadmium ICP	10/15/91	.058	.05	116	80	120
Chromium ICP	10/15/91	.202	.2	101	80	120
Cobalt ICP	10/15/91	.501	.5	100	80	120
Copper ICP	10/15/91	.250	.25	100	80	120
Iron ICP	10/15/91	1.052	1	105	80	120
Lead GF	10/10/91	.0193	.02	97	74	133
Manganese ICP	10/15/91	.498	.5	100	80	120
Mercury CV	10/11/91	.00110	.001	110	80	120
Nickel ICP	10/15/91	.498	.5	100	80	120
Zinc ICP	10/15/91	.523	.5	105	80	120
Amenable CN	10/14/91	.204	.2	102	80	120
Total CN	10/10/91	.210	.2	105	80	120

ANALYST: ______ Date 10-23-91 REVIEWER: ______ Date 10/23/91
File:M1QCLCSW

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANIC QC SUMMARY - LCS and LCS Dup
WATER - mg/L

Work Order: 3332, 3333

% Moisture: NA

Matrix: Water

Units: mg/L Water

	ICP	GF-AA	Mercury	Total CN	Amen. CN
Lab ID Spiked:	425.68A	425.69A	377.953A	395.64A	395.68A
QC Batch:	425.68B	425.69B	377.953B	395.64B	395.68B

Parameter	Date Analyzed LCS	Results Unspiked Sample	Results LCS	Results LCS Dup	RPD	RPD QC Limit	Conc Added LCS	Conc Added LCS Dup	Percent Recovered LCS	Percent Recovered LCS Dup
Aluminum	10/15/91	0.000	2.167	2.160	0	20	2.000	2.000	108	108
Antimony	10/15/91	0.000	.493	.486	1	20	.500	.500	99	97
Cadmium	10/15/91	0.000	.057	.058	2	20	.050	.050	114	116
Chromium	10/15/91	0.000	.200	.202	1	20	.200	.200	100	101
Cobalt	10/15/91	0.000	.497	.501	1	20	.500	.500	99	100
Copper	10/15/91	0.000	.248	.250	1	20	.250	.250	99	100
Iron	10/15/91	0.000	1.046	1.052	1	20	1.000	1.000	105	105
Lead GF	10/10/91	0.000	.0192	.0193	1	20	.020	.020	96	97
Manganese	10/15/91	0.000	.494	.498	1	20	.500	.500	99	100
Mercury CV	10/11/91	0.000	.00107	.00110	3	20	.001	.001	107	110
Nickel	10/15/91	0.000	.494	.498	1	20	.500	.500	99	100
Zinc	10/15/91	0.000	.518	.523	1	20	.500	.500	104	105
Amenable CN	10/14/91	0.000	.199	.204	2	20	.200	.200	99	102
Total CN	10/10/91	0.000	.212	.210	1	20	.200	.200	106	105

QC Limits for % Rec: 75 - 125

ANALYST: ______ Date 10-23-91 REVIEWER: ______ Date 10/23/91

File:M1QCMSWM

0010

CHAIN OF CUSTODY RECORD

PROJECT NO. 54201.20.03	**PROJECT NAME** CGBS NYSEG Court Street
SAMPLERS (Signatures) Scott B. Dilleman	

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	EPA Method 624 VOL	Semi VOA Method 625	~~Metals~~ ABD	Mercury EPA Method 7470	Total Cyanide EPA Method 335	Amenable Cyanide	Pb EPA Method 7421 (GF)	Cr EPA Method 7191 (GF)	Fe, Zn, Al, Cd, Sb, Cu, Co Mn, Ni; EPA Method 200.7 ICP	REMARKS
CGBS SW-1	10-3-91	1104		✓	Court Street	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CGBS SW-2		1022		✓	Ct. St.	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CGBS SW-3		9:45		✓	Ct. St.	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CGBS SW-4		9:55		✓	Ct. St.	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CGBS SW-2 MS		1022		✓	Ct. St.	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CGBS SW-2 MSD	10-3-91	1022		✓	Ct. St.	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CGBS TP					Trip Blank Galson	2	✓									
									ABD							

Relinquished by: (Signature)	**Date/Time** 10/3/91 4:30 pm	**Received by: (Signature)** Fed Exp.	**Relinquished by: (Signature)**	**Date/Time**	**Received by: (Signature)**
Relinquished by: (Signature)	**Date/Time**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**Date/Time**	**Received by: (Signature)**
Relinquished by: (Signature)	**Date/Time**	**Received for lab. by: (Signature)**	**Date/Time** 10/4/91 1015	**Remarks**	

ENGINEERING-SCIENCE INC.
290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
Telephone: (315) 451-9560

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 11/6/91
Work Order No.:3334

Client:

George Moreau
ES Syracuse/ NYSEG
290 Elwood Davis Road
Liverpool, NY. 13088

Date of Sample Receipt: 10/4/91

Your solid samples identified as:

CGBS-SS-1
CGBS-SS-2
CGBS-SS-3
CGBS-SS-4
CGBS-SS-5
CGBS-SS-6
CGBS-SS-7
CGBS-SED-1
CGBS-SED-2

were analyzed for semivolatile organics by EPA Method 8270, volatile organics by EPA Method 8240, 12 client specified metals and total cyanide.

In addition your solid sample identified as:

CGBS-SS-1

was analyzed for amenable cyanide.

Finally your solid sample identified as:

CGBS-SED-3

was analyzed for semivolatile organics by EPA Method 8270, volatile organics by EPA Method 8240, hydrocarbon fingerprint, 12 client specified metals and total cyanide.

The analytical reports for the samples listed above are attached.

LEGEND FOR ORGANIC RESULT QUALIFIERS

U	The compound was analyzed for but not detected.
J	The value reported is an estimated concentration. This is used when: 1. The mass spectral data indicate the presence of a compound that meets identification criteria, but the result is less than the reporting limit; 2. Estimating the concentration for tentatively identified compounds (TICs) where a 1:1 response is assumed.
C	This is used for pesticide results where identification has been confirmed by GC/MS.
B	The analyte is found in the associated blank as well as in the sample.
A	A TIC is a suspected aldol-condensation product.
E	This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.
D	This flag identifies a compound whose reported analytical result is calculated from a greater dilution than the primary analysis. The actual dilution used to calculate the analytical result is reported either on the report or in the case narrative.
N	Indicates presumptive evidence of a compound. This flag is only used for TICs, where the identification is based on a mass spectral library search. It is applied to all TIC results.

VOLATILE ORGANICS CASE NARRATIVE
WORK ORDER NO.3334
EPA METHOD 8240

These soil samples were analyzed for volatile organics by EPA Method 8240. CLP compounds, spiking amounts, and QC acceptance criteria were used for the internal standards, surrogates, and matrix spike/spike duplicates.

All samples were analyzed within EPA Data Validation Technical Holding Times.

Four blanks were analyzed with these samples and met CLP acceptance criteria for internal standard areas, surrogates and contamination.

The continuing calibration checks (CCC) used for quantifying these samples met CLP acceptance criteria.

All internal standard areas were within CLP acceptance criteria with the following exceptions:

> Samples 3334-06, 3334-08 and 3334-10 all had one low internal standard area. Re-analysis showed similar results indicating a possible matrix problem.

All surrogate recoveries were within CLP acceptance criteria.

All blank spike/spike duplicate recoveries and relative percent differences were within CLP acceptance criteria.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-01

Date Analyzed: 10/09/91

Client ID: CGBS_SS-1

% Moisture: 7

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	11 U
Bromomethane	11 U
Vinyl Chloride	11 U
Chloroethane	11 U
Methylene Chloride	5 U
Acetone	54 U
Carbon Disulfide	11 U
Trichlorofluoromethane	11 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	54 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	54 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	11 U
Bromoform	5 U
2-Hexanone	54 U
4-Methyl-2-pentanone	54 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	54 U
Acrylonitrile	54 U

Analyst: S.C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-02

Date Analyzed: 10/09/91

Client ID: CGBS_SS-2

% Moisture: 7

Matrix: SOIL

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	11 U
Bromomethane	11 U
Vinyl Chloride	11 U
Chloroethane	11 U
Methylene Chloride	5 U
Acetone	54 U
Carbon Disulfide	11 U
Trichlorofluoromethane	11 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	54 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	54 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	11 U
Bromoform	5 U
2-Hexanone	54 U
4-Methyl-2-pentanone	54 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	54 U
Acrylonitrile	54 U

Analyst: S.C.

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-03

Date Analyzed: 10/09/91

Client ID: CGBS_SS-3

% Moisture: 7

Matrix: SOIL

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	11 U
Bromomethane	11 U
Vinyl Chloride	11 U
Chloroethane	11 U
Methylene Chloride	5 U
Acetone	54 U
Carbon Disulfide	11 U
Trichlorofluoromethane	11 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	54 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	54 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	11 U
Bromoform	5 U
2-Hexanone	54 U
4-Methyl-2-pentanone	54 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	54 U
Acrylonitrile	54 U

Analyst: S. C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-04

Date Analyzed: 10/09/91

Client ID: CGBS_SS-4

% Moisture: 3

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	52 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	52 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	52 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	52 U
4-Methyl-2-pentanone	52 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	52 U
Acrylonitrile	52 U

Analyst: S. C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-05

Date Analyzed: 10/09/91

Client ID: CGBS_SS-5

% Moisture: 3

Matrix: SOIL

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	52 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	52 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	52 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	52 U
4-Methyl-2-pentanone	52 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	52 U
Acrylonitrile	52 U

Analyst: S. C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-06 Date Analyzed: 10/09/91

Client ID: CGBS_SS-6 % Moisture: 7

Matrix: SOIL Level: LOW Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	11 U
Bromomethane	11 U
Vinyl Chloride	11 U
Chloroethane	11 U
Methylene Chloride	5 U
Acetone	54 U
Carbon Disulfide	11 U
Trichlorofluoromethane	11 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	54 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	54 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	11 U
Bromoform	5 U
2-Hexanone	54 U
4-Methyl-2-pentanone	54 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	54 U
Acrylonitrile	54 U

Analyst: S.C. Group Leader: Richard Ward

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-06RE

Date Analyzed: 10/10/91

Client ID: CGBS_SS-6RE

% Moisture: 7

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	11 U
Bromomethane	11 U
Vinyl Chloride	11 U
Chloroethane	11 U
Methylene Chloride	5 U
Acetone	54 U
Carbon Disulfide	11 U
Trichlorofluoromethane	11 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	54 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	54 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	11 U
Bromoform	5 U
2-Hexanone	54 U
4-Methyl-2-pentanone	54 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	54 U
Acrylonitrile	54 U

Analyst: S.C

Group Leader: Richard Ward

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-07

Date Analyzed: 10/09/91

Client ID: CGBS_SS-7

% Moisture: 4

Matrix: SOIL

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	52 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	52 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	52 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	52 U
4-Methyl-2-pentanone	52 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	52 U
Acrylonitrile	52 U

Analyst: S.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-08

Date Analyzed: 10/09/91

Client ID: CGBS_SED-1

% Moisture: 59

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	24 U
Bromomethane	24 U
Vinyl Chloride	24 U
Chloroethane	24 U
Methylene Chloride	12 U
Acetone	120 U
Carbon Disulfide	24 U
Trichlorofluoromethane	24 U
1,1-Dichloroethene	12 U
1,1-Dichloroethane	12 U
1,2-Dichloroethene (Total)	12 U
Chloroform	12 U
1,2-Dichloroethane	12 U
2-Butanone	120 U
1,1,1-Trichloroethane	12 U
Carbon Tetrachloride	12 U
Vinyl Acetate	120 U
Bromodichloromethane	12 U
1,2-Dichloropropane	12 U
cis-1,3-Dichloropropene	12 U
Trichloroethene	12 U
Benzene	12 U
Dibromochloromethane	12 U
1,1,2-Trichloroethane	12 U
trans-1,3-Dichloropropene	12 U
2-Chloroethylvinylether	24 U
Bromoform	12 U
2-Hexanone	120 U
4-Methyl-2-pentanone	120 U
Tetrachloroethene	12 U
1,1,2,2-Tetrachloroethane	12 U
Toluene	12 U
Chlorobenzene	12 U
Ethylbenzene	12 U
Styrene	12 U
Total Xylenes	12 U
1,3-Dichlorobenzene	12 U
1,4-Dichlorobenzene	12 U
1,2-Dichlorobenzene	12 U
Acrolein	120 U
Acrylonitrile	120 U

Analyst: S.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-08RE

Date Analyzed: 10/09/91

Client ID: CGBS_SED-1RE

% Moisture: 59

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	24 U
Bromomethane	24 U
Vinyl Chloride	24 U
Chloroethane	24 U
Methylene Chloride	12 U
Acetone	120 U
Carbon Disulfide	24 U
Trichlorofluoromethane	24 U
1,1-Dichloroethene	12 U
1,1-Dichloroethane	12 U
1,2-Dichloroethene (Total)	12 U
Chloroform	12 U
1,2-Dichloroethane	12 U
2-Butanone	120 U
1,1,1-Trichloroethane	12 U
Carbon Tetrachloride	12 U
Vinyl Acetate	120 U
Bromodichloromethane	12 U
1,2-Dichloropropane	12 U
cis-1,3-Dichloropropene	12 U
Trichloroethene	12 U
Benzene	12 U
Dibromochloromethane	12 U
1,1,2-Trichloroethane	12 U
trans-1,3-Dichloropropene	12 U
2-Chloroethylvinylether	24 U
Bromoform	12 U
2-Hexanone	120 U
4-Methyl-2-pentanone	120 U
Tetrachloroethene	12 U
1,1,2,2-Tetrachloroethane	12 U
Toluene	12 U
Chlorobenzene	12 U
Ethylbenzene	12 U
Styrene	12 U
Total Xylenes	12 U
1,3-Dichlorobenzene	12 U
1,4-Dichlorobenzene	12 U
1,2-Dichlorobenzene	12 U
Acrolein	120 U
Acrylonitrile	120 U

Analyst: J.C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-09

Date Analyzed: 10/10/91

Client ID: CGBS_SED-2

% Moisture: 59

Matrix: SOIL

Level: MED

Dilution Fact: 2500.0

Compound	Analytical Results ug/Kg
Chloromethane	61000 U
Bromomethane	61000 U
Vinyl Chloride	61000 U
Chloroethane	61000 U
Methylene Chloride	30000 U
Acetone	300000 U
Carbon Disulfide	61000 U
Trichlorofluoromethane	61000 U
1,1-Dichloroethene	30000 U
1,1-Dichloroethane	30000 U
1,2-Dichloroethene (Total)	30000 U
Chloroform	30000 U
1,2-Dichloroethane	30000 U
2-Butanone	300000 U
1,1,1-Trichloroethane	30000 U
Carbon Tetrachloride	30000 U
Vinyl Acetate	300000 U
Bromodichloromethane	30000 U
1,2-Dichloropropane	30000 U
cis-1,3-Dichloropropene	30000 U
Trichloroethene	30000 U
Benzene	30000 U
Dibromochloromethane	30000 U
1,1,2-Trichloroethane	30000 U
trans-1,3-Dichloropropene	30000 U
2-Chloroethylvinylether	61000 U
Bromoform	30000 U
2-Hexanone	300000 U
4-Methyl-2-pentanone	300000 U
Tetrachloroethene	30000 U
1,1,2,2-Tetrachloroethane	30000 U
Toluene	30000 U
Chlorobenzene	30000 U
Ethylbenzene	98000
Styrene	30000 U
Total Xylenes	48000
1,3-Dichlorobenzene	30000 U
1,4-Dichlorobenzene	30000 U
1,2-Dichlorobenzene	30000 U
Acrolein	300000 U
Acrylonitrile	300000 U

Analyst: S. C

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-10

Date Analyzed: 10/09/91

Client ID: CGBS_SED-3

% Moisture: 40

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	17 U
Bromomethane	17 U
Vinyl Chloride	17 U
Chloroethane	17 U
Methylene Chloride	8 U
Acetone	83 U
Carbon Disulfide	17 U
Trichlorofluoromethane	17 U
1,1-Dichloroethene	8 U
1,1-Dichloroethane	8 U
1,2-Dichloroethene (Total)	8 U
Chloroform	8 U
1,2-Dichloroethane	8 U
2-Butanone	83 U
1,1,1-Trichloroethane	8 U
Carbon Tetrachloride	8 U
Vinyl Acetate	83 U
Bromodichloromethane	8 U
1,2-Dichloropropane	8 U
cis-1,3-Dichloropropene	8 U
Trichloroethene	8 U
Benzene	8 U
Dibromochloromethane	8 U
1,1,2-Trichloroethane	8 U
trans-1,3-Dichloropropene	8 U
2-Chloroethylvinylether	17 U
Bromoform	8 U
2-Hexanone	83 U
4-Methyl-2-pentanone	83 U
Tetrachloroethene	8 U
1,1,2,2-Tetrachloroethane	8 U
Toluene	8 U
Chlorobenzene	8 U
Ethylbenzene	8 U
Styrene	8 U
Total Xylenes	8 U
1,3-Dichlorobenzene	8 U
1,4-Dichlorobenzene	8 U
1,2-Dichlorobenzene	8 U
Acrolein	83 U
Acrylonitrile	83 U

Analyst: S.C

Group Leader: Richard Ward

ES-ENGINEERING SCIENCE, INC.

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Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: 3334-10RE

Date Analyzed: 10/09/91

Client ID: CGBS_SED-3RE

% Moisture: 40

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	17 U
Bromomethane	17 U
Vinyl Chloride	17 U
Chloroethane	17 U
Methylene Chloride	8 U
Acetone	83 U
Carbon Disulfide	17 U
Trichlorofluoromethane	17 U
1,1-Dichloroethene	8 U
1,1-Dichloroethane	8 U
1,2-Dichloroethene (Total)	8 U
Chloroform	8 U
1,2-Dichloroethane	8 U
2-Butanone	83 U
1,1,1-Trichloroethane	8 U
Carbon Tetrachloride	8 U
Vinyl Acetate	83 U
Bromodichloromethane	8 U
1,2-Dichloropropane	8 U
cis-1,3-Dichloropropene	8 U
Trichloroethene	8 U
Benzene	8 U
Dibromochloromethane	8 U
1,1,2-Trichloroethane	8 U
trans-1,3-Dichloropropene	8 U
2-Chloroethylvinylether	17 U
Bromoform	8 U
2-Hexanone	83 U
4-Methyl-2-pentanone	83 U
Tetrachloroethene	8 U
1,1,2,2-Tetrachloroethane	8 U
Toluene	8 U
Chlorobenzene	8 U
Ethylbenzene	8 U
Styrene	8 U
Total Xylenes	8 U
1,3-Dichlorobenzene	8 U
1,4-Dichlorobenzene	8 U
1,2-Dichlorobenzene	8 U
Acrolein	83 U
Acrylonitrile	83 U

Analyst: J.C.

Group Leader: Richard Ward

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: MSVM2911009

Date Analyzed: 10/09/91

Client ID: VBLANK

% Moisture: NA

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: MSVM1911009

Date Analyzed: 10/09/91

Client ID: VBLANK

% Moisture: NA

Matrix: SOIL

Level:LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: MWVM1911010

Date Analyzed: 10/10/91

Client ID: VBLANK

% Moisture: NA

Matrix: SOIL

Level:MED

Dilution Fact: 125.0

Compound	Analytical Results ug/Kg
Chloromethane	1300 U
Bromomethane	1300 U
Vinyl Chloride	1300 U
Chloroethane	1300 U
Methylene Chloride	630 U
Acetone	6300 U
Carbon Disulfide	1300 U
Trichlorofluoromethane	1300 U
1,1-Dichloroethene	630 U
1,1-Dichloroethane	630 U
1,2-Dichloroethene (Total)	630 U
Chloroform	630 U
1,2-Dichloroethane	630 U
2-Butanone	6300 U
1,1,1-Trichloroethane	630 U
Carbon Tetrachloride	630 U
Vinyl Acetate	6300 U
Bromodichloromethane	630 U
1,2-Dichloropropane	630 U
cis-1,3-Dichloropropene	630 U
Trichloroethene	630 U
Benzene	630 U
Dibromochloromethane	630 U
1,1,2-Trichloroethane	630 U
trans-1,3-Dichloropropene	630 U
2-Chloroethylvinylether	1300 U
Bromoform	630 U
2-Hexanone	6300 U
4-Methyl-2-pentanone	6300 U
Tetrachloroethene	630 U
1,1,2,2-Tetrachloroethane	630 U
Toluene	630 U
Chlorobenzene	630 U
Ethylbenzene	630 U
Styrene	630 U
Total Xylenes	630 U
1,3-Dichlorobenzene	630 U
1,4-Dichlorobenzene	630 U
1,2-Dichlorobenzene	630 U
Acrolein	6300 U
Acrylonitrile	6300 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
VOLATILE ORGANICS

Work Order No: 3334

Laboratory ID: MSVM2911010

Date Analyzed: 10/10/91

Client ID: VBLANK

% Moisture: NA

Matrix: SOIL

Level: LOW

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	50 U
Carbon Disulfide	10 U
Trichlorofluoromethane	10 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene (Total)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone	50 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	50 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	5 U
Benzene	5 U
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
trans-1,3-Dichloropropene	5 U
2-Chloroethylvinylether	10 U
Bromoform	5 U
2-Hexanone	50 U
4-Methyl-2-pentanone	50 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Styrene	5 U
Total Xylenes	5 U
1,3-Dichlorobenzene	5 U
1,4-Dichlorobenzene	5 U
1,2-Dichlorobenzene	5 U
Acrolein	50 U
Acrylonitrile	50 U

Analyst: S.C

Group Leader: Richard Ward

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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SOIL VOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/09/91

LEVEL: LOW

LABORATORY ID	S1 (DCE)	S2 (TOL)	S3 (BFB)	Total Out
MSVM2911009	108	100	100	0
3334-03	106	97	90	0
3334-04	105	94	87	0
3334-05	93	95	86	0
3334-06	117	110	79	0
3334-07	100	90	84	0
3334-08	112	114	79	0
3334-10	113	108	83	0

	QC LIMITS
S1(DCE)= 1,2-Dichloroethane-d4	(70-121)
S2(TOL)= Toluene-d8	(84-138)
S3(BFB)= Bromofluorobenzene	(59-113)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST: S.C

Quality control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL VOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/09/91

LEVEL: LOW

LABORATORY ID	S1 (DCE)	S2 (TOL)	S3 (BFB)	Total Out
MSVM1911009	102	98	101	0
3334-01	89	109	87	0
3334-02	89	102	96	0
3334-08RE	109	116	86	0
3334-10RE	98	108	83	0
SSVM1911009A	94	91	94	0
SSVM1911009B	91	103	97	0

	QC LIMITS
S1(DCE)= 1,2-Dichloroethane-d4	(70-121)
S2(TOL)= Toluene-d8	(84-138)
S3(BFB)= Bromofluorobenzene	(59-113)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST: S.C

Quality control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL VOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/10/91

LEVEL: MED

LABORATORY ID	S1 (DCE)	S2 (TOL)	S3 (BFB)	Total Out
MWVM1911010	104	95	105	0
3334-09	110	101	111	0

	QC LIMITS
S1(DCE)= 1,2-Dichloroethane-d4	(70-121)
S2(TOL)= Toluene-d8	(84-138)
S3(BFB)= Bromofluorobenzene	(59-113)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST: S.C.

Quality control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL VOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/10/91

LEVEL: LOW

LABORATORY ID	S1 (DCE)	S2 (TOL)	S3 (BFB)	Total Out
MSVM2911010	107	97	100	0
3334-06RE	101	104	93	0

	QC LIMITS
S1(DCE)= 1,2-Dichloroethane-d4	(70-121)
S2(TOL)= Toluene-d8	(84-138)
S3(BFB)= Bromofluorobenzene	(59-113)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST: J.C.

Quality control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

Matrix Spike/Spike Duplicate Recovery

Volatile Organics

Work Order: 3334

Analysis Date: 10/08/91

QC Sample : MSVM2911008

Matrix: SOIL

Instrument: VMS-2

Units: ug/Kg

Level: LOW

Cor. Fact: 1

% Moisture: NA

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,1-Dichloroethene	0	50	52	104
Trichloroethene	0	50	53	106
Benzene	0	50	53	106
Toluene	0	50	53	106
Chlorobenzene	0	50	60	121

Compound	Conc. MSD	Percent Recovered	RPD	Criteria RPD %REC
1,1-Dichloroethene	57	115	9	22 (59-172)
Trichloroethene	54	109	3	24 (62-137)
Benzene	53	107	1	21 (66-142)
Toluene	50	101	4	21 (59-139)
Chlorobenzene	57	114	6	21 (60-133)

ANALYST: S.C.

Quality Control:

* = Value Outside QC Limit

$$\text{Percent Recovery} = \frac{\text{Conc. MS}|\text{MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

ES-ENGINEERING SCIENCE, INC.

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Matrix Spike/Spike Duplicate Recovery

Volatile Organics

Work Order: 3334

Analysis Date: 10/09/91

QC Sample : MSVM1911009

Matrix: SOIL

Instrument: VMS-1

Units: ug/Kg

Level: LOW

Cor. Fact: 1

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,1-Dichloroethene	0	50	49	97
Trichloroethene	0	50	49	98
Benzene	0	50	51	101
Toluene	0	50	49	97
Chlorobenzene	0	50	51	101

Compound	Conc. MSD	Percent Recovered	RPD	Criteria	
				RPD	%REC
1,1-Dichloroethene	51	102	5	22	(59-172)
Trichloroethene	49	99	1	24	(62-137)
Benzene	50	99	2	21	(66-142)
Toluene	46	92	5	21	(59-139)
Chlorobenzene	52	105	4	21	(60-133)

ANALYST: S.C

Quality Control:

* = Value Outside QC Limit

$$\text{Percent Recovered} = \frac{\text{Conc. MS|MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

Semi-VOLATILE ORGANICS CASE NARRATIVE
WORK ORDER NO.3334
EPA METHOD 8270

These ten soil samples were analyzed for semivolatile organics by EPA Method 8270. CLP compounds, spiking amounts, and QC acceptance criteria were used for the internal standards, surrogates, and matrix spike/spike duplicates.

All samples were analyzed within Data Validation Technical Holding Times.

Two blanks were analyzed with these samples and met CLP acceptance criteria for internal standard areas, surrogates and contamination.

The continuing calibration checks (CCC) used for quantifying these samples met CLP acceptance criteria.

All internal standard areas were within CLP acceptance criteria with the following exceptions:

> Samples 3334-01, 3334-01RA, 3334-08 and 3334-08RA all showed one low internal standard area. Re-analysis showed similar results indicating a possible matrix problem.

All surrogate recoveries were within CLP acceptance criteria.

All blank spike/spike duplicate recoveries and relative percent differences were within CLP acceptance criteria, indicating laboratory was in control.

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: 3334-01

Date Analyzed: 10/29/91

Client ID: CGBS_SS-1

% Moisture: 7

Matrix: SOIL

Level:MED

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	11000 U
Phenol	11000 U
bis(2-Chloroethyl)ether	11000 U
2-Chlorophenol	11000 U
1,3-Dichlorobenzene	11000 U
1,4-Dichlorobenzene	11000 U
Benzyl Alcohol	11000 U
1,2-Dichlorobenzene	11000 U
2-Methylphenol	11000 U
bis(2-chloroisopropyl)Ether	11000 U
4-Methylphenol	11000 U
N-Nitroso-Di-n-Propylamine	11000 U
Hexachloroethane	11000 U
Nitrobenzene	11000 U
Isophorone	11000 U
2-Nitrophenol	11000 U
2,4-Dimethylphenol	11000 U
bis(2-Chloroethoxy)methane	11000 U
2,4-Dichlorophenol	11000 U
Benzoic Acid	27000 U
1,2,4-Trichlorobenzene	11000 U
Naphthalene	11000 U
4-Chloroaniline	11000 U
Hexachlorobutadiene	11000 U
4-Chloro-3-Methylphenol	11000 U
2-Methylnaphthalene	11000 U
Hexachlorocyclopentadiene	11000 U
2,4,6-Trichlorophenol	11000 U
2,4,5-Trichlorophenol	27000 U
2-Chloronaphthalene	11000 U
2-Nitroaniline	11000 U
Dimethylphthalate	11000 U
Acenaphthylene	11000 U
2,6-Dinitrotoluene	11000 U
3-Nitroaniline	27000 U
Acenaphthene	11000 U
2,4-Dinitrophenol	27000 U
Dibenzofuran	11000 U
4-Nitrophenol	27000 U

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: 3334-01

Date Analyzed: 10/29/91

Client ID: CGBS_SS-1

% Moisture: 7

Matrix: SOIL

Level:MED

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	11000 U
Fluorene	11000 U
Diethylphthalate	2800 J
4-Chlorophenyl-phenylether	11000 U
4-Nitroaniline	27000 U
4,6-Dinitro-2-Methylphenol	27000 U
N-Nitrosodiphenylamine	11000 U
4-Bromophenyl-phenylether	11000 U
Hexachlorobenzene	11000 U
Pentachlorophenol	27000 U
Phenanthrene	3500 J
Anthracene	3500 J
Di-n-Butylphthalate	8900 J
Fluoranthene	6100 J
Pyrene	11000 U
Butylbenzylphthalate	11000 U
Benzo(a)Anthracene	11000 U
3,3'-Dichlorobenzidine	22000 U
Chrysene	11000 U
bis(2-Ethylhexyl)Phthalate	11000 U
Di-n-octylphthalate	11000 U
Benzo(b)Fluoranthene	11000 U
Benzo(k)Fluoranthene	11000 U
Benzo(a)Pyrene	11000 U
Indeno(1,2,3-cd)Pyrene	11000 U
Dibenz(a,h)Anthracene	11000 U
Benzo(g,h,i)Perylene	11000 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: 3334-01RA

Date Analyzed: 10/31/91

Client ID: CGBS_SS-1

% Moisture: 7

Matrix: SOIL

Level:MED

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	11000 U
Phenol	11000 U
bis(2-Chloroethyl)ether	11000 U
2-Chlorophenol	11000 U
1,3-Dichlorobenzene	11000 U
1,4-Dichlorobenzene	11000 U
Benzyl Alcohol	11000 U
1,2-Dichlorobenzene	11000 U
2-Methylphenol	11000 U
bis(2-chloroisopropyl)Ether	11000 U
4-Methylphenol	11000 U
N-Nitroso-Di-n-Propylamine	11000 U
Hexachloroethane	11000 U
Nitrobenzene	11000 U
Isophorone	11000 U
2-Nitrophenol	11000 U
2,4-Dimethylphenol	11000 U
bis(2-Chloroethoxy)methane	11000 U
2,4-Dichlorophenol	11000 U
Benzoic Acid	27000 U
1,2,4-Trichlorobenzene	11000 U
Naphthalene	11000 U
4-Chloroaniline	11000 U
Hexachlorobutadiene	11000 U
4-Chloro-3-Methylphenol	11000 U
2-Methylnaphthalene	11000 U
Hexachlorocyclopentadiene	11000 U
2,4,6-Trichlorophenol	11000 U
2,4,5-Trichlorophenol	27000 U
2-Chloronaphthalene	11000 U
2-Nitroaniline	11000 U
Dimethylphthalate	11000 U
Acenaphthylene	11000 U
2,6-Dinitrotoluene	11000 U
3-Nitroaniline	27000 U
Acenaphthene	11000 U
2,4-Dinitrophenol	27000 U
Dibenzofuran	11000 U
4-Nitrophenol	27000 U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334
Date Extracted: 10/09/91
Laboratory ID: 3334-01RA
Date Analyzed: 10/31/91
Client ID: CGBS_SS-1
% Moisture: 7
Matrix: SOIL
Level:MED
Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	11000 U
Fluorene	11000 U
Diethylphthalate	2800 J
4-Chlorophenyl-phenylether	11000 U
4-Nitroaniline	27000 U
4,6-Dinitro-2-Methylphenol	27000 U
N-Nitrosodiphenylamine	11000 U
4-Bromophenyl-phenylether	11000 U
Hexachlorobenzene	11000 U
Pentachlorophenol	27000 U
Phenanthrene	3400 J
Anthracene	3400 J
Di-n-Butylphthalate	8600 J
Fluoranthene	5900 J
Pyrene	11000 U
Butylbenzylphthalate	11000 U
Benzo(a)Anthracene	11000 U
3,3'-Dichlorobenzidine	22000 U
Chrysene	4600 J
bis(2-Ethylhexyl)Phthalate	11000 U
Di-n-octylphthalate	11000 U
Benzo(b)Fluoranthene	11000 U
Benzo(k)Fluoranthene	11000 U
Benzo(a)Pyrene	11000 U
Indeno(1,2,3-cd)Pyrene	11000 U
Dibenz(a,h)Anthracene	11000 U
Benzo(g,h,i)Perylene	11000 U

Analyst:
Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: 3334-02

Date Analyzed: 11/02/91

Client ID: CGBS_SS-2

% Moisture: 7

Matrix: SOIL

Level:MED

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	11000 U
Phenol	11000 U
bis(2-Chloroethyl)ether	11000 U
2-Chlorophenol	11000 U
1,3-Dichlorobenzene	11000 U
1,4-Dichlorobenzene	11000 U
Benzyl Alcohol	11000 U
1,2-Dichlorobenzene	11000 U
2-Methylphenol	11000 U
bis(2-chloroisopropyl)Ether	11000 U
4-Methylphenol	11000 U
N-Nitroso-Di-n-Propylamine	11000 U
Hexachloroethane	11000 U
Nitrobenzene	11000 U
Isophorone	11000 U
2-Nitrophenol	11000 U
2,4-Dimethylphenol	11000 U
bis(2-Chloroethoxy)methane	11000 U
2,4-Dichlorophenol	11000 U
Benzoic Acid	27000 U
1,2,4-Trichlorobenzene	11000 U
Naphthalene	11000 U
4-Chloroaniline	11000 U
Hexachlorobutadiene	11000 U
4-Chloro-3-Methylphenol	11000 U
2-Methylnaphthalene	11000 U
Hexachlorocyclopentadiene	11000 U
2,4,6-Trichlorophenol	11000 U
2,4,5-Trichlorophenol	27000 U
2-Chloronaphthalene	11000 U
2-Nitroaniline	11000 U
Dimethylphthalate	11000 U
Acenaphthylene	11000 U
2,6-Dinitrotoluene	11000 U
3-Nitroaniline	27000 U
Acenaphthene	11000 U
2,4-Dinitrophenol	27000 U
Dibenzofuran	11000 U
4-Nitrophenol	27000 U

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334
Date Extracted: 10/09/91

Laboratory ID: 3334-02
Date Analyzed: 11/02/91

Client ID: CGBS_SS-2
% Moisture: 7

Matrix: SOIL
Level:MED
Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	11000 U
Fluorene	11000 U
Diethylphthalate	11000 U
4-Chlorophenyl-phenylether	11000 U
4-Nitroaniline	27000 U
4,6-Dinitro-2-Methylphenol	27000 U
N-Nitrosodiphenylamine	11000 U
4-Bromophenyl-phenylether	11000 U
Hexachlorobenzene	11000 U
Pentachlorophenol	27000 U
Phenanthrene	4600 J
Anthracene	4700 J
Di-n-Butylphthalate	30000
Fluoranthene	7000 J
Pyrene	8900 J
Butylbenzylphthalate	11000 U
Benzo(a)Anthracene	4200 J
3,3'-Dichlorobenzidine	22000 U
Chrysene	4800 J
bis(2-Ethylhexyl)Phthalate	11000 U
Di-n-octylphthalate	11000 U
Benzo(b)Fluoranthene	6000 J
Benzo(k)Fluoranthene	11000 U
Benzo(a)Pyrene	11000 U
Indeno(1,2,3-cd)Pyrene	11000 U
Dibenz(a,h)Anthracene	11000 U
Benzo(g,h,i)Perylene	11000 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334
Date Extracted: 10/07/91
Laboratory ID: 3334-03
Date Analyzed: 10/26/91
Client ID: CGBS_SS-3
% Moisture: 3
Matrix: SOIL
Level:LOW
Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	690 U
Phenol	690 U
bis(2-Chloroethyl)ether	690 U
2-Chlorophenol	690 U
1,3-Dichlorobenzene	690 U
1,4-Dichlorobenzene	690 U
Benzyl Alcohol	690 U
1,2-Dichlorobenzene	690 U
2-Methylphenol	690 U
bis(2-chloroisopropyl)Ether	690 U
4-Methylphenol	690 U
N-Nitroso-Di-n-Propylamine	690 U
Hexachloroethane	690 U
Nitrobenzene	690 U
Isophorone	690 U
2-Nitrophenol	690 U
2,4-Dimethylphenol	690 U
bis(2-Chloroethoxy)methane	690 U
2,4-Dichlorophenol	690 U
Benzoic Acid	1700 U
1,2,4-Trichlorobenzene	690 U
Naphthalene	690 U
4-Chloroaniline	690 U
Hexachlorobutadiene	690 U
4-Chloro-3-Methylphenol	690 U
2-Methylnaphthalene	690 U
Hexachlorocyclopentadiene	690 U
2,4,6-Trichlorophenol	690 U
2,4,5-Trichlorophenol	1700 U
2-Chloronaphthalene	690 U
2-Nitroaniline	690 U
Dimethylphthalate	690 U
Acenaphthylene	690 U
2,6-Dinitrotoluene	690 U
3-Nitroaniline	1700 U
Acenaphthene	690 U
2,4-Dinitrophenol	1700 U
Dibenzofuran	690 U
4-Nitrophenol	1700 U

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-03

Date Analyzed: 10/26/91

Client ID: CGBS_SS-3

% Moisture: 3

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	690 U
Fluorene	690 U
Diethylphthalate	690 U
4-Chlorophenyl-phenylether	690 U
4-Nitroaniline	1700 U
4,6-Dinitro-2-Methylphenol	1700 U
N-Nitrosodiphenylamine	690 U
4-Bromophenyl-phenylether	690 U
Hexachlorobenzene	690 U
Pentachlorophenol	1700 U
Phenanthrene	690 U
Anthracene	690 U
Di-n-Butylphthalate	780
Fluoranthene	690 U
Pyrene	690 U
Butylbenzylphthalate	690 U
Benzo(a)Anthracene	690 U
3,3'-Dichlorobenzidine	1400 U
Chrysene	690 U
bis(2-Ethylhexyl)Phthalate	690 U
Di-n-octylphthalate	690 U
Benzo(b)Fluoranthene	690 U
Benzo(k)Fluoranthene	690 U
Benzo(a)Pyrene	690 U
Indeno(1,2,3-cd)Pyrene	690 U
Dibenz(a,h)Anthracene	690 U
Benzo(g,h,i)Perylene	690 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-04

Date Analyzed: 10/26/91

Client ID: CGBS_SS-4

% Moisture: 3

Matrix: SOIL

Level:LOW

Dilution Fact: 5.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	1700 U
Phenol	1700 U
bis(2-Chloroethyl)ether	1700 U
2-Chlorophenol	1700 U
1,3-Dichlorobenzene	1700 U
1,4-Dichlorobenzene	1700 U
Benzyl Alcohol	1700 U
1,2-Dichlorobenzene	1700 U
2-Methylphenol	1700 U
bis(2-chloroisopropyl)Ether	1700 U
4-Methylphenol	1700 U
N-Nitroso-Di-n-Propylamine	1700 U
Hexachloroethane	1700 U
Nitrobenzene	1700 U
Isophorone	1700 U
2-Nitrophenol	1700 U
2,4-Dimethylphenol	1700 U
bis(2-Chloroethoxy)methane	1700 U
2,4-Dichlorophenol	1700 U
Benzoic Acid	4300 U
1,2,4-Trichlorobenzene	1700 U
Naphthalene	1700 U
4-Chloroaniline	1700 U
Hexachlorobutadiene	1700 U
4-Chloro-3-Methylphenol	1700 U
2-Methylnaphthalene	1700 U
Hexachlorocyclopentadiene	1700 U
2,4,6-Trichlorophenol	1700 U
2,4,5-Trichlorophenol	4300 U
2-Chloronaphthalene	1700 U
2-Nitroaniline	1700 U
Dimethylphthalate	1700 U
Acenaphthylene	1700 U
2,6-Dinitrotoluene	1700 U
3-Nitroaniline	4300 U
Acenaphthene	1700 U
2,4-Dinitrophenol	4300 U
Dibenzofuran	1700 U
4-Nitrophenol	4300 U

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-04

Date Analyzed: 10/26/91

Client ID: CGBS_SS-4

% Moisture: 3

Matrix: SOIL

Level:LOW

Dilution Fact: 5.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	1700 U
Fluorene	1700 U
Diethylphthalate	1700 U
4-Chlorophenyl-phenylether	1700 U
4-Nitroaniline	4300 U
4,6-Dinitro-2-Methylphenol	4300 U
N-Nitrosodiphenylamine	1700 U
4-Bromophenyl-phenylether	1700 U
Hexachlorobenzene	1700 U
Pentachlorophenol	4300 U
Phenanthrene	1700 U
Anthracene	1700 U
Di-n-Butylphthalate	970 J
Fluoranthene	1700 U
Pyrene	350 J
Butylbenzylphthalate	1700 U
Benzo(a)Anthracene	1700 U
3,3'-Dichlorobenzidine	3400 U
Chrysene	1700 U
bis(2-Ethylhexyl)Phthalate	1700 U
Di-n-octylphthalate	1700 U
Benzo(b)Fluoranthene	1700 U
Benzo(k)Fluoranthene	1700 U
Benzo(a)Pyrene	1700 U
Indeno(1,2,3-cd)Pyrene	1700 U
Dibenz(a,h)Anthracene	1700 U
Benzo(g,h,i)Perylene	1700 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334 Date Extracted: 10/07/91

Laboratory ID: 3334-05 Date Analyzed: 10/26/91

Client ID: CGBS_SS-5 % Moisture: 3

Matrix: SOIL Level:LOW Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	690 U
Phenol	690 U
bis(2-Chloroethyl)ether	690 U
2-Chlorophenol	690 U
1,3-Dichlorobenzene	690 U
1,4-Dichlorobenzene	690 U
Benzyl Alcohol	690 U
1,2-Dichlorobenzene	690 U
2-Methylphenol	690 U
bis(2-chloroisopropyl)Ether	690 U
4-Methylphenol	690 U
N-Nitroso-Di-n-Propylamine	690 U
Hexachloroethane	690 U
Nitrobenzene	690 U
Isophorone	690 U
2-Nitrophenol	690 U
2,4-Dimethylphenol	690 U
bis(2-Chloroethoxy)methane	690 U
2,4-Dichlorophenol	690 U
Benzoic Acid	1700 U
1,2,4-Trichlorobenzene	690 U
Naphthalene	690 U
4-Chloroaniline	690 U
Hexachlorobutadiene	690 U
4-Chloro-3-Methylphenol	690 U
2-Methylnaphthalene	690 U
Hexachlorocyclopentadiene	690 U
2,4,6-Trichlorophenol	690 U
2,4,5-Trichlorophenol	1700 U
2-Chloronaphthalene	690 U
2-Nitroaniline	690 U
Dimethylphthalate	690 U
Acenaphthylene	690 U
2,6-Dinitrotoluene	690 U
3-Nitroaniline	1700 U
Acenaphthene	690 U
2,4-Dinitrophenol	1700 U
Dibenzofuran	690 U
4-Nitrophenol	1700 U

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334
Date Extracted: 10/07/91
Laboratory ID: 3334-05
Date Analyzed: 10/26/91
Client ID: CGBS_SS-5
% Moisture: 3
Matrix: SOIL
Level: LOW
Dilution Fact: 2.0

Compound	Analytical Results ug/Kg	
2,4-Dinitrotoluene	690	U
Fluorene	690	U
Diethylphthalate	690	U
4-Chlorophenyl-phenylether	690	U
4-Nitroaniline	1700	U
4,6-Dinitro-2-Methylphenol	1700	U
N-Nitrosodiphenylamine	690	U
4-Bromophenyl-phenylether	690	U
Hexachlorobenzene	690	U
Pentachlorophenol	1700	U
Phenanthrene	690	U
Anthracene	690	U
Di-n-Butylphthalate	200	J
Fluoranthene	690	U
Pyrene	690	U
Butylbenzylphthalate	690	U
Benzo(a)Anthracene	690	U
3,3'-Dichlorobenzidine	1400	U
Chrysene	690	U
bis(2-Ethylhexyl)Phthalate	160	J
Di-n-octylphthalate	690	U
Benzo(b)Fluoranthene	690	U
Benzo(k)Fluoranthene	690	U
Benzo(a)Pyrene	690	U
Indeno(1,2,3-cd)Pyrene	690	U
Dibenz(a,h)Anthracene	690	U
Benzo(g,h,i)Perylene	690	U

Analyst:
Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-06

Date Analyzed: 11/02/91

Client ID: CGBS_SS-6

% Moisture: 7

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	720 U
Phenol	720 U
bis(2-Chloroethyl)ether	720 U
2-Chlorophenol	720 U
1,3-Dichlorobenzene	720 U
1,4-Dichlorobenzene	720 U
Benzyl Alcohol	720 U
1,2-Dichlorobenzene	720 U
2-Methylphenol	720 U
bis(2-chloroisopropyl)Ether	720 U
4-Methylphenol	720 U
N-Nitroso-Di-n-Propylamine	720 U
Hexachloroethane	720 U
Nitrobenzene	720 U
Isophorone	720 U
2-Nitrophenol	720 U
2,4-Dimethylphenol	720 U
bis(2-Chloroethoxy)methane	720 U
2,4-Dichlorophenol	720 U
Benzoic Acid	1800 U
1,2,4-Trichlorobenzene	720 U
Naphthalene	720 U
4-Chloroaniline	720 U
Hexachlorobutadiene	720 U
4-Chloro-3-Methylphenol	720 U
2-Methylnaphthalene	720 U
Hexachlorocyclopentadiene	720 U
2,4,6-Trichlorophenol	720 U
2,4,5-Trichlorophenol	1800 U
2-Chloronaphthalene	720 U
2-Nitroaniline	720 U
Dimethylphthalate	720 U
Acenaphthylene	720 U
2,6-Dinitrotoluene	720 U
3-Nitroaniline	1800 U
Acenaphthene	720 U
2,4-Dinitrophenol	1800 U
Dibenzofuran	720 U
4-Nitrophenol	1800 U

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-06

Date Analyzed: 11/02/91

Client ID: CGBS_SS-6

% Moisture: 7

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	720 U
Fluorene	720 U
Diethylphthalate	720 U
4-Chlorophenyl-phenylether	720 U
4-Nitroaniline	1800 U
4,6-Dinitro-2-Methylphenol	1800 U
N-Nitrosodiphenylamine	720 U
4-Bromophenyl-phenylether	720 U
Hexachlorobenzene	720 U
Pentachlorophenol	1800 U
Phenanthrene	720 U
Anthracene	720 U
Di-n-Butylphthalate	240 J
Fluoranthene	720 U
Pyrene	720 U
Butylbenzylphthalate	720 U
Benzo(a)Anthracene	720 U
3,3'-Dichlorobenzidine	1400 U
Chrysene	720 U
bis(2-Ethylhexyl)Phthalate	170 J
Di-n-octylphthalate	720 U
Benzo(b)Fluoranthene	720 U
Benzo(k)Fluoranthene	720 U
Benzo(a)Pyrene	720 U
Indeno(1,2,3-cd)Pyrene	720 U
Dibenz(a,h)Anthracene	720 U
Benzo(g,h,i)Perylene	720 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-07

Date Analyzed: 10/26/91

Client ID: CGBS_SS-7

% Moisture: 4

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	700 U
Phenol	700 U
bis(2-Chloroethyl)ether	700 U
2-Chlorophenol	700 U
1,3-Dichlorobenzene	700 U
1,4-Dichlorobenzene	700 U
Benzyl Alcohol	700 U
1,2-Dichlorobenzene	700 U
2-Methylphenol	700 U
bis(2-chloroisopropyl)Ether	700 U
4-Methylphenol	700 U
N-Nitroso-Di-n-Propylamine	700 U
Hexachloroethane	700 U
Nitrobenzene	700 U
Isophorone	700 U
2-Nitrophenol	700 U
2,4-Dimethylphenol	700 U
bis(2-Chloroethoxy)methane	700 U
2,4-Dichlorophenol	700 U
Benzoic Acid	1700 U
1,2,4-Trichlorobenzene	700 U
Naphthalene	700 U
4-Chloroaniline	700 U
Hexachlorobutadiene	700 U
4-Chloro-3-Methylphenol	700 U
2-Methylnaphthalene	700 U
Hexachlorocyclopentadiene	700 U
2,4,6-Trichlorophenol	700 U
2,4,5-Trichlorophenol	1700 U
2-Chloronaphthalene	700 U
2-Nitroaniline	700 U
Dimethylphthalate	700 U
Acenaphthylene	700 U
2,6-Dinitrotoluene	700 U
3-Nitroaniline	1700 U
Acenaphthene	700 U
2,4-Dinitrophenol	1700 U
Dibenzofuran	700 U
4-Nitrophenol	1700 U

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-07

Date Analyzed: 10/26/91

Client ID: CGBS_SS-7

% Moisture: 4

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	700 U
Fluorene	700 U
Diethylphthalate	700 U
4-Chlorophenyl-phenylether	700 U
4-Nitroaniline	1700 U
4,6-Dinitro-2-Methylphenol	1700 U
N-Nitrosodiphenylamine	700 U
4-Bromophenyl-phenylether	700 U
Hexachlorobenzene	700 U
Pentachlorophenol	1700 U
Phenanthrene	700 U
Anthracene	700 U
Di-n-Butylphthalate	700 U
Fluoranthene	700 U
Pyrene	700 U
Butylbenzylphthalate	700 U
Benzo(a)Anthracene	700 U
3,3'-Dichlorobenzidine	1400 U
Chrysene	700 U
bis(2-Ethylhexyl)Phthalate	140 J
Di-n-octylphthalate	700 U
Benzo(b)Fluoranthene	700 U
Benzo(k)Fluoranthene	700 U
Benzo(a)Pyrene	700 U
Indeno(1,2,3-cd)Pyrene	700 U
Dibenz(a,h)Anthracene	700 U
Benzo(g,h,i)Perylene	700 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-08

Date Analyzed: 10/31/91

Client ID: CGBS_SED-1

% Moisture: 59

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	1600 U
Phenol	1600 U
bis(2-Chloroethyl)ether	1600 U
2-Chlorophenol	1600 U
1,3-Dichlorobenzene	1600 U
1,4-Dichlorobenzene	1600 U
Benzyl Alcohol	1600 U
1,2-Dichlorobenzene	1600 U
2-Methylphenol	1600 U
bis(2-chloroisopropyl)Ether	1600 U
4-Methylphenol	1600 U
N-Nitroso-Di-n-Propylamine	1600 U
Hexachloroethane	1600 U
Nitrobenzene	1600 U
Isophorone	1600 U
2-Nitrophenol	1600 U
2,4-Dimethylphenol	1600 U
bis(2-Chloroethoxy)methane	1600 U
2,4-Dichlorophenol	1600 U
Benzoic Acid	4100 U
1,2,4-Trichlorobenzene	1600 U
Naphthalene	1600 U
4-Chloroaniline	1600 U
Hexachlorobutadiene	1600 U
4-Chloro-3-Methylphenol	1600 U
2-Methylnaphthalene	1600 U
Hexachlorocyclopentadiene	1600 U
2,4,6-Trichlorophenol	1600 U
2,4,5-Trichlorophenol	4100 U
2-Chloronaphthalene	1600 U
2-Nitroaniline	1600 U
Dimethylphthalate	1600 U
Acenaphthylene	1600 U
2,6-Dinitrotoluene	1600 U
3-Nitroaniline	4100 U
Acenaphthene	1600 U
2,4-Dinitrophenol	4100 U
Dibenzofuran	1600 U
4-Nitrophenol	4100 U

ES-ENGINEERING SCIENCE, INC.

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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-08

Date Analyzed: 10/31/91

Client ID: CGBS_SED-1

% Moisture: 59

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	1600 U
Fluorene	1600 U
Diethylphthalate	1600 U
4-Chlorophenyl-phenylether	1600 U
4-Nitroaniline	4100 U
4,6-Dinitro-2-Methylphenol	4100 U
N-Nitrosodiphenylamine	1600 U
4-Bromophenyl-phenylether	1600 U
Hexachlorobenzene	1600 U
Pentachlorophenol	4100 U
Phenanthrene	1600 U
Anthracene	1600 U
Di-n-Butylphthalate	1800
Fluoranthene	1600 U
Pyrene	330 J
Butylbenzylphthalate	1600 U
Benzo(a)Anthracene	1600 U
3,3'-Dichlorobenzidine	3300 U
Chrysene	1600 U
bis(2-Ethylhexyl)Phthalate	1600 U
Di-n-octylphthalate	1600 U
Benzo(b)Fluoranthene	1600 U
Benzo(k)Fluoranthene	1600 U
Benzo(a)Pyrene	1600 U
Indeno(1,2,3-cd)Pyrene	1600 U
Dibenz(a,h)Anthracene	1600 U
Benzo(g,h,i)Perylene	1600 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-08RA

Date Analyzed: 11/02/91

Client ID: CGBS_SED-1

% Moisture: 59

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	1600 U
Phenol	1600 U
bis(2-Chloroethyl)ether	1600 U
2-Chlorophenol	1600 U
1,3-Dichlorobenzene	1600 U
1,4-Dichlorobenzene	1600 U
Benzyl Alcohol	1600 U
1,2-Dichlorobenzene	1600 U
2-Methylphenol	1600 U
bis(2-chloroisopropyl)Ether	1600 U
4-Methylphenol	1600 U
N-Nitroso-Di-n-Propylamine	1600 U
Hexachloroethane	1600 U
Nitrobenzene	1600 U
Isophorone	1600 U
2-Nitrophenol	1600 U
2,4-Dimethylphenol	1600 U
bis(2-Chloroethoxy)methane	1600 U
2,4-Dichlorophenol	1600 U
Benzoic Acid	4100 U
1,2,4-Trichlorobenzene	1600 U
Naphthalene	1600 U
4-Chloroaniline	1600 U
Hexachlorobutadiene	1600 U
4-Chloro-3-Methylphenol	1600 U
2-Methylnaphthalene	1600 U
Hexachlorocyclopentadiene	1600 U
2,4,6-Trichlorophenol	1600 U
2,4,5-Trichlorophenol	4100 U
2-Chloronaphthalene	1600 U
2-Nitroaniline	1600 U
Dimethylphthalate	1600 U
Acenaphthylene	1600 U
2,6-Dinitrotoluene	1600 U
3-Nitroaniline	4100 U
Acenaphthene	1600 U
2,4-Dinitrophenol	4100 U
Dibenzofuran	1600 U
4-Nitrophenol	4100 U

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-08RA

Date Analyzed: 11/02/91

Client ID: CGBS_SED-1

% Moisture: 59

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg	
2,4-Dinitrotoluene	1600	U
Fluorene	1600	U
Diethylphthalate	1600	U
4-Chlorophenyl-phenylether	1600	U
4-Nitroaniline	4100	U
4,6-Dinitro-2-Methylphenol	4100	U
N-Nitrosodiphenylamine	1600	U
4-Bromophenyl-phenylether	1600	U
Hexachlorobenzene	1600	U
Pentachlorophenol	4100	U
Phenanthrene	1600	U
Anthracene	1600	U
Di-n-Butylphthalate	1500	J
Fluoranthene	1600	U
Pyrene	340	J
Butylbenzylphthalate	1600	U
Benzo(a)Anthracene	1600	U
3,3'-Dichlorobenzidine	3300	U
Chrysene	1600	U
bis(2-Ethylhexyl)Phthalate	1600	U
Di-n-octylphthalate	1600	U
Benzo(b)Fluoranthene	1600	U
Benzo(k)Fluoranthene	1600	U
Benzo(a)Pyrene	1600	U
Indeno(1,2,3-cd)Pyrene	1600	U
Dibenz(a,h)Anthracene	1600	U
Benzo(g,h,i)Perylene	1600	U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: 3334-09

Date Analyzed: 10/31/91

Client ID: CGBS_SED-2

% Moisture: 59

Matrix: SOIL

Level:MED

Dilution Fact: 10.0

Compound	Analytical Results ug/Kg	
N-Nitroso-Dimethylamine	240000	U
Phenol	240000	U
bis(2-Chloroethyl)ether	240000	U
2-Chlorophenol	240000	U
1,3-Dichlorobenzene	240000	U
1,4-Dichlorobenzene	240000	U
Benzyl Alcohol	240000	U
1,2-Dichlorobenzene	240000	U
2-Methylphenol	240000	U
bis(2-chloroisopropyl)Ether	240000	U
4-Methylphenol	240000	U
N-Nitroso-Di-n-Propylamine	240000	U
Hexachloroethane	240000	U
Nitrobenzene	240000	U
Isophorone	240000	U
2-Nitrophenol	240000	U
2,4-Dimethylphenol	240000	U
bis(2-Chloroethoxy)methane	240000	U
2,4-Dichlorophenol	240000	U
Benzoic Acid	610000	U
1,2,4-Trichlorobenzene	240000	U
Naphthalene	980000	
4-Chloroaniline	240000	U
Hexachlorobutadiene	240000	U
4-Chloro-3-Methylphenol	240000	U
2-Methylnaphthalene	180000	J
Hexachlorocyclopentadiene	240000	U
2,4,6-Trichlorophenol	240000	U
2,4,5-Trichlorophenol	610000	U
2-Chloronaphthalene	240000	U
2-Nitroaniline	240000	U
Dimethylphthalate	240000	U
Acenaphthylene	240000	U
2,6-Dinitrotoluene	240000	U
3-Nitroaniline	610000	U
Acenaphthene	710000	
2,4-Dinitrophenol	610000	U
Dibenzofuran	240000	U
4-Nitrophenol	610000	U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: 3334-09

Date Analyzed: 10/31/91

Client ID: CGBS_SED-2

% Moisture: 59

Matrix: SOIL

Level:MED

Dilution Fact: 10.0

Compound	Analytical Results ug/Kg	
2,4-Dinitrotoluene	240000	U
Fluorene	250000	
Diethylphthalate	240000	U
4-Chlorophenyl-phenylether	240000	U
4-Nitroaniline	610000	U
4,6-Dinitro-2-Methylphenol	610000	U
N-Nitrosodiphenylamine	240000	U
4-Bromophenyl-phenylether	240000	U
Hexachlorobenzene	240000	U
Pentachlorophenol	610000	U
Phenanthrene	920000	
Anthracene	200000	J
Di-n-Butylphthalate	240000	U
Fluoranthene	270000	
Pyrene	470000	
Butylbenzylphthalate	240000	U
Benzo(a)Anthracene	120000	J
3,3'-Dichlorobenzidine	490000	U
Chrysene	130000	J
bis(2-Ethylhexyl)Phthalate	240000	U
Di-n-octylphthalate	240000	U
Benzo(b)Fluoranthene	240000	U
Benzo(k)Fluoranthene	240000	U
Benzo(a)Pyrene	240000	U
Indeno(1,2,3-cd)Pyrene	240000	U
Dibenz(a,h)Anthracene	240000	U
Benzo(g,h,i)Perylene	240000	U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No:	3334	Date Extracted:	10/07/91
Laboratory ID:	3334-10	Date Analyzed:	10/26/91
Client ID:	CGBS_SED-3	% Moisture:	40
Matrix:	SOIL Level:LOW	Dilution Fact:	5.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	2800 U
Phenol	2800 U
bis(2-Chloroethyl)ether	2800 U
2-Chlorophenol	2800 U
1,3-Dichlorobenzene	2800 U
1,4-Dichlorobenzene	2800 U
Benzyl Alcohol	2800 U
1,2-Dichlorobenzene	2800 U
2-Methylphenol	2800 U
bis(2-chloroisopropyl)Ether	2800 U
4-Methylphenol	2800 U
N-Nitroso-Di-n-Propylamine	2800 U
Hexachloroethane	2800 U
Nitrobenzene	2800 U
Isophorone	2800 U
2-Nitrophenol	2800 U
2,4-Dimethylphenol	2800 U
bis(2-Chloroethoxy)methane	2800 U
2,4-Dichlorophenol	2800 U
Benzoic Acid	6900 U
1,2,4-Trichlorobenzene	2800 U
Naphthalene	2800 U
4-Chloroaniline	2800 U
Hexachlorobutadiene	2800 U
4-Chloro-3-Methylphenol	2800 U
2-Methylnaphthalene	2800 U
Hexachlorocyclopentadiene	2800 U
2,4,6-Trichlorophenol	2800 U
2,4,5-Trichlorophenol	6900 U
2-Chloronaphthalene	2800 U
2-Nitroaniline	2800 U
Dimethylphthalate	2800 U
Acenaphthylene	2800 U
2,6-Dinitrotoluene	2800 U
3-Nitroaniline	6900 U
Acenaphthene	2800 U
2,4-Dinitrophenol	6900 U
Dibenzofuran	2800 U
4-Nitrophenol	6900 U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
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GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: 3334-10

Date Analyzed: 10/26/91

Client ID: CGBS_SED-3

% Moisture: 40

Matrix: SOIL

Level:LOW

Dilution Fact: 5.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	2800 U
Fluorene	2800 U
Diethylphthalate	2800 U
4-Chlorophenyl-phenylether	2800 U
4-Nitroaniline	6900 U
4,6-Dinitro-2-Methylphenol	6900 U
N-Nitrosodiphenylamine	2800 U
4-Bromophenyl-phenylether	2800 U
Hexachlorobenzene	2800 U
Pentachlorophenol	6900 U
Phenanthrene	2800 U
Anthracene	2800 U
Di-n-Butylphthalate	1600 J
Fluoranthene	2800 U
Pyrene	2800 U
Butylbenzylphthalate	2800 U
Benzo(a)Anthracene	2800 U
3,3'-Dichlorobenzidine	5500 U
Chrysene	2800 U
bis(2-Ethylhexyl)Phthalate	2800 U
Di-n-octylphthalate	2800 U
Benzo(b)Fluoranthene	2800 U
Benzo(k)Fluoranthene	2800 U
Benzo(a)Pyrene	2800 U
Indeno(1,2,3-cd)Pyrene	2800 U
Dibenz(a,h)Anthracene	2800 U
Benzo(g,h,i)Perylene	2800 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: MSBNA911009B

Date Analyzed: 10/29/91

Client ID: BLANKB

% Moisture: NA

Matrix: SOIL

Level:MED

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	10000 U
Phenol	10000 U
bis(2-Chloroethyl)ether	10000 U
2-Chlorophenol	10000 U
1,3-Dichlorobenzene	10000 U
1,4-Dichlorobenzene	10000 U
Benzyl Alcohol	10000 U
1,2-Dichlorobenzene	10000 U
2-Methylphenol	10000 U
bis(2-chloroisopropyl)Ether	10000 U
4-Methylphenol	10000 U
N-Nitroso-Di-n-Propylamine	10000 U
Hexachloroethane	10000 U
Nitrobenzene	10000 U
Isophorone	10000 U
2-Nitrophenol	10000 U
2,4-Dimethylphenol	10000 U
bis(2-Chloroethoxy)methane	10000 U
2,4-Dichlorophenol	10000 U
Benzoic Acid	25000 U
1,2,4-Trichlorobenzene	10000 U
Naphthalene	10000 U
4-Chloroaniline	10000 U
Hexachlorobutadiene	10000 U
4-Chloro-3-Methylphenol	10000 U
2-Methylnaphthalene	10000 U
Hexachlorocyclopentadiene	10000 U
2,4,6-Trichlorophenol	10000 U
2,4,5-Trichlorophenol	25000 U
2-Chloronaphthalene	10000 U
2-Nitroaniline	10000 U
Dimethylphthalate	10000 U
Acenaphthylene	10000 U
2,6-Dinitrotoluene	10000 U
3-Nitroaniline	25000 U
Acenaphthene	10000 U
2,4-Dinitrophenol	25000 U
Dibenzofuran	10000 U
4-Nitrophenol	25000 U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/09/91

Laboratory ID: MSBNA911009B

Date Analyzed: 10/29/91

Client ID: BLANKB

% Moisture: NA

Matrix: SOIL

Level:MED

Dilution Fact: 1.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	10000 U
Fluorene	10000 U
Diethylphthalate	10000 U
4-Chlorophenyl-phenylether	10000 U
4-Nitroaniline	25000 U
4,6-Dinitro-2-Methylphenol	25000 U
N-Nitrosodiphenylamine	10000 U
4-Bromophenyl-phenylether	10000 U
Hexachlorobenzene	10000 U
Pentachlorophenol	25000 U
Phenanthrene	10000 U
Anthracene	10000 U
Di-n-Butylphthalate	10000 U
Fluoranthene	10000 U
Pyrene	10000 U
Butylbenzylphthalate	10000 U
Benzo(a)Anthracene	10000 U
3,3'-Dichlorobenzidine	20000 U
Chrysene	10000 U
bis(2-Ethylhexyl)Phthalate	10000 U
Di-n-octylphthalate	10000 U
Benzo(b)Fluoranthene	10000 U
Benzo(k)Fluoranthene	10000 U
Benzo(a)Pyrene	10000 U
Indeno(1,2,3-cd)Pyrene	10000 U
Dibenz(a,h)Anthracene	10000 U
Benzo(g,h,i)Perylene	10000 U

Analyst:

Group Leader:

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: MSBNA911007A

Date Analyzed: 10/16/91

Client ID: SSBLANK

% Moisture: NA

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
N-Nitroso-Dimethylamine	660 U
Phenol	660 U
bis(2-Chloroethyl)ether	660 U
2-Chlorophenol	660 U
1,3-Dichlorobenzene	660 U
1,4-Dichlorobenzene	660 U
Benzyl Alcohol	660 U
1,2-Dichlorobenzene	660 U
2-Methylphenol	660 U
bis(2-chloroisopropyl)Ether	660 U
4-Methylphenol	660 U
N-Nitroso-Di-n-Propylamine	660 U
Hexachloroethane	660 U
Nitrobenzene	660 U
Isophorone	660 U
2-Nitrophenol	660 U
2,4-Dimethylphenol	660 U
bis(2-Chloroethoxy)methane	660 U
2,4-Dichlorophenol	660 U
Benzoic Acid	1700 U
1,2,4-Trichlorobenzene	660 U
Naphthalene	660 U
4-Chloroaniline	660 U
Hexachlorobutadiene	660 U
4-Chloro-3-Methylphenol	660 U
2-Methylnaphthalene	660 U
Hexachlorocyclopentadiene	660 U
2,4,6-Trichlorophenol	660 U
2,4,5-Trichlorophenol	1700 U
2-Chloronaphthalene	660 U
2-Nitroaniline	660 U
Dimethylphthalate	660 U
Acenaphthylene	660 U
2,6-Dinitrotoluene	660 U
3-Nitroaniline	1700 U
Acenaphthene	660 U
2,4-Dinitrophenol	1700 U
Dibenzofuran	660 U
4-Nitrophenol	1700 U

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

GC/MS ANALYTICAL REPORT
SEMIVOLATILE ORGANICS

Work Order No: 3334

Date Extracted: 10/07/91

Laboratory ID: MSBNA911007A

Date Analyzed: 10/16/91

Client ID: SSBLANK

% Moisture: NA

Matrix: SOIL

Level:LOW

Dilution Fact: 2.0

Compound	Analytical Results ug/Kg
2,4-Dinitrotoluene	660 U
Fluorene	660 U
Diethylphthalate	660 U
4-Chlorophenyl-phenylether	660 U
4-Nitroaniline	1700 U
4,6-Dinitro-2-Methylphenol	1700 U
N-Nitrosodiphenylamine	660 U
4-Bromophenyl-phenylether	660 U
Hexachlorobenzene	660 U
Pentachlorophenol	1700 U
Phenanthrene	660 U
Anthracene	660 U
Di-n-Butylphthalate	660 U
Fluoranthene	660 U
Pyrene	660 U
Butylbenzylphthalate	660 U
Benzo(a)Anthracene	660 U
3,3'-Dichlorobenzidine	1300 U
Chrysene	660 U
bis(2-Ethylhexyl)Phthalate	660 U
Di-n-octylphthalate	660 U
Benzo(b)Fluoranthene	660 U
Benzo(k)Fluoranthene	660 U
Benzo(a)Pyrene	660 U
Indeno(1,2,3-cd)Pyrene	660 U
Dibenz(a,h)Anthracene	660 U
Benzo(g,h,i)Perylene	660 U

Analyst:

Group Leader:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL SEMIVOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/16/91

LEVEL: LOW

LABORATORY ID	S1 NBZ	S2 FBP	S3 TPH	S4 PHL	S5 2FP	S6 TBP	TOT OUT
MSBNA911007A	72	74	70	76	70	77	0
SSBNA911007A	59	65	52	59	57	59	0
SSBNA911007B	71	79	64	72	67	71	0

	QC LIMITS
S1(NBZ)= Nitrobenzene-d5	(23-120)
S2(FBP)= 2-Fluorobiphenyl	(30-115)
S3(TPH)= Terphenyl-d14	(18-137)
S4(PHL)= Phenol-d5	(24-113)
S5(2FP)= 2-Fluorophenol	(25-121)
S6(TBP)= 2,4,6-Tribromophenol	(19-122)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST:

Quality Control: J Hard

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL SEMIVOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/29/91

LEVEL: ~~LOW~~ MED jam 11/5/91

LABORATORY ID	S1 NBZ	S2 FBP	S3 TPH	S4 PHL	S5 2FP	S6 TBP	TOT OUT
MSBNA911009B	77	82	76	75	73	80	0
SSBNA911009C	75	77	72	75	74	85	0
SSBNA911009D	74	75	70	73	72	83	0
3334-01	56	60	70	51	44	34	0

	QC LIMITS
S1(NBZ)= Nitrobenzene-d5	(23-120)
S2(FBP)= 2-Fluorobiphenyl	(30-115)
S3(TPH)= Terphenyl-d14	(18-137)
S4(PHL)= Phenol-d5	(24-113)
S5(2FP)= 2-Fluorophenol	(25-121)
S6(TBP)= 2,4,6-Tribromophenol	(19-122)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST:

Quality Control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL SEMIVOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/26/91

LEVEL: LOW

LABORATORY ID	S1 NBZ	S2 FBP	S3 TPH	S4 PHL	S5 2FP	S6 TBP	TOT OUT
3334-07	66	66	74	63	62	57	0
3334-10	45	48	46	43	43	35	0
3334-03	65	67	70	63	61	51	0
3334-04	79	82	78	75	76	49	0
3334-05	65	69	76	62	60	60	0

		QC LIMITS
S1(NBZ)=	Nitrobenzene-d5	(23-120)
S2(FBP)=	2-Fluorobiphenyl	(30-115)
S3(TPH)=	Terphenyl-d14	(18-137)
S4(PHL)=	Phenol-d5	(24-113)
S5(2FP)=	2-Fluorophenol	(25-121)
S6(TBP)=	2,4,6-Tribromophenol	(19-122)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST:

Quality Control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL SEMIVOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 11/02/91

LEVEL: MED/LOW

LABORATORY ID	S1 NBZ	S2 FBP	S3 TPH	S4 PHL	S5 2FP	S6 TBP	TOT OUT
3334-02	85	86	92	73	57	37	0
3334-06	60	67	83	62	57	58	0
3334-08RA	28	30	34	28	29	25	0

		QC LIMITS
S1(NBZ)=	Nitrobenzene-d5	(23-120)
S2(FBP)=	2-Fluorobiphenyl	(30-115)
S3(TPH)=	Terphenyl-d14	(18-137)
S4(PHL)=	Phenol-d5	(24-113)
S5(2FP)=	2-Fluorophenol	(25-121)
S6(TBP)=	2,4,6-Tribromophenol	(19-122)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST:

Quality Control:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

SOIL SEMIVOLATILE SURROGATE RECOVERY

WORK ORDER NO: 3334

DATE ANALYZED: 10/31/91

LEVEL: LOW/MED

LABORATORY ID	S1 NBZ	S2 FBP	S3 TPH	S4 PHL	S5 2FP	S6 TBP	TOT OUT
3334-01RA	59	60	75	53	43	31	0
3334-09	D	D	D	D	D	D	0
3334-08	29	30	31	30	29	19 *	1

	QC LIMITS
S1(NBZ)= Nitrobenzene-d5	(23-120)
S2(FBP)= 2-Fluorobiphenyl	(30-115)
S3(TPH)= Terphenyl-d14	(18-137)
S4(PHL)= Phenol-d5	(24-113)
S5(2FP)= 2-Fluorophenol	(25-121)
S6(TBP)= 2,4,6-Tribromophenol	(19-122)

D =Surrogate Diluted Out
* =Surrogate Outside QC Limit

ANALYST:

Quality Control: John H

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

Matrix Spike/Spike Duplicate Recovery

Semivolatile Organics

Ext. Date : 10/07/91
Analysis Date: 10/16/91

Work order: 3334
Matrix: SOIL

QC Sample : MSBNA911007A
Units: ug/Kg

Instrument: EMS-2
Cor. Fact: 67

Level: LOW
% Moisture: NA

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,2,4-Trichlorobenzene	0	3350	2061	62
Acenapthene	0	3350	2336	70
2,4-Dinitrotoluene	0	3350	2278	68
Pyrene	0	3350	1714	51
N-Nitrosodipropylamine	0	3350	2240	67
1,4-Dichlorobenzene	0	3350	2159	64
Pentachlorophenol	0	5025	3566	71
Phenol	0	5025	3189	63
2-Chlorophenol	0	5025	3344	67
4-Chloro-m-cresol	0	5025	3170	63
4-Nitrophenol	0	5025	3282	65

Compound	Conc. MSD	Percent Recovered	RPD	Criteria RPD	Criteria %REC
1,2,4-Trichlorobenzene	2261	68	9	23	(38-107)
Acenapthene	2502	75	7	19	(31-137)
2,4-Dinitrotoluene	2365	71	4	47	(28-89)
Pyrene	1902	57	10	36	(35-142)
N-Nitrosodipropylamine	2419	72	8	38	(41-126)
1,4-Dichlorobenzene	2291	68	6	27	(28-104)
Pentachlorophenol	3853	77	8	47	(17-109)
Phenol	3407	68	7	35	(26-90)
2-Chlorophenol	3556	71	6	50	(25-102)
4-Chloro-m-cresol	3471	69	9	33	(26-103)
4-Nitrophenol	3447	69	5	50	(11-114)

ANALYST:

Quality Control:

* = Value Outside QC Limits

$$\text{Percent Recovery} = \frac{\text{Conc. MS|MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley, CA. 94710

Matrix Spike/Spike Duplicate Recovery

Semivolatile Organics

Ext. Date : 10/09/91

Analysis Date: 10/29/91

Work order: 3334

Matrix: SOIL

QC Sample : MSBNA911009B

Units: ug/Kg

Instrument: EMS-2

Cor. Fact: 2.5

Level: MED

% Moisture: NA

Compound	Conc. Sample	Conc. Spiked	Conc. MS	Percent Recovered
1,2,4-Trichlorobenzene	0	125	91	73
Acenapthene	0	125	101	81
2,4-Dinitrotoluene	0	125	101	81
Pyrene	0	125	100	80
N-Nitrosodipropylamine	0	125	101	81
1,4-Dichlorobenzene	0	125	92	74
Pentachlorophenol	0	188	165	88
Phenol	0	188	129	69
2-Chlorophenol	0	188	140	75
4-Chloro-m-cresol	0	188	146	78
4-Nitrophenol	0	188	149	80

Compound	Conc. MSD	Percent Recovered	RPD	Criteria RPD	Criteria %REC
1,2,4-Trichlorobenzene	88	70	3	23	(38-107)
Acenapthene	99	79	2	19	(31-137)
2,4-Dinitrotoluene	99	79	2	47	(28-89)
Pyrene	96	77	3	36	(35-142)
N-Nitrosodipropylamine	96	77	5	38	(41-126)
1,4-Dichlorobenzene	89	71	4	27	(28-104)
Pentachlorophenol	167	89	2	47	(17-109)
Phenol	124	66	4	35	(26-90)
2-Chlorophenol	135	72	3	50	(25-102)
4-Chloro-m-cresol	142	76	3	33	(26-103)
4-Nitrophenol	151	81	1	50	(11-114)

ANALYST:

Quality Control:

* = Value Outside QC Limits

$$\text{Percent Recovery} = \frac{\text{Conc. MS|MSD} - \text{Conc. Sample}}{\text{Conc. Spiked}} * 100$$

$$\text{RPD} = \left(\frac{\text{Conc. MS} - \text{Conc. MSD}}{(\text{Conc. MS} + \text{Conc. MSD})/2}\right) * 100$$

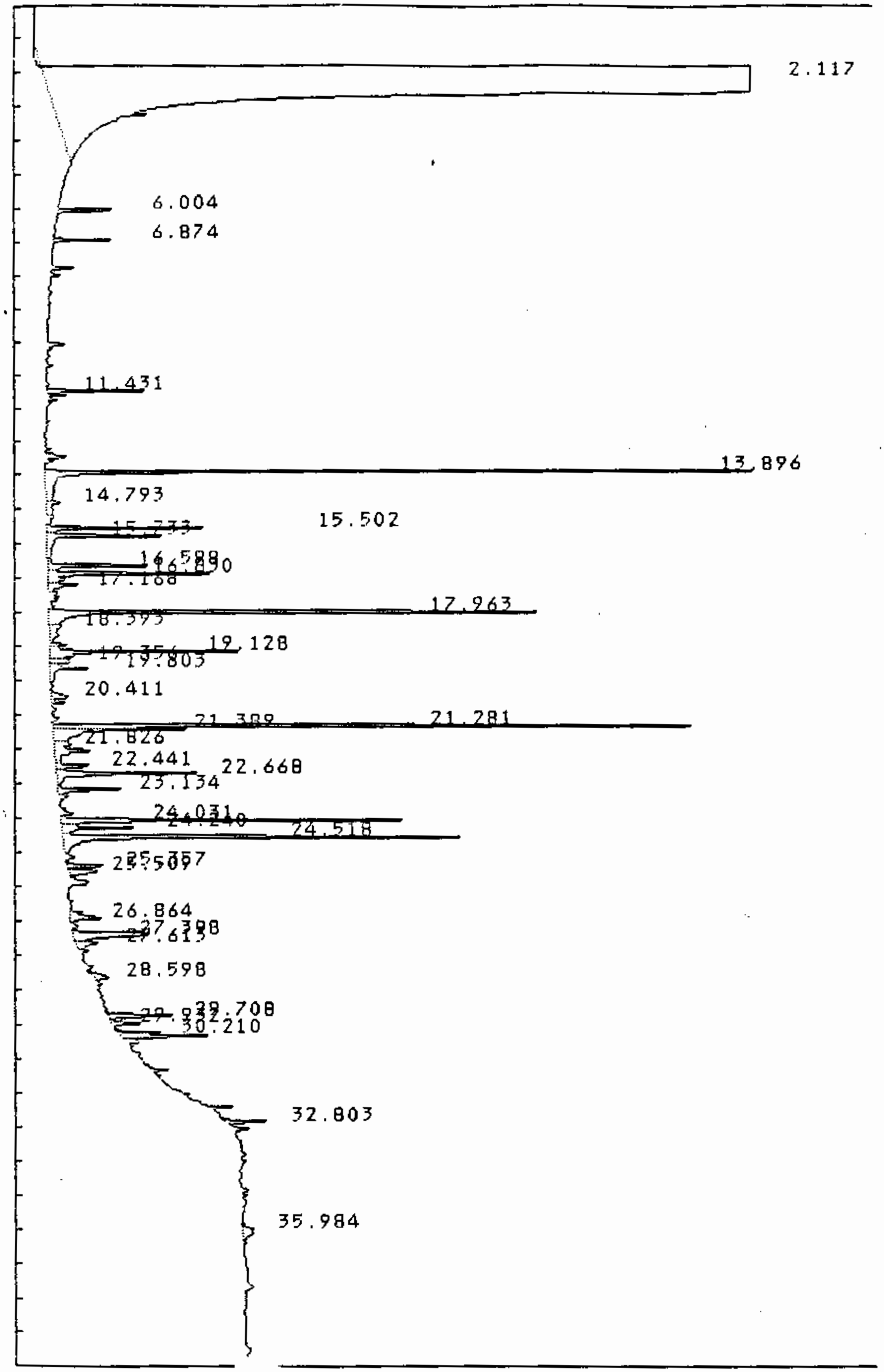
G C FINGERPRINT REPORT
WORK ORDER #3334

One gram of the solid sample 3334-09 was extracted with dichloromethane by the EPA 3550 sonication technique. Extract was centrifuged and filtered to remove insoluble material. Final volume was 10 mL.

Sample extract was injected on the chromatograph with a DB-5 megabore column, which resolves petroleum compounds from C8 to C36, by a temperature ramp program on the chromatograph, and detection by flame ionization.

Examination of the sample chromatogram showed peaks in the C14 to C28 range. The peaks observed did not match any of the straight chain hydrocarbon standards that were also analyzed, indicating that the sample did not contain significant amounts of natural petroleum components.

In addition, the sample chromatogram did not exhibit the characteristic envelope that is normally observed in petroleum products.



```
   Plot Minimum        Plot Maximum    Enlarge       Time Range (min.)
"   2.3E+04     ,       6.2E+04     ,   1      ,     0        to 40
     ------------------------------------------------------------------
 "        Sample ID:","3334-09                                      "
 "   Analysis Date:","Mon Oct 14, 1991   1:25:48 pm          "
 "Dilution Factor:","        100"
 "       Data File:","/DATA/EGC4DES_010.RES
```

CASE NARRATIVE
WORK ORDER NO.3334
INORGANICS - METALS

Chromium was analyzed using ICP emission rather than graphite furnace atomic absorption. Detection limit criteria are met using ICP.

Amenable cyanide was analyzed only when total cyanide was detected.

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client:	ES SYRACUSE	Work Order:	3334
Project:	NYSEG	Matrix:	SOLID

Client's ID:	CGBS SS-1	CGBS SS-2	CGBS SS-3
	1300	1320	1340
Sample Date:	10/03/91	10/03/91	10/03/91
% Moisture:	6.82	7.39	2.81
Lab ID:	3334.01	3334.02	3334.03
	E	E	E

Parameter	Results			Method	Normal Report Limit	Units	Date Analyzed
Aluminum	6900.	9600.	7600.	ICP	40	mg/Kg	10/14/91
Antimony	ND	ND	ND	ICP	12	(PPM)	10/14/91
Cadmium	1.1	ND	ND	ICP	1	in Soil	10/14/91
Chromium	21.	14.	9.6	ICP	2	Dry	10/14/91
Cobalt	21.	ND	ND	ICP	10	"	10/14/91
Copper	74.	32.	19.	ICP	5	"	10/14/91
Iron	150,000.	27,000.	20,000.	ICP	20	"	10/14/91
Lead	120.	190.	13.	GF-AA	.6	"	10/11/91
Manganese	540.	520.	360.	ICP	3	"	10/14/91
Mercury	.29	.73	ND	CV-AA	.1	"	10/11/91
Nickel	33.	17.	13.	ICP	8	"	10/14/91
Zinc	250.	160.	51.	ICP	4	"	10/14/91
Amenable CN	ND	NR	NR	Color	1	"	10/14/91
Total CN	11.	ND	ND	Color	1	"	10/10/91

NR- Not Required; Total Cyanide Was Not Detected
ND- Not Detected

ANALYST: ____________________ GROUP LEADER: ____________________

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG

Work Order: 3334
Matrix: SOLID

Client's ID:	CGBS SS-4	CGBS SS-5	CGBS SS-6				
	1400	1420	1440				
Sample Date:	10/03/91	10/03/91	10/03/91				
% Moisture:	3.41	3.21	7.24				
Lab ID:	3334.04 E	3334.05 E	3334.06 E				
Parameter	------------Results	------------	------------	Method	Normal Report Limit	Units	Date Analyzed
Aluminum	11,000.	6900.	12,000.	ICP	40	mg/Kg	10/14/91
Antimony	ND	ND	ND	ICP	12	(PPM)	10/14/91
Cadmium	ND	ND	ND	ICP	1	in Soil	10/14/91
Chromium	16.	9.2	13.	ICP	2	Dry	10/14/91
Cobalt	11.	ND	ND	ICP	10	"	10/14/91
Copper	28.	21.	15.	ICP	5	"	10/14/91
Iron	34,000.	18,000.	23,000.	ICP	20	"	10/14/91
Lead	36.	15.	49.	GF-AA	.6	"	10/11/91
Manganese	860.	400.	700.	ICP	3	"	10/14/91
Mercury	.10	ND	ND	CV-AA	.1	"	10/11/91
Nickel	24.	14.	18.	ICP	8	"	10/14/91
Zinc	69.	60.	80.	ICP	4	"	10/14/91
Total CN	ND	ND	ND	Color	1	"	10/10/91

ND- Not Detected

ANALYST:

GROUP LEADER:

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG

Work Order: 3334
Matrix: SOLID

Client's ID: CGBS SS-7 CGBS SED-1 CGBS SED-2

	1500	1104	1022				
Sample Date:	10/03/91	10/03/91	10/03/91				
% Moisture:	3.61	59.1	59.4				
Lab ID:	3334.07	3334.08	3334.09				
	E	C	C				
Parameter	-----------Results------------			Method	Normal Report Limit	Units	Date Analyzed
Aluminum	7000.	9500.	9800.	ICP	40	mg/Kg	10/14/91
Antimony	ND	ND	ND	ICP	12	(PPM)	10/14/91
Cadmium	ND	ND	ND	ICP	1	in Soil	10/14/91
Chromium	8.8	13.	12.	ICP	2	Dry	10/14/91
Cobalt	ND	ND	ND	ICP	10	"	10/14/91
Copper	18.	23.	60.	ICP	5	"	10/14/91
Iron	19,000.	22,000.	21,000.	ICP	20	"	10/14/91
Lead	14.	35.	96.	GF-AA	.6	"	10/11/91
Manganese	380.	990.	620.	ICP	3	"	10/14/91
Mercury	ND	.36	ND	CV-AA	.1	"	10/11/91
Nickel	14.	18.	16.	ICP	8	"	10/14/91
Zinc	49.	99.	110.	ICP	4	"	10/14/91
Total CN	ND	ND	ND	Color	1	"	10/10/91

ND- Not Detected

ANALYST: ________________ GROUP LEADER: ________________

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG

Work Order: 3334
Matrix: SOLID

Client's ID: CGBS SED-3

945
Sample Date: 10/03/91
% Moisture: 40.2
Lab ID: 3334.10
C

Parameter	Results	Method	Normal Report Limit	Units	Date Analyzed
Aluminum	8100.	ICP	40	mg/Kg	10/14/91
Antimony	ND	ICP	12	(PPM)	10/14/91
Cadmium	ND	ICP	1	in Soil	10/14/91
Chromium	11.	ICP	2	Dry	10/14/91
Cobalt	ND	ICP	10	"	10/14/91
Copper	17.	ICP	5	"	10/14/91
Iron	18,000.	ICP	20	"	10/14/91
Lead	28.	GF-AA	.6	"	10/11/91
Manganese	420.	ICP	3	"	10/14/91
Mercury	ND	CV-AA	.1	"	10/11/91
Nickel	17.	ICP	8	"	10/14/91
Zinc	76.	ICP	4	"	10/14/91
Total CN	ND	Color	1	"	10/10/91

ND- Not Detected

ANALYST: ____________ GROUP LEADER: ____________

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES SYRACUSE
Project: NYSEG

Work Order: 3328
Matrix: SOLID

Client's ID: Prep Blank

Sample Date: NA
% Moisture: 0
Lab ID: Prep Blank

Parameter	------------Results------------	Method	Normal Report Limit	Units	Date Analyzed
Aluminum	ND	ICP	40	mg/Kg	10/14/91
Antimony	ND	ICP	12	(PPM)	10/14/91
Cadmium	ND	ICP	1	in Soil	10/14/91
Chromium	ND	ICP	2	Dry	10/14/91
Cobalt	ND	ICP	10	"	10/14/91
Copper	ND	ICP	5	"	10/14/91
Iron	ND	ICP	20	"	10/14/91
Lead	ND	GF-AA	.6	"	10/10/91
Manganese	ND	ICP	3	"	10/14/91
Mercury	ND	CV-AA	.1	"	10/11/91
Nickel	ND	ICP	8	"	10/14/91
Zinc	ND	ICP	4	"	10/14/91
Amenable CN	ND	Color	1	"	10/14/91
Total CN	ND	Color	1	"	10/10/91

ND- Not Detected

ANALYST:

GROUP LEADER:

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS QC SUMMARY - LAB CONTROL SAMPLE - SOIL

Work Order: 3328, 3330, 3334

% Moisture: 0

Lab ID of LCS:

ICP: 425.66A LCS
GF-AA: 425.67A LCS
Mercury: 377.952A LCS
Amenable CN: 395.67A LCS
Total CN: 395.61A LCS

Matrix: Soil

Units: mg/Kg Dry

Parameter	Date Analyzed LCS	LCS Result	Conc Added	% Rec LCS	-QC Limits- -- % Rec -- Low	High
Aluminum ICP	10/14/91	428.160	400	107	80	120
Antimony ICP	10/14/91	93.398	100	93	80	120
Cadmium ICP	10/14/91	10.918	10	109	80	120
Chromium ICP	10/14/91	38.492	40	96	79	127
Cobalt ICP	10/14/91	95.314	100	95	80	120
Copper ICP	10/14/91	48.258	50	97	80	120
Iron ICP	10/14/91	206.820	200	103	80	120
Lead GF	10/10/91	3.8340	4	96	72	145
Manganese ICP	10/14/91	95.138	100	95	80	120
Mercury CV	10/11/91	.52776	.5	106	80	120
Nickel ICP	10/14/91	94.652	100	95	67	127
Zinc ICP	10/14/91	97.030	100	97	79	121
Amenable CN	10/14/91	26.350	25	105	80	120
Total CN	10/07/91	24.350	25	97	80	120

N = Outside QC Limit

ANALYST: Date 10/29/91 REVIEWER: Date 10/29/91

File:M1QCLCSS

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANIC QC SUMMARY - MS and MSD
SOIL - mg/Kg Dry Basis

Work Order: 3328, 3330, 3340

% Moisture: 14.4

	ICP	GF-AA	Mercury	Total CN	Amenable CN
Lab ID Spiked:	3330.09	3330.09	3330.09	3330.09	3328.09
QC Batch:	425.66	425.67	377.952	395.61	395.67

Matrix: Soil

Units: mg/Kg Dry

Parameter	Date Analyzed MS	Results: Unspiked Sample	Results: MS	Results: MSD	RPD	RPD QC Limit	Conc Added: MS	Conc Added: MSD	Percent Recovered: MS	Percent Recovered: MSD
Aluminum	10/14/91	16363.08	14215.09	16986.44	18	20	400.000	400.000	NC	NC
Antimony	10/14/91	0.000	69.066	48.050	36 *	20	100.000	100.000	69 N	48 N
Cadmium	10/14/91	.241	12.698	13.237	4	20	10.000	10.000	125	130 N
Chromium	10/14/91	16.333	58.080	61.032	5	20	40.000	40.000	104	112
Cobalt	10/14/91	11.335	118.259	119.349	1	20	100.000	100.000	107	108
Copper	10/14/91	12.463	67.572	69.737	3	20	50.000	50.000	110	115
Iron	10/14/91	29264.58	29494.77	30306.74	3	20	200.000	200.000	NC	NC
Lead GF	10/11/91	116.745	97.758	86.431	12	20	4	4	NC	NC
Manganese	10/14/91	661.328	740.192	656.334	12	20	100.000	100.000	NC	NC
Mercury CV	10/11/91	0.000	.714	.706	1	20	.500	.500	143 N	141 N
Nickel	10/14/91	17.199	123.769	125.763	2	20	100.000	100.000	107	109
Zinc	10/14/91	70.790	172.832	185.197	7	20	100.000	100.000	102	114
Amenable CN	10/14/91	4.460	29.226	24.600	17	20	25.000	25.000	99	81
Total CN	10/10/91	0.000	25.476	26.000	2	20	25.000	25.000	102	104

NC- Not Calculated; Sample concentration is more than four times the spike added.
* or N= Outside QC Limits

QC Limits for % Rec: 75 - 125

ANALYST: DATE: 10/29/91 REVIEWER: DATE: 10/30/91

0009

CHAIN OF CUSTODY RECORD

PROJECT NO. SY201.20.03	**PROJECT NAME** CGBS NYSEG Court Street	
SAMPLERS (Signature) Scott B. Dillman		

STA. NO.	**DATE**	**TIME**	**COMP.**	**GRAB**	**STATION LOCATION**	**NO. OF CONTAINERS**	BNA's EPA 8270	VOA's EPA 8240	Hg EPA 7471	Pb EPA 7421	Cr NOT ICP 7191	Cu, Co, Mg, Ni, Zn, Al, Ca, Sb EPA 6010	Cn (total & amenable) EPA 9010 C.	**REMARKS**
CGBS SS-1	10-3-91	1300		✓	SS-1 Court Street	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SS-2	10-3-91	1320		✓	SS-2 Ct. St	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SS-3	↓	1340		✓	SS-3 Ct. St	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SS-4		1400		✓	SS-4 Ct St	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SS-5		1420		✓	SS-5 Ct St	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SS-6		1440		✓	SS-6 Ct St	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SS-7		1500		✓	SS-7 Ct. St	5	✓	✓	✓	✓	✓	✓	✓	
CGBS SED-1	10-3-91	1104		✓	SED-1 Ct. St	3	✓	✓	✓	✓	✓	✓	✓	
CGBS SED-2	10-3-91	1022		✓	SED-2 Ct. St	3	✓	✓	✓	✓	✓	✓	✓	
CGBS SED-3	10-3-91	945		✓	SED-3 Ct. St	3	✓	✓	✓	✓	✓	✓	✓	
SED ~~CGBS SED~~														

Relinquished by: (Signature)	**Date/Time** 10/3 1430	**Received by: (Signature)** Fed Exp	**Relinquished by: (Signature)**	**Date/Time**	**Received by: (Signature)**
Relinquished by: (Signature)	**Date/Time**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**Date/Time**	**Received by: (Signature)**
Relinquished by: (Signature)	**Date/Time**	**Received for lab. by: (Signature)**	**Date/Time** 10/4/91 1015	**Remarks**	

ENGINEERING-SCIENCE INC.
290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
Telephone: (315) 451-9560

APPENDIX F

SSPS SCORING DATA

SSPS DATA ENTRY FORM

Site Name: NYSEG Binghamton-Court Street (CGBS)

Type of Site: Former manufactured gas plant (MGP) site

The SSPS ranking scores for the Binghamton-Court Street site are as follows:

	Actual Risk	Perceived Risk	Clean-Up
Primary Scores	6.4	13.1	12.0
Secondary Site Scores			
Groundwater	0.0	0.0	
Surface Water	3.3	29.8	
Direct Contact	9.9	13.1	
Air	7.3	9.7	

Q1) Site Description Former MGP Site on Court Street in the City of Binghamton

Comments:

Q2) Service Region: Binghamton

Service Division: Binghamton

Neighborhood Type: Industrial/Commercial

Comments:

Q3) How is the surface water used?

- ___ Not currently used (score = 1)
- ___ Industrial (2)
- ___ Recreational (3)
- ___ Irrigation, food prep., or fishing (4)
- X Drinking water (5)

Select the appropriate answer with the highest score.

Comments: Susquehanna River is a Class A surface water-drinking water. (USGS Castle Creek, Binghamton West Quadrangle, 1968; NYSDEC Surface Water Classification)

Score: 5

Q4) For each distance, check the appropriate row to indicate the number of people using the downstream surface water for the highest scoring purpose above:

		Distance		
Population	Within 5 km	Within 3 km	Within 1 km	Within 1/2 km
0	_(0)	_(0)	_(0)	_(0)
1 to 100	___(1)	___(2)	___(3)	___(4)
101 to 1,000	___(2)	___(3)	___(4)	___(6)
1,001 to 10,000	___(3)	___(4)	___(6)	___(8)
10,001 to 100,000	___(4)	___(6)	___(8)	_X_(10)
100,001 and up	___(6)	___(8)	___(10)	___(12)

Comments: Municipal surface water intake using Susquehanna River as source serving approximately 60,000 to City of Binghamton (NYSDOH, 1982).

Score: 10

Q5) Check the appropriate downstream distance from the site to the nearest of each type of sensitive surface water environment

	Distance				
Target	Outside 4 km	Within 4 km	Within 2 km	Within 1 km	Within 1/2 km
Coastal wetland	_X_(0)	___(1)	___(6)	___(12)	___(16)
Freshwater wetland	___(0)	_X_(1)	___(3)	___(7)	___(16)
Endangered species	_X_(0)	___(1)	___(3)	___(8)	___(16)

Comments: Within 4 km of the site exists a freshwater wetland - Cutler Pond (CC-11). (Telecon to R. Nolan, NYSDEC, June, 1991; NYSDEC Freshwater Wetlands Map, Castle Creek, Binghamton West 1973); and NYSDEC Wildlife Resources Center.

Score: 1

Q6) What is the average slope across the site:

X_ Less than 3%
__ 3% or greater
__ 5% or greater
__ 8% or greater

What is the average slope between the site and the nearest body of surface water?

X_ Less than 3%
__ 3% or greater
__ 5% or greater
__ 8% or greater

Comments: Site is graded to <3% slope and separated from the Susquehanna River by a concrete floodwall. ES site inspection 6/12/91.

Score:

Q7) What is the expected maximum 24-hour rainfall over a year?

- ___ Less than 2 cm (0)
- ___ Less than 5 cm (1)
- _X_ Less than 8 cm (2)
- ___ 8 cm or greater (3)

Comments: 5.7 cm. (USDOC Technical Paper #40).

Score: 2

Q8) What is the distance to the nearest body of surface water?

- ___ Greater than 2 km (0)
- ___ Less than 2 km (1)
- ___ Less than 1/2 km (2)
- _X_ Less than 100 meters (3)

Comments: Nearest body of surface water, the Susquehanna River, is less than 100 m from the site (USGS, 1968).

Score: 3

Q9) What is the physical state of the wastes within one-tenth of one meter (10 cm) of the site surface?

- _X_ Solid, consolidated and stabilized (0)
- ___ Solid, unconsolidated and unstabilized (1)
- ___ Powder or fine material (2)
- ___ Liquid, gas, or sludge (3)

Comments: Default score-no known wastes identified within referenced area, other than the noted type.

Score: 0

Q10) How well is the site designed to reduce runoff?

- ___ Runoff blocked by high terrain (score = 0)
- _X_ Waste covered (1)
- ___ Exposed waste, sound diversion system (2)
- ___ Exposed waste, poor diversion system (3)
- ___ Site in surface water (4)

Select the appropriate answer with the highest score.

Comments: No exposed MGP residues observed. Site drainage is toward an adjacent storm sewer system (ES site inspection 6/12/91).

Score: 1

Q11) Fill out the table below describing the wastes present within one-tenth of a meter (10 cm) of the site surface. If not known exactly, approximations must be made. Include up to six chemicals.

Chemical Waste Name	Concentration (ppm)	Established Values (ppm)	Persistence (0-3)	Quantity (kg)
Lead	190	15	3	4.23
Cyanide	11	500	3	0.11
PAHs	8.9	10	3	0.39
C-PAHs	6.0	10	3	0.15

Chemical Waste: Types of wastes were determined by mutual consent. They are defined below with C-PAHs and PAHs broken down into the specific compounds detected in the surface soils.
Cyanide
Lead
PAHs
C-PAHs: Benzo(a)anthracene, benzo(k)fluoranthene, benzo-(g,h,i) perylene, benzo(a) pyrene, chrysene, indeno(1,2,3-cd) pyrene

Concentration: The highest concentration detected in any of the samples used. If none was detected, concentration = 0.
C-PAHs: Concentration represents the sum of the highest concentrations of all C-PAHs detected.
PAHs: Concentration represents the sum of the highest concentrations of all PAHs detected, not including C-PAHs.

Established Values: Aresenic and Lead - Used the background concentrations for arsenic and lead from Shacklette and Boerngen (USGS, 1984).
Cyanide, C-PAHs, PAHs-used default values:
Cyanide - 50 ppm (domestic land use)
500 ppm (industrial land use)
C-PAHs - 10 ppm
PAHs - 10 ppm

Persistence: Based on values supplied in the SSPS help screen.

Quantity: The quantity of waste represents the summation of the concentration of waste detected in each surface soil sample multiplied by the volume of soil contaminated. For each sample this volume was assumed to be 10 m^3 (10m x 10m x 10cm).

Q12) What is the physical state of all of the wastes at the site surface?

X Solid, consolidated and stabilized (0)
___ Solid, unconsolidated and unstabilized (1)
___ Powder or fine material (2)
___ Liquid, gas, or sludge (3)

Comments: Default score-based on ES site observations.

Score: 0

Q13) What is the distance from the bottom of the site to the top of the water table?

___ Greater than 15 m (0)
___ Less than 15 m (1)
___ Less than 5 m (2)
X Less than 1 m (3)
___ Site in water table (6)

Comments: Default value-depth to top of water table is unknown and depth of bottom of site is unknown.

Subsurface relief holders are known to have been used on-site (ES inspection 6/12/91. Aerial Photography, 1935).

Score: 3

Q14) What is expected annual net precipitation?

___ Less than -25 cm (0)
___ Greater than -25 cm (1)
___ Greater than 10 cm (2)
X Greater than 25 cm (3)

Comments: 33.02 cm. net precipitation (USDOC, 1983)

Score: 3

Q15) What is the permeability of the soil between the site and the water table?

___ Less than 1×10^{-7} (0)
___ Greater than 1×10^{-7} (1)
X Greater than 1×10^{-5} (2)
___ Greater than 1×10^{-3} (3)

Comments: Soil maps identify silty fill material, alluvial deposits. Permeability not specified but estimated to be greater than 1×10^{-5} (U.S.D.A. Broome Co. Soil Survey, 1971).

Score: 2

Q16) What is the mobility of the primary chemicals in the saturated zone?

X Greater than 10,000 (0)
__ Less than 10,000 (1)
__ Less than 100 (2)
__ Less than 1 (3)

Comments: Default value, assuming primary constituent of residues to be benzene.

Score: 0

Q17) How well is the site designed to reduce leaching and subsurface release?

__ Non-permeable barrier and no ponding (0)
__ Non-permeable barrier and ponding (1)
X Inadequate barrier and no ponding (2)
__ Inadequate barrier and ponding (3)

Comments: No significant ponding observed on-site. No barrier known to exist. (ES site inspection 6/12/91).

Score: 2

Q18) Fill out the table below describing all of the wastes present at the site. If data are not known exactly, approximations must be made. Include up to six chemicals

Chemical Waste Name	Concentration (ppm)	Established Value (ppm)	Persistence (0-3)	Quantity (kg)
VOA	706.6	1	3	184.91
PAHs	52889	10	3	13,840.73
Cyanide	11.0	500	3	2.87
Lead	190.0	15	3	49.72

Chemical Waste:	Determined to be volatile organics, PAHs, cyanide, as arrived at by mutual consent.
Concentration:	Used the geometric mean concentrations for tar waste, and conversion factor for tar (gallons) to tar (weight in kilograms) from the GRI EPRI data base. Cyanide concentration represents level detected in surface soil samples. Metals concentration represents the highest level detected in surface soil samples which exceeded the referenced naturally-occurring value (USGS, 1984).

Established Values: Determined by mutual consent as follows:
Volatile Organics - 1 ppm
PAHs - 10 ppm
Cyanide - 50 ppm (domestic land use)
500 ppm (industrial land use)

Persistence: Based on values supplied in the SSPS help screen.

Quantity: Used the Radian report to determine the average gas production for the years that the site was in operation to be 157 MCF. This average was multiplied by the years of operation (58) and then by a constant (7.3) representing the assumption that 730 gallons of tar are produced for every 1,000,000 ft^3 of gas manufactured (Radian report) and approximately 1% is lost as waste onsite. Multiply the resulting value times 3.9368 (converting gallons to kilograms), times the concentration of the waste, divided by 1,000,000 (concentration conversion factor).

Q19) Fill out the table below describing wastes that have been detected in the nearest body of surface water. If wastes have not been detected, enter zeros for the concentrations. If a waste release was detected by sight or smell but not sampled analytically, an approximation must be made. Include up to six chemicals.

Chemical Waste Name	Concentration (ppb)	Government Standard (ppb)
VOA	0	0
PAHs	0	0
C-PAHs	0	0
Cyanide	97	100
Lead	8.7	50

Chemical Waste: Determined to be volatile organics, C-PAHs, PAHs, metals, and cyanide.

Concentration: Determined from Surface Water Sample Analysis.

Government Standard: Based on NYSDEC surface water classifications or as a default, drinking water standards. Only considered elements which exceeded NYSDEC ambient water quality standards and guidance values for Class A surface waters.

Q20) How is the groundwater used?

____ Not currently used (score = 1)
____ Industrial with alternative (2)
X Drinking water with alternative or industrial with no alternative (6)
____ Drinking water with no alternative (9)

Select the appropriate answer with the highest score.

Comments: Municipal supply for Binghamton is served by the Susquehanna River, and back up groundwater wells serving approximately 60,000.

Score: 6

Q21) For each distance, check the appropriate row to indicate the number of people using the downgradient water for the highest scoring purpose above:

		Distance			
Population	Within 5 km	Within 3 km	Within 1 km	Within 1/2 km	On-site
0	X (0)	__(0)	__(0)	__(0)	__(0)
1 to 100	__(4)	__(6)	__(8)	__(10)	__(20)
101 to 1,000	__(8)	__(12)	__(16)	__(20)	__(30)
1,001 to 10,000	__(12)	__(18)	__(24)	__(30)	__(40)
10,001 to 100,000	__(16)	__(24)	__(32)	X (35)	__(45)
100,001 and up	__(20)	__(30)	__(35)	__(40)	__(50)

Comments: Ranney well is most likely upgradient of the site, no other municipal drinking water wells within 5 km. downgradient of the site. (NYSDOH,1982).

Score: 0

Q22) What is the distance from the bottom of the site to the top of the aquifer in use?

__ Greater than 50 m (0)
__ Less than 50 m (1)
__ Less than 25 m (2)
X Less than 5 m (3)
__ Site in aquifer (6)

Comments: Default value; depth to bottom of site and depth to water table are unknown. Since groundwater is used for drinking water, the default value of less than 5 meters is assigned.

Score: 3

Q23) Fill out the table below describing wastes that have been detected in the groundwater. If wastes have not been detected, enter zeros for the concentrations. If a waste release was detected by sight or smell but not sampled analytically, an approximation must be made. Include up to six chemicals.

Chemical Waste Name	Concentration (ppb)	Government Standard (ppb)
Benzene	195.6	0.0
Xylene	214.1	5.0
Toluene	94.1	5.0
Cyanide	106.1	100.0
Napthalene	237.6	10.0
Benzo(a)pyrene	32.9	0.0

Chemical Waste:	Benzene, xylene, toluene, cyanide, naphthalene, benzo(a)pyrene as determined by mutual consent.
Concentration:	Geometric mean concentration derived from the GRI EPRI data base.
Government Standard:	NYSDEC Class GA standards for groundwater quality (6NYCRR Part 703.5).

Score: 100

Q24) Indicate the distance from the site to the nearest instance of each of the land uses below:

	Distance					
Land Use	Outside 4 km	Within 4 km	Within 2 km	Within 1 km	Within 1/2 km	On-site
Commercial/ Industrial	__(0)	__(1)	__(2)	__(3)	__(6)	X(9)
National Parks	X(0)	__(1)	__(1)	__(2)	__(3)	__(4)
Agriculture	X(0)	__(1)	__(1)	__(2)	__(4)	__(6)
Residential	__(0)	__(1)	__(3)	__(5)	X(8)	__(15)

Comments: ES site inspection 6/12/91.

Score: 9

Q25) Indicate the number of people living or working within each of the specified distances.

	Distance				
Population	Within 5 km	Within 3 km	Within 1 km	Within 1/2 km	On-site
0	__(0)	__(0)	__(0)	__(0)	X(0)
1 to 100	__(9)	__(12)	__(15)	__(18)	__(28)
101 to 1,000	__(12)	__(15)	__(18)	__(21)	__(31)
1,001 to 10,000	__(15)	__(18)	__(21)	X(24)	__(34)
10,001 to 100,000	__(18)	X(21)	X(24)	__(27)	__(37)
100,001 and up	X(21)	__(24)	__(27)	__(30)	__(40)

Comments: (Donnelly Marketing Information Services, 6/91).

Score: 24

Q26) Check the appropriate distance from the site to the nearest of each type of sensitive environments, without regard to direction.

	Distance				
Target	Outside 2 km	Within 2 km	Within 1 km	Within 1/2 km	On-site
Coastal wetland	X(0)	__(1)	__(2)	__(3)	__(6)
Freshwater wetland	X(0)	__(0)	__(1)	__(2)	__(6)
Endangered species	X(0)	__(0)	__(1)	__(2)	__(6)

Comments: NYSDEC Wildlife Resource Center, 6/91.

Score: 0

Q27) What is the vapor pressure of the primary wastes?

__ 1×10^{-5} mm Hg or less (0)
__ Greater than 1×10^{-5} mm Hg (1)
__ Greater than 1×10^{-3} mm Hg (2)
X Greater than 10 mm Hg (3)

Comments: Default value for benzene, assumed to be on-site.

Score: 3

Q28) What natural or artificial characteristics of the site prevent volitization?

- __ Covered by more than 10 cm of soil or other impermeable barrier (score = 1)
- X Covered by 1 to 10 cm of soil (3)
- __ Uncovered contaminated soil (7)
- __ Covered by less than 1 cm soil (8)
- __ Uncovered pure contaminants (10)

Select the appropriate answer with the highest score.

Comments: Soil cover approximately 1-10 cm deep (ES site inspection 6/12/91).

Score: 3

Q29) What is the average wind speed at this site?

- __ Less than 2 m/s (1)
- __ More than 2 m/s (2)
- __ More than 4 m/s (3)
- X More than 6 m/s (4)

Comments: Default value for New York State

Score: 4

Q30) What natural or artificial characteristics of the site prevent dust production?

- __ Urban (score = 1)
- __ Woodland or forest (2)
- __ Grassland (4)
- X Open field (10)

Select the appropriate answer with the highest score.

Comments: Site surface unpaved, fugitive dust possible during dry periods; ES site inspection 6/12/91.

Score: 10

Q31) Fill out the table below describing the wastes present at the surface of the site. If data are not known exactly, approximations must be made. Include up to six chemicals.

Chemical Waste Name	Concentration (ppm)	Established Values (ppm)	Persistence (0-3)	Contaminated area (m^2)
Lead	190	15	3	600
Cyanide	11	500	3	100
Total PAHs	8.9	10	3	300
Total C-PAHs	6.0	10	3	100

Chemical Waste:	Wastes are defined below with C-PAHs and PAHs broken down into the specific compounds detected in the surface soils at the site. Cyanide Lead PAHs C-PAHs: Benzo(a)anthracene, benzo(k)fluoranthene, benzo-(g,h,i)perylene, benzo(a) pyrene, chrysene, indeno(1,2,3-cd) pyrene
Concentration:	The highest concentration detected in any of the samples was used. If none was detected, concentration = 0. C-PAHs: Concentration represents the sum of the highest concentrations of all C-PAHs detected. PAHs: Concentration represents the sum of the highest concentrations of all PAHs detected (not including C-PAHs).
Established Values:	Metals-Used the background concentrations for New York State soils from Shacklette and Boerngen (USGS, 1984). Cyanide, C-PAHs, PAHs-used default values assigned at the NYSEG 12/12/90 meeting: Cyanide - 50 ppm (domestic land use) 500 ppm (industrial land use) C-PAHs - 10 ppm PAHs - 10 ppm
Persistence:	Based on values supplied in the SSPS help screen.
Contaminated Area:	Assumed 100 square meters for composite samples (SS-1 through SS-4). Used visually estimated extent for Samples SS-5 (1 square meter). Area provided is a summation for all samples where the chemical waste was detected.

Q32) Fill out the table below describing wastes that have been detected in the air. If wastes have not been detected, enter zeros for the concentrations. If a waste release was detected by sight or smell but not sampled analytically, an approximation must be made. Include up to six chemicals

Chemical Waste Name	Concentration (ppm)	Government Standard (ppm)

Concentration: Enter the average concentration of the waste in the air.

Government standard: Enter an applicable government standard, limit, or guideline for air concentrations of the specified chemical.

Comments: No air sampling conducted.

Score: 0

Q33) What steps have been taken to reduce access to the site?

__ Full barrier and a guard (0)
X Full barrier (1)
__ Guard (2)
__ Incomplete barrier (3)
__ No barrier, no guard (4)

Comments: Site is completely fenced; no guard on duty; ES site inspection 6/12/91.

Score: 1

Q34) What is the distance from the site to the nearest residence or gathering point for children?

X 100 m or more (1)
__ 10 m to 100 m (2)
__ 0 to 10 meters (5)
__ On-site (10)

Comments: ES site inspection 6/12/91.

Score: 1

Q35) What is the distance from the site to the nearest groundwater well in use?

__ 10 km or more (1)
__ 1 km to 10 km (3)
X 100 m to 1 km (6)
__ less than 100 m (10)

Comments: Used score for distance from site to municipal well #3 (Ranney Well).

Score: 6

Q36) What are the characteristics of the site wastes?

__ Other types of wastes (score = 1)
__ Acute, deadly toxins (4)
X Carcinogens (7)
__ Radioactive wastes (10)

Select the appropriate answer with the highest score.

Comments: Default value for carcinogenic PAHs assumed to be present on-site.

Score: 7

Q37) Is off-site contamination evident?

X No (score = 1)
__ Yes, has been measured (7)
__ Yes, is visible (9)
__ Yes, has been smelled (10)

Select the appropriate answer with the highest score.

Comments: No off-site contamination is evident. ES site insepction 6/12/91.

Score: 1

Q38) Describe the area near the site:

__ Rural (1)
__ Agricultural (2)
X Industrial (3)
__ Commercial (4)
__ Residential/Commercial (8)
__ Residential (9)
__ Urban (10)

Comments: ES site inspection, 6/12/91

Score: 3

Q39) What is the total volume of soil that is contaminated above regulatory limits?

- X Less than 10 m^3 (1)
- __ More than 10 m^3 (2)
- __ More than 100 m^3 (3)
- __ More than 1,000 m^3 (4)
- __ More than 10,000 m^3 (5)

Comments: Default value-no applicable regulatory limits for soils in New York State.

Score: 1

Q40) How is on-site land used?

- __ Other (1)
- __ Agricultural (2)
- X Industrial (6)
- __ Residential (9)

Comments: ES site inspection 6/12/91. Site used for equipment and material storage.

Score: 6

ENGINEERING-SCIENCE

SITE INSPECTION AND PRIORITIZATION

FIELD INSPECTION FORM

6/12/91

ENGINEERING-SCIENCE SITE SCREENING AND PRIORITIZATION FIELD INSPECTION FORM FOR NEW YORK STATE ELECTRIC AND GAS PROPERTIES

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1. Site Name: COURT ST. NYSEG MGP.

2. Site Location: COURT ST.

3. Site Description: MGP (FORMER)

4. Site Status: INACTIVE, STORAGE, PARKING

5. Inspection Date/Time: 6/12/91 0930

6. Weather: BRIGHT 75±°F, BREEZY

7. On-site Personnel
S. DILLMAN
J. NYLUND
R. YOUNGMAN

---

8. Accessibility:
X Full Fence
___ Incomplete Fence
___ No Limits to Access

9. Average Site Slope: 0 % (See Site Sketch)

10. Slope Aspect: N/A

11. Distance to Nearest Surface Water: 200 [✓ Ft] Miles

12. Slope Between Site and Surface Water: 0 %

13. Surface Water Type:
X Stream ___ Pond
___ River ___ Lake
___ Wetland ___ Reservoir

14. Name of Surface Water: SUSQUEHANNA RIVER

15. Direction of Flow or Drainage: EAST

16. Land Use:
___ Rural ___ Commercial
___ Agriculture ___ Residential
X Industrial X Urban

17. Distance To:
Commercial ADJ. [✓ Ft.] Mi.
Agricultural ___ Ft. Mi.
Residential .5 Ft. [✓ Mi.] (.8 KM)
School 1 Ft. [✓ Mi.] (1.6 KM)

18. Adjacent Property Types:
SCRAP METAL YARD North (WIETZMAN)
RIVER South
COLUMBIA TRANSMISS. East
BRANDYWINE AVE. West

19. Additional Observations:

LML/FORMS/RWYSITE

6/12/91

"REFERENCE-QUESTION #3"

WATER QUALITY REGULATIONS

SURFACE WATER AND GROUNDWATER CLASSIFICATIONS AND STANDARDS

New York State
Codes, Rules and Regulations
Title 6, Chapter X
Parts 700-705

New York State Department of Environmental Conservation

TABLE I

CLASSIFICATIONS AND STANDARDS OF QUALITY AND PURITY WHICH ARE ASSIGNED TO THE WATERS OF THE SUSQUEHANNA RIVER BORDERING OR FLOWING THROUGH THE COUNTIES OF TIOGA, BROOME, CHENANGO, DELAWARE AND OTSEGO

Item No.	Waters Index Number	Name	Description	Map Ref. No.	Class	Standards
1		Susquehanna River	From New York-Pennsylvania State line near Waverly, New York, to 3.0 miles downstream from western boundary of Owego Village.	M-14	B	B
2		Susquehanna River	From 3.0 miles downstream from western boundary of Owego Village to eastern boundary of Owego Village.	M-14 M-15	C	C
3		Susquehanna River	From eastern boundary of Owego Village to Tioga-Broome County boundary line southwest of Endicott Village.	M-15	B	B
4		Susquehanna River	From Tioga-Broome County boundary line southwest of Endicott Village to Rock Bottom Dam in Binghamton, New York.	M-15 M-16c	C	C
5		Susquehanna River	From Rock Bottom Dam in Binghamton, New York, to one mile southeast of bridge that crosses the Susquehanna River at Conklin, New York.	M-16c M-16d	A	A

BINGHAMTON EAST QUADRANGLE

MAP M-16-d

4735 CN 2-15-67

BINGHAMTON WEST QUADRANGLE

MAP M-16-c

4734 CN 2-15-67

"REFERENCE-QUESTION #4"


FREETOWN
CINCINNATUS
GERMAN
McDONOUGH
PRESTON
MARATHON
LAPEER
Marathon
Willet
CHENANGO
BOWMAN LAKE STATE PARK
STATE FIRE TOWER
McDonough
WHITNEY POINT LAKE (FEDERAL)
STATE BOAT LAUNCHING SITE
SMITHVILLE
Oxford
OXFORD
BROOME
Killawog
LISLE
Whitney Point Lake
Smithville Flats
67
16
73
Lisle
50
Whitney Point
25
Triangle
48
Greene
GREENE
COVENTRY
BARKER
NANTICOKE
42
32
43
70
CHENANGO
BROOME
Chenango Forks
CHENANGO VALLEY STATE PARK
Chenango River
57
Castle Creek
53
TIOGA
BROOME
Maine
36
60
52
34
46
21
Kattellville
75
18
63
38
62
37
2
58
35
CHENANGO BRIDGE
19
59
46
47
41
4
14
Chenango Bridge
64
27
30
5
6
44
Hillcrest
20
55
33
76
29
Harpursville
71
Sanitaria Springs
COLESVILLE
Nineveh
Union Center
Chodnut Center
Johnson City
13
Port Dickinson
12
KIRKWOOD
Endicott
Endwell
West Endicott
11
Campville
10
5
6
Vestal
22
24
66
4
Tioga Terrace
27
30
23 East Vestal
Willow Point
3
9
15
Binghamton
8
69
West Windsor
17
Windsor
61
54
39
26
74
Damascus
68
WINDSOR
Vestal Center
South Vestal
South Apalachin
Kirkwood
49
56
Corbettsville
Riverside
CONKLIN
40
KIRKWOOD
BROOME
PENNSYLVANIA
28 65 51
SCALE 1:250,000
5
0
5 MILES
NORTH

BROOME COUNTY

Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
1	Afton Village (Chehango Co, Page 22)		Wells (Springs)
2	Applewood Acres	280	Wells
3	Binghamton City	60000	Susquehanna River, Wells
4	Chenango Water District #1	2072	Wells
5	Chenango Water District #3	680	Wells
6	Chenango Water District #7	NA	Wells
7	Chenango Water District #14	272	Wells
8	Chenango Water District #14 (Woodland Park)	225	Wells
9	Conklin Water District #2	1868	Wells
10	Deposit Village	1897	Big Hollow Brook Reservoir, Wells
11	Endicott Municipal Water Works	45000	Wells
12	Hillcrest Water District #1	3356	Wells
13	Johnson City Water Works	17126	Wells
14	Keeler Avenue Water Association	104	Wells
15	Kirkwood Water District #4	256	Wells
16	Lisle Village	500	Wells (Springs)
17	Masler Water Supply	90	Wells
18	Pennview (Chenango Water District #10)	35	Wells
19	River Road Water Association	40	Wells
20	Riverside Co-op Water Association	110	Wells
21	Runacre Estates (Chenango Water District #11)	180	Wells
22	Vestal Water District #1	8760	Wells
23	Vestal Water District #4	3700	Wells
24	Vestal Water District #5	900	Wells
25	Whitney Point Village	1100	Wells
26	Windsor Village	1400	Wells

Non-Municipal Community

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
27	Binghamton Mobile Estates	250	Wells
28	Blue Ridge Mobile Home Park	75	Wells
29	Blue Stone Mobile Home Park	30	Spring
30	Bolebruchs Mobile Home Park	25	Wells
31	Country Court Mobile Home Park	NA	Wells
32	Country Estates Mobile Home Court	170	Wells
33	Country Manor	60	Wells
34	D & G Trailer Park	25	Wells
35	Deluxe Mobile Park	60	Wells
36	Edison Road Mobile Court	150	Wells
37	Fenton Mobile Estates	210	Wells
38	Forest Manor Residential Development	200	Wells
39	Forestview Mobile Homes Park	150	Wells
40	Fountain Bleau Court	360	Wells
41	Glendale Court	30	Wells
42	Green Valley Mobile Lodge	120	Wells
43	Haist Mobile Home Park	80	Wells
44	Hayes Service Court	36	Wells
45	Heaths Trailer Park	150	Wells
46	Hickory Ridge Trailer Park	46	Wells
47	Hillside Park	NA	Wells
48	Hust Trailer Park	NA	Wells
49	Kirkwood Trailer Park	60	Wells
50	Lakeside Lodge	NA	Wells
51	Lillian Diamond Trailer Park	NA	Wells
52	Maine Mobile Court	NA	Wells
53	Manns Mobile Community	NA	Wells
54	Maple Run Mobile Home Park	NA	Wells
55	MBM Mobile Home Court	NA	Wells
56	Meadows Mobile Home Park	NA	Wells
57	Mount Ettrick Terrace	NA	Wells
58	Mount Mobile Home Community	63	Wells
59	Mountain View Mobile Home Park	NA	Wells
60	Nanticoke Valley Mobile Court	270	Wells
61	Occanum Falls Court	NA	Wells
62	Orshals	1000	Wells
63	Pennview Apartments	68	Wells
64	Perts Mobile Home Park	NA	Wells
65	Pride Manor Mobile Home Park	NA	Wells
66	Rush Trailer Park	NA	Wells
67	Shady Maple Trailer Park	60	Wells
68	Tuscarora Mobile Village	40	Wells
69	Twin Acre Terrace	34	Wells
70	Valley Vista	44	Wells
71	Village Court	NA	Wells
72	Virginia City Mobile Home Court	NA	Wells
73	Wal Mar	24	Wells
74	Westview Trailer Park	NA	Wells
75	Whispering Pines Mobile Home Court	NA	Wells
76	Wooded Estates	NA	Wells

"REFERENCE-QUESTION #5"

ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. 5Y20L.10.01

FILE DESIGNATION Court Street

DATE June 3 - 91 TIME 9³⁰

PHONE CALL FROM TAW - ES PHONE NO. (315) 451 - 9560

PHONE CALL TO Ray Nelson - Wetlands Division PHONE NO.

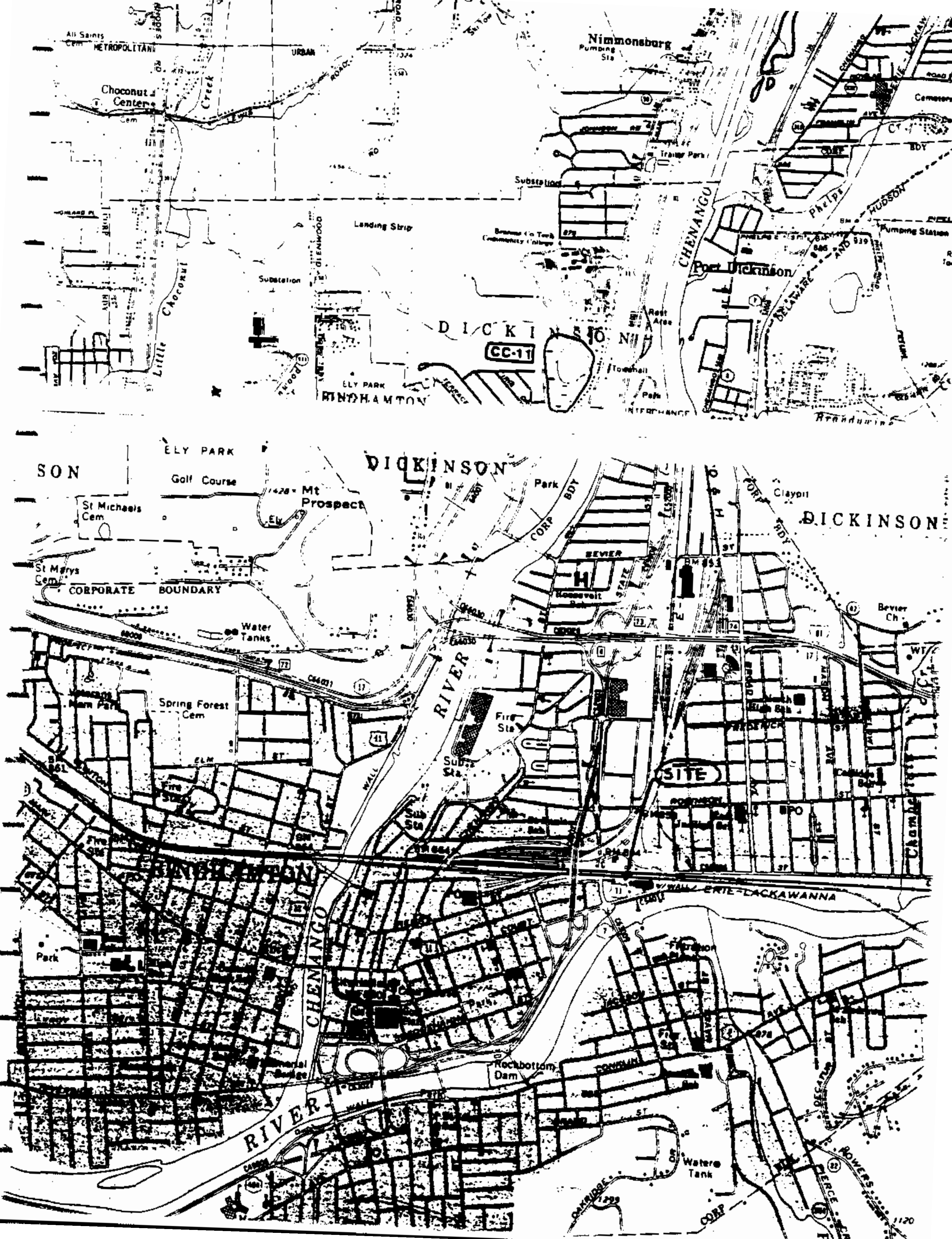
CONFERENCE WITH DEC / Fish and Wildlife / (607) 753 - 3095 (Ray Nelson)

PLACE (phone-call)

SUBJECT Informed That Within 4-Km There is a Wetland -(CC-11) Named Cattle Pond.

Also said that The locals are extremely Protective of it.

SIGNED


All Saints Cem
METROPOLITAN
URBAN
Nimmonsburg
Pumping Sta
Choconut Center
Cem
Creek
ROAD
Substation
Trailer Park
CHENANGO
Phelps
HUDSON
Pumping Station
Landing Strip
Broome Co Tech Community College
Substation
GLENWOOD
Port Dickinson
DELAWARE AND
Rest Area
DICKINSON
CC-11
Little Choconut
ELY PARK
BINGHAMTON
TERRACE
Tollhall
Park
INTERCHANGE
Brandywine
BDY
SON
ELY PARK
Golf Course
DICKINSON
Park
1428 × Mt Prospect
St Michaels Cem
Ely
CORP
BDY
Claypit
DICKINSON
CORP
BDY
BEVIER
BM 853
Roosevelt Sch
STATE
St Marys Cem
CORPORATE BOUNDARY
Bevier Ch
Water Tanks
RIVER
Spring Forest Cem
Fire Sta
Subst Sta
SITE
ELM
FREDERICK
High Sch
BPO
Chamber
Sub Sta
Fire Sta
Fire Sta
BINGHAMTON
WALL
ERIE-LACKAWANNA
CHENANGO
COURT
Park
Filtration
Park
JACKSON
Fire Sta
CONKLIN
Rockbottom Dam
Memorial Bridge
RIVER
WALL
ST
Water Tank
OAKRIDGE
CORP
PIERCE
POWERS
1120

"REFERENCE -QUESTION #6"

ENGINEERING-SCIENCE

SITE INSPECTION AND PRIORITIZATION

FIELD INSPECTION FORM

6/12/91

ENGINEERING-SCIENCE SITE SCREENING AND PRIORITIZATION FIELD INSPECTION FORM FOR NEW YORK STATE ELECTRIC AND GAS PROPERTIES

1. Site Name: COURT ST. NYSEG MGP.

2. Site Location: COURT ST.

3. Site Description: MGP (FORMER)

4. Site Status: INACTIVE, STORAGE, PARKING

5. Inspection Date/Time: 6/12/91 0930

6. Weather: BRIGHT 75±°F, BREEZY

7. On-site Personnel
S. PILLMAN
J. NYLUND
R. YOUNGMAN

8. Accessibility:
☒ Full Fence
☐ Incomplete Fence
☐ No Limits to Access

9. Average Site Slope: 0 % (See Site Sketch)

10. Slope Aspect: N/A

11. Distance to Nearest Surface Water: 200 [✓ Ft.] Miles

12. Slope Between Site and Surface Water: 0 %

13. Surface Water Type:
☒ Stream
☐ River
☐ Wetland
☐ Pond
☐ Lake
☐ Reservoir

14. Name of Surface Water: SUSQUEHANNA RIVER

15. Direction of Flow or Drainage: EAST

16. Land Use:
☐ Rural
☐ Agriculture
☒ Industrial
☐ Commercial
☐ Residential
☒ Urban

17. Distance To:
Commercial ADJ. [✓ Ft.] Mi.
Agricultural Ft. Mi.
Residential .5 Ft. [✓ Mi.] (.8 KM)
School 1 Ft. [✓ Mi.] (1.6 KM)

18. Adjacent Property Types:
SCRAP METAL YARD North (WIETZMAN)
RIVER South
COLUMBIA TRANSMISS. East
BRANDYWINE AVE. West

19. Additional Observations:

LML/FORMS/RWYSITE

6/12/91

"REFERENCE-QUESTION #7"

COMMERCE
etary

WEATHER BURE
F. W. REICHELDERFER, C

TECHNICAL PAPER NO. 40

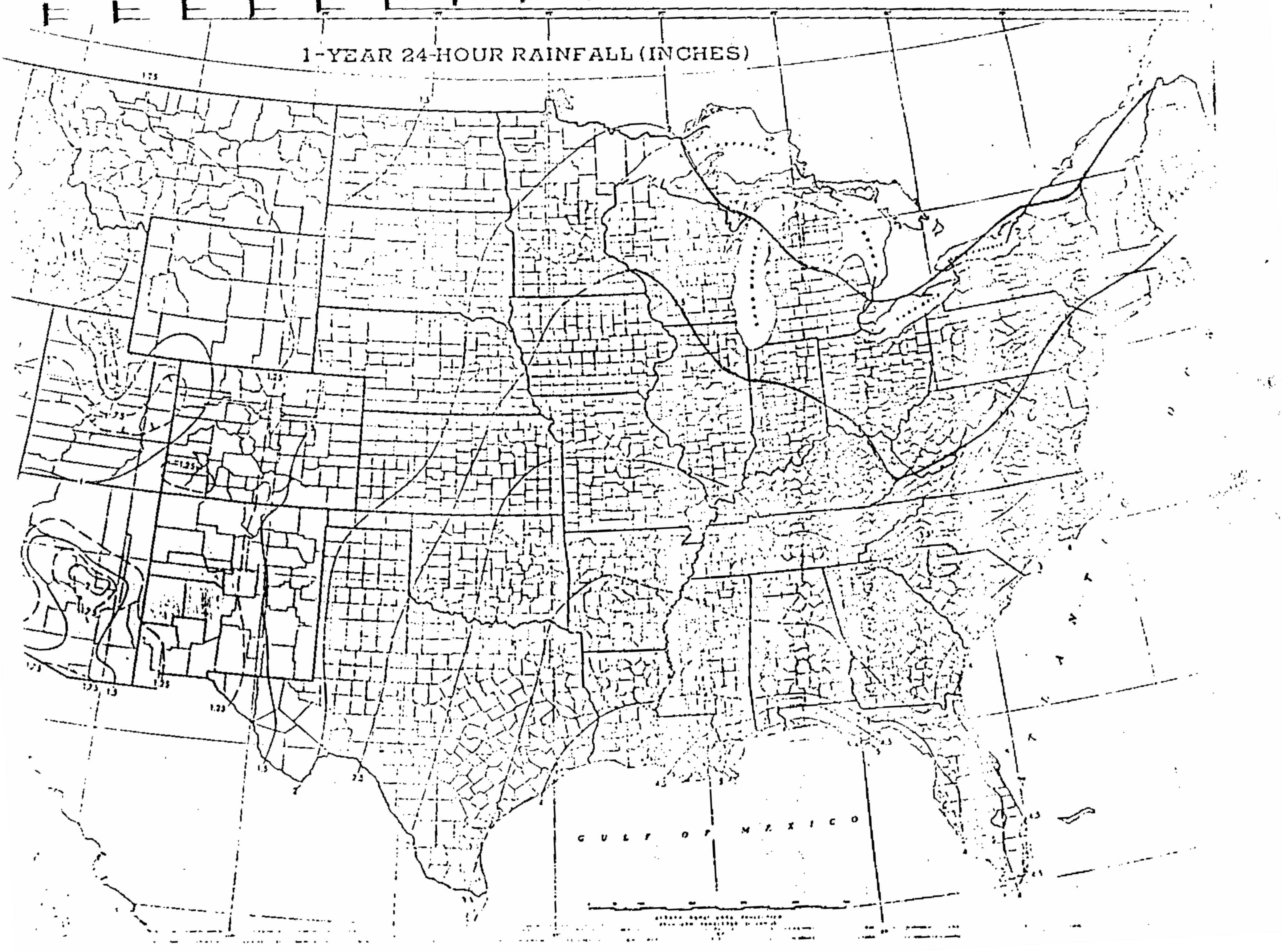
RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

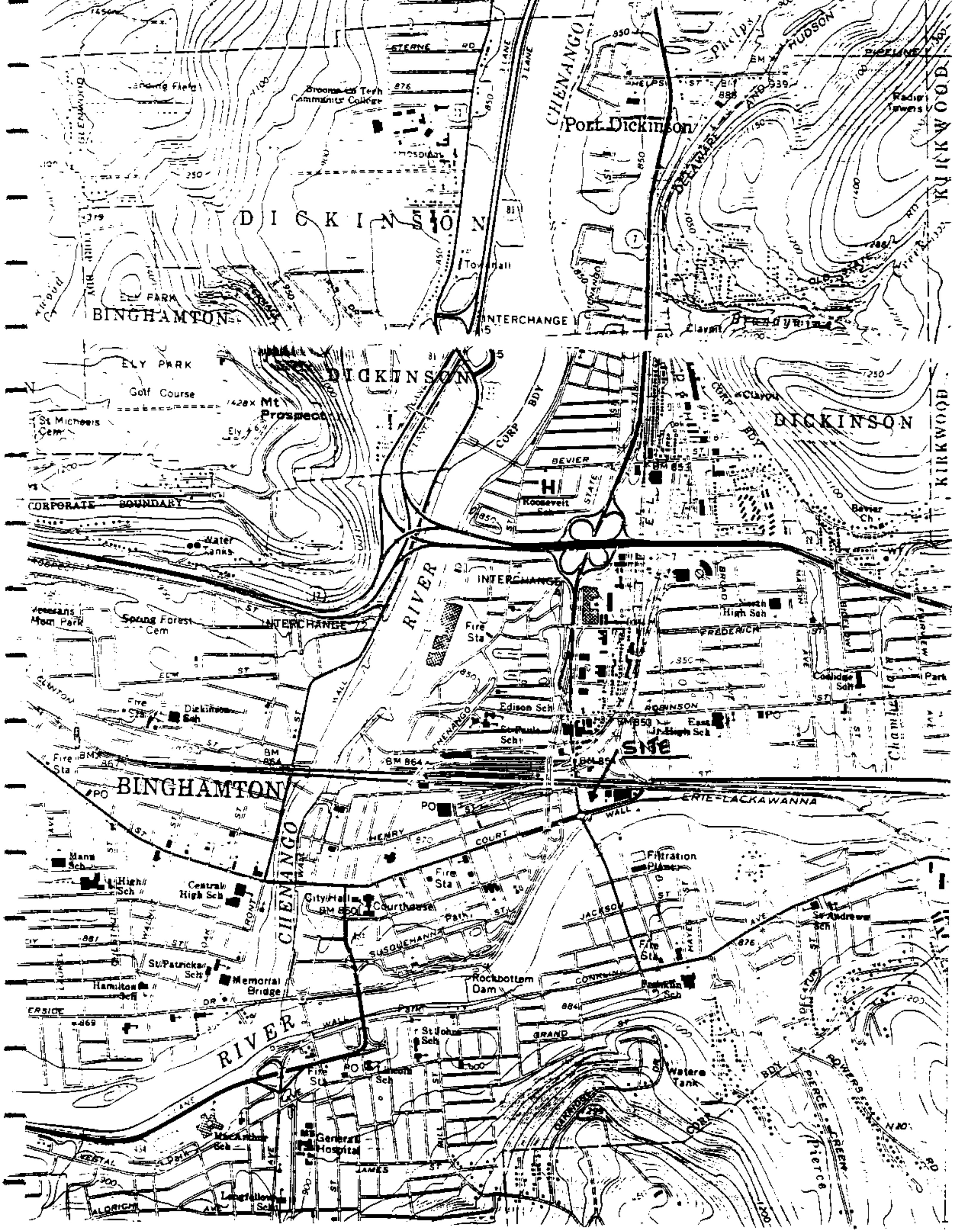
WASHINGTON, D.C.
May 1961

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price $1.75



1-YEAR 24-HOUR RAINFALL (INCHES)

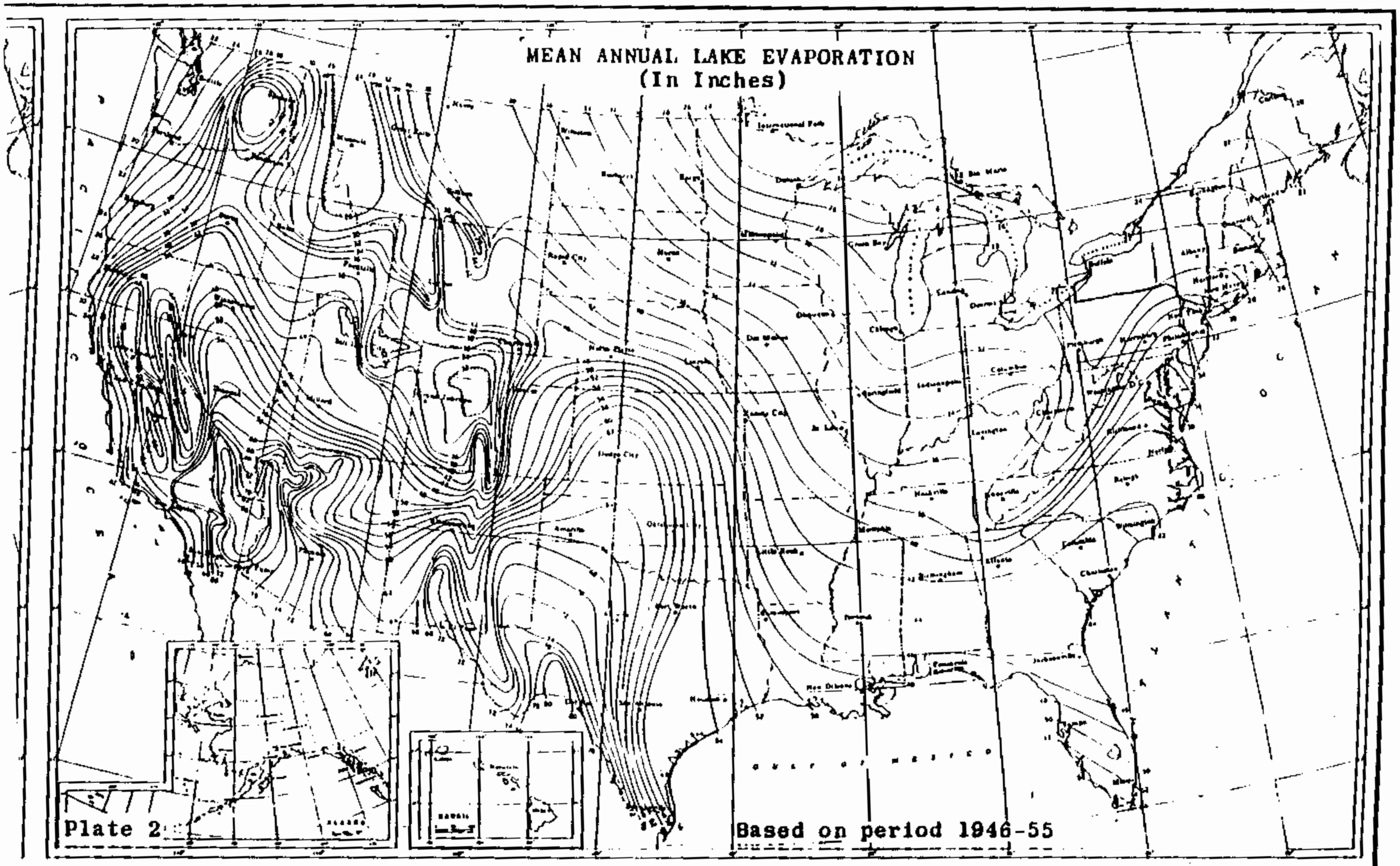
"REFERENCE -QUESTION #8"



STERNE RD
CHENANGO
Phelps
HUDSON
DELAWARE AND
Port Dickinson
Broome Co Tech Community College
Landing Field
Radio Towers
KIRKWOOD
DICKINSON
Town Hall
ELY PARK
BINGHAMTON
INTERCHANGE
Brandywine
Golf Course
Mt Prospect
St Michaels Cem
CORP BDY
BEVIER
STATE
Roosevelt Sch
Claypit
Bevier Ch
CORPORATE BOUNDARY
Water Tanks
RIVER
North High Sch
FREDERICK
Veterans Mem Park
Spring Forest Cem
Fire Sta
Coolidge Sch
Park
ELM ST
Edison Sch
ROBINSON
St Pauls Sch
East Jr High Sch
PO
Dickinson Sch
ERIE-LACKAWANNA
HENRY
COURT
WALL
Filtration Plant
Mann Sch
High Sch
Central High Sch
City Hall
Courthouse
SUSQUEHANNA
JACKSON
St Andrews Sch
St Patricks Sch
Memorial Bridge
Hamilton Sch
Rockbottom Dam
CONKLIN
Franklin Sch
St Johns Sch
GRAND
Water Tank
PIERCE CREEK
POWERS RD
MacArthur Sch
General Hospital
VESTAL
JAMES ST
ALDRICH AVE
Longfellow Sch

"REFERENCE-QUESTION #14"

D LAKE EVAPORATION

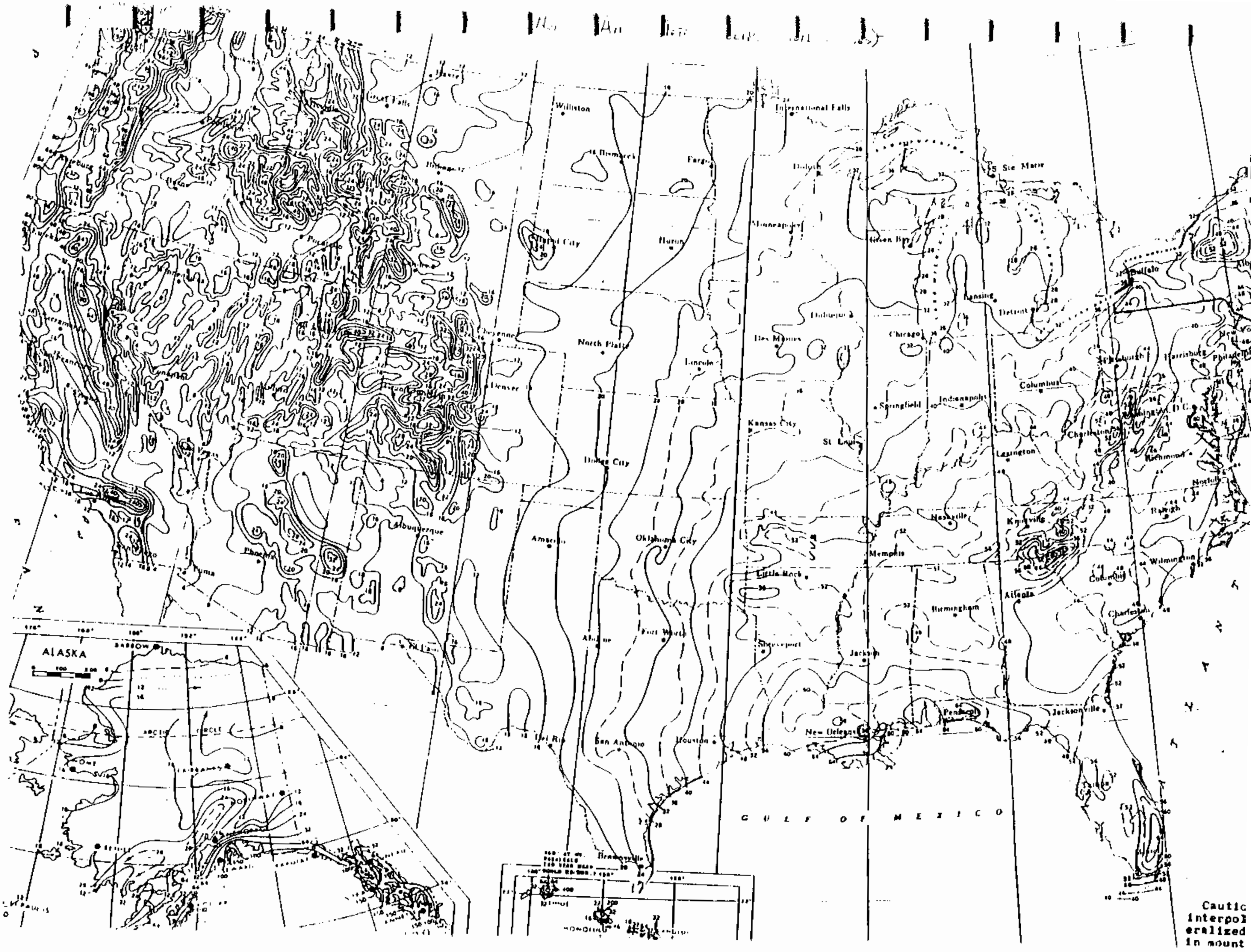


MEAN ANNUAL LAKE EVAPORATION
(In Inches)

Plate 2

Based on period 1946-55

MEAN MAY-OCTOBER EVAPORATION IN PERCENT OF ANNUAL



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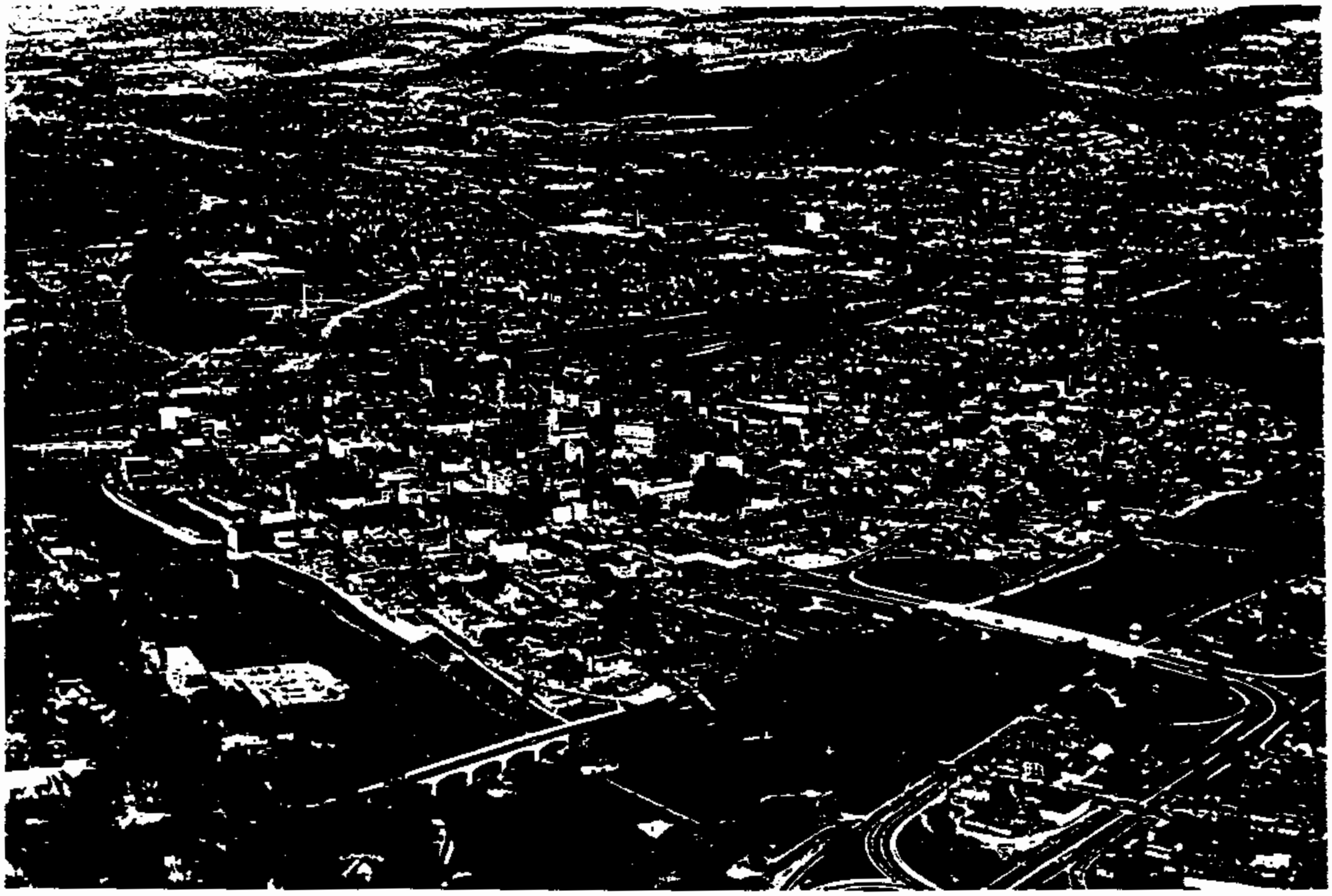
"REFERENCE-QUESTION #15"

Issued March 197

SOIL SURVEY
Broome County, New York



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATIO

11!ORENL

				sing sieve—				
Soil series and map symbols	Depth to bedrock	Depth to seasonal high water table	Depth from surface	10)	No. 200 (0.074 mm.)	Permeability	Reaction	Available moisture capacity
	Ft.	*Ft.*	*In.*			*In. per hr.*	*pH*	*In. per in. of soil*
Alden: AfA (For Chippewa part, see Chippewa series.)	4+	0	0-1 10-2 20-3	5 5 0	60-70 60-70 50-60	0.20-2.0 0.20-0.63 <0.20	5.5-6.0 5.0-6.8 6.5-7.0	0.17-0.25 0.17-0.20
Alluvial land: Ad	2+	0-2+						
Arnot: ArD	1-2	1-2	0-1 1	0	55-70	0.63-2.0	4.5-5.5	0.15-0.18
Braceville: Br	5+	1½-2	0-1 18-4 41-4	5 0	35-50 50-70	0.63-2.0 <0.63	5.0-6.5 5.0-6.5	0.18-0.20 0.15-0.17
Canaseraga: CaB, CaC	5+	1½-3	0-2 23-6	00 0	60-90 30-60	0.63-2.0 <0.63	4.5-5.5 5.5-6.5	0.15-0.20
Cattaraugus: CcC, CcD, CcE	5+	2½+	0-2 28-5	5 0	50-65 30-40	0.63-2.0 <0.63	5.0-5.5 5.0-5.5	0.15-0.20
Chenango: ChA, ChC, ChD, ChE (For Howard part, see Howard series.)	5+	3+	0-2 29-8	5 0	15-25 0-10	0.63-6.3 >6.3	5.0-6.0 5.0-7.6	0.13-0.17 0.07-0.10
Chippewa: CpB	4+	0-1	0-1 12-4	0 5	60-70 50-60	0.2-2.0 <0.2	5.0-6.0 5.6-6.4	0.20-0.23
Culvers: CuB, CuC, CuD	4+	1-1½	0-2 20-9	0 5	40-55 30-45	0.63-2.0 <0.2	5.0-5.5 5.2-7.0	0.17-0.20
Cut and fill lands: Cv, Cw, Cy								
Dalton: DaB, DaC	5+	1-2	0-2 20-6	00 0	70-90 30-60	0.63-2.0 <0.20	5.0-6.0 5.0-6.5	0.15-0.20
Howard	5+	3+	0-2 20-4 40-5	5 0 0	12-30 3-25 5-20	2.0-6.3 0.63-6.3 >6.3	5.0-6.0 5.5-6.5 7.0-7.6	0.17-0.20 0.12-0.15
Lordstown: LdB, LdC, LdD, LoE, LrF, LsE (For Oquaga part of LoE, LrF and LsE, see Oquaga series.)	2-3½	2-3½+	0-2 2	0	55-70	0.63-2.0	5.0-5.5	0.17-0.20
Made land, sanitary land fill: Mf								
Mardin: MhB, MhC, MhD, MhE, MmB, MnC, MnD, MrF. (For Chenango part of MnC and MnD, see Chenango series. For Cattaraugus part of MrF, see Cattaraugus series.)	5+	1½-2	0-18 18-7	70 5	50-60 45-55	0.63-2.0 <0.20	5.0-5.5 5.0-7.0	0.17-0.20
Middlebury: Ms	5+	1-1½	0-4 4	100	65-85	0.63-6.3	5.5-6.5	0.18-0.23

(Joins sheet 42)

(Joins sheet 62)

Scale 1: 15 840

(Joins sheet 51)

"REFERENCE -QUESTION #25"

Donnelley Marketing Information Services
A Company of The Dun & Bradstreet Corporation

NGINEERING SCIENCE
REA 1 = COURT ST/BRANDYWINE AV, BINGHAMPTON, NY
REA 2 = COURT ST/BRANDYWINE AV, BINGHAMPTON, NY
REA 3 = COURT ST/BRANDYWINE AV, BINGHAMPTON, NY

AmericanProfile 06/06/91
Profile Report (1)

	AREA 1	AREA 2	AREA 3
rivate Sector Employment	5,949	20,092	47,694
ocio-Economic Status Indicator	24	30	45
opulation:			
1995 Projection	2,959	16,857	61,646
1990 Estimate	3,126	17,395	64,111
1980 Census	3,582	18,801	69,227
1970 Census	4,306	21,678	77,747
Percent Change, 1970-1980	-16.8	-13.3	-11.0
Percent Change, 1980-1990	-12.7	-7.5	-7.4
990 Population by Race:			
% White	89.1	90.4	94.2
% Black	8.0	7.3	4.0
% Other	3.0	2.3	1.9
% Spanish	1.7	1.2	1.3
990 Population by Age:			
% 0 - 5	8.8	8.1	6.9
% 6 - 13	11.3	10.4	9.0
% 14 - 17	4.8	5.0	4.6
% 18 - 24	8.4	9.5	9.2
% 25 - 34	19.0	17.1	18.1
% 35 - 44	13.8	12.8	14.1
% 45 - 54	7.9	8.3	8.6
% 55 - 64	8.1	9.2	9.2
% 65 +	17.8	19.5	20.2
Median Age Total Population	33.7	34.9	36.5
Median Age Adult Population	42.3	44.1	43.8
980 % High Sch Grads or Some College	41.5	48.3	50.6
980 % College Graduates	4.1	6.5	13.8
1980 Median School Years Completed	11.02	12.13	12.40
ouseholds:			
1995 Projection	1,381	7,933	26,881
1990 Estimate	1,422	7,945	27,340
1980 Census	1,518	7,823	27,551
1970 Census	1,585	7,523	26,830
Percent Change, 1970-1980	-4.2	4.0	2.7
Percent Change, 1980-1990	-6.3	1.6	-0.8
980 Household Population	3,572	18,602	66,774
1980 Households w/ Children under 18	438	2,338	7,919
980 Households w/ Persons over 65	457	2,493	8,527

1. 1. 0 : Ring: 0.5 mile(s): 42.1025 75.8978
1. 2. 0 : Ring: 1 mile(s): 42.1025 75.8978
1. 3. 0 : Ring: 3 mile(s): 42.1025 75.8978

(800) 866 - 2255

Donnelley Marketing Information Services
A Company of The Dun & Bradstreet Corporation

ENGINEERING SCIENCE
REA 1 = COURT ST/BRANDYWINE AV, BINGHAMPTON, NY

AmericanProfile 06/06/91
Profile Report (1)

	AREA 1
rivate Sector Employment	65,686
Socio-Economic Status Indicator	50
opulation:	
1995 Projection	101,805
1990 Estimate	104,130
1980 Census	108,380
1970 Census	116,390
Percent Change, 1970-1980	-6.9
Percent Change, 1980-1990	-3.9
990 Population by Race:	
% White	94.8
% Black	3.0
% Other	2.2
% Spanish	1.3
990 Population by Age:	
% 0 - 5	6.6
% 6 - 13	8.7
% 14 - 17	5.5
% 18 - 24	11.1
% 25 - 34	17.7
% 35 - 44	13.5
% 45 - 54	9.1
% 55 - 64	9.5
% 65 +	18.4
Median Age Total Population	35.4
Median Age Adult Population	43.1
1980 % High Sch Grads or Some College	51.4
1980 % College Graduates	15.0
1980 Median School Years Completed	12.45
ouseholds:	
1995 Projection	41,628
1990 Estimate	41,701
1980 Census	40,696
1970 Census	38,408
Percent Change, 1970-1980	6.0
Percent Change, 1980-1990	2.5
1980 Household Population	102,196
1980 Households w/ Children under 18	12,724
980 Households w/ Persons over 65	11,571

1. 4. 0 : Ring: 5 mile(s): 42.1025 75.8978

(800) 866 - 2255

"REFERENCE -QUESTION #26"

New York State Department of Environmental Conservation

Wildlife Resources Center
Information Services
700 Troy-Schenectady Road
Latham, New York 12110-2400

Thomas C. Jorling
Commissioner

June 5, 1991

Ms. Tracey A. Weibezahl
ES Engineering-Science, Inc.
290 Elwood Davis Road, Suite 312
Liverpool, New York 13088

Dear Ms. Weibezahl:

We have reviewed the Significant Habitat Program and the Natural Heritage Program files with respect to your request for biological data concerning potentially hazardous waste site investigations for a site as indicated on your map, in the City of Binghamton, Broome County.

We did not identify any potential impacts on endangered, threatened, or special concern wildlife species, rare plant, animal or natural community occurrences, or other significant habitats.

The absence of data does not necessarily mean that rare or endangered elements, natural communities or other significant habitats do not exist on or adjacent to the proposed site, but rather that our files currently do not contain any information which indicates the presence of these. Our files are continually growing as new habitats and occurrences of rare species and communities are discovered. In most cases, site-specific or comprehensive surveys for plant and animal occurrences have not been conducted. For these reasons, we cannot provide a definitive statement on the presence or absence of species, habitats or communities. This information should not be substituted for on-site surveys that may be required for environmental assessment.

This response applies only to known occurrences of rare animals, plants and natural communities and/or significant wildlife habitats. You should contact our regional office, Division of Regulatory Affairs, at the address on the enclosed list for information regarding any regulated areas or permits that may be required (e.g., regulated wetlands) under state law.

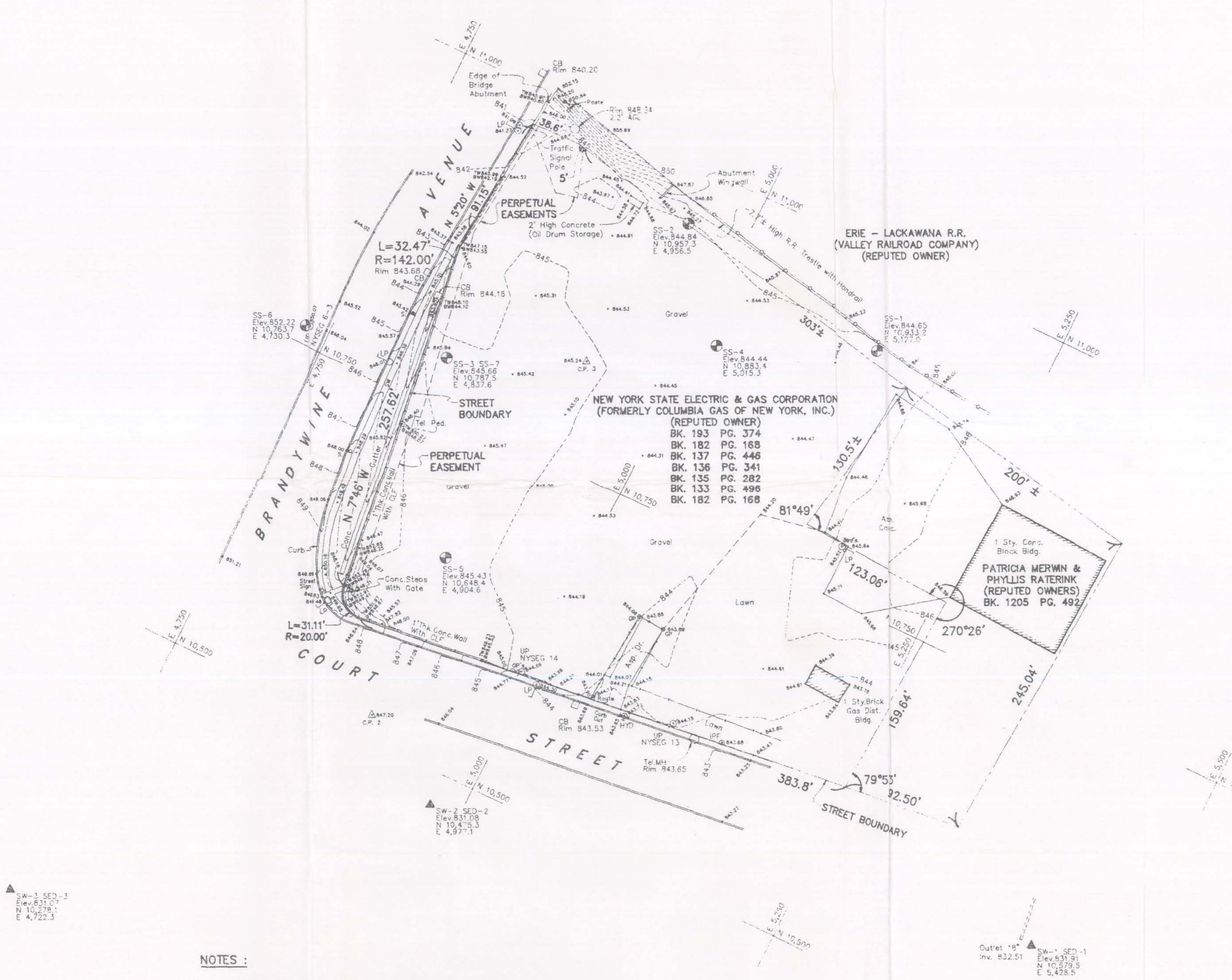
If this proposed project is still active one year from now we recommend that you contact us again so that we can update this response.

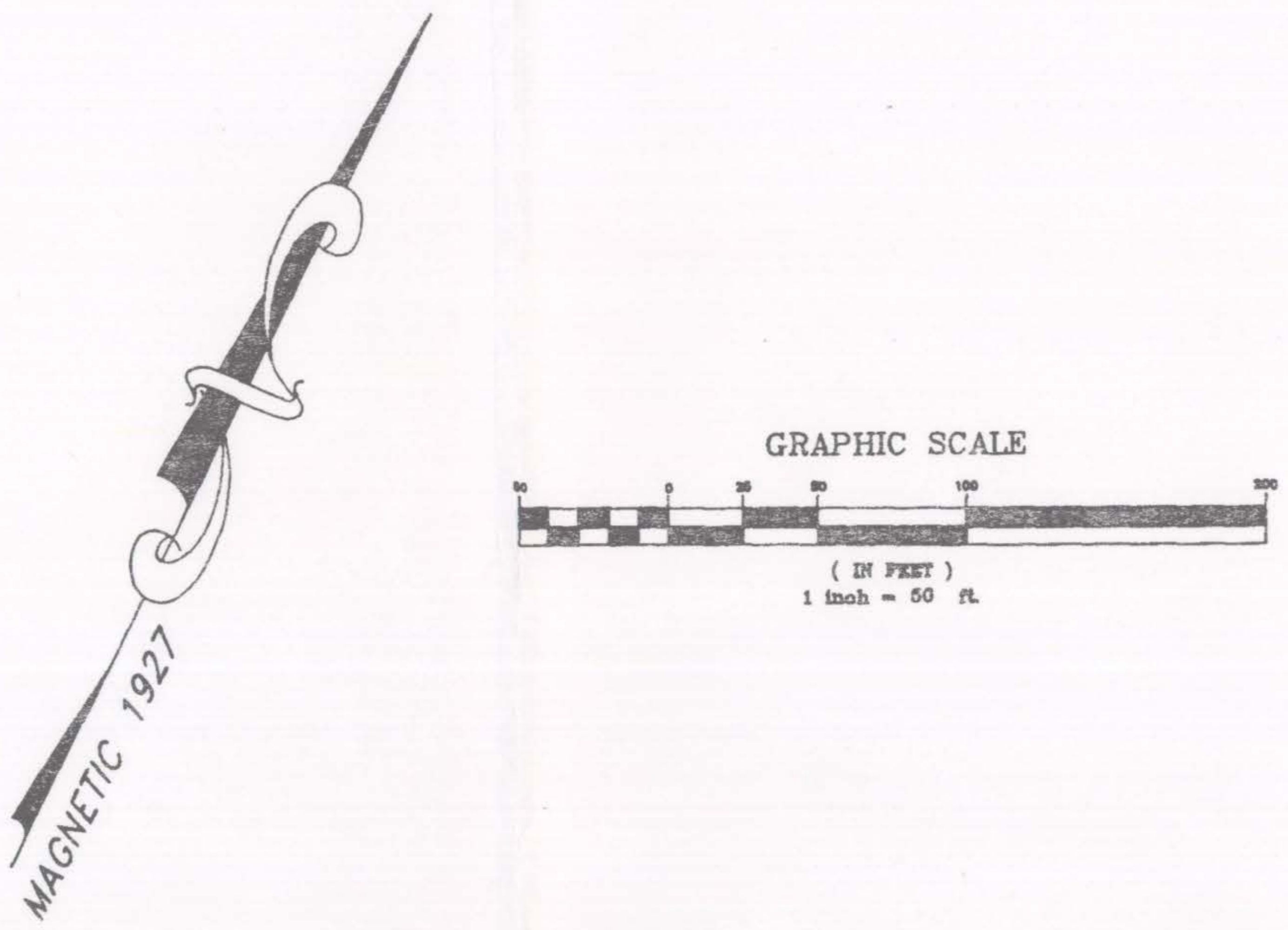
Sincerely,

Burrell Buffington

Burrell Buffington
Significant Habitat Unit

Enc.





LEGEND			
	PROPERTY LINE	Tel. Ped.	TELEPHONE PEDESTAL
	EDGE OF PAVEMENT	LP	LIGHT POLE
	CURB	UP	UTILITY POLE
SW	SIDEWALK	←----	GUY WIRE AND ANCHOR
	BUILDING LINE	HYD	HYDRANT
	EDGE OF GRAVEL	WV	WATER VALVE
--x--	CHAIN LINK FENCE		SIGN OR MARKER
GP GP	GATE WITH GATE POSTS	MH	MANHOLE
B'rd.	BOLLARD (GUARD POST)	CB	CATCH BASIN
IPF	IRON PIPE (OR PIN) FOUND	C.P. B-34	SURVEY CONTROL POINT
190	ONE FOOT CONTOUR INTERVAL	SS	SOIL SAMPLE
189.63	SURVEY SPOT ELEVATION	SW	SURFACE WATER SAMPLE

NOTES :

1. HORIZONTAL GRID DATUM IS BASED ON N 10,000 AND E 5,000 AT CP-1.
2. VERTICAL DATUM IS BASED ON B.M. 854 - STANDARD U.S.C.& G.S. DISK SET IN SOUTHWEST RAILROAD BRIDGE ABUTMENT STAMPED "A 109 , 1935" ; BINGHAMTON WEST, 1973.
3. UTILITIES SHOWN ARE VISIBLE SURFACE FEATURES ONLY.
4. ALL BEARINGS AND DISTANCES SHOWN ON BOUNDARIES ARE DEED CALLS UNLESS OTHERWISE NOTED.
5. ELEVATIONS SHOWN ALONG CURB LINES ARE TAKEN AT THE TOP OF CURB.
6. LOCATION OF BUILDING IN NORTHEASTERLY CORNER OBTAINED FROM AERIAL PHOTOGRAPHY.

CAD MAPPING BY : JULIAN J. WOLOSZYN

CHECKED BY : G.D.R. / L.A.V. / J.E.H.

REVISIONS

9-28-93 ADDT'L PROP. LINES & BUILDING

2-25-92 JEH

Alterations or additions to this survey map are prohibited except as provided in Section 7209 Subdivision 2 of the N.Y.S. Education Law.

The undersigned hereby certifies that this is a correct map from an actual survey.

Donald H. Fry

DONALD H. FRY LS# 043743
LICENSED LAND SURVEYOR

DONALD HOUSE FRY
043743

MGP PRIORITIZATION

COURT ST. - N.Y.S.E.G.
CITY OF BINGHAMTON
BROOME COUNTY
STATE OF NEW YORK

DRAWING TITLE

SAMPLING LOCATIONS
BINGHAMTON-COURT ST. SITE
CGBS CODE

modi associates
CONSULTING ENGINEERS & LAND SURVEYORS
4260 SOUTH BAY ROAD
CICERO, N.Y. 13039 (315)699-9006

DATE	SCALE	PROJECT NO.	
DEC. 20, 1991	1" = 50'	MA # 91.91-10	Sht.1