GROUNDWATER
TECHNOLOGY

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DRAFT FINAL
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORK PLAN
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK

SITE I.D. #1-52-031

September 30, 1993

OCT - 4 1993
HAZARDOUS WASTE REMEDIATION
NYSDEC REGION 1

Prepared for:
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REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN
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1.0 INTRODUCTION

Groundwater Technology, Inc. (Groundwater Technology) has prepared this **Final** Work Plan for a Remedial Investigation/Feasibility Study ("RI/FS") for the site referred to as the Peerless Photo Products Inc. owned by the Agfa Division of Miles Inc., referred to herein as the "site," located at Route 25A and Randall Road in Shoreham, New York. The site was characterized as a Class 2 Inactive Hazardous Waste Disposal Site under the NYS "Superfund" Program (I.D. #1-52-031). This RI/FS is being undertaken pursuant to New York State Department of Environmental Conservation ("NYSDEC") Order on Consent W-10428-89-07 voluntarily entered into by Agfa Corporation[1] on August 17, 1991.

The RI/FS proposed herein has been developed to augment the findings of a Phase II Investigation performed as part of a previous NYSDEC Order on Consent 1-1398 and investigatory work subsequently performed. The purpose of the Phase II Investigation (performed by ERM-Northeast, Plainview, New York as a contractor to Peerless Photo Products, Inc.) was to address data requirements identified by the NYSDEC during their Phase I Preliminary Investigation. The Phase II Investigation concluded that elevated levels of metals and organics were present in soil and groundwater.

This Final Work Plan was prepared based on the original draft Work Plan submitted by Agfa to the NYSDEC dated December 16, 1991, NYSDEC comments, dated March 2, 1992 to the original Work Plan, response to the comments submitted by Agfa to the NYSDEC on April 16, 1992, a NYSDEC meeting with Agfa on December 14, 1992, and NYSDEC comments, dated July 9, 1993 to the draft Work Plan submitted by Agfa to the NYSDEC dated February 8, 1993.

This Final Work Plan has been prepared on the basis of:

- A review of the NYSDEC Phase I Preliminary Investigation.
- A review of the Agfa Phase II Investigation.
- Results of an underground storage tank management program implemented by Agfa.
- Review of historical aerial photographs.
- Review of excerpts from the book "Tesla; Man Out of Time" by Margaret Cheney, 1981, Prentice-Hall, Inc.
- Information requirements specified in Order on Consent W-10428-89-07.
- Conversations and meetings with NYSDEC, New York State Department of Health (NYSDOH), and Suffolk County Department of Health Services ("SCDHS") representatives.

This Final Work Plan has been prepared for review and comment by the NYSDEC and the public.

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[1] Peerless Photo Products, Inc. began operations at the site in 1939. In 1969, Agfa-Gevaert, Inc. purchased Peerless Photo Products, Inc. but the facility retained the name Peerless Photo Products. Later, Agfa-Gevaert, Inc. changed its name to Agfa Corporation and as of January 1991, Agfa Corporation merged into Miles Inc. and is now known as Agfa Division of Miles Inc. Peerless Photo Products, Inc., Agfa-Gevaert, Inc., Agfa Corporation, and Agfa Division of Miles Inc. are collectively referred to in this document as "Agfa" except in discussions of history of ownership or in reference to contracts and consent orders.

Page 1 revised 1/24/94

1.1 Purpose and Objectives

The purposes of this RI/FS, pursuant to the terms of the Order on Consent, are to quantify soil and groundwater quality, to investigate possible off-site impacts, and to evaluate and determine the need for appropriate on and off-site remedial measures.

The overall objectives of the RI/FS are to:

- Complete a field program for collecting data to evaluate the type, extent, and concentration of contaminants[2] in soil (surface and subsurface), groundwater, and air at the site.
- Determine the present and future risks to human health and the environment from residual contaminants.
- Develop and evaluate remedial action alternatives where unacceptable risks to human health and the environment are identified.

Specific objectives are to:

- Confirm the existence and determine the extent of contamination with specific attention to; the North Recharge Basins, West Soil Storage area, East Soil Storage area, Drum Storage area, Tesla Tower Base, appropriate former underground storage tank locations, appropriate drywells and sanitary pools, aerial photography anomalies, Former Drum location, Primary Pump Station, Water Meter Room Pit and Emulsion Building Sump.
- Identify all applicable standards, criteria, and guidelines (SCGs) with respect to the on-site chemicals, the location and type of media impacted, and potential remedial activities.
- Perform a public health risk assessment to address the potential impact resulting from presence of contaminants in on-site soils and groundwater contamination.
- Determine the extent of remediation required.
- Identify an appropriate remedy.

The methodology and approach used to establish the project objectives and the RI/FS scope of work are consistent with:

- Compendium of Superfund Field Operations Methods (USEPA/540/P-87/001, OSWER directive 9355.0-14, December 1987)
- Title 29 Code of Federal Regulations, Part 1910, (OSHA)

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[2] "Contaminant" refers to selected naturally occurring contaminants (for example iron) or contaminants present throughout the environment above naturally occurring concentrations (for example phenols) and chemicals potentially released at the site (for example silver).

- NYSDEC, New York State Inactive Hazardous Waste Site Citizen Participation Plan, August 30, 1988.
- Required elements of an RI/FS as set forth in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) [40 U. S. C. 9601 et seq, as amended],
- National Contingency Plan (NCP) of March 8, 1990 [40 CFR Part 300],
- United States Environmental Protection Agency (USEPA) guidance document entitled, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", October 1988.
- Appropriate USEPA and NYSDEC technical and administrative guidance documents.
- USEPA, Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Office of Emergency and Remedial Response, Washington, D.C. USEPA 540/1-89/002. 1989
- USEPA, Health Effects Assessment Summary Tables. OSWER (OS-230), ORD (RD-689). 1992
- NYSDEC, "Health Risk Assessment Process". Prepared by New York State Department of Health, Draft Cleanup Policy and Guidelines, Volume II - Appendix, October 1991.
- NYSDEC, "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites". Prepared by New York State Department of Environmental Conservation, Division of Fish and Wildlife, June 1991.
- NYSDEC, Draft Cleanup Policy and Guidelines, Volumes I and II, October 1991.
- NYSDEC, "Phase I Investigations" and "Phase II Investigation Generic Work Plan", TAGM's #4019 and 4007, respectively. Eastern Remedial Action Bureau, November 25, 1988.

1.2 Scope of Work

The site contains 19 areas and/or groups of operations where chemicals are known to have been handled or potentially may exist. The RI/FS will attempt to characterize these areas completely in a phased approach. A phased approach will be used in order to better focus the investigatory program without the need for collecting an unnecessary amount of data. A phased approach is the most effective in identifying and characterizing the 19 areas of potential concern and areas identified during the RI. Additionally, if the extent of contamination in soil and groundwater is greater than anticipated, a phased approach will be necessary to further identify the extent of the contaminants. It is anticipated that the RI will be completed in three phases.

The scope of work that is described herein is designed to meet the RI/FS purpose and objectives presented in the previous section.

1.3 Contents of the RI/FS Work Plan

This RI/FS Work Plan consists of six sections, including this Introduction (Section 1.0). Section 2.0 provides a description of the site location, general site layout, physical characteristics, site history, and a summary of existing data. Section 3.0 outlines the scoping of the RI and includes the following:

- Description of the specific objectives of the RI/FS,
- Listing of data limitations and requirements,
- Summary of Data Quality Objectives (DQOs),
- Preliminary list of applicable Standards, Criteria and Guidelines (SCGs),
- Summary of potential remedial alternatives, and
- Scoping and technical approach for the RI Field Investigation.

Seven tasks have been identified for conducting the Phase 1 RI for the site. Section 4.0 of this report describes the field and analytical methodology for implementing these tasks. Section 5.0 describes the Phase 1 FS tasks (Tasks 8 through 11). Project management activities, including the project organization, quality assurance, data management, and project scheduling are provided in Section 6.0.

2.0 SUMMARY OF EXISTING DATA

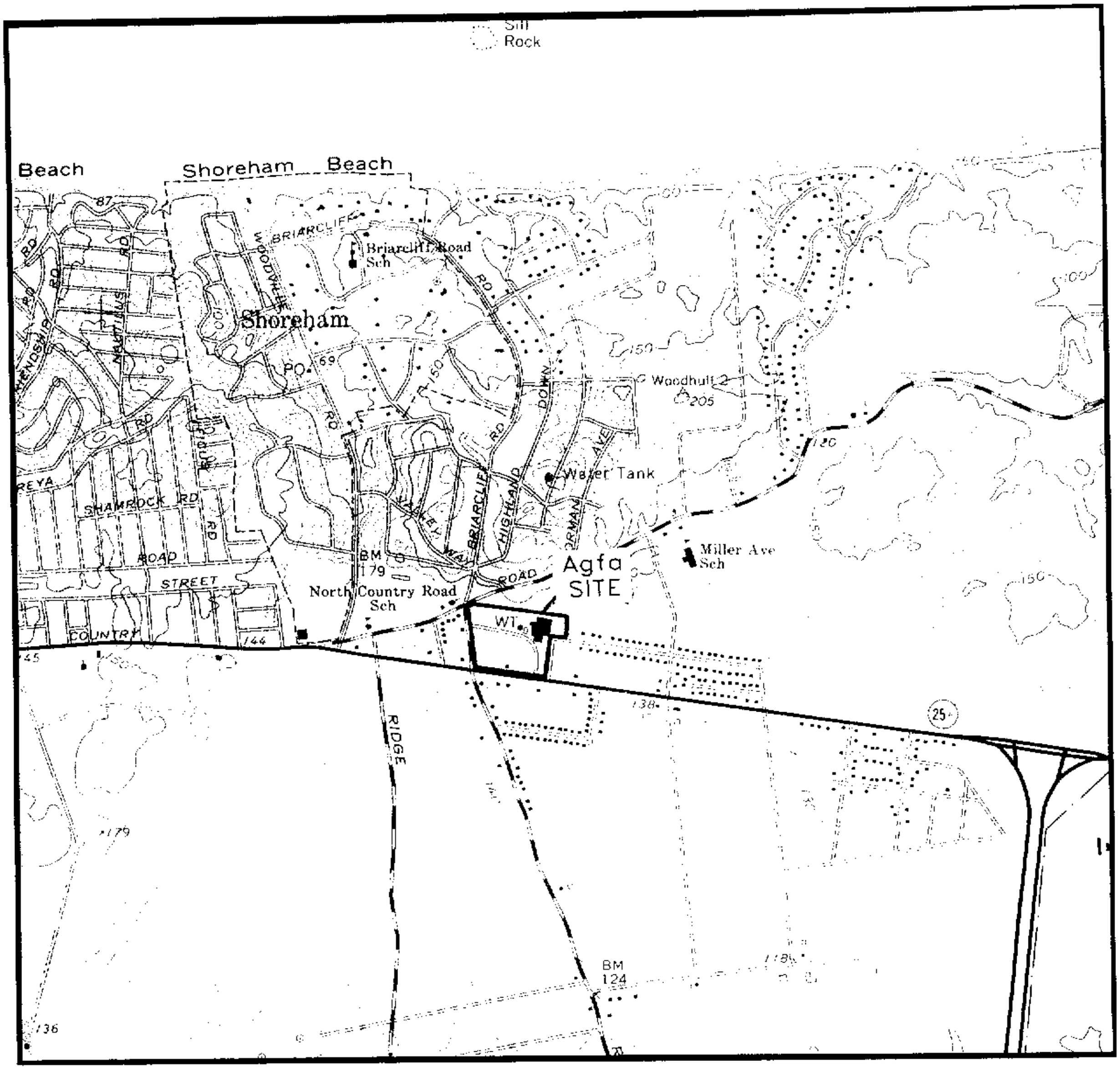
2.1 Site Description

The site is located in Shoreham in the Town of Brookhaven, Suffolk County, New York (see Figure 2-1). The site is bordered to the south by Route 25A (also known as the Port Jefferson-Riverhead Road), to the west by Randall Road, to the north by residences and the Long Island Lighting Company (LILCO) right-of-way and to the east by residences.

The site is located in a predominantly residential area. Retail establishments are located to the east and west along Route 25A. Immediately to the north, the site is bordered and overlapped by a LILCO right-of-way and transmission lines. The Suffolk County Water Authority (SCWA), formerly Shorewood Water Supply Company, Briarcliff Road public supply well field, is located 600 feet to the northwest of the site.

At present there are seven structures on the 16.2 acre site including the Main Plant Structure on the northeast corner of the site, Building #13 (on administration building) on the south side of the site, and the administration (Building #17) and wastewater treatment (Building #14) buildings located on the southwest corner of the site, a gatehouse at the entrance on the west side of the site and two small storage sheds on the southwest corner of the Main Plant Structure. Parking lots are located adjacent to the administration building and roadways lead to the various buildings. The former wastewater treatment plant recharge basins are located along the northern side of the site beneath LILCO's power lines. Figure 2-2 shows significant site features.

The Main Plant Structure consists of thirteen buildings. The majority of the Main Plant Structure was either constructed prior to 1955 or was constructed between 1973 and 1984. The use of each building has varied over time. Building #18 is a three story building located in the Main Plant Structure. The first floor had small laboratory and storage rooms, the second and third floors were equipment rooms. Building #4, located at the northeast corner of the Main Plant Structure, had offices and quality assurance laboratories. Building #10, located in the north central portion of the Main Plant Structure, was the maintenance building which had machine shops and offices. Building #16, located on the south side of Building #10, had shop areas and a large boiler. The use of the Buildings 1, 2, 5, 6, 7, 8, 9, 12, 15 and 17 varied considerably over time and potentially included a combination of the operations described above. As part of the Phase 1 RI, an audit of the Main Plant Structure will be performed which will include documenting historical use of each building.



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
MIDDLE ISLAND, N.Y.
7.5 MINUTE SERIES
DATE: 1967

SCALE 1:24,000

GROUNDWATER TECHNOLOGY

101-1 COLIN DRIVE
HOLBROOK, NEW YORK
(516) 472-4000

DESIGNED: TLD
DETAILED: TRS
CHECKED: TLD

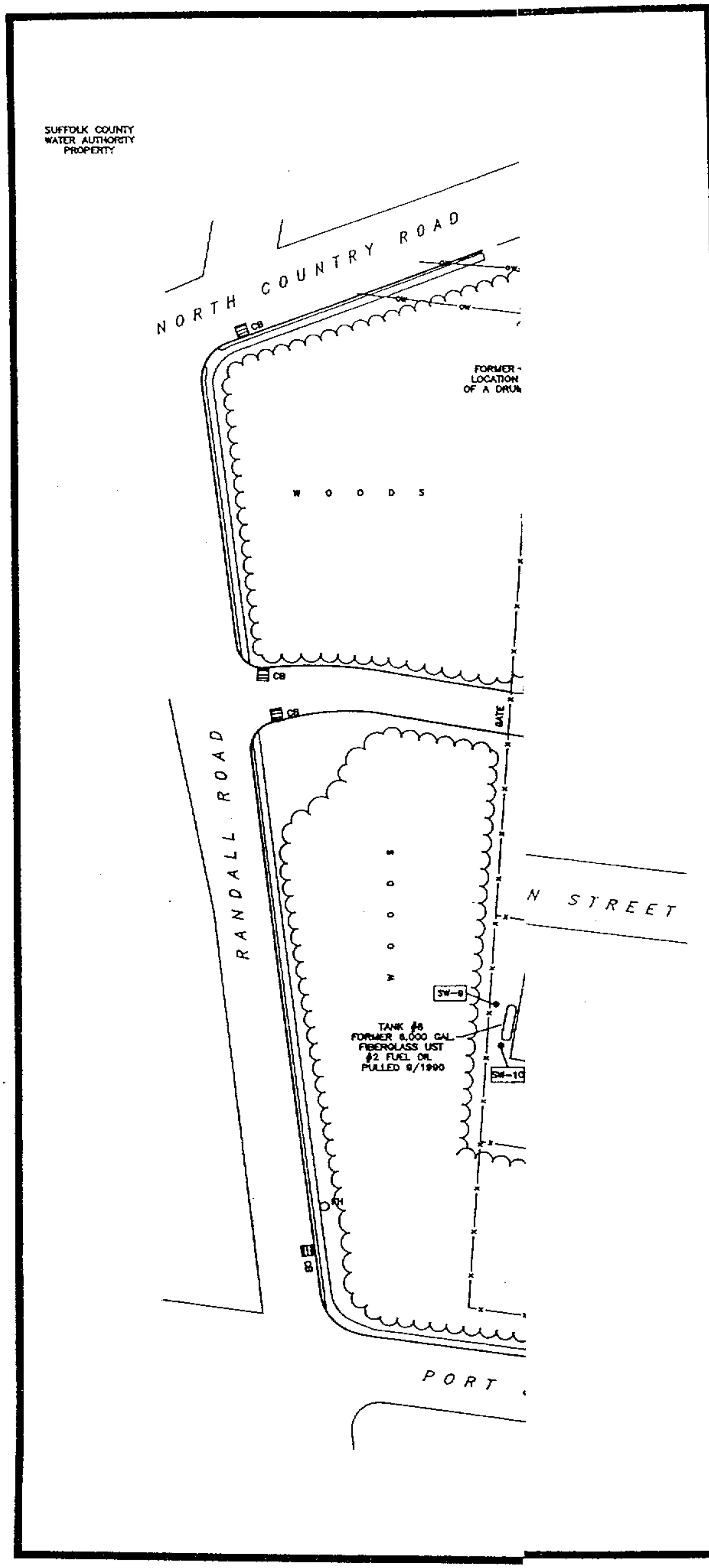
SITE LOCATION

NAME: Agfa Division of Miles Inc.

DRAWING DATE: 1/21/93

LOCATION: SITE ID# 1-52-031
RANDALL ROAD
SHOREHAM, NEW YORK

FIGURE: **2-1**



NO.	DATE	BY	REVISION

LEGEND

- SW-4 / DW-4 ● INJECTION WELL
- ✦ MONITORING WELL
- • ☐ CONCRETE COVERS
- —×— CHAIN LINK FENCE
- UST UNDERGROUND STORAGE TANK
- ⊡ FORMER SUPPLY WELL
- SD ● STORM DRAIN
- FH ○ FIRE HYDRANT
- ☼ LIGHT
- MH ○ MANHOLE
- —ow— OVERHEAD WIRES
- ○ UTILITY POLE
- CB ⊟ CATCH BASIN

NOTES: LOCATIONS OF SW-7, SW-8 AND SW-10 ARE APPROXIMATE.

SOURCE:

YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG, N.Y.S. P.E.&L.S. LIC. #12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

LOCATION OF FORMER UNDERGROUND
STORAGE TANKS
ERM — NORTHEAST
SITE PLAN — PEERLESS PHOTO PRODUCTS
FIGURE 3-2

N

50 0 50 100
SCALE FEET

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

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101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741 (516) 472-4000

Agfa Division of Miles Inc.

PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

BASE MAP

DESIGNED BY: SEE SOURCE	DETAILED BY: TRS	CHECKED BY:
DRAWING DATE: 1/21/93	ACAD FILE: 50732-2	
PROJECT NO.: 01113-5073	CONTRACT:	
DRAWING: **FIGURE 2-2**	REVISION:	

The site is completely encircled by a six foot high chain linked fence and is guarded twenty-four hours per day. The perimeter of the fence area is inspected daily. Periodically LILCO inspects the fence for continuity as grounding of the fence is critical because of its proximity to the LILCO power lines along the north side of the site.

2.2 Site Operational History

2.2.1 Site Ownership History

In 1901, Nikola Tesla purchased the site from James D. Warden who was the manager and director of Suffolk County Land Company. Mr. Tesla's purchase of the site was financed by J. Pierpont Morgan. This early account of the site history is based on the book "Tesla: Man Out of Time" by Margaret Cheney 1981, Prentice-Hall, Inc.

Peerless Photo Products, Inc. began operations at the site in 1939. In 1969, Agfa-Gevaert, Inc. purchased Peerless Photo Products, Inc. As of January 1, 1991, Agfa Corporation has merged into Miles Inc. and is now known as Agfa Division of Miles Inc. For additional information, see footnote 1 on the bottom of page 1 of this Work Plan.

2.2.2 Physical Site Development

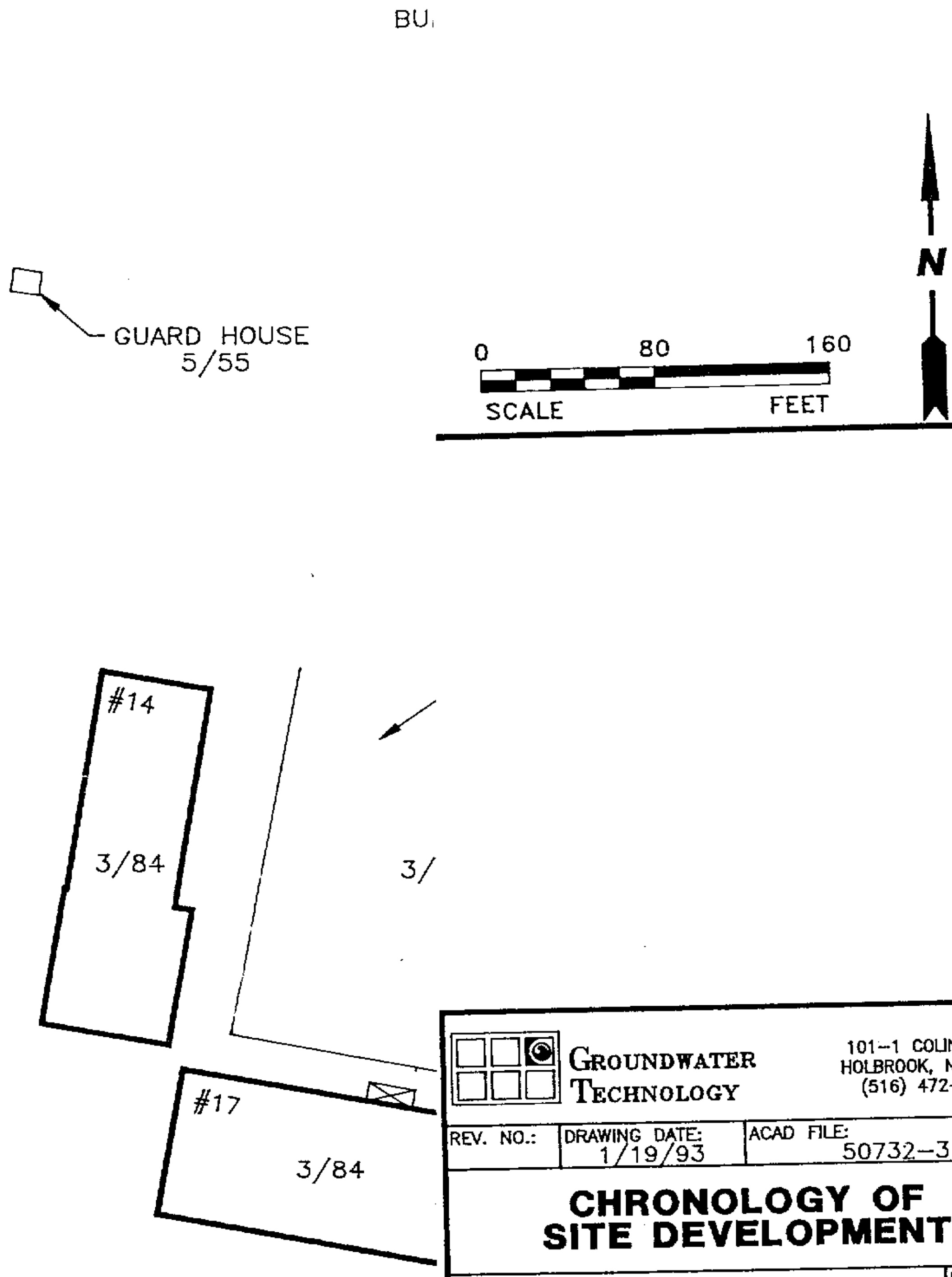
The site was first developed after it was purchased by Mr. Tesla. Mr. Tesla constructed a building in 1903 which served as a residence and a laboratory. This original structure is part of Building #1 located in the Main Plant Structure (Figure 2-3). In addition, he constructed a radio tower which was demolished between 1917 and 1918. The foundation of the former radio tower, herein referred to as Tesla Tower Base, is located in the southeast corner of the site.

Peerless Photo Products, Inc. began operating at the Shoreham site in 1939. Figure 2-3 shows the chronology of site development based upon aerial photographs taken during 1947, 1955, 1962, 1964, 1966, 1972, 1973, 1978 and 1984 and review of file information. The majority of the buildings on the site were constructed between 1947 and 1955 and between 1973 and 1984.

In the aerial photograph from 1947, only the original building is visible. Tesla Tower base is visible as a disturbance. Otherwise, the area is largely wooded and there are no obvious areas of environmental concern.

LEGEND

5/55 DATE OF CONSTRUCTION AND/OR FIRST APPEARANCE ON HISTORICAL AERIAL PHOTOGRAPHS.



GROUNDWATER TECHNOLOGY

101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741
(516) 472-4000

REV. NO.:	DRAWING DATE:	ACAD FILE:
	1/19/93	50732-3

CHRONOLOGY OF SITE DEVELOPMENT

CLIENT: Agfa Division of Miles Inc.

PM:

LOCATION: PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE ID# 1-52-031

PE/RG:

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
TLD	TRS	01113-5073	**2-3**

NOTE 1

PORTIONS OF BUILDING #1 WERE BUIL
AND 1908. SUBSEQUENT BUILDING #1
MADE ALONG WITH OTHER CONSTRUCTI
PLANT STRUCTURE.

In the aerial photograph from 1962, a large building expansion added to the north of the original building is evident. Two disturbed areas are visible west of the building and north of a plant road extending north from 25A. In addition, the 1962 aerial photograph east of the Main Plant Structure approximately twelve objects, somewhat neatly arranged are discernable. The area is referred to as the "Northeast Corner Aerial Photography Anomaly". The recharge basins are now readily identifiable.

In the aerial photograph from 1972, there is an increased level of disturbance near the intersection of Randall Road and the LILCO right-of-way. Discoloration of soil is apparent east of the newer Building #6 in two places. An airphoto dated approximately 1955 reveals the presence of a coal storage bin in the area of Building #16. It is speculated that the coal was used to fire the boiler located in Building #8.

2.2.3 Site Activity History

Review of existing data contained in the NYSDEC Phase I Preliminary Investigation report, Agfa Phase II Investigation report, SCDHS files, the book "Tesla: Man Out of Time" by Margaret Cheney 1981, and interviews with personnel of Agfa were used to develop a historical description of activities at the site.

Between 1917 and 1918, the Tesla tower was demolished reportedly because of the fear that German submarines and surface raiders would use the facility. According to one report, demolition consisted of collapsing the structure into the hole formed by the octagonal shaped masonry foundation walls which had supported the structure. However, another report indicates that the tower was hauled off-site for scrap in 1920. The top of the foundation walls are still evident and extend approximately two feet above grade. Prior to Peerless Photo Products, Inc's. purchase of the property, the hole formed by the foundation walls was used for disposal of unknown materials. Review of file data and interviews with former employees indicate that disposal may have stopped as early as 1960 or as late as 1973. At present, the area within the foundation walls is level and vegetated with grass and large trees.

Peerless Photo Products, Inc. operated at the site from 1939 until 1969. Primary operations throughout the sites industrial vitality were the production of photographic emulsions used in the manufacture of photographic film and the emulsion coating of photographic paper. From 1939 until 1979, Peerless Photo Products, Inc. disposed of untreated process water into an 800 foot long, 25 foot wide recharge basin along the north side of the property, referred to herein as the "North Recharge Basins". The North Recharge Basins were formerly a depression in which a Long Island Railroad track was located. Peerless Photo Products, Inc. production of paper increased six fold from 1961 to 1981 and doubled again by closure in 1987 with resultant process water flow increases to the North Recharge Basins.

The North Recharge Basins consist of four separate depressions. The two east and west depressions are separated by earthen dikes. The middle two depressions are separated by a cement wall. Prior to 1981, all four depressions received water from the plant. Since 1981 only the two center depressions have received process water, except on rare occasions during 1981 and 1982 when storm water flow would cause topping of the dikes and overflow.

In 1979 the wastewater treatment plant was installed and a New York State Pollution Discharge Elimination Systems (SPDES) permit was obtained to discharge treated effluent into the North Recharge Basin. Between 1979 and 1988, Peerless Photo Products, Inc. treated and discharged 15,000 to 20,000 gallons per day of process water and 200,000 gallons per day of non-contact cooling water into the North Recharge Basins. This process water contained silver, cadmium, copper, iron, chloride, barium, sulfate, lead, phenols, nitrates, and dissolved solids. Between 1979 and 1985, analyses of the effluent indicated violations of SPDES permit limitations for these constituents. There was only one permit violation after 1985. On July 31, 1987, the wastewater treatment plant was closed and discharges to the North Recharge Basins from the waste water treatment plant ceased. From 1987 to December 31, 1991, only non contact cooling water was discharged into the basins at a maximum rate of 5,000 gallons per day. At present the North Recharge Basins only receive storm water run off from roof and parking lot areas.

In 1979 as part of the wastewater treatment plant construction, soil from the bottom of the North Recharge Basins was excavated to a depth of four feet, and was stored for approximately one year on the northwest side of the site. In 1980 this soil was disposed of in a secure landfill operated by CECOS in Niagara Falls, New York. In 1981, Peerless Photo Products, Inc. was subject to a Consent Order to upgrade the wastewater treatment plant. As part of this improvement, an additional 250 cubic yards of soil were again excavated from the North Recharge Basins and stockpiled for approximately one year on a plastic liner on the northwest side of the site near where the previous soil pile had been. The SCDHS analyzed soil samples from this stockpile and determined that the soil was non-hazardous and Peerless Photo Products, Inc. subsequently disposed of the soil in the Brookhaven Town Landfill. The locations of the two soil storage areas are shown in Figure 2-2 and are referred to as the "East and West Soil Storage Areas".

Several construction-related spills occurred in 1981 during the upgrading of the wastewater treatment plant. In June 1981, a 5 gallon spill of "rusty" water from an empty drum (iron content - 13 ppm) occurred adjacent to the truck loading ramp next to Building #14 (Figure 2-2). Soils excavated from the site were analyzed and hauled away for proper disposal under SCDHS supervision. In June 1981, an inspection of the site by SCDHS revealed that there were three separate areas being used for storage of 55 gallon drums without provisions for spill control. These locations are designated as DS-A through DS-C (Figure 2-2). Only site DS-A is currently accessible. Buildings have been erected in areas DS-B and DS-C. Drum storage facilities were installed at the site as requested by the SCDHS. In July 1981 a spill of an unknown quantity of sludge containing silver and cadmium occurred on the south side of the wastewater treatment plant. This sludge was scraped off and stockpiled again on the northwest side of the site in the same area that the soil from the North Recharge Basins was stored. This sludge was determined to contain elevated concentrations of metals by the SCDHS and was disposed of in a permitted landfill in Pennsylvania.

On July 23, 1981 the influent line to the wastewater treatment plant ruptured during construction to upgrade the wastewater treatment plant. The rupture occurred under what is now the north end of the treatment plant (Building #14) and resulted in a spill of 3,000 gallons of the influent water. The water flowed onto the parking lot surface and into a nearby storm drain (storm drain DW-9, Figure 2-2). Approximately 330 gallons of the spill was recovered from storm drain DW-9 and returned to the wastewater treatment plant. The remainder of the spill was absorbed by surface soils and/or evaporated. Soils below and adjacent to the rupture in the influent pipe were excavated, analyzed and removed to an appropriate disposal facility. This work was supervised by the SCDHS.

In February 1984, a 1,000 gallon spill of influent water occurred at the primary wastewater pump station (Figure 2-2). Soil samples were collected and analyzed under the supervision of the SCDHS.

Until 1987, process water and cooling water for plant operations were drawn from two on-site supply wells S-65293 and S-56126 (Figure 2-2), which were screened in the water table aquifer, and from the Briarcliff well field which also supplied water for the surrounding community.

Sanitary waste disposal was provided on-site by fourteen sanitary leaching pools. The locations of the sanitary septic pools are shown on Figure 2-2. Sanitary pools connected to Buildings #13 and #17 respectively were used for disposal of sanitary waste. Sanitary pools SW-9 and SW-10 were used for sanitary waste but were also connected to the former waste water treatment plant lab laboratory. One of these pools was sampled by the SCDHS and found to contain toluene. The historical use of cesspools SW-1 through SW-8 and SW-11, surrounding the Main Plant Structure, potentially received process waste waters. The historic usage of the cesspools is not well documented, although it is speculated they primarily received septic waste.

Storm water runoff at the site is controlled by twenty five storm water drywells located throughout the site, these drywells discharge directly into the underlying soils. Most of the drywells are located in the parking lots. Several of these storm drains, DW-1 through DW-8, are located in close proximity to the Main Plant Structure and have piping connected to the interior of the Main Plant Structure.

2.2.3.1 Cessation of Manufacturing Operations

Manufacturing operations at the site began to slow in 1984. The coating of black and white emulsions on paper ceased in 1985 and eventually all manufacturing operations ceased in mid 1987. The wastewater treatment facility ceased operation on July 31, 1987.

The following chronology details the decommissioning of the manufacturing operations:

June 1987 - Inventory of chemicals in laboratories and warehouse was performed.

July 1987- Last wastewater from production operations were treated in wastewater treatment plant.

August 1987 - Shipment of sludge from wastewater treatment plant to a permitted disposal site was completed.

September 11, 1987 - Last emulsion salvage material sent out for reclamation.

September 23, 1987 - Remaining wastewater treatment plant chemicals were disposed of at a permitted disposal site.

1987-1988 - Usable chemicals were shipped to other Agfa manufacturing plants. Remaining chemicals were consolidated and stored on-site.

September 8, 1988 through September 15, 1988 - All portions of tankage and piping from emulsion manufacture through wastewater treatment plant system was decontaminated with hot high pressure wash system. 30,000 gallons of wastewater were produced and shipped off-site for disposal at a permitted disposal site. Usable equipment dismantled for shipment to parent firm.

Cleaning of floors in all areas of chemical use and coating machinery operation was completed. Labs were washed. Holding areas are power washed as were piping to maximum extent possible. All waters directed to the equalization tank in the wastewater treatment plant were vacuumed for off-site disposal. Shipments were made over several days in small truck quantities. Process equipment, wash sinks and vats that were not easily cleanable were removed and disposed of at a permitted disposal site.

September 30, 1988 - Unused boiler treatment contaminants were shipped off-site.

February 18, 1989 and March 13, 1989 - Septic tanks were pumped (liquids and solids) to remove any residual from in house operations.

February 16, 1989 - Accumulated rain water and condensation water were pumped from water sumps on-site.

1990 - Removed eight underground storage tanks (USTs) and abandoned one in-place. Three of the former UST locations were found to have slightly elevated levels of petroleum hydrocarbons in the underlying soils. These three locations will be investigated as part of the Phase 1 RI.

2.2.4 Historical Raw Materials Usage

An exhaustive list of the raw materials utilized in the quality assurance laboratories, production laboratory, maintenance facilities and wastewater treatment plant are presented in Appendix 1. This list presents the quantity of the raw materials stored, as well as the on-site storage location (i.e. Building #4, #10, #14, #16 and #18). The primary raw materials and chemicals used in the emulsion production and photographic paper coating process were:

RAW MATERIAL	FORMULA
Silver Nitrate	$AgNO_3$
Cadmium Chloride	$CdCl_2$
Cadmium Iodide	CdI
Gelatins	
Sulfuric Acid	H_2SO_4
Ethanol	CH_3CH_2OH

2.3 Previous Studies and Investigations

There have been several investigations and data gathering events at the site. The three major investigations include: a Phase I Preliminary Investigation conducted by the NYSDEC in 1983, a Phase II Investigation conducted by Agfa between 1986 and 1988 and an underground storage tank removal program conducted by Agfa in 1990. In addition, various miscellaneous investigations and data gathering events have occurred including an investigation of groundwater conducted for Agfa by Malcolm Pirnie, Inc. in 1980, a survey of all significant features including areas of potential environmental concern in 1992, and a survey of all sanitary pools and storm water drywells in 1992. A summary of the analytical data collected to date at the site is presented in Appendix 2. The following is a brief description of each of these investigations and data gathering events.

2.3.1 NYSDEC Phase I Preliminary Investigation

A Phase I Preliminary Investigation of the site was conducted in August 1983 by Woodward-Clyde Consultants, Inc. for the NYSDEC. The objectives of the Phase I Preliminary Investigation were to collect and review data, perform a site reconnaissance, prepare a draft Hazard Rank System (HRS) and documentation, develop a specific site Work Plan for Phase II Investigation, develop a Phase II Site Investigation cost estimate, identify known responsible parties and prepare a summary report. Based upon the available data, the HRS score was calculated as 37.57, which is above the 28.5 threshold level for inclusion on the National Priority List (NPL). Since no hazardous wastes were disposed of in an uncontrolled manner at the site, the site was not included in the NPL. The site was however, designated as a New York State Inactive Hazardous Waste Disposal Site and assigned the identification number 1-52-031.

2.3.2 Phase II Investigation

A Phase II Investigation was conducted by ERM-Northeast, Inc. on behalf of Agfa between 1986 and 1988. The purpose of the Phase II Investigation was to address data requirements identified by the NYSDEC during the Phase I Preliminary Investigation. The investigation included the review of files, sampling of 31 soil borings, installation and sampling of three monitoring wells and collection of water samples from two on-site production wells which are no longer serviceable and the Briarcliff Road well field supply wells. In summary, the Phase II data yielded the following conclusions:

- Soil in four areas of the site contained cadmium, chromium, lead, silver and mercury in concentrations above the average concentrations typical of soils in the eastern United States. These four areas included the Northern Recharge Basins, West Soil Storage area, Emulsions Building Sump and Tesla Tower Base.
- Groundwater at the site occurs approximately 120 feet below grade under unconfined aquifer conditions.
- Groundwater flow on-site is to the north-northeast, but flow may shift directions downgradient of the site. Sufficient data does not exist to permit establishing downgradient groundwater flow direction.
- Water samples from the Briarcliff Road well field have not exceeded NYSDOH drinking water guidelines since installation.
- The groundwater quality data indicates a possible off-site upgradient source of groundwater contamination.

2.3.3 Underground Storage Tank Program

An underground storage tank (UST) testing and removal/abandonment program was completed at the site in 1990 under the direction of the NYSDEC and SCDHS. A UST closure report entitled "Underground Storage Tank Removal Program, Agfa Corporation, Shoreham, New York", dated June 25, 1991 was prepared by Groundwater Technology and submitted to NYSDEC. The program included the closure of nine USTs; eight by removal and one by abandonment in-place and collection and analysis of soil endpoint samples. Closure by abandonment was chosen for the one UST due to the close proximity to the Main

Plant Structure foundation. The locations of the former USTs are shown on Figure 2-2. Table 2-1 summarizes the size, contents, construction, age, tank test results and status of the USTs.

Endpoint samples were collected from the bottom of the tank excavations in accordance with the draft Quality Assurance Project Plan (QAPP) subsequently provided to the NYSDEC as part of the first draft submission of this Work Plan dated December 16, 1991. The endpoint samples were collected after the tanks were removed, except for the two 20,000 gallon USTs which were sampled through holes cut through their bottoms.

The samples were analyzed by York Laboratories of Monroe, Connecticut. All samples were analyzed according to the parameters agreed upon by the NYSDEC utilizing Contract Laboratory Program (CLP) procedures. A summary of the analytical results is presented in Table 2-2.

The analytical results revealed concentrations of tentatively identified semi-volatile compounds and total petroleum hydrocarbons (TPH) in endpoint samples from UST locations 6, 7, and 9. The NYSDEC's Oil Spill Unit in a letter addressed to Groundwater Technology, dated October 16, 1992, has requested the collection of soil samples beneath the former UST locations 6, 7, and 9 and also stated that no additional investigatory or remedial work is required at the UST locations 1, 2, 3, 4, 5, and 8.

TABLE 2-1

SUMMARY OF FORMER UNDERGROUND STORAGE TANKS
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

SITE TANK #	SCDHS TANK #	SIZE (GAL)	CONSTRUCTION	USED FOR STORAGE OF	YEAR OF CONSTR	PRESENT CONDITION	TANK TEST RESULTS
1	2	20,000	Steel	#6 Fuel Oil/Waste	1967	Abandoned in place	Not tested
2	1	20,000	Fiberglass	#2 Fuel Oil	1978	Removed	Failed
3	6	5,000	Steel	#2 Fuel Oil	1982	Removed	Failed
4	7	3,000	Steel	Methanol	1967	Removed	Not Tested
5	4	5,000	Steel	Ethanol/Methanol	1965	Removed	Passed
6	51	550	Steel	#2 Fuel Oil	x	Removed	Not Tested
7	52	1,000	Steel	#2 Fuel Oil	x	Removed	Not Tested
8	8	6,000	Fiberglass	#2 Fuel Oil	1982	Removed	Not Tested
9	53	4,000	Steel	#2 Fuel Oil	x	Removed	Not Tested

x = Year of Construction is Unknown

2.3.4 Miscellaneous Studies

In December 1980, Malcolm Pirnie, Inc. conducted an investigation of the groundwater quality at, and downgradient, of the site. The findings of this investigation were presented in the report entitled "Groundwater Evaluation, Peerless Photo Products, Inc., Shoreham, New York" dated December 1980. Water samples were collected from Agfa and Briarcliff Road well field supply wells and analyzed for ammonia nitrogen, nitrate nitrogen, MBAS, chloride, sulfate, iron, manganese, copper, zinc, sodium, pH, specific conductance, cadmium, coliform, trichloroethylene, tetrachloroethylene, chloroform, trichloroethane, trichloro-trifluoroethane, bromodichloromethane, bromoform, carbon tetrachloride, chlorodibromomethane, and total trihalomethanes. The results can be found in Appendix 2. The results indicate water quality did not exceed applicable drinking water standards, with the exception of iron and pH. High iron values were attributed to corrosion of the well casings. The groundwater modeling study conducted by Malcolm Pirnie suggested that there should be a one hundred-fold reduction in solute concentration between the North Recharge Basins and the Briarcliff Road wells. It was concluded that there would be no drinking water standards violated with this dilution factor.

Site inspections, conducted by Agfa, NYSDEC and SCDHS in 1992, identified areas of potential environmental concern. In general the areas identified included sanitary septic pools, storm water drywells, sumps in the main plant building, the Water Meter Room Pit, former drum location in the northwest corner of the property and an aerial photography anomaly in the north east corner of the property. The location of these areas were surveyed onto a site map, which has been used as a basis for the figures presented in this Work Plan, by a NYS licensed professional land surveyor.

In addition, all available engineering drawings of the structures have been reviewed to identify piping and areas of potential environmental concern.

TABLE 2-2

SUMMARY OF SOIL ANALYTICAL RESULTS: DETECTED PARAMETERS IN UST ENDPOINT SAMPLES
PEERLES PHOTO PRODUCTS INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-032
September 30, 1993

TENTATIVELY IDENTIFIED SEMI-VOLATILE ORGANICS

TANK NUMBER **COMPOUND**	**1A** (ppb)	**1B/1C** (ppb)	**2A** (ppb)	**2B** (ppb)	**3A** (ppb)	**6A** (ppb)	**7A** (ppb)	**8A** (ppb)	**8B** (ppb)	**9A** (ppb)	**9B** (ppb)
Unknowns	ND	560	150	ND	ND	1400	730	440	240	910	2530
Unknown C8 Alkenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	960	750
Unknown Acid/Esters	1630	4050	4980	5790	2900	6280	7090	3610	4120	1680	1580
4-Methyl, 3-Pentene-2-One	ND	ND	ND	ND	ND	ND	ND	ND	ND	630	710
Unknown Cycloalkanes	ND	ND	ND	ND	ND	160	240	ND	ND	ND	ND
Unknown Cycloketones	ND	ND	ND	ND	840	ND	ND	ND	ND	ND	ND
Unknown Alkenes	610	ND	ND	270	ND	1240	ND	1250	ND	ND	ND
Unknown Isomer of Dimethyl Pentene	ND	ND	460	ND	ND	ND	ND	ND	ND	ND	ND
Unknown Ketones	ND	ND	ND	ND	1690	ND	ND	ND	ND	ND	ND
Unknown Isomer of 1-Propene-Chloro	ND	ND	170	240	ND	ND	ND	ND	ND	ND	ND
Ethanone, 1-Phenyl	ND	ND	ND	180	ND	ND	ND	ND	ND	ND	ND
Unknown Alkyl Benzene	ND	ND	ND	330	ND	ND	ND	ND	ND	ND	ND
Unknown Alkanes	ND	ND	1150	ND	ND	1940	1400	700	ND	ND	510
Hexanedoic Acid	ND	ND	ND	ND	ND	ND	180	ND	ND	ND	ND
Unknown Isomer of Octadecenal	ND	ND	ND	ND	ND	160	ND	ND	ND	ND	ND
Unknown Acids	ND	ND	ND	430	ND	410	ND	ND	ND	ND	ND
Unknown Alcohols	ND	ND	ND	ND	ND	ND	950	ND	ND	ND	ND
Hexadecanal	ND	ND	ND	ND	ND	ND	220	ND	ND	ND	ND
Unknown Alkene/Cycloalkane	ND	ND	ND	ND	ND	ND	ND	1690	2670	ND	ND
Unknown Phthalates	ND	ND	ND	ND	ND	ND	ND	150	ND	ND	ND
Unknown Alkene C7H8	ND	ND	ND	ND	ND	ND	ND	ND	960	ND	ND
TIC TOTAL	**2240**	**4610**	**6910**	**7240**	**5430**	**11590**	**10810**	**7840**	**7990**	**4180**	**6080**
TIC BLANK TOTAL	**4670**	**4670**	**4670**	**4670**	**4670**	**4670**	**4670**	**7360**	**7360**	**3170**	**3170**

TOTAL PETROLEUM HYDROCARBONS

TANK NUMBER	**1A** (ppm)	**1B/1C** (ppm)	**2A** (ppm)	**2B** (ppm)	**3A** (ppm)	**6A** (ppm)	**7A** (ppm)	**8A** (ppm)	**9A** (ppm)
Petroleum Hydrocarbons	17.6	38.9	28.8	12.3	55.3	281	223	16.6	730

ND = Not Detected
ppm = parts per million
ppb = parts per billion

TIC = Tentatively Identified Compounds
NOTE: Letter suffixes denote separate sample duplicates.

In 1992, all storm drains and sanitary pools were identified, opened, visually inspected for presence of liquids, depth, diameter, construction, and interconnecting piping. Based on this inspection, a Work Plan for removing materials from selected sanitary pools and drywells, sampling and closure was prepared for submittal to the SCDHS and NYSDEC for approval. The draft work plan entitled "Work Plan For Closure of Class V Injection Wells" will be submitted to the SCDHS and NYSDEC for approval by these agencies.

2.3.5 Useability of Data

A detailed list of the raw materials used and stored at the site during the operating history of the site is included in Appendix 1. Appendix 2 contains a summary of analytical data collected at the site and at the Briarcliff Road well field over a period of eleven years. A review was also made of the wastewater treatment plant performance data over a period of several years.

The review of all the analytical information revealed that the data are very consistent, despite the fact that they were collected over a period of several years by different individuals and analyzed by different laboratories including W-C Consultants, ERM-Northeast, EcoTest Laboratories, Inc., Chemical Management, Volumetric Techniques, York Laboratories, SCDHS, Agfa analytical contractors, Shorewood Water Supply Company contractors, and others.

All the analytical information is consistent with the site's past operating history: primarily the production of photographic emulsions and emulsion coating of photographic paper. The vast majority of the data is for silver, cadmium, iron, copper, chloride, phenols, and UST-associated contaminants, since these were the principal constituents used at the site. Much of the soil and water quality data collected during the Phase II Investigation was composited and lacked Quality Assurance/Quality Control (QA/QC) evaluation consistent with present day USEPA and NYSDEC RI/FS requirements. The data while not appearing to meet current NYSDEC requirements may be used to augment and/or confirm the findings of this RI.

2.4 Topography, Surface Water, and Drainage

The regional topography is somewhat hilly to the north of the site, flattens out to the south and generally slopes to the north toward the Long Island Sound. The site topography is essentially flat. A topographic survey of the site consisting of establishing spot elevations at selected locations was completed on June 23, 1992. The survey was conducted by Howard W. Young, NYS licensed land surveyor. Measured elevations were referred to the National Geodetic Vertical Datum (MSL 1929). The elevation of the land surface on-site ranges between 137 and 145 feet above mean sea level (Figure 2-1).

The surface water body closest to the site is the Long Island Sound, located approximately one mile to the north of the site. There are no natural surface water bodies on-site. Drainage on-site is controlled by a series of storm water drywells located primarily in the parking areas. Figure 2-2 shows the locations of all storm drains at the site. Runoff is controlled so as not to leave the site.

2.5 Water Supply

The site and surrounding community is supplied with water by the SCWA. The closest public water supply wells are located at the Briarcliff Road well field, approximately 600 feet to the northwest of the northwest corner of the site. The well field consists of two wells, S-08265 and S-11464, which are 186 and 175 feet deep, each with screened lengths of 20 feet. The screened intervals extend from 166 to 186 feet and 150 to 170 feet below grade, respectively. Well S-08265 has been in operation since 1950 and pumps an average of 266,400 gallons per day. Well S-11464 has been in operation since 1955 and pumps an average of 252,000 gallons per day.

The wells are sampled four times per year, per SCDHS and NYSDEC requirements, and reported to the appropriate regulatory authorities. The most recent available water sampling data in the SCDHS computer data base is from May, 1992. The water samples have not exceeded New York State Class GA groundwater standards except for the secondary parameter pH which is native to waters on Long Island.

If groundwater contamination is detected above Class GA groundwater standards during the Phase 1 RI, a survey of additional supply wells located within a one mile radius of the site will be conducted.

2.6 Hydrogeologic Setting

2.6.1 Regional Hydrogeology

The northern part of the town of Brookhaven is underlain by approximately 1,100 feet of unconsolidated deposits that rest unconforably on the Precambrian consolidated rock. The bedrock is overlain by the Raritan Formation, which consists of the Lloyd Sand Member and an overlying clay member. The Lloyd Sand Member is approximately 200 feet thick, and the clay member is approximately 150 feet thick. The Magothy Formation and Matawan Group, undifferentiated, overlies the Raritan Formation; its thickness ranges from 100 feet thick at the north shore of Long Island to more than 1,000 feet at the south shore of Long Island. These three units are of Late Cretaceous age, and except for the Magothy Formation and

Matawan Group, are continuous through the northern part of the town of Brookhaven.

The Pleistocene Upper Glacial deposits, which directly overlay the Magothy Formation, are approximately 300 feet thick and outcrop over the entire surface of the town of Brookhaven. The Upper Glacial deposits consist of several glacial, periglacial, and interglacial units including a marine clay and Smithtown Clay. The surficial deposits consist of outwash, morainal, and Holocene deposits; the Holocene material includes shore, beach and salt-marsh deposits and, at certain locations, artificial fill.

The water table aquifer occurs within the Upper Glacial deposits. The underlying formations contain groundwater under confined and semi-confined conditions. Depths to water average 100 feet in the northern part of the town of Brookhaven.

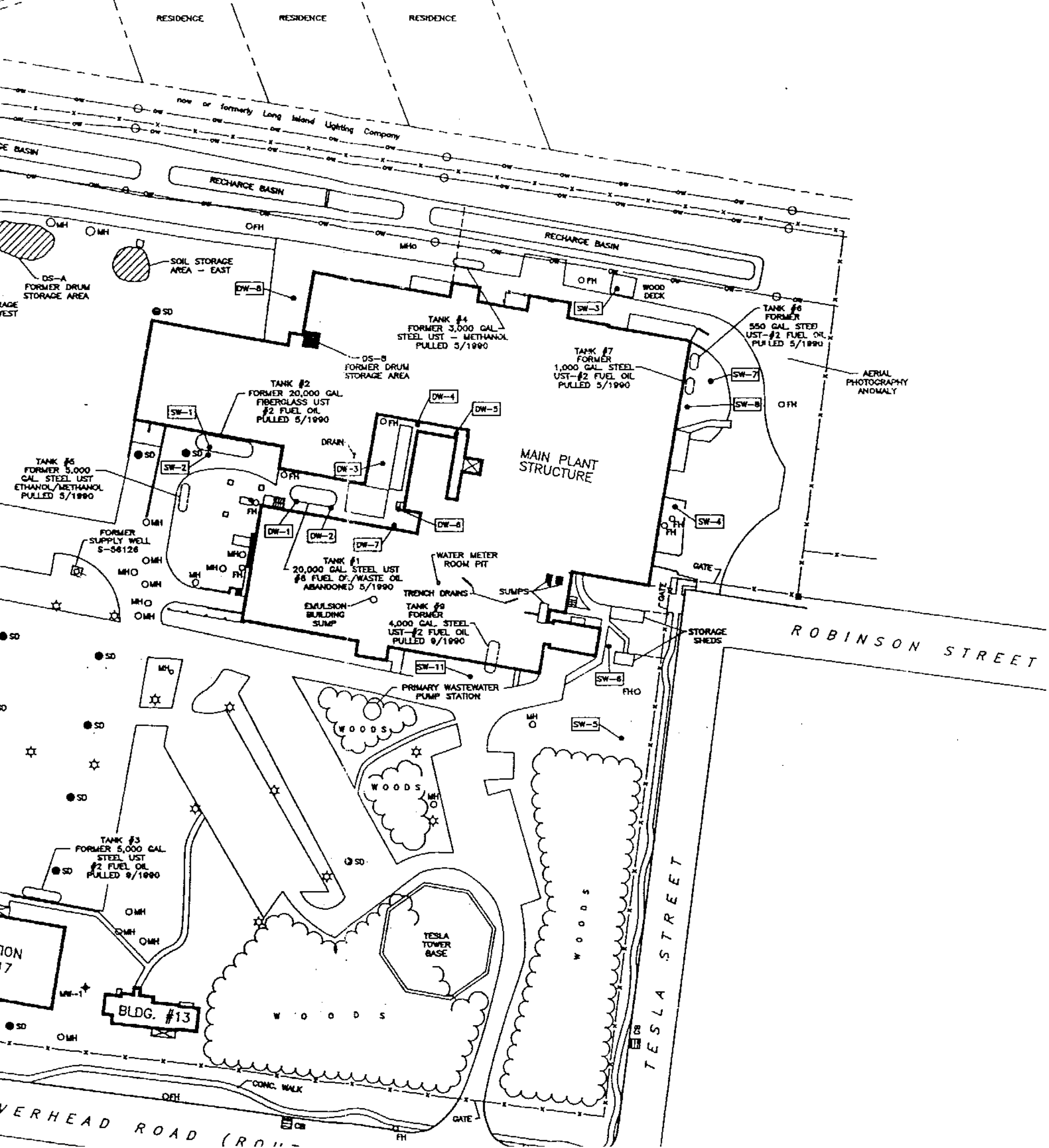
Long Island's major groundwater divide trends generally east to west and is located 3.25 miles south of the site. North of the divide, groundwater flows to the north towards the Long Island Sound, and south of the divide groundwater flows into the Great South Bay. A cross section depicting the regional hydrogeology is presented in Figure 2-4.

2.6.2 Site Specific Hydrogeology

The site is located on glacial outwash deposits between two terminal moraines, the Harbor Hill to the north and the Ronkonkoma to the south. The surficial deposits encountered during the installation of monitoring wells MW-1, MW-2, and MW-3 during the Phase II Investigation were typical of Upper Glacial deposits. The deposits consisted of a heterogeneous mixture of sands, silt and gravel. There were no discernable aerially continuous stratigraphic horizons evident. The deposits were generally medium grained sand with variable amounts of silt, coarse sand and pebbles. Deposits encountered 118-135 feet below grade (within the groundwater) in the boring for well MW-3 consisted of cobbles, pebbles and very coarse sand. This coarse material was not encountered in borings for wells MW-1 and MW-2. A cross section of the site is presented in Figure 2-4.

2.6.3 Groundwater Occurrence

The water table configuration beneath the site is shown in Figure 2-5. The groundwater contours were based on a synoptic set of water levels obtained September 2, 1988. The North Recharge Basins and the Agfa production wells were not in operation when the water levels were collected.



—x— CHAIN LINK FENCE
UST UNDERGROUND STORAGE TANK
⊡ FORMER SUPPLY WELL
SD ● STORM DRAIN
FHO FIRE HYDRANT
☆ LIGHT
MHO MANHOLE
—●— OVERHEAD WIRES
○ UTILITY POLE
CB ▤ CATCH BASIN

NOTES: LOCATIONS OF SW-7, SW-8 AND SW-10 ARE APPROXIMATE.

SOURCE:
YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG, N.Y.S. P.E.&L.S. LIC. #12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

LOCATION OF FORMER UNDERGROUND STORAGE TANKS
ERM - NORTHEAST
SITE PLAN - PEERLESS PHOTO PRODUCTS
FIGURE 3-2

N

50 0 50 100
SCALE FEET

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741 (516) 472-4000

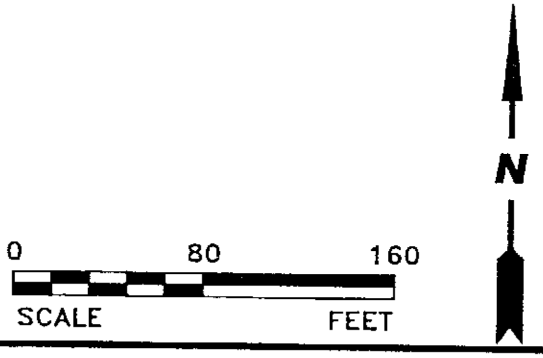
Agfa Division of Miles Inc.

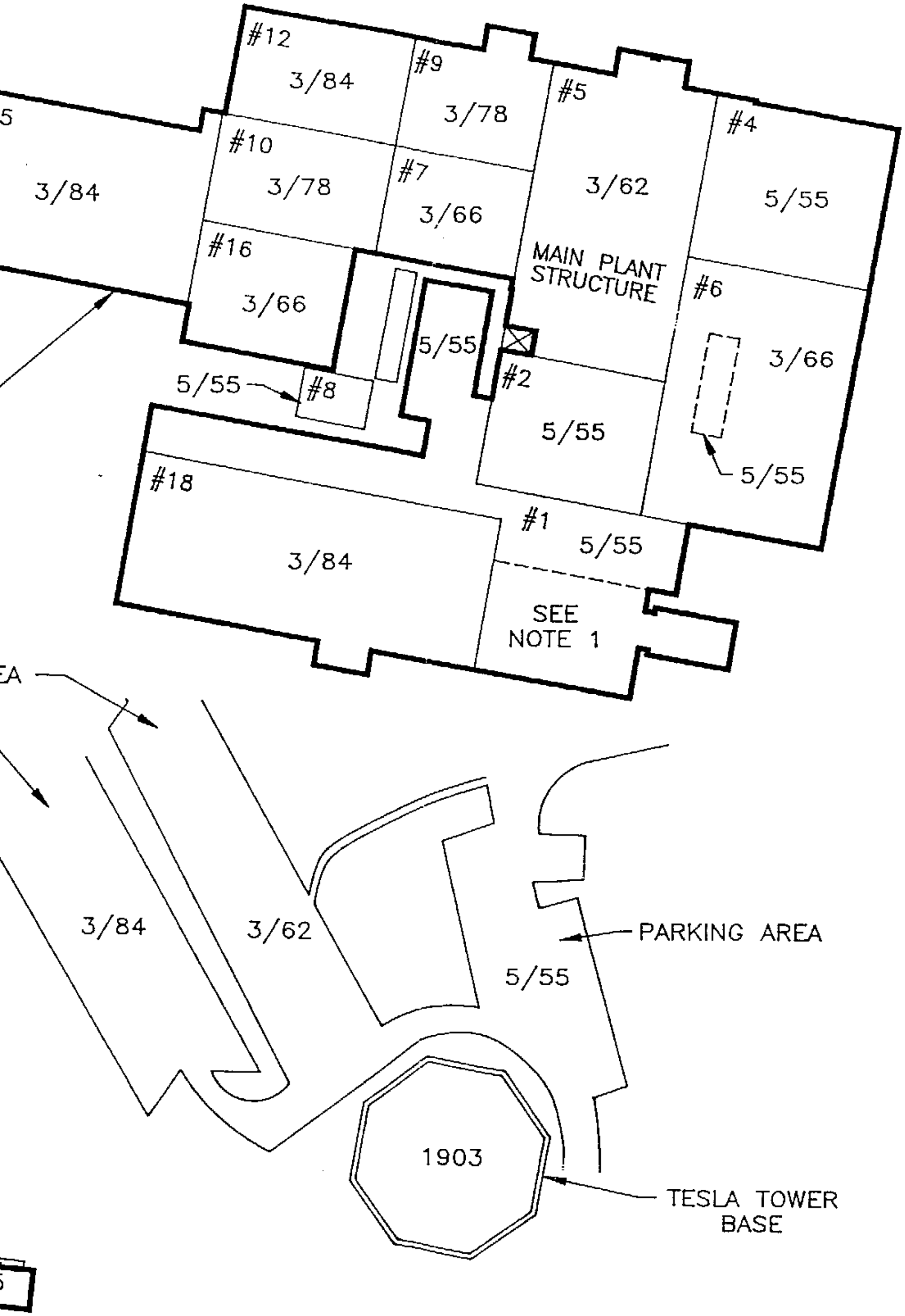
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

BASE MAP

DESIGNED BY: SEE SOURCE	DETAILED BY: TRS	CHECKED BY:
DRAWING DATE: 1/21/93	ACAD FILE: 50732-2	

DATE OF CONSTRUCTION AND/OR
FIRST APPEARANCE ON HISTORICAL
AERIAL PHOTOGRAPHS.





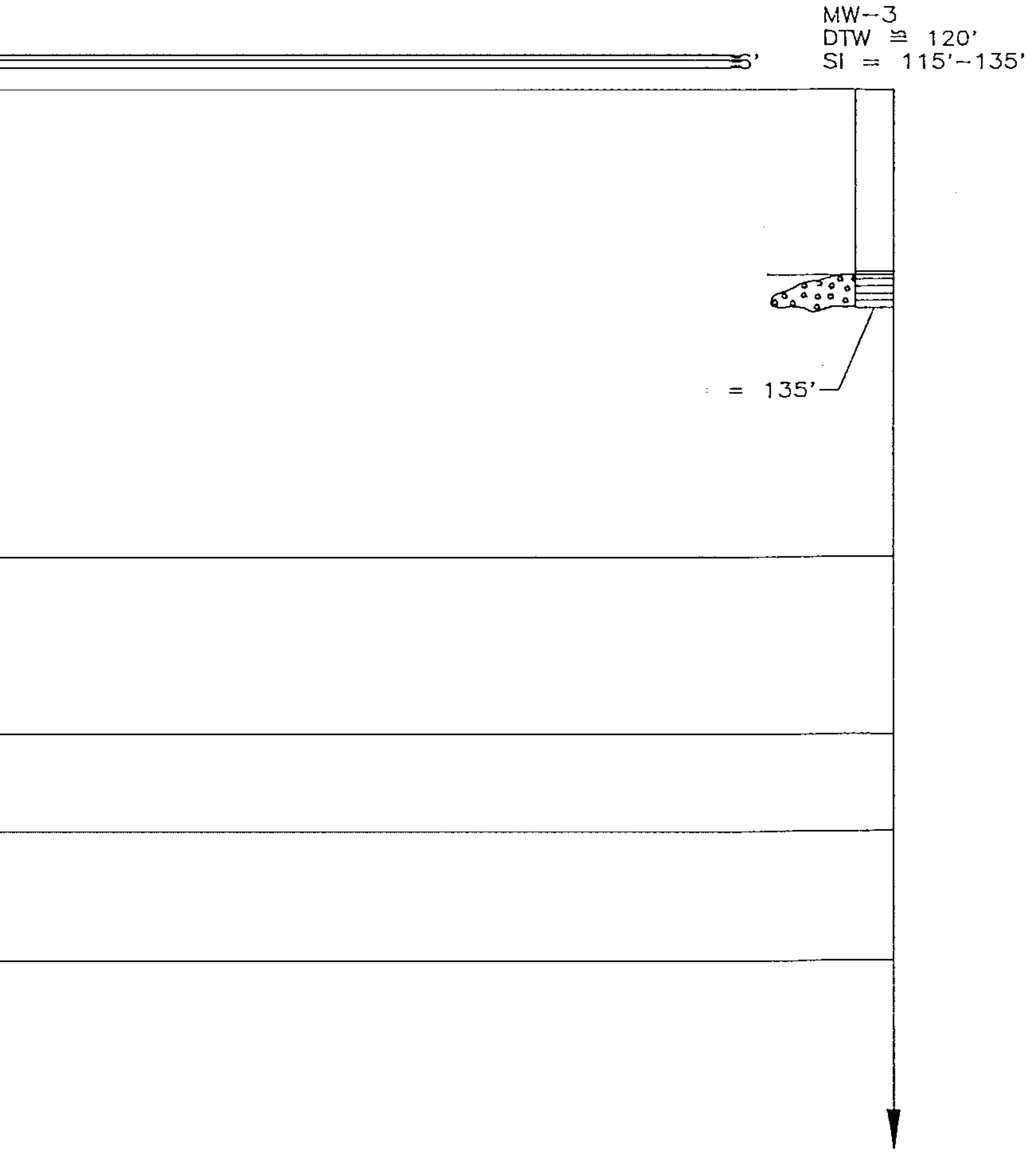
GROUNDWATER TECHNOLOGY

101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741
(516) 472-4000

REV. NO.:	DRAWING DATE: 1/19/93	ACAD FILE: 50732-3

CHRONOLOGY OF SITE DEVELOPMENT

CLIENT: Agfa Division of Miles Inc.	PM:
LOCATION: PEERLESS PHOTO PRODUCTS, INC. SITE	PE/RG:



▩	SANDY CLAY, CLAYEY SAND AND SILT
⁙	GRAVEL
☰	CLAY
░	SAND
▨	CONSOLIDATED ROCK
DTW	DEPTH TO WATER
TD	TOTAL DEPTH
SI	SCREEN INTERVAL
▽	WATER LEVEL

NOTE: GEOLIGIC UNIT DEPTHS AND THICKNESSES ARE APPROXIMATE.

GROUNDWATER TECHNOLOGY

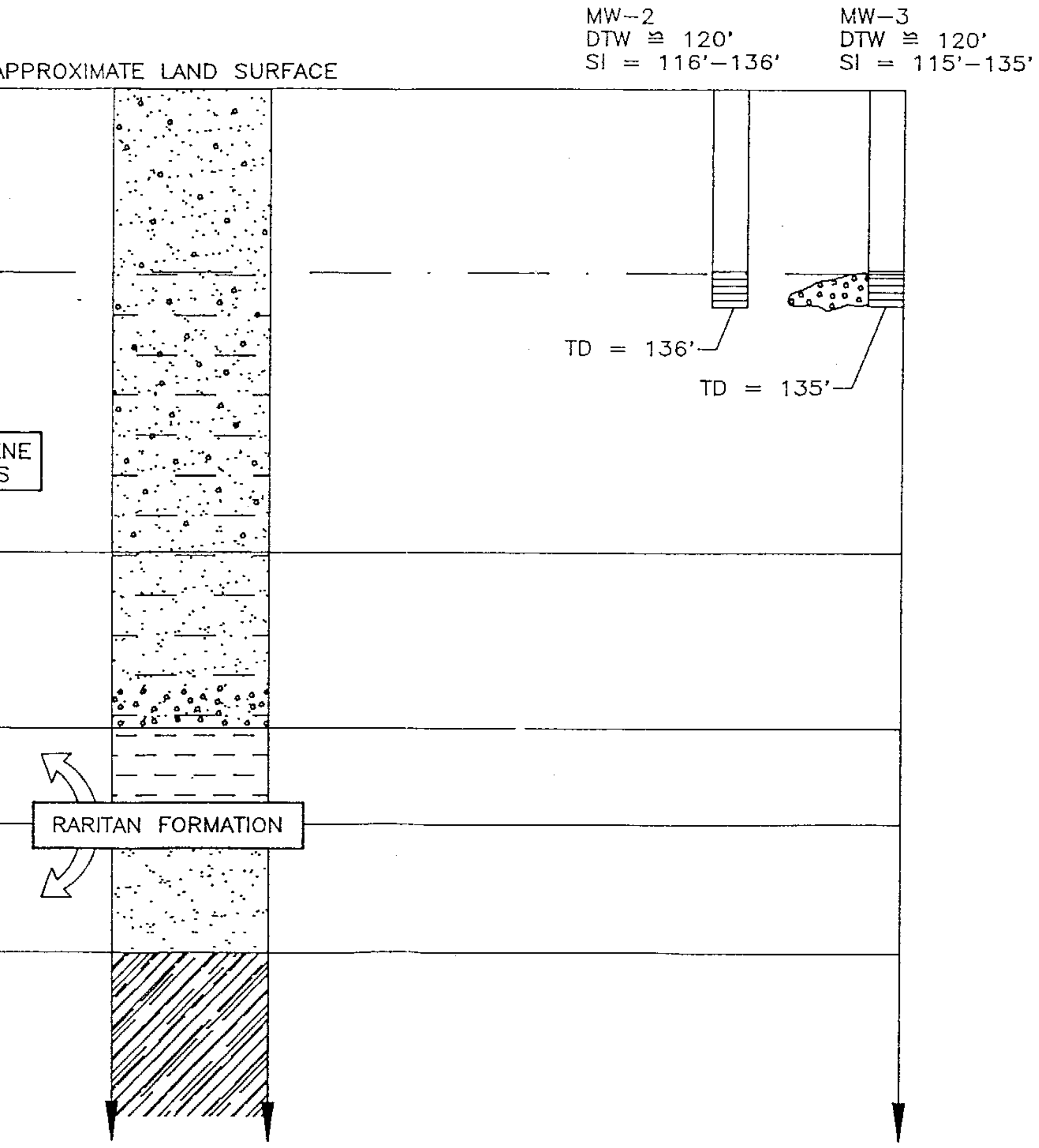
101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741
(516) 472-4000

REV. NO.:	DRAWING DATE: 1/19/93	ACAD FILE: 5073CS1

CROSS SECTION

CLIENT: Agfa Division of Miles Inc.

PM:



▨	SANDY CLAY, CLAYEY SAND AND SILT
⁘	GRAVEL
▤	CLAY
░	SAND
▨	CONSOLIDATED ROCK
DTW	DEPTH TO WATER
TD	TOTAL DEPTH
SI	SCREEN INTERVAL
▽	WATER LEVEL

NOTE: GEOLIGIC UNIT DEPTHS AND THICKNESSES ARE APPROXIMATE.

GROUNDWATER TECHNOLOGY

101−1 COLIN DRIVE
HOLBROOK, N.Y. 11741
(516) 472−4000

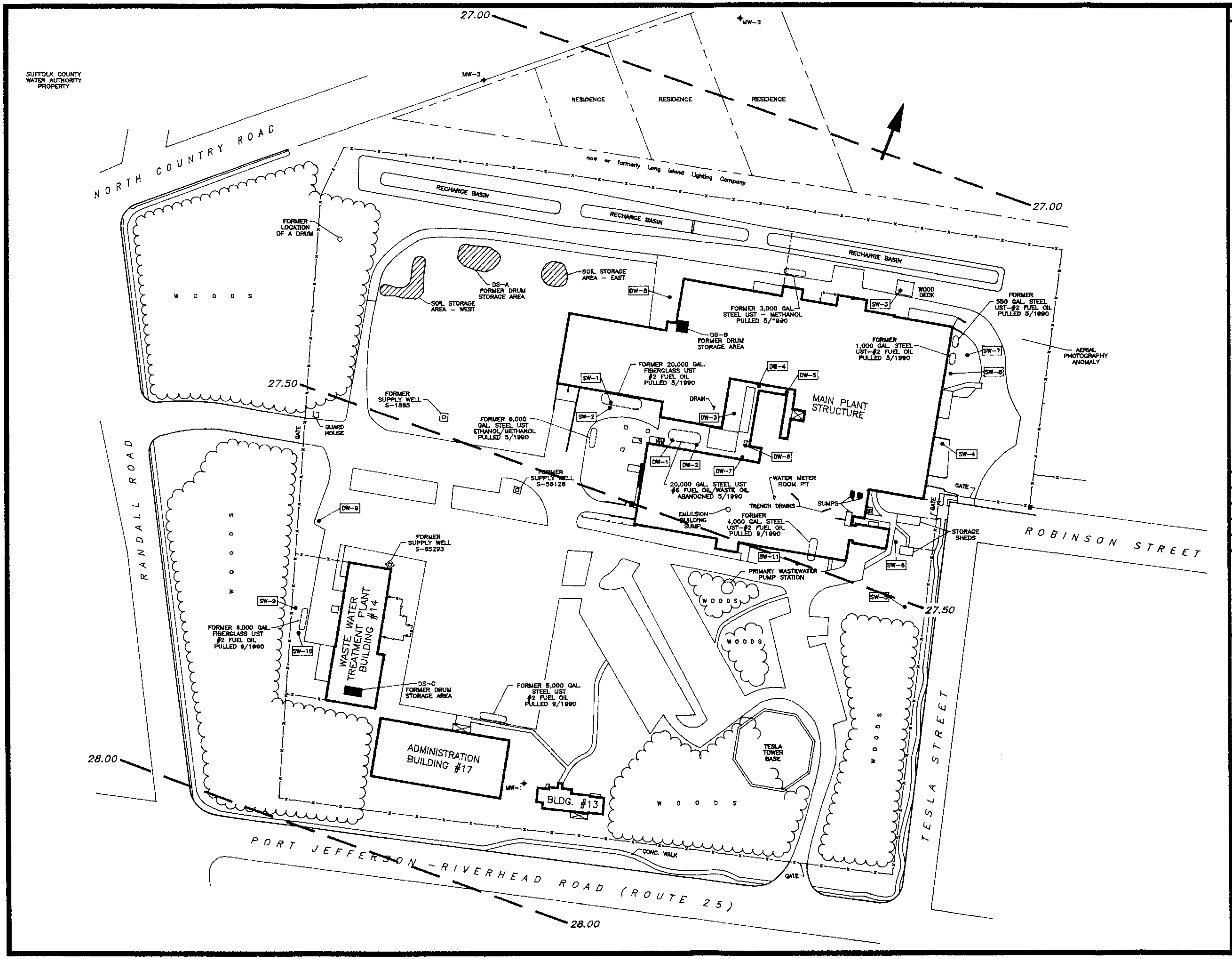
REV. NO.:	DRAWING DATE: 1/19/93	ACAD FILE: 5073CS1

CROSS SECTION

CLIENT: Agfa Division of Miles Inc.

PM:

2



NO.	DATE	BY	REVISION

LEGEND

SW-4 / DW-4 ● INJECTION WELL

◆ MONITORING WELL

• ☐ CONCRETE COVERS

—•—•— CHAIN LINK FENCE

UST UNDERGROUND STORAGE TANK

▣ FORMER SUPPLY WELL

— — — INFERRED GROUNDWATER CONTOUR LINE

↗ INFERRED DIRECTION OF GROUNDWATER FLOW

NOTES: LOCATIONS OF SW-7, SW-8 AND SW-10 ARE APPROXIMATE.

SOURCE:

YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG, N.Y.S. P.E.&L.S. LIC. #12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

ERM – NORTHEAST
SITE PLAN – PEERLESS PHOTO PRODUCTS
FIGURE 3-2

N

50 0 50 100
SCALE FEET

SIGNATURE		DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

GROUNDWATER TECHNOLOGY
101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741 (516) 472-4000

Agfa Division of Miles Inc.

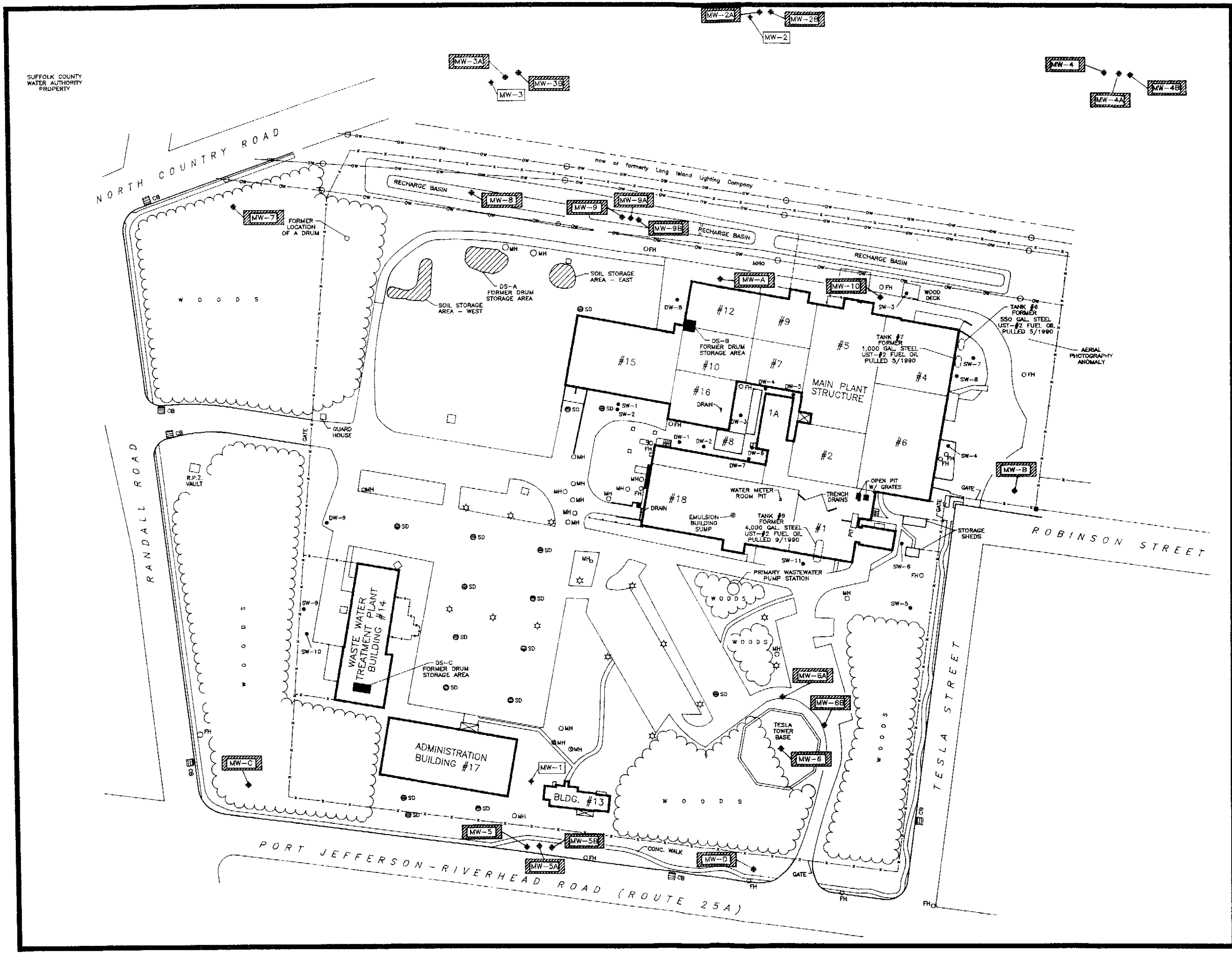
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

WATER TABLE ELEVATION MAP
2 SEPTEMBER 1992

DESIGNED BY: SEE SOURCE	DETAILED BY: TRS	CHECKED BY:
DRAWING DATE: 1/21/93	ACAD FILE: 5073GW01	
PROJECT NO.: 01113-5073	CONTRACT:	
DRAWING:	REVISION:	

FIGURE 2-5

4



NO.	DATE	BY	REVISION
1	12/92	TRS	CHANGED MW#'S, COLOR
2	1/93	TRS	ADDED INT. ROOMS
3	9/93	TLD	CHANGED PHASE ON MW-2B, 3A, 3B, 7, 8

LEGEND

MW-5 ◆	PROPOSED MONITORING WELL
■	INJECTION WELLS TO BE CLEANED
MW-3 ◆	EXISTING MONITORING WELL
SD ⊜	STORM DRAIN
FH ○	FIRE HYDRANT
☼	LIGHT
MH ○	MANHOLE
• □	CONCRETE COVERS
—•—	CHAIN LINK FENCE
—■—	OVERHEAD WIRES
○	UTILITY POLE
CB ▤	CATCH BASIN

COLOR CODE

MW-5	PURPLE = PHASE 1 RI
MW-5A	BLUE = PHASE 2 RI
MW-5B	ORANGE = PHASE 3 RI

NOTES: LOCATIONS OF SW-7, SW-8 AND SW-10 ARE APPROXIMATE.

SOURCE:

YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG, N.Y.S. P.E.&L.S. LIC. #12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

N

50 0 50 100
SCALE FEET

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741 (516) 472-4000

Agfa Division of Miles Inc.

PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

PROPOSED MONITORING WELL LOCATIONS

DESIGNED BY: TLD	DETAILED BY: TRS	CHECKED BY:
DRAWING DATE: 9/13/93	ACAD FILE: 5073W492	
PROJECT NO.: 01113-5073	CONTRACT:	
DRAWING:	REVISION:	

FIGURE 3-2

Groundwater flow at the site is not directly towards the Briarcliff Road well field. Groundwater flow is approximately to the north-northeast. This is consistent with regional flow which is towards the Long Island Sound. However, it is possible that to the north of the site groundwater flow may shift to the west due to groundwater pumping at the Briarcliff Road well field. The groundwater gradient is approximately 0.001 ft/ft.The hydraulic conductivity of the Upper Glacial aquifer at the site was estimated based on historical specific capacity data. Specific capacity of the two Agfa supply wells, S-56126 and S-65293, was 54 gallons per minute per foot of drawdown. By applying the specific capacity values to a derivation of the Theis Nonequilibrium Equation, as presented in the United States Geological Survey (USGS) Professional Paper 627-E, "Water Transmitting Properties of Aquifers on Long Island, NY", by McClymonds and Franke, 1972, a hydraulic conductivity was calculated at 1,800 gallons per day per square foot which is high for Long Island aquifers, but not unusual.

Using a calculated hydraulic conductivity of 1,800 gallons per day per square foot, and the hydraulic gradient of 0.001 ft/ft, the groundwater flow rate range between 1.06 ft/day (387 ft/year) and 0.75 ft/day (274 ft/year), depending on the assumed porosities of 25 percent and 35 percent, respectively. This suggests that in twenty years, groundwater could travel 7,740 feet. Malcolm Pirnie in their December 1980 report calculated that a particle of discharge water would take 85 to 115 days to reach the Briarcliff Road well field, which is located 660 feet from of the site. Malcolm Pirnie pointed out that in 1980 there has been no measured increase in the amounts of chlorides in either the Agfa well S-65293 or the Briarcliff Road well field wells, which suggests no impact on the groundwater quality from the site. Recent chloride data from the Briarcliff Road well field also supports this observation. Malcolm Pirnie estimated based on dispersion and a variety of dilution factors that the concentration of industrial discharges to the North Recharge Basins would be diluted under worst case assumptions by a factor of ten prior to reaching the Briarcliff Road well field. Under more realistic conditions a 100 fold dilution in concentration would occur.

2.7 Areas of Potential Concern

To focus the efforts of the RI/FS, areas of potential concern were identified. There are presently 19 areas of potential concern where soil contamination is documented or where soil contamination potentially exists. These areas include both specific areas or operational units (i.e. North Recharge Basins), or groups of operational units of similar nature (i.e. injection wells). These nineteen areas were identified based on previous investigations, inspections and file review by Agfa or the NYSDEC or the SCDHS as described in Section 2.3 of this Work Plan. These areas include:

- North Recharge Basins,
- East Soil Storage area,
- West Soil Storage area,
- Former Drum Storage area,
- Former Drum location,
- Northeast Corner Aerial Photography Anomaly,
- Primary Wastewater Pump Station,
- Tesla Tower Base,
- Injection Wells (drywells and cesspools),
- sumps within the Main Plant Structure,
- Emulsion Building Sump,
- Water Meter Room Pit,
- Former Underground Storage Tank (UST) location #6
- Former UST location #7
- Former UST location #9
- Main Plant Structure,
- Wastewater Treatment Plant,
- North Shed located at southeast corner of Main Plant Structure,
- South Shed located at southeast corner of Main Plant Structure.

None of these areas are documented to date to have impacted groundwater quality however, groundwater is a primary area of concern at the site.

The following is a description of existing data and associated soil quality information that became available for each of the 19 areas of potential concern during the previous investigations.

2.7.1 North Recharge Basins

The North Recharge Basins are an area of potential concern because historically these areas received industrial waste water discharges and because soil sampling of these basins detected the presence of elevated concentrations of metals in the soils. The North Recharge Basins collectively measure 800 feet long by 25 feet wide and are located along the northern edge of the site as shown in Figure 2-2. Six composite soil samples were collected from dry portions of the recharge basins during the Phase II Investigation in 1986. At that time the wastewater treatment plant was operational and discharges to the two center basins were occurring. Each of the six composite samples represent four composite samples from a specific depth (0 to 2 feet, 2 to 4 feet or 4 to 6 feet below grade) from one of two areas sampled within the North Recharge Basins. All samples were analyzed for arsenic, barium, cadmium, lead, mercury, selenium, and silver. Selected samples were also analyzed for iron, copper, nickel, cyanide, chloride, sulfate, nitrate, MBAS, phenols, pH, EP Toxicity for 8 Resource, Conservation and Recovery Act (RCRA) metals, and volatile organics by USEPA Method 8010/8020. Arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, and silver were detected in the composite soil samples. The Phase II Investigation soil data is summarized in Table 2-3.

The contaminants present, their actual concentration, and horizontal and vertical distribution within the North Recharge Basins cannot be established based on the historic data because samples were composited, samples were not collected along the center of the basins, samples were not collected deep enough and samples were not analyzed for the full list of parameters currently required by the NYSDEC. Cadmium was detected above average values typical for soils in the eastern United States. Copper was detected above average values typical for soils in the eastern United States but within the normal range for soils in the eastern United States. A table listing the average concentrations of a variety of metals in eastern United States soil is presented as Table 2-4. Cadmium was detected at 0.2 to 4.3 parts per millon. The average concentration for soils in the eastern United States is 1 ppm. Silver was detected in all six soil samples with concentrations ranging between 6.8 and 550 ppm. There is no listing for average silver concentrations in soils of the eastern United States.

2.7.2 East Soil Storage Area

The East Soil Storage area is an area of potential concern because soils from the bottom of the North Recharge Basins were temporarily stored at this location prior to disposal off-site as described in Section 2.2 of this Work Plan. Leaching of contaminants from the stockpiled soils into the underlying soils may have occurred. The area is roughly circular in shape and measures approximately 25 feet in diameter. The ground is vegetated with grass and surrounded by trees.

Composite soil samples were collected from grade to two feet below grade in four locations from this area during the Phase II Investigation in 1986. The four composite soil samples were combined into a single sample and analyzed for arsenic, barium, cadmium, chloride, copper, cyanide, iron, lead, mercury, MBAS, nickel, nitrate, pH, phenols, selenium, silver, sulfate, EP Toxicity for 8 RCRA metals, and volatile organics by USEPA Method 8010/8020.

The inorganics which were detected in the composite soil sample were a subset of those detected in the North Recharge Basins. The placement of soils from the North Recharge Basins into this area is fully discussed in Section 2.2 of this Work Plan. The inorganics which were detected included arsenic, barium, cadmium, copper, iron, lead, mercury, nickel, selenium, and silver (Table 2-3). Volatile organics were not detected.

None of the inorganics were detected in concentrations above the average values typical for soils in the eastern United States presented in Table 2-4. The contaminants present and their actual concentration in the soils could not be established because the soil samples were composited and the samples were not analyzed for the full list of parameters currently required by the NYSDEC. Soil samples were only collected to a depth of two feet below grade, therefore, the vertical distribution of the contaminants could not be determined.

TABLE 2-3

SUMMARY OF SOIL QUALITY DATA: DETECTED PARAMETERS

PHASE II INVESTIGATION

PEERLESS PHOTO PRODUCTS, INC. SITE

SHOREHAM, NEW YORK

SITE I.D. # 1-52-031

September 30, 1993

AREA	NORTH RECHARGE BASINS						SOIL STORAGE		STORM DRAIN (DW-9)	DRUM STORAGE	PRIMARY PUMP STATION
SAMPLE	WEST			EAST			WEST	EAST			
INTERVAL (FEET	0-2	2-4	4-6	0-2	2-4	4-6	0-2	0-2	0-2	0-2	0-2
# OF SAMPLES COMPOSITED	4	4	4	4	4	4	4	4	4	4	4
INORGANICS (EPA analytical method, if reported)											
Arsenic (206.3)	0.480	0.430	0.560	0.730	0.860	0.170	3.400	1.000	0.800	1.100	3.600
Barium (208.2)	24.000	2.400	7.500	130.000	120.000	22.000	38.000	11.000	5.000	22.000	16.000
Cadmium (213.2)	1.800	0.200	1.200	3.800	4.300	0.360	2.700	0.400	0.065	0.750	0.070
Chromium (215.1)	NA	1.300	2.200	NA	1.400	4.000	NA	NA	NA	NA	NA
Copper (220.1)	34.000	NA	NA	23.000	NA	NA	6.000	1.800	1.800	4.000	3.900
Iron (236.1)	1700.000	NA	NA	1700.000	NA	NA	7500.000	4800.000	2500.000	5500.000	7500.000
Lead (239.2)	2.200	0.800	0.340	4.200	1.500	3.600	4.200	2.200	1.700	3.300	4.400
Mercury (245.1)	0.021	0.022	ND (0.005)	0.053	0.025	0.042	0.024	0.011	ND (0.005)	0.013	0.021
Nickel (249.1)	1.500	NA	NA	1.500	NA	NA	3.500	2.500	1.500	3.000	4.000
Selenium (270.3)	0.100	0.097	ND (0.075)	0.063	0.079	ND (0.075)	0.230	0.130	0.140	0.140	0.071
Silver (272.1)	160.000	200.000	6.800	440.000	320.000	550.000	65.000	6.500	0.500	9.500	1.900
EP TOXICITY											
Barium	1.100	NA	NA	0.060	NA	NA	0.090	0.050	0.070	0.090	ND (0.05)
Cadmium	0.053	NA	NA	0.036	NA	NA	0.036	0.005	ND (0.001)	0.005	ND (0.001)
Mercury	ND (0.0005)	NA	NA	ND (0.0005)	NA	NA	0.001	0.001	ND (0.0005)	ND (0.0005)	ND (0.0005)
Silver	ND (0.01)	NA	NA	0.050	NA	NA	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)

All Concentrations in mg/kg (ppm); Leaching data in mg/L (ppm)

NA = Not Analyzed

ND (XX.XX) = Not Detected (method detection limit, if reported, in ppm)

Analytical data from July 1986

TABLE 2-3 (CONTINUED)
SUMMARY OF SOIL QUALITY DATA: DETECTED PARAMETERS
PHASE II INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

AREA	EMULSION BUILDING	TESLA TOWER BASE		
SAMPLE	SUMP	SS-1	SS-2	SS-3
DEPTH (FEET)	0-14	0-20	0-20	0-20
# OF SAMPLES COMPOSITED	7	10	10	10
INORGANICS (EPA analytical method)				
Aluminum (202.2)	NA	1480.000	1180.000	3220.000
Barium (208.2)	22.000	3.900	19.000	66.000
Cadmium (213.2)	9.200	1.300	16.000	36.000
Calcium (215.1)	NA	190.000	190.000	50.000
Chromium (218.1)	14.000	15.000	17.000	45.000
Cobalt (219.1)	NA	3.100	3.100	4.100
Copper (220.1)	NA	1.500	33.000	85.000
Iron (236.1)	NA	2310.000	1890.000	4172.000
Lead (239.2)	10.000	ND (5.200)	301.000	80.000
Magnesium (242.1)	NA	160.000	160.000	660.000
Manganese (243.1)	NA	27.000	12.000	39.000
Mercury (245.1)	ND (0.210)	ND (0.210)	0.220	0.380
Nickel (249.1)	NA	8.000	9.300	16.000
Potassium (258.1)	NA	34.000	47.000	87.000
Silver (272.1)	48.000	46.000	337.000	366.000
Sodium (273.1)	NA	98.000	94.000	99.000
Vanadium (286.2)	NA	4.400	5.600	9.200
Zinc (289.1)	NA	4.700	27.000	56.000
EP TOXICITY				
Barium	0.390	NA	NA	NA
Cadmium	0.210	NA	NA	NA
Mercury	ND (0.0005)	NA	NA	NA
Silver	0.010	NA	NA	NA
ORGANICS (by EPA method 624/625)				
Toluene	NA	0.011	ND (0.005)	0.022
Carbon Disulfide	NA	0.046	ND (0.005)	ND (0.005)

All Concentrations in mg/kg (ppm); Leaching data in mg/L (ppm)
NA = Not Analyzed
ND (XX.XX) = Not Detected (method detection limit, if reported, in ppm)
Analytical Data from November, 1987

TABLE 2-4

TYPICAL METAL CONCENTRATIONS IN EASTERN UNITED STATES SOILS

PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

ELEMENT	AVERAGE CONCENTRATION (PPM)	CONCENTRATION RANGE (PPM)
Aluminum	33,000	7,000 - 100,000
Barium	300	15 - 1,000
Boron	32	<10 - 150
Cadmium	<1	<1 - 1
Calcium	3,200	<100 - 160,000
Chromium	36	1 - 100
Cobalt	7	<7 - 300
Copper	14	<1 - 150
Iron	15,000	100 - >100,000
Lead	14	<7 - 300
Lithium	17	<5 - 136
Magnesium	2,300	50 - 50,000
Manganese	290	<2 - 7,000
Mercury	0.096	0.01 - 3.4
Nickel	13	<3 - 700
Sodium	2,600	<200 - 15,000
Strontium	51	<5 - 700
Vanadium	46	<5 - 300
Zinc	36	<5 - 400

FROM: Connor, Jon J., and Shacklett, Hansford T. (1975): Background Geochemistry of Some Rocks, Soils, Plants and Vegetables in the Conterminous United States. United States Geological Survey, Professional Paper 574-F.

2.7.3 West Soil Storage Area

The West Soil Storage area an area is of potential concern because soils from the bottom of the North Recharge Basins were temporarily stored here prior to disposal off-site as described in Section 2.2 of this Work Plan. Leaching of contaminants from the stockpiled soils into the underlying soils may have occurred. The area is "L" shaped and measures approximately 50 feet along each side of the "L" and is approximately 15 feet wide. The ground is vegetated with grass and surrounded by trees.

Composite soil samples were collected from grade to two feet below grade in four locations from this area during the Phase II Investigation in 1986. The four composite soil samples were combined into a single sample and analyzed for arsenic, barium, cadmium, copper, chloride, cyanide, iron, lead, mercury, MBAS, nickel, nitrate, ph, phenols, selenium, silver, sulfate, EP Toxicity for 8 RCRA metals, and volatile organics by USEPA Method 8010/8020.

The inorganics which were detected in the composite soil sample were a subset of those detected in the North Recharge Basins. The placement of soils from the North Recharge Basins into this area is fully discussed in Section 2.2 of this Work Plan. The inorganics which were detected included arsenic, barium, cadmium, copper, iron, lead, mercury, nickel, selenium, and silver (Table 2-3). Cadmium was the only contaminant detected above average values typical for soils in the eastern United States, (Table 2-4). Cadmium was detected at 2.7 ppm while the average concentration for cadmium in soils in the eastern United States is 1 ppm.

The contaminants present and their actual concentration in the soils could not be established because samples were composited and the samples were not analyzed for the full list of parameters currently required by the NYSDEC. Soil samples were only taken to a depth of two feet below grade, therefore, the vertical distribution of the contaminants could not be determined.

2.7.4 Former Drum Storage Area

Drums both empty and full were stored on barren soil in the former drum storage area prior to shipment off-site for disposal at a permitted disposal site. This area was used until 1981. The area is roughly oval in shape and measures approximately 50 feet by 25 feet. The ground is lightly vegetated with grass. There are no records of any spillage in this area. This area is an area of potential concern because spillage may have occurred from the drums into the unprotected underlying soils.

A composite soil sample was collected from grade to two feet below grade from four locations within the Former Drum Storage area during the Phase II Investigation in 1986. The four composite soil samples at each depth were composited into a single composite sample and analyzed for arsenic, barium, cadmium, chloride, copper, cyanide, iron, lead, mercury, MBAS, nickel, nitrate, Ph, phenols, selenium, silver, sulfate, EP Toxicity for 8 RCRA metals, and volatile organics by USEPA Method 8010/8020. Inorganics detected included arsenic, barium, cadmium, copper, iron, lead, mercury, nickel, selenium, and silver (Table 2-3). Volatile organics were not detected. The inorganics detected had concentrations below average values typical for soils in the eastern United States (Table 2-4).

The contaminants present and their actual concentration in the soils could not be established because the soil samples were composited and the samples were not analyzed for the full list of parameters currently required by the NYSDEC. Soil samples were collected to a depth of two feet below grade, therefore, the vertical distribution of the contaminants could not be determined.

2.7.5 Former Drum Location

The Former Drum location area is an area of potential concern because a site inspection by Agfa personnel in 1992 discovered an empty 55 gallon capacity steel drum in this area and the area has never been investigated for the presence of contamination. In addition the drum had no label and facility personnel have no knowledge of its former contents or origin.

The Former Drum Location is surrounded by woods which extend from the Guard House to the south to the North Recharge Basins to the north and the fence line to the west. The ground surface inside the fence and between the guard house and North Recharge Basins appears to have been disturbed because of the presence of holes and depressions. There are no records of disposal in this area. There is no soil analytical data for the Former Drum Location.

2.7.6 Northeast Corner Aerial Photography Anomaly

This area is listed as an area of potential concern because an aerial photograph from 1962 showed approximately 12 unidentifiable objects, somewhat neatly arranged in the northeast area of the site which are no longer present. There is no record of drum storage and/or of spills in this area. The area is currently vegetated with grass and surrounded by trees. The exact former location of the 12 objects is not known at this time, but will be estimated during the RI with the assistance of the NYSDEC and the aerial photographs.

2.7.7 Primary Wastewater Pump Station

The Primary Wastewater Pump Station area is an area of potential concern because in early 1984 a 1,000 gallon spill of water containing low concentrations of heavy metals occurred in this area. The 1,000 gallon spill ran across the barren ground for approximately 20 feet to the south, pooled and seeped into the ground. The area where the spillage occurred measured approximately 20 feet by 5 feet. The ground in this area is currently vegetated with grass and surrounded by bushes and trees.

A composite soil sample was collected from grade to two feet below grade in four locations was within the Primary Wastewater Pump Station area during the Phase II Investigation in 1986. The four composite samples were combined into a single sample and analyzed for arsenic, barium, cadmium, chloride, copper, cyanide, iron, lead, mercury, MBAS, nickel, nitrate, Ph, phenols, selenium, silver, sulfate, EP Toxicity for 8 RCRA metals, and volatile organics by USEPA Method 8010/8020.

Inorganics detected included arsenic, barium, cadmium, copper, iron, lead, mercury, nickel, and silver (Table 2-3). Volatile organics were not detected. The inorganics detected had concentrations below average values typical for soils in the eastern United States (Table 2-4).

The contaminants present and their actual concentration in the soils could not be established because the soil samples were composited and the samples were not analyzed for the full list of parameters currently required by the NYSDEC. Soil samples were collected to a depth of two feet below grade, therefore, the vertical distribution of the contaminants could not be determined.

2.7.8 Tesla Tower Base

The Tesla Tower Base is an area of potential concern because the materials used to backfill the hole formed by the foundation walls are not documented and historic sampling detected the presence of trace concentrations of contaminants. The Tesla Tower Base foundation is octagonal in shape and measures approximately 90 feet in diameter. The foundation walls extend approximately two feet above grade. The area within the foundation walls is approximately level with the top of the walls. The ground surface is vegetated with grass and trees. The configuration and construction of the Tesla Tower and foundation is unknown.

Three composite soil samples of soils from grade to 20 feet below grade were collected from three soil boring locations within the Tesla Tower Base foundation walls during the Phase II Investigation in 1987.

The composite soil samples were analyzed for hazardous substance list (HSL) metals (total), volatile organics, base neutral and acid extractables (BNA), pesticides, polychloridated biphenols (PCB), phenol, and cyanide. In addition, a library search for 40 of the first peaks was conducted (15 volatile organics, 10 acid extractables, 15 base neutrals). This analytical list is collectively referred to as HSL plus 40. The inorganics which were detected included aluminum, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, silver, sodium, vanadium, and zinc. Organics detected included toluene and carbon disulfide (Table 2-3). Pesticides and PCB's were not detected.

Cadmium was detected between 1.3 ppm and 36 ppm. The average concentration for cadmium in soils in the eastern United States is 1 ppm. Zinc, copper, lead, mercury and nickel were detected above the average concentration for each respective metal but within the typical concentration range for soils in the eastern United States (Table 2-4). Toluene was detected between 0.011 ppm and 0.022 ppm which is below the TCLP Alternative Guidance Value of 100 ppb listed in NYSDEC Stars Memo #1 Petroleum-Contaminated Soil Guidance Policy dated August 1992. There is no soil standard for comparison of the carbon disulfide.

The source of the fill deposits, distribution and depth within the Tesla Tower Base is unknown. The contaminants present and their actual concentration in the soils can not be established because the soil samples were composited and the samples were not analyzed for the full list of parameters currently required by the NYSDEC. Soil samples were composited and collected to a depth of 20 feet, therefore, the distribution of contaminants to 20 feet and below 20 feet has not been established.

2.7.9 Injection Wells

The injection wells are an area of potential concern because the historical usage and composition of sludge and soils within injection wells at the site which includes sanitary septic pools and storm water drywells has not been documented. There is no record of spills into injection wells with the exception of SW-9, SW-10 and DW-9. SCDHS sampling of injection wells SW-9 and SW-10 revealed the presence of toluene. The likely source of the toluene in SW-9 and SW-10 is the sink in the former wastewater treatment plant laboratory.

On July 23, 1981 the influent line to the wastewater treatment plant ruptured during upgrade of the wastewater treatment plant. The rupture occurred under what is now the north end of the wastewater treatment plant (Building #14) and resulted in a spill of 3,000 gallons of the influent. This flowed onto the surface and into DW-9. Approximately 330 gallons of the spill were recovered from storm drain

DW-9 and returned to the treatment plant. The remainder of the spill was absorbed by surface soils and/or evaporated. A composite soil sample from grade to two feet below grade from four locations was collected around the edge of DW-9 during the Phase II Investigation in 1986. The four composite soil samples were combined into a single composite sample and analyzed for arsenic, barium, cadmium, chloride, copper, cyanide, iron, lead, mercury, MBAS, nickel, pH, phenols, selenium, silver, sulfate, EP Toxicity 8 RCRA metals, and volatile organics by EPA Method 8010/8020.

Inorganics detected include arsenic, barium, cadmium, copper, iron, lead, nickel, selenium, and silver. Volatile organics were not detected (Table 2-3). The inorganics detected had concentrations below average values typical for soils in the eastern United States (Table 2-4).

Prior to the implementation of the RI, injection wells SW-9, SW-10 and DW-9 along with 16 other injection wells on-site will be closed. The 16 injection wells plus SW-9, SW-10 and DW-9 include storm water catch basins, sanitary septic tanks and cesspools. The locations of the injection wells are presented in Figure 2-2. The injection wells will be closed per Title 40 of the Code of Federal Regulations (CFR) Parts 144.6 and 146.5 (underground injection wells) in accordance with the Suffolk County Department of Health Services (SCDHS) guidance document entitled "Guidelines for Minimal Equipment and Procedures for Pumping out Industrial Waste Pools" dated May 10, 1990. In addition, to meet NYSDEC Superfund program requirements, all samples will be analyzed for a broader list of parameters than required by the SCDHS.

The Work Plan entitled "Work Plan for Closure of Class V Injection Wells, Agfa Division of Miles Inc., Shoreham, New York facility, Site I.D. #1-52-031", describes the closure program and endpoint sampling. The endpoint soil sample results will be used to determine if any of the injection wells should be included in the RI.

2.7.10 Emulsion Building Sump

The Emulsion Building Sump is an area of potential concern because from approximately 1965 to 1979 it was used as a central collection point for waste water and sludge. The location of the Emulsion Building Sump is shown in Figure 2-2. The wastewater and sludge was collected at the sump prior to treatment and discharge into the Northern Recharge Basins. The Emulsion Building Sump is estimated to have measured approximately 6 feet by 5 feet wide and 5 feet deep and was open bottomed. During construction of the Main Plant Structure in 1980, a large foundation footing was constructed immediately next to the former Emulsion Building Sump. Excavation for the footing extended into the area of the Emulsion Building Sump and thereby disturbed it and possibly removed it. The Emulsion Building Sump, if present, would currently be located under nine inches of reinforced concrete.

A composite soil sample of soils from grade to 14 feet below grade was collected in the former location of the Emulsion Building Sump during the Phase II Investigation in 1987. The composite soil sample was analyzed for total arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and EP Toxicity for 8 RCRA metals. Inorganics detected included barium, cadmium, chromium, lead, and silver (Table 2-3). Cadmium was the only inorganic detected above average values typical for soils in the eastern United States (Table 2-4). Cadmium was detected at 9.2 ppm while the average concentration for cadmium in soils in the eastern United States is 1 ppm.

The contaminants present and their actual concentration in the soils cannot be established because the samples were composited and because the samples were not analyzed for the full list of parameters currently required by the NYSDEC.

2.7.11 Three Former Fuel Oil Underground Storage Tank Locations

The three former UST locations (UST#6, UST#7, UST#9) are areas of potential concern because endpoint samples collected beneath the tanks contained elevated petroleum hydrocarbon as described in Section 2.3.3. of this Work Plan.

A NYSDEC letter dated October 16, 1992 has requested additional investigatory work at UST location 6, 7, and 9 because of elevated total petroleum hydrocarbons in the endpoint samples at these UST locations.

2.7.12 Main Plant Structure, Wastewater Treatment Plant, Two Storage Sheds

These structures are areas of potential concern because documentation and sampling has not been performed to demonstrate that contaminants are not present. There is no records of contaminant spills in the Main Plant Structure, wastewater treatment plant, or the two storage sheds collectively referred to as "buildings". The buildings have been cleaned and decommissioned as outlined in Section 2.2.3.1 of this Work Plan, however, a comprehensive audit of every room within the buildings has not been conducted to document that there are no areas of potential concern.

Specifically within the Main Plant Structure several areas of potential concern have been identified. Inspection of the Main Plant Structure has revealed concrete lined sumps and floor drains. The locations of these sumps and floor drains are shown on Figure 2-2. These sumps and floor drains are being inspected during the injection well closure program prior to the implementation of the RI to ensure that these sumps do not have any openings that could have permitted liquids to enter into the underlying soils. If the integrity of the sumps is found to be compromised, the appropriate sumps will be investigated as part of the RI.

2.7.13 Water Meter Room Pit

The Water Meter Room Pit is an open bottomed pit located in Building #18 water meter room, (Figure 2-2) measuring approximately 3 feet square by 3 feet deep. The Water Meter Room Pit is an area of potential concern because a series of pipes including boiler blow down pipes terminate in the Water Meter Room Pit and the area has never been investigated for the presence of contamination.

2.7.14 Groundwater

Groundwater is an area of concern because it is potentially impacted by leaching of contaminants from soils at the 19 other areas of potential concern, in addition, historical sampling of the three existing groundwater monitoring wells installed during the Phase II investigation revealed the presence of slightly elevated levels of contaminants. Groundwater sampling was conducted September 3, 1986, April 2, 1987 and November 4, 1987 (Table 2-5). Results from this sampling indicate that upgradient monitoring well MW-1 contained measurable concentrations of arsenic, barium, chromium, copper, lead, and phenol. Arsenic, chromium, lead and phenol concentrations in MW-1 were above NYSDEC Class GA groundwater standards for these constituents. The downgradient wells, MW-2 and MW-3, contained measurable concentrations of barium, cadmium, copper, and lead and phenol. Cadmium and phenol were detected above the NYSDEC Class GA groundwater standard downgradient of the site. The downgradient monitoring wells contained no arsenic or chromium and the concentrations of copper and lead were lower than in the upgradient well MW-1. The presence of contaminants in the upgradient well could be attributed to off-site sources such as the former dog kennel located to the south of the site.

In addition to the metals listed above, downgradient monitoring well MW-3 also contained minor concentrations of benzene (2 ppb), chloroform (1 ppb), ethylbenzene (1 ppb), vinyl chloride (1 ppb) and 1,1,1 trichloroethane (1 ppb). In one sampling event, September 3, 1986, concentrations of phenol were detected in well MW-3, however, subsequent groundwater samples collected on April 2, 1987 and November 4, 1987 did not contain detectable phenols.

The most recent water quality analytical data reviewed for the Briarcliff Road well field, located approximately 600 feet to the northwest of the site is from May, 1992 (Table 2-5). These data show that all analyzed constituents are below NYSDOH drinking water guidelines, as well as the NYSDEC Class GA groundwater standards.

The distribution of contaminants in groundwater has not been established. The vertical distribution of contaminants within groundwater is not documented. Vertical downward migration of contaminants may have occurred due to the mounding effect of the recharge basins and/or the pumping of groundwater from the Briarcliff Road well field.

Groundwater flow direction is not conclusively known and may vary from the direction indicated by the three existing monitoring wells. If flow direction is different than indicated by the existing three wells then the water quality that these wells monitor may not be indicative of water quality downgradient of potential areas of concern. Water quality is not documented beneath areas of potential concern including Tesla Tower Base and the North Recharge Basins. Upgradient groundwater quality also is not documented.

TABLE 2-5
SUMMARY OF GROUND WATER QUALITY DATA: DETECTED PARAMETERS
PHASE II SITE INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

SAMPLE LOCATION	MW-1			MW-2			MW-3	AGFA SUPPLY WELL S-65293	AGFA SUPPLY WELL S-56126	BRIARCLIFF ROAD WATER SUPPLY S-08265	
SAMPLE DATE	09/03/86	04/02/87	11/04/87	09/10/86	04/02/87	11/04/87	11/04/87	11/04/87	11/04/87	11/04/87	5/27/92
ORGANICS (1)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Benzene	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	2.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
Chloroform	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)
Ethyl Benzene	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
Phenol	4.00	ND (1.00)	ND (1.00)	2.50	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	NA
Vinyl Chloride	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
1,1,1-Trichloro ethane	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
INORGANICS (EPA Analysis Method)											
Arsenic (206.3)	30.00	ND (5.00)	19.00	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (20.00)
Barium (208.2)	240.00	110.00	25.00	80.00	70.00	100.00	50.00	ND (50.00)	ND (50.00)	ND (50.00)	ND
Cadmium (213.2)	4.00	2.00	ND (1.00)	17.00	8.00	9.00	15.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (2.00)
Chloride (4500CIB)	50000.00	24000.00	13000.00	63000.00	44000.00	46000.00	23000.00	7000.00	7000.00	13000.00	16000.00
Chromium (218.1)	NA	NA	60.00	NA	NA	ND (20.00)	ND (20.00)	20.00	ND (20.00)	ND (20.00)	ND (10.00)
Copper (220.1)	130.00	40.00	90.00	ND (20.00)	20.00	30.00	ND (20.00)	ND (20.00)	ND (20.00)	150.00	ND (100.00)
Iron (236.1)	55000.00	7000.00	43000.00	860.00	1900.00	8900.00	7400.00	360.00	400.00	200.00	NS (100.00)
Lead (239.3)	52.00	26.00	52.00	ND (5.00)	ND (5.00)	10.00	10.00	ND (5.00)	ND (5.00)	7.00	1.00
MBAS (425.1)	ND (1.00)	140.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND
Mercury (245.1)	ND (1.00)	ND (1.00)	ND (1.00)	0.34	ND(0.50)	ND(0.50)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND
Nitrate (351.3)	5900.00	5900.00	4300.00	5700.00	3900.00	3300.00	2800.00	500.00	500.00	1300.00	2000.00
pH (150.1)	NA	5.80	5.80	7.00	6.50	6.40	6.00	6.00	6.00	6.00	6.10
Silver (272.1)	ND (10.00)	10.00	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)
Sulfate (375.4)	22000.00	30000.00	34000.00	40000.00	32000.00	41000.00	27000.00	16000.00	16000.00	19000.00	14000.00

ND (XX.XX) = Not Detected (method detection limit, if reported, in ppb)
NA = Not Analyzed
(1) = Organics analyzed by EPA method 601/602

3.0 SCOPING OF RI/FS

3.1 RI/FS Objective

The objective of the RI/FS process is to collect information of sufficient nature and quality to support informed risk management decisions regarding which remedy appears to be most appropriate for a given site. To achieve that objective, this Work Plan has been prepared in accordance with USEPA's guidance document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", October, 1988, as wells as appropriate NYSDEC's guidance documents.

The appropriate level of analysis to meet this objective can only be reached through constant strategic thinking and careful planning concerning the essential data needed to reach a remedy selection decision. As hypotheses are tested and either rejected or confirmed, adjustments or choices as to the appropriate course for further investigations and analyses are required. These choices, like the remedy selection itself, involve the balancing of a wide variety of factors and the exercise of best professional judgement.

Due to the lack of data and the lack of detection of impacts from the site waste handling/disposal activities, a phased (e.g., three phases) approach in implementing the RI/FS is proposed. The results of the Phase 1 RI outlined in Sections 3.3.1 through 3.3.13 will determine whether the Phase 1 monitoring well and soil boring network is sufficient to address the majority of the objectives of the RI. The data gaps that exist at the completion of the Phase 1 RI will be addressed in the Phase 2 RI and, if appropriate, in the Phase 3 RI.

3.1.1 Risk Assessment Data Needs

This section summarizes the risk assessment data that are necessary to meet the risk assessment objectives for performing an RI/FS at the site.

Risk assessment data needs were identified by reviewing the existing data from the site. The risk assessment data needs for the site are derived from the need to accurately assess source-receptor relationships. The greatest potential for human exposure to contaminants at the site appears to be through the transport of contaminants in groundwater and the ingestion of contaminated soils.

To perform an environmental risk assessment for the site, it is necessary to characterize the following:

- Types, concentration and distribution of contaminants in the soils within each of the areas of potential concern.
- Groundwater quality both on-site and downgradient off-site.
- Groundwater flow patterns with respect to the areas of concern on the site and with respect to potential receptors.
- Potential leaching of contaminants from soils into the groundwater.
- Extent of potential airborne volatile organics on and in the vicinity of the site.

Data requirements for performing the risk assessment for the site include the following:

- Sampling and analysis of soils to determine the types, concentration and distribution (vertical and horizontal) of contaminants in each of the areas of potential concern.
- Sampling and analysis of groundwater to determine types, concentration and distribution of contaminants both on-site and downgradient off-site in the groundwater.
- Identification and characterization of receptors potentially at risk.
- Identification and characterization of pathways of potential exposure.

A range of activities and personnel will be utilized in order to achieve the objectives outlined above.

3.1.2 Preliminary Scoping of Remedial Technologies and Process Options

In this section, potential remedial technologies and process options are identified and screened according to their overall applicability (technical implementability) to the media (soils, groundwater, air), primary contaminants, and conditions present at the site (sand and gravel aquifer). This identification is not meant to be a detailed investigation of alternatives, but rather to ensure that data needed to evaluate them can be collected as efficiently as possible.

Potential remedial action technologies of the site could include but not limited to no-action, institutional controls, soil removal and disposal, soil fixation, in-situ treatment of soils and groundwater, groundwater removal and treatment, as well as a variety of physico-chemical treatment options for groundwater.

3.1.3 Engineering Data Gaps

Engineering data are mainly needed for two purposes:

- Determine and evaluate feasible remedial alternatives and
- Design the final site remedy.

As was stated earlier, potential remedial action alternatives at this site include, among others, soil removal and disposal, soil fixation, extraction and treatment of groundwater. Therefore potential engineering data gaps include groundwater fouling data (pH, iron content, calcium carbonate, etc.), soil geotechnical and physicochemical properties, metal leaching potential, volume of affected soils, etc.

If data is collected during the Phase 1 RI that suggest that potential remediation of the soils or groundwater is needed, potential remedial action alternatives will be evaluated. Based on the potential remedial actions identified, engineering data gaps will become apparent and the data needs to fill the engineering data gaps will be collected in the subsequent Phase 2 or Phase 3 RI.

There are some general engineering data gaps that exist pertaining to assessing fate and transport of contaminants in soil and groundwater. These data gaps include moisture content, specific gravity, total organic carbon content, bulk density, permeability, particle size distribution, consolidation and compaction properties of soils and ion exchange capacity. The data needed to fill these data gaps will be gathered during the Phase 2 RI.

3.2 Identification of Data Requirements

3.2.1 Determination of Standards, Criteria, and Guidelines (SCGs)

Remedial action objectives are being developed in the RI to be protective of human health and the environment and to comply with the applicable SCGs. This section summarizes the preliminary lists of Federal and NYSDEC SCGs identified for the site. The SCGs identified in Tables 3-1 through 3-4 will be refined and revised throughout the RI process to take into account actual site conditions and potential remedial actions. The appropriate NYSDEC guidance documents (such as the Technical and Administrative Memorandums (TAGMs) and the Technical and Operating Guidance Series (TOGS) documents) as well as the USEPA Guidance document entitled "CERCLA Compliance with Other Laws Manual" (USEPA, 1988) were used as a reference for all of the SCGs definitions given in the following sections.

SCGs are used to determine the appropriate extent of site cleanup, to scope and formulate remedial action alternatives, and to govern the implementation and operation of the selected action. Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require that remedial actions under CERCLA comply with federal standards, requirements, criteria, or limitations that are legally applicable to hazardous substances of the site, or relevant and appropriate under the circumstances of the releases or threatened release of such hazardous substances. New York State requirements must also be attained under Section 121 (d)(2)(c) of CERCLA, if they are legally enforceable and consistently enforced statewide. Under Section 121(d)(4) of CERCLA, requirements may be waived by USEPA under six specific conditions, provided that protection of human health and the environment is still assured.

TABLE 3-1

POTENTIAL CHEMICAL-SPECIFIC SCGs
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Medium/ Authority	Requirement	Status	Requirement Synopsis	Consideration at the Peerless Photo Products, Inc. Site
Groundwater				
Federal Requirements	MCLs promulgated under the Safe Drinking Water Act	Relevant and Appropriate	Set limits on certain carcinogenic and non-carcinogenic substances in public drinking water.	Used to evaluate site impacts on potential groundwater use.
State Regulatory Requirements	NYSDEC Safe Drinking Water Act	Applicable	NYSDEC SDWA sets forth standards at least as stringent as the National PDWR.	Used to evaluate chemical concentrations in groundwater.
Air				
Federal Regulatory Requirements	CAA-National Air Quality Standards (NAQS) - 40 CFR 50	Applicable	These standards were primarily developed to regulate stack and automobile emissions.	Standards for particulate matter will be used when assessing excavation and emission controls for excavation.
State Regulatory Requirements	NYSDEC Air Pollution Control Regulations	Applicable	These standards were primarily developed to regulate point source emissions and emmissions during remedial actions.	See above.
Federal Criteria, Advisories, and Guidance	Threshold Limit Values (TLVs)	To be Considered	These standards were issued as consensus standards for controlling air quality in the work place environment.	TLVs could be used for assessing site inhalation risks for soil removal operations.

TABLE 3-2

POTENTIAL GROUNDWATER SCGs
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Compound	Maximum Groundwater Concentration (ug/l)	Groundwater (ug/l) (1)	Drinking Water (ug/l) (2)	Drinking Water (ug/l) (3)
Aluminum	NA	-	-	100
Antimony	NA	3	-	3
Arsenic	30	25	50	190
Barium	240	1,000	1,000	-
Cadmium	17	10	10	-
Chromium	60	50	50	-
Copper	130	200	1000	-
Iron	55,000	300	300	300
Lead	52	25	15	-
Magnesium	NA	-	-	3500
Manganese	ND	300	300	-
Mercury	0.34	2	2	0.2
Nickel	NA	-	-	-
Selenium	NA	10	10	1.0
Silver	10	50	50	0.1
Zinc	ND	300	5000	30
Benzene	2	0.7	5	-
Ethylbenzene	1	5	-	-
Chloroform	1	7	-	-
Phenol (total)*	0.004	1	-	-
Toluene	ND	5	-	-
1,1,1 Trichloroethane	1	5	5	-
Vinyl chloride	1	2	2	-
Xylenes (total)	5	5	5	-

(1) 6 NYCRR 703.5(a)(3) Groundwater Standards for Class GA Waters, September, 1991
(2) 10NYCRR Subpart 5-1 Standards for Drinking Water Supplies.
(3) 40CFR 141.11 Standards for Public Drinking Water Systems.

NA - Not Analyzed
ND - Not Detected
* - Based on hardness of 144 mg/liter.

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TABLE 3-3

POTENTIAL ACTION-SPECIFIC SCGs
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031

September 30, 1993

Potential Remedial Action(s)	SCGs	Status	Requirement Synopsis
All	Superfund Amendments and Reauthorization Act (SARA)	Applicable	One of the main requirements of SARA is that the EPA should pursue permanent remedial solutions (destruction, detoxification, or treatment of hazardous substances) whenever possible.
All	OSHA-General Industry Standards (29 CFR S1910)	Applicable	These regulations specify the eight-hour time-weighted average concentration for worker exposure to various organic compounds. Training reequirements for workers at hazardous waste operations are specified 29 CFR 1910.120.
All	OSHA-Safety and Health Standards (29 CFR S1926)	Applicable	The regulation specifies the type of safety equipment to be used and procedures to be followed during site remediation.
All	Resource Conservation and Recovery Act (RCRA), RCRA Subtitle c, 40 CFR 260	Applicable	RCRA regulates the generation, transport, storage, treatment, and disposal of hazardous waste. CERCLA specifically requires (in Section 104(c)(3)(B)) that hazardous substances from removal actions be disposed of at facilities in compliance with Subtitle C of RCRA.
All	OSHA - Record keeping, Reporting, and Related Regulations (29 CFR S1904)	Applicable	This regulation outlines the record keeping and reporting requirements for an employer under OSHA.
All	Intergovernmental Review of Federal Program. Executive Order 12372 and 40 CFR S29 (replaces state and area-wide coordination process required by OMB Circular A-95).	Applicable	Requires state and local coordination and review of proposed EPA assisted projects. The EPA administrator is required to communicate with State and local officials to explain the project, consult with other affected Federal agencies, and provide a comment period for state review.
All	RCRA-Standards for Owners Operators of Permitted Hazardous Waste Facilities (40 CFR S264.10 - S264.8)	Relevant and Appropriate	General facility requirements outline general waste analysis, security measures, Inspections, and training requirements.
All	RCRA - Preparedness and Prevention (40 CFR S264.30 - S264.31).	Relevant and Appropriate	This regulation outlines requirements for safety equipment and spill control.
All	RCRA - Contingency Plan and Emergency Procedures (40 CFR S264.50 - S264.56)	Relevant and Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc.
All	RCRA - Groundwater Protection (40 CFR S264.90 - S264.100)	Relevant and Appropriate	This regulation details requirements for a groundwater monitoring program to be installed at a hazardous waste facility.
All	RCRA - Closure and Post Closure (40 CFR S264.110 - S264.120)	Relevant and Appropriate	This regulation details specific requirements for closure and post-closure of hazardous waste facilities.

TABLE 3-3 (CONTINUED)
POTENTIAL ACTION-SPECIFIC SCGs
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Potential Remedial Action(s)	SCGs	Status	Requirement Synopsis
Capping-Waste in Place	RCRA - Landfills (40 CFR S264.310(a))	Applicable	Placement of a cap over waste requires a cover designed and constructed to: - Provide long-term minimization of migration of liquids through the capped area; - Function with minimum maintenance; - Promote drainage and minimize erosion or abrasion of the cover; - Accommodate settling and subsidence so that the cover's integrity is maintained; - Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.
	RCRA - Landfills (40 CFR S264.310(a))	Applicable	Prevent run-on and run-off from damaging cover.
Clean Closure (Removal)	RCRA - General Standards (40 CFR S264.111)	Relevant and Appropriate	General performance standard requires minimization of need for further maintenance and control; minimization or elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products. Also requires disposal or decontamination of equipment, structures, and soils.
	RCRA - Manifesting, Recordkeeping and Reporting	Applicable	This regulation specifies the recordkeeping and reporting requirements for RCRA facilities.
	RCRA - Manifesting, Recordkeeping and Reporting (40 CFR S264.70 - S264.77)	Applicable	This regulation specifies the recordkeeping and reporting requirements for RCRA facilities.
Ground Water and Surface Water Monitoring	RCRA - Ground Water Protection (40 CFR S264.97)	For Ground Water, Relevant and Appropriate; for Surface Water, To Be Considered	General requirements for groundwater monitoring at a hazardous waste facility.
Construction and Operation of On-site Landfill	RCRA - Landfills	Applicable	Regulates the design, construction, operation, and closure of hazardous waste landfills.
	RCRA Land Ban (40 CFR S268, Subpart D)	Applicable	Placement on or in land outside unit boundary or area of contamination triggers land disposal requirements and restrictions. Also requires treatment by Best Demonstrated Available Technology (BDAT) before placement.

TABLE 3-3 (CONTINUED)
POTENTIAL ACTION-SPECIFIC SCGs
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Potential Remedial Action(s)	SCGs	Status	Requirement Synopsis
Land Disposal	Hazardous and Solid Waste Amendments of 1984 (1984 Amendments to RCRA) PL 98-616, Federal Law 71:3101	Applicable	Specific wastes are prohibited from land disposal under the 1984 RCRA Amendments. This includes a ban on the placement of wastes containing free liquids. Also, solvent-containing wastes are prohibited from land disposal, effective November 1986. EPA is also required to set treatment levels or methods, exempting treated hazardous wastes from the land disposal ban. To date, these treatment standards have not been promulgated. The RCRA amendments will also restrict the landfilling of most RCRA-listed wastes by 1991 unless treatment standards are specified.
On-site Water Treatment and Discharge	National Pollutant Discharge Elimination System (NPDES) (40 CFR S122)	Relevant and Appropriate	Regulates the discharge of water into public surface waters. Major requirements are: ■ Use of best available technology (BAT) economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants. Technology-based limitations may be determined on a case-by-case basis. ■ Applicable Federally approved State water quality standards must be complied with. These standards may be in addition to or more stringent than other Federal standards under the CWA. ■ The discharge must conform to applicable water quality requirements when the discharge affects a state other than the certifying state. ■ The discharge must be consistent with the requirements of a Water Quality Management Plan approved by EPA. ■ Discharge limitations must be established for all toxic pollutants that are or may be discharged at levels greater than that which can be achieved by technology-based standards. ■ Discharge must be monitored to assure compliance. Dischargers will monitor: - The mass of each pollutant. - The volume of effluent. - Frequency of discharge and other measurements as appropriate. ■ Approved test methods for waste constituents to be monitored must be followed. Detailed requirements for analytical procedures and quality controls are provided. ■ Permit application information must be submitted, including a description of activities listing of environmental permits, etc. On-site discharges to surface waters are exempt from procedural NPDES permit requirements. (Section 121 of SARA exempts on-site CERCLA activities from obtaining permits. However, the substantive requirements of the permit must be met). Off-site discharges would be required to apply for and obtain a NPDES permit. ■ Monitor and report results as required by permit (minimum of at least annually). ■ Comply with additional permit conditions such as: - Duty to mitigate any adverse effects of any discharge; and - Proper operation and maintenance of treatment systems.
	Fish and Wildlife Coordination Act USC S661 et. seq.	Applicable	This act requires that before undertaking any Federal action that causes the Act 16 modification of any body of water or affects fish and wildlife, the following agencies must be consulted: the appropriate State agency exercising jurisdiction over Wildlife Resources and the U.S. Fish and Wildlife Service.
Off-site Discharge to POTW	Clean Water Act (CWA) (40 CFR S403)	Applicable	These regulations control the discharge of contaminated water to POTW's. The same regulations apply regardless of whether remedial action discharges into the sewer or trucks waste to the POTW. Point of reference is entry of pollutants into treatment system at the POTW. Some of the major requirements of these regulations are:

TABLE 3-3 (CONTINUED)

POTENTIAL ACTION-SPECIFIC SCGs
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031

September 30, 1993

Potential Remedial Action(s)	SCGs	Status	Requirement Synopsis
			■ Pollutants that pass through the POTW without treatment, interfere with POTW operation, or contaminate POTW sludge are prohibited. ■ Specific prohibitions preclude the discharge of pollutants to POTWs that: - Create a fire or explosion hazard in the POTW; - Are corrosive (pH < 5.0); - Are discharged at a flow rate and/or concentration that will result in interference; - Increase the temperature of wastewater entering the treatment plant that would result in interference, but in no case raise the POTW influent temperature above 104 degrees F (40 degrees C). ■ If a leachate collection system is installed and the discharge is sent to a POTW, the POTW must have an approved pretreatment program, the collection leachate runoff must be in compliance with the approved program. Prior to discharging, a report must be submitted containing identifying information, list of approved permits, description of operation, flow measurements, measurement of pollutants, certification by a qualified professional, and a compliance schedule.
	RCRA - General Standards (40 CFR S264.71 and S264.72)	Relevant and Appropriate	RCRA permit-by-rule requirements must be complied with for discharge of RCRA hazardous wastes to POTWs by truck, rail, or dedicated pipe.
Excavation	CAA - NAAQS for Total Suspended Particulates and (40 CFR S129.105, S129.750)	Relevant Appropriate	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter. Fugitive dust emissions from site excavation activities must be maintained below 260 ug/m^3 (primary standard).
	Land Ban (40 CFR S268 - Subpart D)	Applicable	After 8 November, 1988, movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions.
Off-Site Treatment and Disposal	DOT rules for Hazardous Materials Transport (49 CFR, Parts S107, S171.1-S171.500)	Relevant and Appropriate	Regulates the transport of hazardous materials to off-site treatment and disposal facilities.
	RCRA Hazardous Waste	Relevant	Regulates the transport of hazardous materials to off-site treatment and disposal facilities.
All	New York State Environmental Conservation Law Chapter 3, Title 6, Parts 256 - 260, Part 263, Parts 371 - 375, Parts 703 - 705	Applicable	NYS, Laws on RCRA, CERCLA, State Superfund, CWA, Solid Waste, etc.

TABLE 3-4

ACTION SPECIFIC REQUIREMENTS: AIR EMISSION ACTION LIMITS
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1992

COMPOUND	AVERAGING TIME	ACTION LIMIT
Benzene	One Hour	6 ug/m^3
Toluene	"	7,500 ug/m^3
Xylene	"	8,700 ug/m^3
1,1,2 Trichloroethane	"	1,100 ug/m^3
Chloroform	"	200 ug/m^3
Tetrachloroethylene	"	6,700 ug/m^3
Dichloromethane	"	3,500 ug/m^3
Carbon Tetrachloride	"	250 ug/m^3
Vinyl Chloride	"	260 ug/m^3
PCBs	"	0.02 ug/m^3
Particulates	15 Minutes	150 ug/m^3*
Total Hydrocarbons	Instantaneous	5 ppm

* If upwind particulate concentrations plus 100 ug/m3 result in downwind concentrations exceeding 150 ug/m3, and this is due to high upwind levels, the on-site coordinator is authorized to permit the restart of remediation activities.

3.2.1.1 Definition of SCGs

NYSDEC and USEPA have indicated that specific SCGs must be identified for each site. The full and final compilation of SCGs will be accomplished during the RI. The preliminary list of SCGs which may be included are as follows:

- Any legally applicable, or relevant and appropriate standard, requirement, criterion, or limitation under federal environmental law.
- Any legally applicable, or relevant and appropriate promulgated standard, requirement, criterion or limitation under New York State environmental or facility-siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation.

Any requirement may be either "applicable" or "relevant and appropriate" to a site-specific remedial action. Definitions of the two types of SCGs, as well as other "to be considered" (TBC) criteria, are given below:

- "Applicable requirements" are promulgated cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations that are generally enforceable under federal or state law, and specifically address a hazardous substance, remedial action, location, or other site-specific condition. An example of an applicable requirement would be groundwater standards, since New York State has promulgated and enforced such standards.
- "Relevant and appropriate requirements" are federal and state standards, criteria, or limitations that are not legally applicable to the site, yet they address problems sufficiently similar (relevant) to those found at the site, that their use is well suited (appropriate) to the particular site. Requirements must be relevant to those found at the site, and their use well suited (appropriate) to the particular site. Requirements must be relevant and appropriate to be an SCG.
- TBC criteria are advisories or guidelines issued by the federal or state government (e.g., Reference Doses, Carcinogenic Potency Factors, USEPA Drinking Water Health Advisories) that are non-promulgated, non-enforceable criteria and do not have the status of potential SCGs. However, where specific SCGs are not available, TBC guidelines or advisories may be useful for developing remedial action, or necessary for determining the level of cleanup for protection of human health and/or the environment.

As was mentioned above, Section 121(d)(4) of CERCLA allows the EPA to approve a selection of a remedial alternative that will not attain all SCGs if any of six conditions for a waiver of SCGs exists. These conditions are as follows:

- The remedial action selected is only a part of a total remedial action where the final remedy will attain the SCG upon completion;
- Compliance with an SCG will result in a greater risk to human health and the environment than alternative options;
- Compliance with an SCG is technically impractical from engineering perspective;
- An alternative remedial action will attain an equivalent standard of performance through the use of another method or approach;
- The SCG is a New York State requirement that the State has not consistently applied (or demonstrated the intent to apply consistently) in similar circumstances; or
- For §104 Superfund-financed remedial actions, compliance with the SCG will not provide a balance between protecting human health and the environment and the availability of Superfund money for response at other facilities.

In addition to governing response actions at the site, SCGs may also dictate other aspects of the RI/FS process. For example, some of the Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act (SDWA) are below the Contract-Required Detection Limits of the EPA's Contract Laboratory Program or the NYSDEC's Analytical Sampling Protocol (ASP). Thus, routine analytical services may be inadequate to indicate compliance or acceptance of the SCG. Therefore, it is often necessary that SCGs be considered during the specification of contaminants-analytical methods. In light of the above, SCGs will be considered at four points during the RI/FS process. (1) Field Investigation; (2) Public Health and Environmental Risk Assessment; (3) Remedial Alternatives Screening; and (4) Remedial Alternatives Evaluation.

3.2.1.2 Identification of Potential SCGs

In this section, potential SCGs are identified and discussed for the site. SCGs fall into three broad categories, based on the manner in which they are applied at a site. These categories are as follows:

- Chemical-specific (i.e., requirements that set protective cleanup levels for the contaminants of concern, or indicate an acceptable limit of discharge associated with a remedial action). These SCGs govern the extent of site cleanup;

- Location-specific (i.e., requirements that restrict remedial actions based on the characteristics of the site or its immediate environment). These SCGs are considered in view of natural or manmade site features. Examples of natural site features include wetlands. Examples of manmade features are the presence of historic districts; and

- Action-specific (i.e., requirements that set controls or restrictions on the design, implementation, and performance levels of activities related to the management of hazardous wastes or contaminants). These SCGs pertain to the implementation of a given remedy.

To be consistent with NCP, SARA requirements and NYSDEC requirements, the following four categories are considered during identification of potential SCGs:

- Federal requirements - applicable, or potentially relevant and appropriate;
- New York State requirements - as applicable, or potentially relevant and appropriate;
- Federal criteria, advisories, and guidance documents to be considered; and
- New York State criteria, advisories, and guidance to be considered.

Where appropriate, the NYSDEC draft document, "Cleanup Policy and Guidelines", dated October 1991, will serve as guidance. The preliminary development of SCGs for the site is summarized in the following sections. The SCGs will be evaluated in terms of their applicability, relevance, and appropriateness to each of the remedial action alternatives under consideration at the site.

The effects of remedial alternatives on air quality will be assessed to determine compliance with applicable New York State and federal regulations. The effects of implementing the remedial alternatives on terrestrial and aquatic species will have to be evaluated to ensure compliance with applicable regulations pertaining to fish, wildlife and endangered species.

3.2.1.3 Chemical-Specific SCGs

This section presents a summary of federal and New York State chemical specific SCGs identified for the site. Chemical-specific SCGs are health-based, risk-based, or technology-based concentration limits that set protective levels for chemicals of concern or classes of chemicals in a designated medium, or indicate an acceptable amount or concentration that can be discharged to the ambient environment. These chemical-specific SCGs may include such standards as MCLs under the SDWA and NYSDOH Public Health Law Standards and Water Quality Criteria (WQC), both federal and New York State, under the Clean Water Act. MCLs and NYSDOH standards are legally applicable to public water supplies serving 25 people or more. A summary of regulations and publications containing potential chemicals-specific SCGs related to groundwater and air is presented in Table 3-1. Surface water is not included, as the closest surface water body is the Long Island Sound which is located one mile to the north of the site and is not a drinking water supply.

Chemical-Specific Groundwater SCGs

The NYSDEC has promulgated groundwater standards under 6 NYCRR 703.5. The NYSDOH applies standards at the point of use. These standards are the New York State MCLs. According to the NCP, cleanup levels for groundwater which are used or could be used for drinking water supply are to be Maximum Contaminant Level Goals (MCLGs), where the MCLG is zero or MCLs (40 CFR 141.61) are to be used. A preliminary list of New York State and federal MCLs for the chemicals used on-site and detected in soil or groundwater at the site are presented in Table 3-2.

The new NYSDEC strategy specifies that the ultimate goal for cleanup of groundwater shall be pre-release. If return to background conditions is technologically impossible, or would cause more harm than the existing condition, the requirements are to be protective of health (primary or secondary MCLs, or risk-based limits) and the environment. If this is not achievable, the requirement will be cleanup of groundwater to levels as close as possible to those limits.

If an MCL does not exist and has not been proposed for a contaminant, then the clean-up standards will be based on human health risk assessment. Remediation goals established using this procedure are sometimes below analytical detection limits for a contaminant. In these cases, the clean-up level is often set at the minimum concentration at which the laboratory can confidently quantify the concentration. This is typically approximately three times the analytical detection limit. In the case of the site, hydrogeologic characteristics may affect the exposure pathways. Therefore, a groundwater risk assessment to determine actual exposure pathways and the risk levels at critical receptors will be performed.

During the course of this RI/FS, the effects of each remedial alternative on groundwater will be assessed to determine compliance with SCGs. Table 3-2 provides a comparison of maximum contaminant concentrations detected in the groundwater under existing conditions to applicable water quality standards and criteria.

Chemical-Specific Soil SCGs

Currently, there are no generally enforceable federal or NYSDEC cleanup levels for metals or organics in soil. There is a draft NYSDEC "Cleanup Policy and Guidelines" document that has been published for public review and comment that summarizes New York State cleanup policy and guidelines. Based on that NYSDEC document, cleanup levels for metals or organics in soil are typically determined on a case-by-case basis depending on the migration pathways and exposure potential at the site. NYSDEC TAGM #HWR-92-4046 provides a basis and procedure for determining soil cleanup levels at Federal Superfund and New York State Superfund sites. According to this TAGM, where groundwater is the primary migration pathway, the cleanup level for metals and organics in soils can be based on the leachable concentration of the contaminants, such that leachate from these materials will not cause groundwater to exceed MCLs or health-based levels at the point of exposure. Another cleanup level determination method consists of the use of mathematical partitioning models (such as the Koc-foc model). Presently, there are insufficient data regarding the contaminants nature and partitioning characteristics of contaminants at the site to determine the cleanup levels using this procedure. Only order-of-magnitude estimates can be made using worst-case assumptions.

3.2.1.4 Location-Specific SCGs

Location-specific requirements establish restrictions on remedial activities or limitations on contaminants levels on the basis of site characteristics or the physical characteristics in the immediate vicinity of the site. There are no location specific SCGs applicable to this site. The site is not in a floodplain area, wilderness area or wildlife refuge, within an area affecting a national wild, scenic or recreational river, or a critical habitat upon which endangered or threatened species depend, or near a stream or surface water body and therefore SCGs for these characteristics do not apply.

3.2.1.5 Action-Specific SCGs

Regulations identified as potential Action-Specific SCGs for possible remedial alternatives are presented in Table 3-4. Major requirements for each remedial alternative that passes the initial screening will be discussed in more detail in the FS Section 5.0. Numerous guidance documents prepared by NYSDEC for facilitating compliance with the New York State regulations must be considered, where appropriate, in the evaluation of the remedial alternatives. The primary requirements applicable to the remedial alternatives selected are the air emission requirements for toxic substances as summarized in Table 3-4.

Discharges to surface water or to groundwater typically must comply with the effluent limits specified in a State Pollutant Discharge Elimination System (SPDES) permit. In the case of Superfund sites, only the substantive (non-administrative) aspects of the SPDES permit apply. NYSDEC develops these limits using the human health criteria for toxic substances. If a treated effluent is discharged to a local Publicly Operated Treatment Works (POTW), the effluent must meet the pretreatment guidelines established by the local POTW. At a minimum, this effluent should have a pH no less than 5.

3.2.1.6 Waivers from SCGs

At this time, no specific requirements for waivers have been identified at the site.

3.2.2 Data Quality Objectives

A clear definition of the RI/FS objectives and procedures for collecting data are required to ensure that the data generated during the RI/FS can support the decision-making process for determination of a site remedial plan. Data quality objective (DQOs) are used to help achieve this goal. Relating the end use of the data to the extent and quality of the data to be collected in the RI can be achieved through the use of DQOs. The types, numbers, and locations of samples that will be collected, and the Quality Assurance (QA) levels associated with the analysis help define the DQOs. The DQOs for this project are developed for the entire RI/FS in the Quality Assurance Project Plan (QAPP) (Appendix 3) and for the Phase 1 RI in the Field Sampling and Analysis Plan (FSAP) (Appendix 4). Since this RI/FS will be conducted in a phased approach, the DQO process is applied during scoping and following each data collection activity. Through the application of the DQO process, decisions regarding the need for additional data will be made and subsequent data collective activities will be designed.

The FSAP defines what samples are to be collected, how they are to be collected, how the samples are to be analyzed. Additionally, the FSAP is used to integrate the information requirements of the various RI data users associated with the RI/FS process.

Qualitative and quantitative goals are established by DQOs. These goals include: precision, accuracy, reproductibility, comparability and completeness for each data set. To aid in the decision/conclusion making process based on RI data, DQOs are used to ensure the level of uncertainty associated with data measurement is compatible with the acceptable level of uncertainty for any given data set.

One component of DQOs is the QA levels associated with the analyses being conducted. These QA levels are generally described follows:

1) Screening requires the lowest data quality but the most rapid results and is used for initial site characterization to define further study, and engineering screening of alternatives (pilot scale tests), i.e., on-site field measurements;

2) Field Analysis requires rapid screening results and better quality data than the preceding level. Analysis will include geophysical and soil gas survey data;

3) Engineering requires an intermediate level of data quality and is used for site characterization. Engineering analyses will include contract laboratory program (CLP) analytical laboratory methods, usually without the validation or documentation required by CLP analysis;

4) Conformational requires the highest level of data quality and is used for risk assessment and engineering design. Confirmation analyses require full CLP analytical and data validation procedures; and

5) Analysis by Non-Standard Methods applies to analyses performed in an off-site analytical laboratory that may or may not be a CLP laboratory. Method development or Method modification may be required for specific constituents or detection limits.

3.3 Scoping of Remedial Investigation

This section presents the data needs and technical approach for addressing the data needs at each of the areas of potential concern, including groundwater. Also presented is the technical approach for the Phase 1 RI and conceptual technical approach for the Phase 2 and Phase 3 RI at the site. Data needs are summarized for the entire RI (Phases 1, 2 and 3) and field activities are outlined to address identified data gaps. The scoping effort is presented by area of potential concern so that the rationale and the technical approach for the proposed activities can be presented and evaluated in a more concise manner. All relevant site features (i.e., Tesla Tower Base, North Recharge Basins, etc.) referred to in this section are illustrated in Figure 2-2. A more detailed description of the overall technical aspects of the Phase 1 RI field activities are presented in Section 4.0.

The RI will be conducted in a phased approach so that the data required to address the data gaps can be collected most effectively. Data needs will become more defined as additional data are obtained and evaluated. For instance, a current data need may be to determine if soil contamination is present. If soil contamination is found to extend down to the water table, then a new data need would be to determine if ground water is contaminated. The data needs that are satisfied during each of the three phases is a subset of all the data needs outlined in this section for each area of potential concern. The data needs listed for each area of concern may also be expanded based on data collected in previous phases. The Phase 1 RI scope of work is outlined in this section for each area of concern. The logic for conducting subsequent phases of work in each area of concern is also presented. Table 3-5 summarizes the Phase 1 RI scope of work, Table 3-6 summarizes the anticipated Phase 2 RI scope of work and Table 3-7 summarizes the anticipated Phase 3 scope of work. The following is a description of all the data needs for the areas of concern, a description of the Phase 1 RI scope of work, as necessary, and the logic for conducting subsequent phases of work in each area of concern.

3.3.1 Preliminary Activities

Preliminary activities to be conducted prior to the implementation of Phase 1 RI will include the closing of 19 Class V injection wells at the site as described in Section 2.7.9 of this Work Plan. The closure of the injection wells will be conducted under the jurisdiction of the SCDHS until endpoint sampling data indicate that a particular injection well may be a possible source of soil and/or groundwater contamination. If an injection well is identified as a potential contaminant source, all future work related to that injection well's closure will be conducted as part of the Phase 2 RI. An injection well closure report will be prepared and submitted to SCDHS and NYSDEC. The report will describe, among other things, the closure activities conducted and it will include a closure certification by an independent, NYS - licensed professional engineer.

3.3.2 North Recharge Basins Investigation

Data needs for the North Recharge Basins investigation includes establishing the following:

Soil

- types of contaminants present in soils,
- contaminant concentrations in soils,
- vertical extent of contaminants in soils, and
- horizontal extent of contaminants in soils.

TABLE 3–5

PHASE 1 REMEDIAL INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1–52–031
September 30, 1993

WELL OR SOIL BORING LOCATION	WELL (MW) OR SOIL BORING (SB) NUMBER	BORING DEPTH OR SCREEN INT. (FEET) BELOW GRADE)	# OF SAMPLES (MEDIUM)	SAMPLE DEPTH INTERVAL (FEET BELOW GRADE)	SAMPLING METHOD	ANALYTICAL PARAMETERS	BORING/MONITORING WELL RATIONALE
WELL LOCATION							
NORTH COUNTRY ROAD	MW–9A	170–190	1 (WATER)	170–190	BAILER	FULL SUPERFUND TARGET COMPOUND LIST (TCL) + 30 AND TARGET . NALYTE LIST (TAL) METALS.	WATER QUALITY DOWNGRADIENT OF SITE.
JAMES STREET	MW–4	115–135	1 (WATER)	WATER TABLE			
ROUTE 25A	MW–6 (SB–6)	110–130	1 (WATER)	WATER TABLE			BACKGROUND UPGRADIENT WATER QUALITY.
BUILDING INSPECTION		VISUAL INSPECTION OF MAIN PLANT STRUCTURE INTERIOR AND WASTE WATER TREATMENT PLANT FOR STAINS, SPILLS AND CRACKS OR OTHER POSSIBLE FLUID CONDUITS.					
METAL DETECTOR SURVEY IN NORTHWEST DRUM LOCATION		METAL DETECTOR SURVEY AROUND FORMER DRUM AREA TO DETERMINE EXISTENCE OF OTHER DRUMS AND ASSOCIATED AREAS OF ENVIRONMENTAL CONCERN.					
SAMPLING OF EXISTING MONITORING WELLS (MW–1, MW–2 AND MW–3)		EXISTING WELLS WILL BE SAMPLED TO DETERMINE WATER QUALITY. ANALYTICAL PARAMETERS WILL BE FULL SUPERFUND TARGET COMPOUND LIST (TCL) + 30 AND TARGET ANALYTE LIST (TAL) METALS.					
PRIVATE SUPPLY WELL INVENTORY		IF MONITORING WEL. (S) AT OR DOWNGRADIENT OF SITE SHOW CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS, PERFORM PRIVATE SUPPLY WELL INVENTORY WITHIN A ONE MILE RADIUS OF SITE TO IDENTIFY POTENTIAL RECEPTORS.					

TA[illegible] 3-6

PHASE 2 REMEDIAL INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
September 30, 1993

WELL OR SOIL BORING LOCATION	WELL (MW) OR SOIL BORING (SB) NUMBER	BORING DEPTH OR SCREEN INT. (FEET) BELOW GRADE)	# OF SAMPLES (MEDIUM)	SAMPLE DEPTH	SAMPLING METHOD	ANALYTICAL PARAMETERS	BORING/MONITORING WELL RATIONALE
NORTH COUNTRY ROAD	MW-2B	140-150	1 (WATER)	140-150	BAILER	PROJECT COMPOUND LIST (PCL)	TO DETERMINE CONTAMINANT DEPTH PROFILE IF MW-2 OR MW-2A SHOW CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
	MW-3A	140-150	1 (WATER)	140-150			TO DETERMINE CONTAMINANT DEPTH PROFILE IF MW-3 SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
JAMES STREET	MW-4A	140-150	1 (WATER)	140-150			TO DETERMINE DEPTH OF CONTAMINANT CONCENTRATION IF MW-4 SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
ROUTE 25A	MW-5A	140-150	1 (WATER)	140-150			TO DETERMINE DEPTH OF CONTAMINANT CONCENTRATION IF MW-5 SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
TESLA TOWER BASE	MW-6A	110-130	1 (WATER)	WATER TABLE			TO DETERMINE SHALLOW WATER QUALITY DOWNGRADIENT OF THE TESLA TOWER IF MW-6 SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
	MW-6B	110-130	1 (WATER)	WATER TABLE			
NORTH COUNTRY ROAD	MW-7	115-135	1 (WATER)	WATER TABLE			TO DETERMINE GROUNDWATER QUALITY BETWEEN THE MAIN PLANT BUILDING AND THE BRIARCLIFF WELLFIELD IF GROUND–
NORTH SB-14 SB-15	....			GRADE NOT ANALYZED IN PHASE 1 RI			
SB-1 SB-2 SB-3 SB-4 SB-C	0 – 0.25	1 (SOIL)	TROWEL	PCL (SOIL) ANALYTES NOT TESTED IN PHASE 1 RI, AS NECESSARY			

TABLE 3–7

'HASE 3 REMEDIAL INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1–52–031
August 11, 1993

WELL OR SOIL BORING LOCATION	WELL (MW) OR SOIL BORING (SB) NUMBER	BORING DEPTH OR SCREEN INT. (FEET) BELOW GRADE)	# OF SAMPLES (MEDIUM)	SAMPLE DEPTH (FEET BELOW GRADE)	SAMPLING METHOD	ANALYTICAL PARAMETERS	BORING/MONITORING WELL RATIONALE
NORTH COUNTRY ROAD	MW–3B	170–180	1 (WATER)	170–180	BAILER	PROJECT COMPOUND LIST (PCL)	TO DETERMINE DEEP WATER QUALITY IF MW–3A SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
JAMES STREET	MW–4B	170–180	1 (WATER)	170–180			TO DETERMINE DEEP WATER QUALITY IF MW–4A SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
ROUTE 25A	MW–5B	170–180	1 (WATER)	170–180			TO DETERMINE DEEP WATER QUALITY IF MW–5A SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS
RECHARGE BASIN	MW–9B	170–180	1 (WATER)	170–180			TO DETERMINE DEEP WATER QUALITY IF MW–6A SHOWS CONTAMINANT CONCENTRATIONS ABOVE CLASS GA GROUNDWATER STANDARDS

OTHER PHASE 3 OPERATIONS	DESCRIPTION AND OPERATIONAL RATIONAL
AIR PATHWAY INVESTIGATION AND ANALYSIS	TO DETERMINE RISK POSED BY SITE IF VOLATILE ORGANICS ARE DETECTED IN NEAR SURFACE SOIL SAMPLES <6 FEET.

Groundwater

- presence of contamination in the groundwater beneath the North Recharge Basins,
- concentrations of contaminants in the groundwater beneath the North Recharge Basins, and
- the vertical extent of contamination in the groundwater beneath the North Recharge Basins.

The Phase 1 RI scope of work for the investigation of the North Recharge Basins includes drilling of soil borings and installing monitoring wells. Specifically, the scope of work for the North Recharge Basins during the Phase 1 RI is as follows:

Soil

Five soil borings, designated SB-7, SB-10, SB-11, SB-12, and SB-13 (Figure 3-1), will be drilled to a depth of 30 feet below grade and soil samples will be collected every five feet beginning at grade. The 35 discrete soil samples will be analyzed for target analyte list (TAL) metals. Additionally, two soil samples per boring (for a total of 10 samples) collected from 0.0 to 0.25 feet and one worst-case sample will be analyzed for the full Superfund target compound list plus first 30 peaks (TCL +30). All soil samples submitted for TAL metals analysis will be split and also submitted for a Toxic Characteristic Leaching Procedure (TCLP) metals extraction (EPA Method 1311). With the NYSDEC's concurrence, TCLP metals analysis will be run on three TCLP extractions representing the respective soil samples with the highest TAL metals concentrations. In addition, two borings designated SB-8 and SB-9 will be drilled to a depth of 110 feet below grade. Samples will be collected at five foot intervals beginning at grade to 50 feet below grade. From 50 feet to 110 feet below grade, samples will be collected at 10 foot intervals. A total of 17 discrete soil samples will be collected and analyzed for the TAL metals. In addition, the top, worst case and bottom samples will be analyzed for the full TCL +30. If no worst case sample is collected, the sample collected proximate to the water table will be analyzed. An outline of the installation and sampling strategies of these soil borings during the Phase 1 RI is presented in Table 3-5. Additional soil sampling will be conducted in the North Recharge Basins during the Phase 2 RI if soil contamination is encountered during the Phase 1 RI. The samples will be analyzed during the Phase 2 RI for those contaminants detected during the Phase 1 RI.

Groundwater

Soil boring SB-9 will be converted into groundwater monitoring well designated MW-9 (Figure 3-2). This well will be installed to a depth of 130 feet with the screened interval set 110 to 130 feet below grade to assess the water quality at the water table. Water samples will be analyzed for TCL + 30 and TAL metals. An outline for the installation and sampling strategies of the monitoring well during the Phase 1 RI is presented in Table 3-5. Additional monitoring wells will be installed beneath the North Recharge Basins to delineate the vertical extent of groundwater contamination during the Phase 2 RI, if groundwater contamination is found in monitoring well MW-9.

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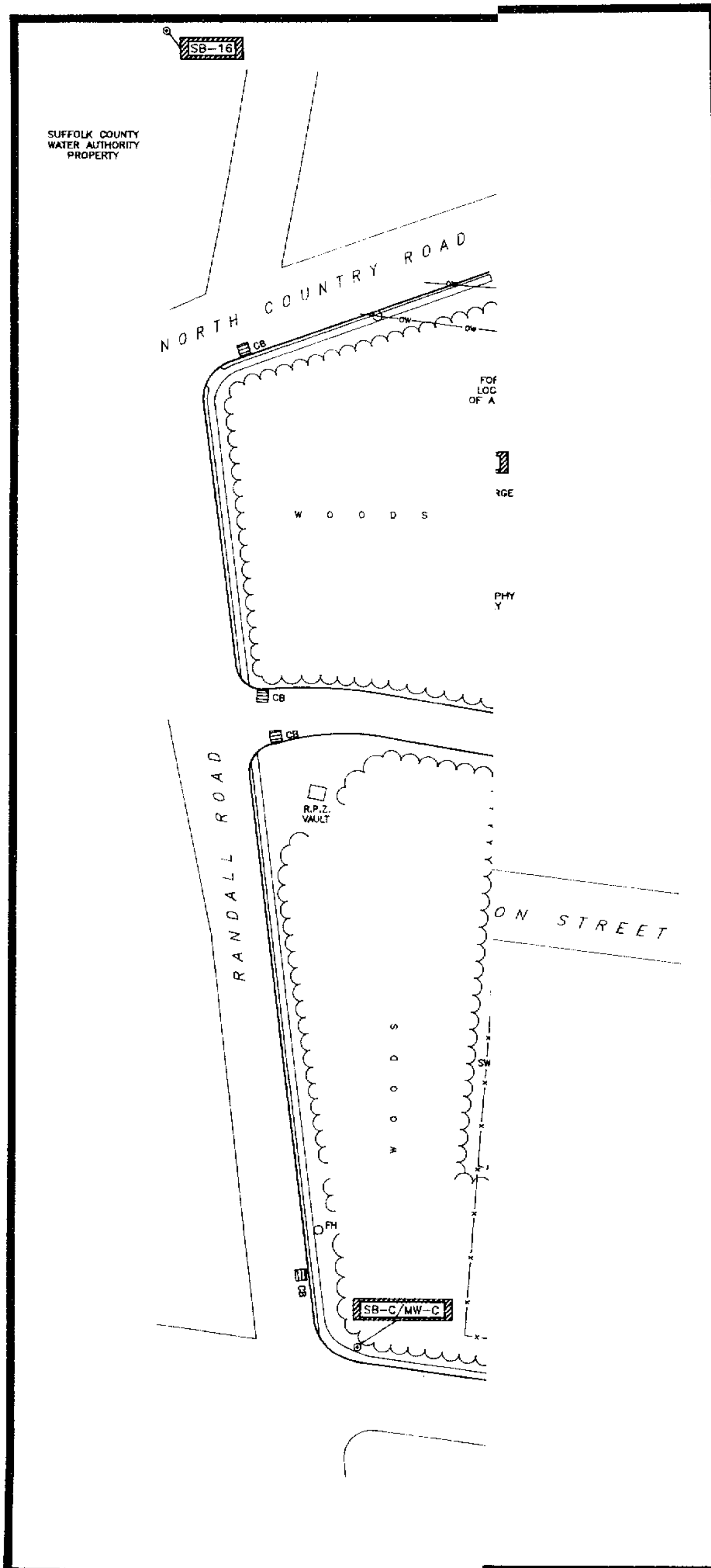

NO.	DATE	BY	REVISION
1	12/92	TRS	CHANGED NW#'S, COLOR
2	1/93	TRS	ADDED INT. ROOMS
3	9/93	TLD	~~CHANGED LOC. OF SB-7~~ REMOVE MW-8

LEGEND

▨SB-8▨ ⊕	PROPOSED SOIL BORING
●	INJECTION WELLS TO BE CLEANED
✦	MONITORING WELL
SD ⊖	STORM DRAIN
FH ○	FIRE HYDRANT
✡	LIGHT
MH ○	MANHOLE
• ☐	CONCRETE COVERS
—x—	CHAIN LINK FENCE
—ow—	OVERHEAD WIRES
○	UTILITY POLE
CB ▤	CATCH BASIN

COLOR CODE

▨SB-8▨	PURPLE = PHASE 1 RI
▨SB-8A▨	BLUE = PHASE 2 RI

NOTES: LOCATIONS OF SW-7, SW-8 AND SW-10 ARE APPROXIMATE.

SOURCE:

YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG, N.Y.S. P.E.&L.S. LIC. #12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

N

50 0 50 100
SCALE FEET

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY

101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741 (516) 472-4000

Agfa Division of Miles Inc.

PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

PROPOSED SOIL BORING LOCATIONS

DESIGNED BY:	DETAILED BY:	CHECKED BY:
TLD	TRS	

DRAWING DATE: 9/13/93	ACAD FILE: 5073W592
PROJECT NO.: 01113-5073	CONTRACT:
DRAWING: **FIGURE 3-1**	REVISION:

3.3.3 East and West Soil Storage Areas Investigation

The data needs for the investigation of the East and West Soil Storage areas include establishing the following:

Soil

- types of contaminants present in soil,
- concentrations of contaminants in soils, if any, and
- vertical extent of contaminants in soils.

Groundwater

The groundwater quality beneath these areas will not be investigated during the Phase 1 RI. However based on the evaluation of the Phase 1 RI data, the need for evaluating groundwater impacts will be determined and, if required, evaluated during the Phase 2 RI. If additional soil sampling is required or the installation of wells is necessary, the samples will be analyzed for contaminants detected in the soil samples during the Phase 1 RI.

The Phase 1 RI scope of work for the investigation of the East and West Soil Storage Area includes the installation of soil borings. The scope of work for these areas are as follows:

Soil

Soil boring SB-2 will be drilled in the West Soil Storage Area, and soil boring SB-4 will be drilled in the East Soil Storage area (Figure 3-1). SB-2 and SB-4 will be drilled to a depth of 20 feet below grade and soil samples obtained every five feet beginning at grade. All soil samples will be analyzed for TAL metals and one worst-case soil sample based on field screening will be analyzed additionally for TCL + 30 (Table 3-5). If analyte concentrations in the worst case soil sample exceed 20 times the class GA groundwater standard, the respective archived sample and analyte(s) will be submitted for TCLP testing. Additionally, all soil samples submitted for TAL metals analysis will be split and also submitted for TCLP metals extraction. With the NYSDEC's concurrence, TCLP metals analysis will be run on the worst-case sample wherein TAL metals analyte(s) concentrations exceeded 20 times the analyte's respective class GA groundwater standard.

3.3.4 Former Drum Storage Area Investigation

The data needs for the investigation of the former drum storage area includes establishing the following:

Soil

- types of chemicals present in soil,
- concentrations of contaminant in soils, if any, and
- vertical extent of contaminants in soils.

Groundwater

The groundwater quality beneath this area will not be investigated during the Phase 1 RI. However based on the evaluation of the Phase 1 RI data the need for evaluating groundwater will be determined and if required, evaluated during the Phase 2 RI. If additional soil samples are required, or the installation of wells is necessary, the samples analyzed for contaminants detected in the soil during the Phase 1 RI.

The Phase 1 RI scope of work for the investigation of the former drum storage area includes the installation of soil borings. The scope of work for the areas is:

Soil

Soil boring SB-3 will be drilled in the middle of the Former Drum Storage Area (Figure 3-1). SB-3 will be drilled to a depth of 20 feet below grade and soil samples obtained every five feet beginning at grade. All soil samples will be analyzed for TAL metals and one worst-case soil sample, based on field screening, will be analyzed additionally for TCL + 30 (Table 3-5). If analyte concentrations in the worst-case soil sample exceed 20 times the class GA groundwater standard, the respective archived sample and analyte will be submitted for TCLP testing. Additionally, all soil samples submitted for TAL metals analysis will be split and also submitted for TCLP metals extraction. With the NYSDEC's concurrence, TCLP metals analysis will be run on the worst-case sample wherein TAL metals analyte(s) concentrations exceeded 20 times the analyte's respective class GA groundwater standard.

3.3.5 Northwest Drum Location Investigation

The data needs for the investigation of the Northwest Drum Location include establishing the following:

Soil

- types of contaminants present in the soils,
- concentrations of contaminants in soils, if any,
- vertical extent of contaminants in soils, and
- the existence of additional drums or storage containers in the subsurface area around the northwest drum location.

Groundwater

The groundwater quality beneath these areas will not be investigated during the Phase 1 RI. However, based on the evaluation of the Phase 1 RI data, the need for evaluating groundwater will be determined and, if required, evaluated during the Phase 2 RI. If additional soil samples are required, or the installation of wells is necessary, the samples will be analyzed for contaminants detected in the soil during the Phase 1 RI.

The Phase 1 RI scope of work for the Northwest Drum Location includes drilling soil borings and conducting a metal detector survey. The scope of work for this area is:

Soil

Soil boring SB-14 will be drilled at the former location of the empty drum (Figure 3-1). SB-14 will be drilled to a depth of 15 feet below grade and soil samples obtained every five feet beginning at grade. The worst-case soil sample based on field screening will be analyzed for TAL metals and TCL + 30 (Table 3-5). If analyte concentrations in the soil sample exceeds 20 times the class GA groundwater standard the respective archived sample and analyte will be submitted for TCLP testing, with the NYSDEC's concurrence.

A metal detector survey will be performed around the area of the former drum location.

If elevated levels of contamination are detected within 15 feet of the surface, and the sample from grade was not analyzed during the Phase 1 RI, a surface soil sample from this location will be collected during the Phase 2 RI. This sample will be analyzed for chemicals detected during the Phase 1 RI. Soil sampling will be conducted during the Phase 2 RI to quantify soil quality at locations of electromagnetic anomalies, if any are found. In addition, in the Phase 2 RI a soil gas survey will be conducted around the area of the former drum location, if elevated levels of VOCs are detected in soil boring SB-14. No soil gas survey will be conducted, if volatile organics are not detected in the soil sample based on the Phase 1 RI sampling.

3.3.6 The Northeast Corner Aerial Photography Anomaly Investigation

The data needs for the investigation of this area include establishing the following:

Soil

- types of contaminants present in the soils,
- concentrations of contaminants in the soils, if any, and
- vertical extent of contaminants in soils.

Groundwater

The groundwater quality beneath this area will not be investigated during the Phase 1 RI. However based on the evaluation of the Phase 1 RI data, the need for evaluating groundwater will be determined and, if required, evaluated during the Phase 2 RI. If additional soil samples are required or the installation of wells is necessary, the samples will be analyzed for contaminants detected in the soil during the Phase 1 RI.

The Phase 1 RI scope of work for the Northeast Corner includes the installation of a soil boring. The scope of work for this area is:

Soil

Soil boring SB-15 will be drilled in the northeast area location (Figure 3-1). SB-15 will be drilled to a depth of 15 feet below grade and soil samples obtained every five feet beginning at grade. The worst-case soil sample based on field screening, will be analyzed for TAL metals and TCL + 30 (Table 3-5). If analyte concentrations in the soil sample exceed 20 times the class GA groundwater standard, the respective archived sample and analyte will be submitted for TCLP testing, with the NYSDEC's concurrence.

If elevated levels or contamination are detected within 15 feet of the surface, and the sample from grade was not analyzed during the Phase 1 RI, a surface soil sample from this location will be collected during the Phase 2 RI. This sample will be analyzed for contaminants detected during the Phase 1 RI.

3.3.7 Primary Wastewater Pump Station Investigation

The data needs for the Primary Wastewater Pump Station investigation includes establishing the following:

Soil

- types of contaminants present in soil,
- concentrations of contaminants in soils, if any, and
- vertical extent of contaminants in soils.

Groundwater

The groundwater quality beneath these areas will not be investigated during the Phase 1 RI. However based on the evaluation of the Phase 1 RI data, the need for evaluating groundwater will be determined and, if required, evaluated during the Phase 2 RI. If additional soil boring samples are required or the installation of wells is necessary, the samples will be analyzed for contaminants detected in the soil during the Phase 1 RI.

The Phase 1 RI scope of work for the Primary Wastewater Pump Station investigation includes the installation of a soil boring. The scope of work for this area is:

Soil

Soil boring SB-1 will be drilled in the Primary Wastewater Pump Station area (Figure 3-1). SB-1 will be drilled to a depth of 20 feet and samples obtained in five foot intervals beginning five feet below grade. All soil samples will be analyzed for TAL metals and one worst-case soil sample, based on field screening, will also be analyzed for TCL + 30 (Table 3-5). If analyte concentrations in the worst-case soil sample exceed 20 times the class GA groundwater standard, the respective archived sample and analyte will be submitted for TCLP testing. Additionally, all soil samples submitted for TAL metals analysis will be split and also submitted for TCLP metals extraction. With the NYSDEC's concurrence, TCLP metals analysis will be run on the worst-case sample wherein TAL metals analyte(s) concentrations exceeded 20 times the analyte's respective class GA groundwater standard.

3.3.8 The Tesla Tower Base Investigation

The data needs for the Tesla tower base investigation include establishing the following:

Soil

- types of contaminants present in the soils,
- concentrations of contaminants in the soils, if any,

- vertical extent of chemicals in soils, and
- horizontal extent of chemicals in soils.

Groundwater

- quality of groundwater beneath the Tesla Tower Base.

The Phase 1 RI scope of work for the Tesla Tower Base investigation includes the drilling of soil borings and installation of groundwater monitoring wells. The scope of work for this area is:

Soil

Soil boring SB-6 (Figure 3-1) will be drilled to a depth of 110 feet and discrete soil samples obtained in five foot intervals beginning at grade. A minimum of five worst-case soil samples, based on field screening, will be submitted for TCL+30 and TAL metals analysis. If based on field screening methods the samples are all clean, five soil samples will be randomly selected for analysis; for example, one sample at grade, and one sample each from 10 feet below grade, 20 feet below grade, 50 feet below grade, and 80 feet below grade. The number of samples to be analyzed and the specific samples to be analyzed will be selected with the concurrence of the NYSDEC field representative. If analyte concentrations in the soil exceed 20 times the class GA groundwater standard, the respective archived sample and analyte will be submitted for TCLP testing. Further, if elevated levels of contamination are detected within 15 feet of the surface, and a soil sample was not analyzed during the Phase 1 RI, a surface sample from this location will be collected during the Phase 2 RI.

Groundwater

Soil boring SB-6 will be converted into a groundwater monitoring well designated MW-6. The total depth of this well will be 130 feet and the last 20 feet will be screened using a schedule 80 PVC screen. All groundwater samples will be analyzed for TAL metals and TCL + 30.

3.3.9 The Emulsion Building Sump Investigation

Data needs for the Emulsion Building Sump investigation include establishing the following:

Soil

- contaminant concentrations in soils, and
- vertical extent of contaminants in soils.

Groundwater

The groundwater quality beneath this area will not be investigated during the Phase 1 RI. However, based on the evaluation of the Phase 1 RI data the need for evaluating groundwater will be determined and, if required, evaluated during the Phase 2 RI. If additional soil samples are required or the installation of wells is necessary, the samples will be analyzed for contaminants detected in the soil during the Phase 1 RI.

The Phase 1 RI scope of work for the Emulsion Building Sump investigation includes the installation of a soil boring. The scope of work for this area is:

Soil

- Soil boring SB-20 will be installed next to the former soil boring installed during the Phase II Site Investigation (Figure 3-1). SB-20 will be drilled to a depth of 30 feet and soil samples obtained in five foot intervals beginning at grade. All samples will be analyzed for TAL metals and one worst-case sample, based on field screening, will also be analyzed for TCL+30. Boring SB-20 will be installed and sampled according to the outline presented in Table 3-5. If analyte concentrations in the worst-case soil sample exceed 20 times the class GA groundwater standard, the respective archived sample and analyte will be submitted for TCLP testing. Additionally, all soil samples submitted for TAL metals analysis will be split and also submitted for TCLP metals extraction. With the NYSDEC's concurrence, TCLP metals analysis will be run on the worst-case sample wherein TAL metals analyte(s) concentrations exceeded 20 times the analyte's respective class GA groundwater standard.

3.3.10 Former Fuel Oil Underground Storage Tank Location Investigation

Data needs for the three former fuel oil UST locations include establishing the following:

Soil

- contaminant concentrations in soils, if any,
- vertical extent of contaminants in soils, and
- leachability of contaminants from site soils.

The Phase 1 RI scope of work at each of the three former UST locations will include the drilling of a soil boring. The scope of work for these locations are:

Soil

Soil borings USTB-17, USTB-18 and USTB-19 will be drilled at the former UST locations (Figure 3-1). Borings will continue to be advanced until field screening of soil samples determines that two successive samples taken on five foot intervals are clean. The deepest of these two soil samples will be analyzed for TCL volatile and TCL semi-volatile compounds (Table 3-5). Additionally, one worst-case sample per boring, based on field screening, will also be analyzed for TCL volatile and TCL semi-volatile components. All soil samples submitted for TCL volatile and TCL semi-volatile analysis will be split and also submitted for TCLP volatile and TCLP semi-volatile extraction. Based upon the results of the TCL volatile and TCL Semi-volatile analyses, and with the concurrence of the NYSDEC, the archived extractions will be analyzed for selected analytes using TCLP methods.

3.3.11 Water Meter Room Pit Investigation

Data needs for the water meter room pit include establishing the following:

Soil

- types of contaminants present in the soils,
- concentrations of contaminants in soils, and
- vertical extent of contaminants in soils.

Groundwater

The groundwater quality beneath these areas will not be investigated during the Phase 1 RI. However, based on the evaluation of the Phase 1 RI data, the need for evaluating groundwater will be determined and, if required, evaluated during the Phase 2 RI. If additional soil boring samples are required or the installation of wells is necessary, the samples will be analyzed for chemicals detected in the soil during the Phase 1 RI.

The Phase 1 RI scope of work for the Water Meter Room Pit includes:

Soil

Soil boring SB-21 (Figure 3-1) will be hand augured through the bottom of the water meter room pit to a depth of five feet below the bottom of the pit and a discrete soil sample at five feet will be collected and analyzed for TCL + 30 and TAL metals (Table 3-5).

If elevated levels of contamination are detected at five feet, the Phase 2 RI work will include sampling from five feet to 30 feet below grade at five foot intervals. These samples will be analyzed for contaminants detected during the Phase 1 RI.

3.3.12 Main Plant Building, Wastewater Treatment Plant and Sheds Investigation

The primary data needs to investigate these areas include:

Buildings

- verification and documentation that residual contamination is not present in the buildings, and
- verification that pathways from spillage of contaminants in the interior of the building to soils beneath the buildings do not exist.

Soil

- establishing soil quality beneath the buildings in areas where potential pathways for migration of contaminants from the buildings to the underlying soils are identified.

Groundwater

The groundwater quality beneath these areas will not be investigated during the Phase 1 RI. However, based on the evaluation of the Phase 1 RI data, any soil quality data potentially collected during a Phase 2 RI sampling of potential pathways for contaminant migration, the need for evaluating groundwater will be determined and, if required, evaluated during the Phase 3 RI.

The Phase 1 RI proposed course of action for the main plant building investigation is to evaluate the potential chemical source areas and migration pathways by conducting a thorough building inspection. The extent to which any potential chemicals compounds are impacting the groundwater beneath the main plant building will be evaluated through the installation of a downgradient monitoring well. The Phase 1 RI proposed scope of work for the building investigation includes:

Buildings

Review of files for documentation of past building usages, and an audit of each room within the buildings will be conducted looking for evidence of spills and pathways for chemicals to enter the underlying soils.

Groundwater

Monitoring well MW-10 will be installed immediately downgradient of the main plant building (Figure 3-2). MW-10 will be installed to a depth of approximately 130 feet. A water sample will be collected from the well and analyzed for TCL + 30 and TAL metals.

3.3.13 Background and Off-Site Groundwater and Soil Investigation

The primary data needs for this investigation include establishing the following:

Soil

- background soil quality.

Groundwater

- groundwater flow direction upgradient and downgradient of the site,
- vertical flow components,
- upgradient water quality, and
- downgradient water quality at several depth intervals corresponding to the screened intervals of the Briarcliff Road wellfield.

The Phase 1 RI scope of work for this investigation includes installing monitoring wells and soil borings including:

Soil

Soil Borings SB-5 and SB-16 will be installed in undisturbed areas approved by the NYSDEC to evaluate background soil conditions (Figure 3-1). SB-5 will be co-located and installed simultaneously with MW-5, described below. Soil samples from 5 to 7 feet below grade will be collected from SB-5 and SB-16 and sampled for TCL + 30 and TAL metals according to the outline presented in Table 3-5. Further, if elevated levels of contamination are detected in the sample from SB-5, a surface soil sample from this location will be collected during the Phase 2 RI.

Groundwater

Monitoring well MW-5 will be installed on the upgradient border of the site (Figure 3-2). MW-5 will be installed and sampled for TCL + 30 and TAL metals as outlined in Table 3-5.

Monitoring wells MW-2A and MW-4 will be installed downgradient of the site (Figure 3-2). MW-2A will be screened from 170-180 feet below grade to assess groundwater quality in the deep flow zone, and to further quantify horizontal and vertical groundwater gradients. MW-4 will be screened across the water table to assess shallow groundwater quality, and to quantify the horizontal groundwater gradient. Monitoring wells MW-2a and MW-4 will be sampled for TCL+30 and TAL metals according to the outline presented in Table 3-5.

If groundwater contamination is detected above Class GA groundwater standards, all public supply wells located within a one mile radius from the site will be identified.

3.3.14 Development of the Project Compound List (PCL)

The analytical results of the Phase 1 RI outlined in Sections 3.3.1 through 3.3.13 will be used to develop a Project Compound List (PCL). The PCL may potentially be used in the subsequent Phase 2 and Phase 3 RI described in Section 3.3.15 in place of the full TCL + 30 and TAL metals analytical parameters used in the Phase 1 RI. Utilization of the PCL will aid in streamlining the Phase 2 and Phase 3 RI.

3.3.15 Phase 2 and Phase 3 Remedial Investigations

The results of the Phase 1 RI outlined in Sections 3.3.1 through 3.3.13 will determine whether the Phase 1 RI monitoring well and soil boring network is sufficient to address the majority of the objectives of the RI. The data gaps that exist at the completion of the Phase 1 RI will be addressed in the Phase 2 RI and, if appropriate, Phase 3 RI. In general, initial data gaps identified at the completion of the Phase 1 RI will be addressed through the implementation of the Phase 2 RI. Data gaps existing at the completion of the Phase 2 RI will be addressed through the implementation of the Phase 3 RI. Table 3-6 and Table 3-7 present outlines of the potential scopes of work for the Phase 2 and Phase 3 Remedial Investigations, respectively. Each Phase subsequent to Phase 1 will contain individually applicable scopes of work specific to a given potential area of concern to be investigated. Since it is probable that not all of the potential areas of concern will present further data needs after the completion of the Phase 1 RI, some of the operations outlined in Table 3-6 and 3-7 may be omitted. Similarly, at the completion of Phase 2, some of the Phase 3 operations may be omitted. Conversely, data generated during the Phase 1 RI and/or Phase 2 RI may require an increase in field activities than what is currently proposed.

Phase 2 RI scope of work could potentially include:

Soil

- sampling soils in areas of potential concern identified in Phase 1 inspection of buildings or as a result of the injection well closures electromagnetic survey anomalies.
- soil gas survey(s) in area(s) of potential concern where elevated volatile organics are detected.
- additional soil samples for completing vertical or horizontal delineation of soil quality.
- collection of shallow surface soil samples from 0 to 3 inch depth for risk assessment purposes at selected locations.

Groundwater

- installation of additional monitoring wells to document groundwater quality downgradient of areas of potential concern or beneath areas of potential concern.
- installation of additional monitoring wells to verify the groundwater quality at depth.
- sampling of all Phase 2 RI installed monitoring wells for contaminants detected during Phase 1 RI sampling.

Engineering Data Collection

The following physicochemical and geotechnical analyses could be performed on representative soil samples at the site: moisture content, specific gravity, total organic carbon content, bulk density, permeability, particle size distribution, consolidation, compaction, and exchange capacity. It is proposed that one sample per section of the North Recharge Basins be taken (4 samples total), one sample at the Tesla Tower Base, one sample in the Former Soil Storage Areas, as well as one sample from the background soil location. Overall, seven (7) samples could be analyzed for the above physicochemical and geotechnical properties of the site soils.

Additionally, selective (e.g., highest and/or medium metal concentration) soil samples will be submitted to the lab for TCLP testing for eight (8) TAL metals. This testing will indicate the potential for metal leaching from the site soils at environmentally significant concentrations (e.g., leachate levels exceeding drinking water levels times a dilution/attenuation factor of 100, per NYSDEC guidance).

Volatile organic compound (VOC) contamination is not significant at this site, as evidenced by the soil and groundwater quality data collected to date. Semi-volatile organic compounds (SVOC) have been detected in limited areas at low concentrations. Therefore, there is no need for treatability studies for biological treatment and vacuum extraction based on the present data. Following the collection and analysis of the Phase 1 RI data, the need for bench scale or pilot scale treatability studies will be addressed in the Phase 2 RI Work Plan. Such studies could include groundwater treatment studies or solidification/stabilization studies. The existing soil and groundwater data for the site do not demonstrate the need for such studies. If analyte concentrations in the soil exceed 20 times the class GA groundwater standard, the respective archived sample and analyte will be submitted for TCLP testing.

Former Production Wells

The former plant production wells will be sealed by a qualified subcontractor, if no substantial groundwater contamination is found during the Phase 1 RI. Should any substantial groundwater contamination be found, the possibility of using the former production wells as recovery wells will be explored.

The Phase 3 RI scope of work could potentially include:

Groundwater

- installation of additional wells to document groundwater quality downgradient of areas of concern or beneath areas of concern.
- installation of additional wells to verify the groundwater quality at depth.
- sampling of all existing and Phase 3 installed monitoring wells.
- sampling of Briarcliff Road well field.

Air

- conducting air pathway investigation and analysis.

General

- conducting a private supply well inventory.
- inventorying public supply wells within a one mile radius of the site.

4.0 TASK PLAN FOR PHASE 1 REMEDIAL INVESTIGATION

This section identifies and presents a description of the tasks that will be implemented to conduct the Phase 1 RI scope of work presented in Section 3.0. The RI will consist of the seven tasks defined below:

Task 1 - Project Planning
Task 2 - Community Relations
Task 3 - Field Investigation
Task 4 - Sample Analysis and Data Validation
Task 5 - Data Evaluation
Task 6 - Preliminary Risk Assessment
Task 7 - Phase 1 Remedial Investigation Report

Section 5.0 provides a detailed description of the four FS tasks. These 11 tasks together comprise the overall program for the site.

4.1 Task 1 - Project Planning

The performance of this task results in the preparation of this Phase 1 RI/FS Work Plan. The activities that comprise this task include:

- Data collection and review.
- Development of Interim Health and Safety Plan.
- Site reconnaissance.
- Identification of preliminary SCGs.
- RI/FS brainstorming and scoping meetings (performed internally within Agfa Division of Miles Inc. and Groundwater Technology).
- Work Plan preparation.
- Field Sampling and Analysis Plan (FSAP) preparation.
- Quality Assurance Project Plan (QAPP) preparation.
- Site Health and Safety Plan (HASP) preparation.

The project plans prepared in Task 1 include:

1. Work Plan, this document, which presents the scope and schedule of work for the site;

2. Field Sampling and Analysis Plan (FSAP) - includes the details of sampling and analytical objectives; the number, location, and rationale for each medium sampled; the site specific quality assurance requirements; detailed sampling and analysis procedures; documentation of sampling equipment procedures, and data management elements. The FSAP also includes the site management plan that includes project organization and responsibilities, the field operations schedule, and site security and access. A draft FSAP is included in Appendix 4.

3. Health and Safety Plan (HASP) - includes site-specific health and safety information, a hazard assessment, training requirements, health and safety monitoring procedures, monitoring procedures, personnel decontamination procedures, and disposal procedures. The HASP will be updated on a subtask-specific basis as needed. A draft HASP is included in Appendix 5.

Groundwater Technology's policy is to take every precaution to minimize exposure of its personnel to potentially hazardous substances, and to respond promptly and correctly should such exposures occur. Some of the key features of Groundwater Technology's Health and Safety Program include:

- 40 hour OSHA Hazardous Waste Site training for all on-site employees.
- Yearly health monitoring and physical examinations.
- On-site air and soil quality monitoring during field activities.
- Preparation of Site Health and Safety Plan.

Groundwater Technology will develop a specific HASP in accordance with the Federal Occupational Safety and Health Administration (OSHA) regulations to address the potential chemical and physical exposures that may be encountered while working on this site. At a minimum, the HASP will:

- include names of key personnel responsible for health and safety, and alternatives.
- include the appointment of a Project Safety Officer.
- define risk analysis for each phase of the operation.
- describe employee training.
- describe personnel protective equipment (PPE) to be used.
- describe medical surveillance requirements.
- define frequency and types of air monitoring, personnel monitoring, sampling techniques and instrumentation to be used.
- define methods of maintenance and calibration of monitoring and sampling equipment.
- detail site control measures including site maps.

- establish decontamination procedures.
- describe standard operating procedures.
- establish emergency response and evacuation contingencies.
- describe confined space entry procedures.
- describe a spill containment program.

Groundwater Technology's approach to the site safety planning reflects the need for expedient document development pursuant to all applicable regulations and implementation without compromising safety. A draft HASP for this project is included in Appendix 5.

4. Citizens Participation Plan (CPP) - includes a description of public involvement activities that Agfa will conduct in consultation with the NYSDEC. A draft CPP is included in Appendix 6.

Because of the nature of this investigation, additional data collection efforts beyond the scope of this Work Plan may be necessary. When these efforts are required, a Phase 2 RI Work Plan describing the additional efforts will be prepared.

4.2 Task 2 - Community Relations

The CPP describes a program of public involvement activities that Agfa will conduct in consultation with the NYSDEC before and during the RI/FS at the site. The program of public involvement activities listed in the CPP has been prepared in accordance with 6 NYCRR Part 375.7 "Requirements for Citizen Participation", and NYSDEC's guidance document entitled "New York State Inactive Hazardous Waste Site Citizen Participation Plan", dated August 30, 1988. The purpose of the CPP is to: 1) ensure that the public is provided with accurate, timely and understandable information; and 2) establish avenues through which the public can voice concerns, ask questions, and provide information regarding the site and the remedial program.

Agfa is committed to a citizen participation program as a part of its responsibilities for the investigation and cleanup program at this site. Citizen participation in the remedial process will promote public understanding of the responsibilities, planning activities, and remedial activities associated with the site. It will also provide an opportunity for the public to contribute information that will enable Agfa to develop a comprehensive remedial program that is protective of both public health and the environment.

This CPP should be regarded as a working document. Its program of community relations activities is flexible and may be changed over the course of the RI/FS to accommodate community interests as well as new information generated by the technical studies. The CPP is found in Appendix 6.

4.3 Task 3 - Field Investigation

This task describes the methodologies proposed to implement the various field investigations that were described previously in Section 3.0 and which will be conducted to collect data for meeting the specific RI/FS objectives. The following field investigations will be performed as part of the Phase 1 RI:

- Field work support - including the development of a comprehensive site health and safety plan, subcontractor procurement, equipment procurement and site setup,
- On-site air quality monitoring.
- Surveying and mapping,
- Soil boring drilling,
- Soil sampling and analysis,
- Hydrogeologic investigation including monitoring well installation and development,
- Groundwater sampling and analysis, and
- Metal detector survey.

4.3.1 Field Work Support

Field work support includes those activities that are necessary before the field activities can be implemented. The following sections describe these activities and include those associated with subcontractor and equipment procurement and site setup.

4.3.1.1 Preparation of Bid Specifications and Subcontractor Procurement

Several of the investigative activities that will be conducted during the course of the RI will require services to be provided by subcontractors other than those scoping and performing the RI/FS. Services expected to be subcontracted include:

- Surveying and topographic mapping,
- Drilling, installation and sampling of monitoring wells and soil borings,
- Removal of waste material generated during the RI activities, and
- Treatability studies, as appropriate.

Under this subtask, bid specifications will be prepared and subcontractors will be procured for the performance of the above activities. The preparation of the bid specifications is being conducted in conjunction with the development of this Work Plan.

4.3.1.2 Equipment Procurement and Site Setup

This element involves securing and shipping field equipment, health and safety equipment and materials to the site and setting up an on-site field office and support area. A room within one of the buildings will be designated as an on-site office for storing equipment and supplies. The office will be outfitted with a telephone, portable sanitary facilities, and electricity. A decontamination pad will also be constructed in an appropriate site location. Prior to drilling in the North Recharge Basins, the dike walls between the basins will be leveled with a backhoe to permit drill rig access. The soils that comprise the dike wall will be positioned in the basins in a manner that does not effect proposed surface soil sample locations. A single source of potable water will be established prior to the initiation of field activities for decontamination purposes, drilling water, and mixing of well construction materials (i.e., grout, etc.). This source will be sampled and analyzed to ensure that no contaminants are being introduced from the outside.

Prior to the commencement of work activities, notification to local police, fire, and potential rescue personnel will be made advising them of the field activities and schedule of events.

All field activities which will be undertaken beyond the perimeter fencing will be clearly marked off with traffic cones and caution tape to ensure that the public is kept at a safe distance from activities which could cause physical injury or that potentially could release contaminants into the air.

4.3.2 Surveying and Mapping

A survey of the site was completed in 1992 by a NYS-licensed professional land surveyor. This survey established a local baseline and benchmark for future sampling and to tie-in new sampling locations. The base map will be updated during the course of the RI to include, at a minimum, the surveyed elevations of the new monitoring wells following their installation.

4.3.3 Hydrogeologic Investigation

The following subsections describe the methodologies proposed to implement the field activities planned for each field investigation described in Section 3.0. Most of the field activities (monitoring well drilling/installation/development/sampling) are common to all of the individual investigations proposed.

These common activities are described below. Based on thorough review of existing data, the following investigations are intended to fill the data gaps and thereby fulfill the objectives listed in Section 3.0. Table 4-1 lists the number of samples to be collected for each sampling media and the analyses to be performed.

4.3.3.1 Monitoring Well Installation

Three types of monitoring wells are proposed for the field investigations: shallow, intermediate and deep monitoring wells. Shallow monitoring wells will be used to monitor the first water-bearing zone encountered (excluding perched zones) and are designed to provide information regarding shallow groundwater quality and flow direction(s). These wells are expected to average 110-130 feet in depth. Intermediate depth monitoring wells are designed to provide water quality data for the flow zones within the 140 to 150 foot depth interval. The deep wells are designed to provide water quality data for the deeper flow zones within the 170-180 foot depth interval. To better define potentiometric relationships in the vicinity of the site and evaluate the extent of groundwater contamination, six (6) monitoring wells will be installed at or around the site during the Phase 1 RI. The depth, screen length, screen interval, soil sampling interval, analytical parameters and purpose for each well has been presented in Table 3-5. The locations of the proposed and existing monitoring wells are illustrated in Figure 3-2.

Most monitoring wells, drilling conditions permitting, will be installed using hollow stem auger (HSA) drilling techniques. If difficult drilling conditions are encountered, the monitoring wells will be installed utilizing a drill rig equipped with a Tigre Tierra casing driver. A Tigre Tierra casing driver consists of a 7 7/8 inch diameter tri-cone bit with open center mounted on the end of drill rods located within 8 inch diameter steel casing. As the bit is advanced through the subsurface, the steel casing is driven directly behind the bit. Drill cuttings in the unsaturated zone will be removed by circulation of potable water down the center of the bit and returned upward through the drill casing. Drilling performed below the water table will be completed using potable water. The casing will be advanced to the appropriate well completion depth. The well screen and well casing will be placed inside the casing and the casing will be completely removed from the borehole.

For HSA drilling 6.25 inch I.D. HSA will be used. The HSA augers will be advanced into the groundwater at which point potable water may need to be introduced into the HSA to prevent heaving of sands up into the HSA. Heaving sands are a documented problem at this site. The lead auger may have a self closing flap or temporary plug of metal acceptable to the NYSDEC. If drilling conditions warrant, the soil borings may need to be drilled with narrow diameter augers to collect split spoon samples, then redrilled with 6.25

inch I.D. augers to facilitate placement of a screen, casing, and gravel pack. The HSA will be advanced to the appropriate depth and the well casing and well screen will be placed inside the HSA followed by the appropriate gravel pack and cement/bentonite slurry and the casing will be completely removed from the borehole.

During the drilling of the wells, soil samples will be collected at five foot intervals starting at five feet below grade utilizing a split barrel (split-spoon) sampler following method ASTM Standard D 1586 for the Standard Penetration Resistance Test. Soil sampling will be conducted by advancing the split-spoon sampler into the underlying undisturbed native soils after the drill bit is removed from the center of the steel casing. Lithologic descriptions will be documented on a soil log by a field geologist. Soil samples will be described using the Unified Soil Classification System terminology. All soil samples will be field screened for potential volatile organic compounds (VOCs) using a photo ionization detector (PID) or flame ionization detector (FID), and VOC concentrations will be noted in the soil log.

Soil cuttings from the drilling operations will be collected and stockpiled separately on-site. After the completion of the Phase 1 RI, the soils will be analyzed for waste characterization. According to the results, the soils will either be transported off-site and disposed of or remediated on-site, as necessary, or used as on-site backfill.

4.3.3.2 Monitoring Well Construction

All monitoring wells will be constructed of four inch diameter threaded schedule C0 PVC casing coupled with 0.020 inch machine slotted PVC screen. All wells will be constructed so that the appropriate aquifer zone (shallow, intermediate or deep) is being monitored. Each well will have a gravel pack extending approximately two feet above the screened interval. A side discharge tremie pipe will be used to install a bentonite slurry seal that extends at least three to five feet above the gravel pack. Following the seal, a cement/bentonite grout will be placed within the annulus along the entire length of the casing up to approximately one (1) foot below grade. Cement will therefore fill the remaining annulus. The monitoring wells will be secured with a locking well cap and a stand pipe which will be cemented in place. Flush mount roadbox completions will be used in vehicular traffic areas and in off-site residential areas. Figure 4-1 illustrates a typical well construction.

4.3.3.3 Monitoring Well Development

Following installation, each monitoring well will be developed by surge and pump methods. A surge block will be used to agitate the well. Because of the coarse nature of the aquifer, it is anticipated that three hours

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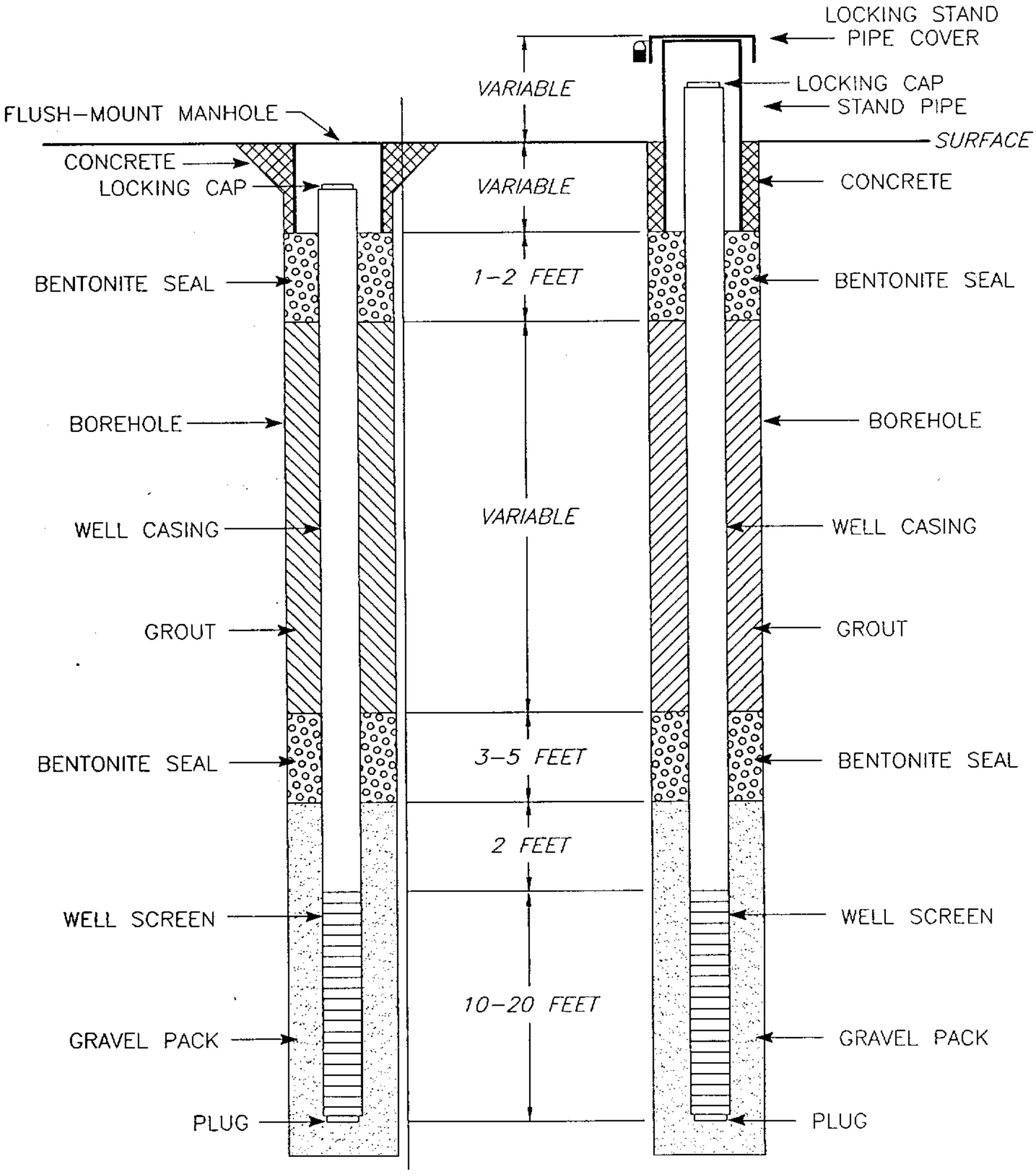
of surging and well pumping will be sufficient to achieve a turbidity level less than 50 nephelometric turbidity units (NTUs). Development will continue until two consecutive samples of discharge water collected at five minutes intervals have a reading of 50 NTUs or less. Specific conductivity, pH and temperature will also be monitored during well development to ensure stabilized conditions. Water generated during development will be containerized and transported to the waste water treatment plant and stored in one of the above ground storage tanks. The water will be segregated depending upon the location of the well and stored as either "clean" or potentially contaminated. After a sufficient volume of water is collected, the water will be analyzed for waste characterization. Based upon the analytical data and applicable NYSDEC water quality criteria, the water will either be transported off-site for treatment and disposal or released directly on-site with NYSDEC concurrence.

FIGURE 4-1
TYPICAL MONITORING WELL CONSTRUCTION
FLUSH-MOUNT AND STAND PIPE CONFIGURATIONS
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE ID# 1-52-031



NOT TO SCALE

GROUNDWATER TECHNOLOGY, INC.

4.3.3.4 Water Level Monitoring

All new monitoring wells will be surveyed by a New York State licensed surveyor to establish horizontal location and elevation of the measuring points. Elevation measurements will be taken on the riser pipe with the measuring point designated by a chisel mark. All elevations will be referenced to the benchmark previously established at the site and the National Geodetic Vertical Datum (MSL 1929). All wells will be located horizontally to within plus or minus 5 feet. Vertical elevations of measuring points will be made to the nearest 0.01 foot.

Water level measurements will be collected once a month from new and existing monitoring wells for the duration of the RI not less than 3 events. An electric water level indicator graduated in 0.01-foot increments will be used.

4.3.3.5 Groundwater Sample Collection

Information obtained from the new and existing monitoring wells will be used to study the likely path of chemical migration, to determine the vertical and lateral extent of the contamination, and to evaluate source containment and groundwater extraction and treatment alternatives.

After well installation and development, groundwater samples will be collected from the new and existing wells. Monitoring wells will be left undisturbed for at least one month after development in order to allow time for equilibration with the surrounding aquifer. Prior to sample collection, a minimum of four to ten well volumes of water will be evacuated from each well utilizing a properly decontaminated stainless steel centrifugal submersible pump or a teflon or polyethylene bladder-type positive displacement pump. Field Ph, temperature, conductivity, turbidity, and dissolved oxygen measurements will be taken. Water samples will be collected using either a dedicated polyethylene, steel, PVC or teflon bailer and monofilament rope or the positive displacement purge pump. Submersible centrifugal-type purge pumps will not be used for sampling purposes. Water samples will be transferred directly from the bailer or positive displacement pump into properly prepared I-Chem 300 or equivalent quality sample containers and placed on blue ice until delivery to the laboratory. Proper chain of custody procedures will be employed throughout the sampling. Sampling procedures are specified in detail in the FSAP (Appendix 4).

4.3.4 Soil Boring Program

Twenty-one (21) soil borings will be installed at or around the site. The soil borings will be used to obtain subsurface soil samples for chemical analysis to determine whether soils are a significant potential source of groundwater contamination, and to determine the approximate extent of affected soils for use in evaluating feasibility study alternatives which may include soil excavation, treatment, disposal, or a combination of these remedial actions. The proposed depth, sample interval, sample analytical parameters and purpose of each soil boring is outlined in Table 3-5. Table 4-1 shows the total number of samples to be collected for soil analysis and the specific analyses to be performed. The locations of the soil borings are illustrated on Figure 2-2. The following sections describe the methodology to be used in drilling and sampling soil borings.

TABLE 4-1

NUMBER OF SAMPLES TO BE COLLECTED FOR EACH SAMPLING MEDIA AND ANALYSES TO BE PERFORMED
PHASE 1 RI PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Type	Source	Monitoring Well or Soil Boring No.	No. of Matrix Samples (Minimum)	No. of Wells or Borings (Minimum)	Matrix	QA/QC Required					Analysis
						(Blind)[1] Replicate	Field[2] (Minimum)	Rinse[3] (Minimum)	Trip[4] (Minimum)	MS/ MSD[5]	
Groundwater	Monitoring Wells	MW's 1, 2, 3, 2A, 4, 5, 6, 9, 10	9	9	Aqueous	1	1	1	1	1	Full Superfund TCL+30/TAL Metals
Hand Auger	Predetermined Locations	SB-21	1	1	Soil	1	1	1	NA	1	Full Superfund TCL+30/TAL Metals
Soil Boring	Predetermined Locations	SB's 5, 6, 14, 15, 16	9	5	Soil	1	4	1	NA	1	Full Superfund TCL+30/TAL Metals on all samples; TCLP analysis of select anaytes detected at > 20 times their respective class GA groundwater standards in one worst case sample per boring
Soil Boring	Predetermined Locations	SB's 8, 9	34	2	Soil	2	4	1	NA	2	TCL+30 on top, worst case, and bottom sample. If no worst case sample is identified, the sample collected from proximate to the water table will be analyzed. TAL Metals on all samples
Soil Boring	Predetermined Locations	SB's 1, 2, 3, 4, 20	27	5	Soil	2	4	1	NA	2	Full Superfund TCL+30/TAL Metals and TCLP analysis of select analytes detected at > 20 times their respective class GA groundwater standards in one worst case sample per boring; TAL Metals only for all other samples
Soil Boring	Predetermined Locations	SB's 7, 10, 11, 12, 13	35	5	Soil	2	4	1	NA	2	TAL Metals for all samples. Additionally, Full Superfund TCL + 30 for the 0 - 0.25 foot interval and the worst case sample per boring; TCLP analysis of select TAL Metals for three worst case samples of the 35 collected
Soil Boring	Former UST Locations	USTB'S 17, 18, 19	6	3	Soil	1	2	1	NA	1	TCL Semi-Volatiles and TCL Volatiles

[1] 1 per 20 samples/matrix

[2] 1 per week/matrix

[3] 1 per week/sampling equipment used

[4] 1 per 20 samples/day

[5] 1 per 20 samples/matrix

NA - Not Applicable

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GROUNDWATER TECHNOLOGY ®

4.3.4.1 Soil Boring Drilling

Four soil borings, SB-5, SB-6, SB-8 and SB-9 will be installed to depths of 110 feet below grade and will be co-located and installed simultaneously with monitoring wells MW-5, MW-6, MW-8 and MW-9, described above. These deep soil borings will be drilled utilizing a drill rig equipped with a Tigre Tierra casing driver or HSAs as described in Section 4.3.3.1. Soil borings SB-1 through SB-4, SB-7 and SB-10 through SB-19 will be installed to maximum depths of 30 feet below grade. These soil borings will be installed using an HSA drill rig. Borings located at the eastern end of the North Recharge Basins will be installed using a low profile HSA rig due to the presence of overhead high tension wires. Soil boring SB-20, located inside of the main plant building, will be installed using some type of portable drill rig (i.e. a tripod rig, a rolloff caterpillar rig, etc.).

The soil cuttings generated during the soil boring installation will be stockpiled on-site separately. After the completion of the RI/FS, soils will be analyzed for waste characterization. According to the results, the soils will either be transported off-site and disposed of, or remediated on-site, as necessary, or used as site backfill material.

Downhole drilling equipment will be decontaminated between boreholes by steam cleaning, using potable water from an established, contaminant-free source. Split-spoon samplers will be decontaminated between each use, using deionized water and methanol, as described in the FSAP. Boreholes where monitoring wells are not installed will be abandoned by injecting a cement/bentonite grout slurry from the bottom of the borings to the ground surface using the tremie pipe method.

4.3.4.2 Soil Sample Collection

Unless otherwise noted in Table 3-4, soil samples will be collected at five foot intervals starting at five feet below grade, utilizing the split barrel (split-spoon) technique. Soil sampling will be conducted by advancing the split-spoon sampler into the underlying undisturbed native soils ahead of the drill bit. Soil samples will be field screened and logged as described in Section 4.3.3.1 above. Samples will be collected for laboratory analysis as detailed in the FSAP.

Surface soil samples will be collected at each boring location in the North Recharge Basins area and the Tesla Tower Base. The soil samples will be collected from the 0 to 3-inch depth interval. The surface soil samples will be obtained using a stainless steel trowel, which will be decontaminated between each use as described in the FSAP.

The soil sample from the Water Meter Room Pit will be collected with a hand auger from a depth of five feet below grade. The hand auger will be decontaminated as described in the FSAP.

4.3.4.3 Metal Detector Survey

A metal detector survey will be conducted around the Former Drum Location in the Northwest Corner of the site. The purpose of the survey is to determine the potential existence of other drums or metal objects in this area.

Prior to conducting metal detector surveys, a planimetric survey will be conducted to establish a grid coordinate system at 100 foot intervals across the Northwest corner of the site. The grid coordinate system will be used to locate geophysical survey lines and measurement stations.

The Electromagnetic Induction (EM) survey will be performed using a Geonics EM31 terrain conductivity meter equipped with an EM31DL data logger or equivalent device. The EM survey will be completed along survey lines spaced every 20 feet. Readings will be taken every 20 feet along each survey line. Field calibration checks of the EM instrument's sensitivity will be performed prior to the start of the survey in an area considered to represent background readings.

Both the quadrature component and in-phase component of the electromagnetic field will be recorded by the data logger at each station. The quadrature component of the electromagnetic field is linearly proportional to the apparent ground conductivity and will be used to delineate areas of past metallic waste disposal, if any. The in-phase component of the electromagnetic field is sensitive to electrically conductive materials, such as metals, and will be used to delineate areas of buried metals. All work will be performed in accordance with the manufacturer's operation manual for the EM31.

The quadrature and in-phase readings will be downloaded daily from the digital data logger to a laptop computer for further processing and contouring. Contour maps of both the quadrature and in-phase component readings will be prepared for the Northwest corner of the site.

The potential exists that the high voltage LILCO power lines will adversely effect the EM31. If this occurs, alternative metal detector survey equipment will be evaluated.

4.3.5 Visual Inspection of Main Plant Structure, Wastewater Treatment Plant, and Two Storage Sheds

Prior to the initiation of on-site sampling, a thorough visual inspection of the Main Plant Structure, Two Storage Sheds and Wastewater Treatment Plant will be performed. The intention of this inspection is to verify and document that residual contamination is not present in the buildings, and verify that pathways from spillage of contaminants in the interior of the buildings to soils beneath the buildings do not exist.

Work steps to be followed during the performance this task include:

1) Develop a base map based on existing plans for plotting information gathered during visual inspection of building.

2) Develop audit check list for use.

3) Inspect existing reports and file information regarding historical use of structures.

4) Visually inspect each room within each structure for industrial process discharges, discharge lines and pipes for leaks or spills, and inspect condition of floors for cracks, holes, drains or stains.

Any abnormalities or non-conformities will be noted.

4.3.6 On-site Air Quality Monitoring

Air quality monitoring will be conducted for safety and health monitoring during on-site activities. Air pathway analysis at the site will consist of:

- Real time particulate monitoring all activities in the work area when disturbance of soils occurs i.e., drilling and grading in North Recharge Basins.
- Real time volatile organic compound (VOC) monitoring during drilling and soil grading activities.

Particulate monitoring will be performed both upwind and downwind of the work area using a Miniature Real Time Aerosol Monitoring (MINIRAM) device. Particulate concentration readings will be taken at each bore-site prior to drilling and at half-hour intervals thereafter until drilling is completed. Readings will also be taken at any time a visible increase in particulates is noted by the field supervisor. The same procedure will be followed during grading of soils for modifying the North Recharge Basins dikes for drill rig access.

VOC monitoring will be conducted using a photo ionization detector (PID) or flame ionization detector (FID). Given the nature of contamination expected to be encountered at the site, it is unlikely that VOCs will be encountered during site activities. However, breathing zone VOC monitoring will be conducted prior to drilling and at half-hour intervals thereafter until drilling is completed. The same procedure will be followed when grading the North Recharge Basins. If significant air concentrations of VOCs are encountered, further characterization of these compounds will be conducted utilizing a portable gas chromatograph/PID (GC/PID).

4.3.7 Community Air Monitoring Plan

Real time air monitoring for volatile compounds and particulate levels at the perimeter of the exclusion zone shall be conducted in accordance with New York State Department of Health (NYSDOH) guidelines. The plan includes the following:

- Volatile organic compounds will be monitored at the downwind perimeter of the exclusion zone daily at 2 hour intervals. If total organic vapor levels exceed 5 ppm above background, drilling/excavation activities will be halted and monitoring continued under the provisions of a Vapor Emission Reponse Plan. All readings will be recorded and be available for State (DEC & DOH) personnel to review.

- Particulates will be continuously monitored downwind of the exclusion zone with a portable particulate monitor that will have an alarm set at 150 :f. mu g/m sup 3 :ef.. If downwind particulate levels, integrated over a period of 15 minutes, exceed 150 :f. mu g/m su 3 :ef.. then particulate levels upwind of the survey or work site will be measured. If the downwind particulate level is more that 100 :f. mu g/m sup 3 : ef.. greater than the upwind particulate level, than drilling/excavation activities will be stopped and corrective action taken. All readings will be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentrations of organic vapors exceeds 5 ppm above background at the perimeter of the Exclusion Zone, drilling/excavation activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, drilling/excavation activities can resume but more frequent intervals of monitoring, as directed by the District Health and Safety Specialist, must be conducted. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background

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at the perimeter of the exclusion zone, drilling/excavation activities can resume provided:

- the organic vapor level 200 feet downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background; and
- more frequent intervals of monitoring, as directed by the Safety Officer, are conducted.

If the organic vapor level is above 25 ppm at the perimeter of the Exclusion Zone activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission

If any organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the Site or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the Exclusion Zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 foot zone).

If either of the following criteria are exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented:

- Organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes.
- Organic vapor levels greater than 10 ppm above background for any time period.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. The local police authorities will immediately be contacted by the Safety Officer by dialing

911 and advised of the situation.

2. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below activation levels are measured, air monitoring may be halted or modified by the Safety Officer.

3. All Emergency contacts will go into effect as appropriate.

A copy of the Community Air Monitoring Plan is incorporated into the HASP, and will be on-site during all site field activities.

4.3.8 Decontamination

An exclusion area will be demarcated surrounding drilling activities in the field. Personnel entering or leaving this area will be required to don or remove protective apparel, in accordance with the HASP (See Appendix 5).

Drilling equipment will be cleaned between boreholes. A steam cleaner will be used to decontaminate augers, drill rods, spoon samplers and other equipment that may contact contaminated soil or ground water. The decontamination of drilling equipment will take place in the concrete diked area adjacent to the wastewater treatment building using potable water from an established, contaminant-free source. All wash water will be stored in the storage tanks in the wastewater treatment building.

Bailers, stainless steel tape and other sampling equipment will be decontaminated as specified in the QAPP (Appendix 3).

4.4 Task 4 - Sample Analysis and Validation

4.4.1 Soil Analyses

The soil samples will be analyzed according to the outline presented in Table 3-4. The soil samples will be analyzed by one or a combination of the following parameters:

- Target Analyte List (TAL) metals
- Full Target Compound List plus first 30 peaks (TCL + 30)
- Toxicity Characteristic Leaching Procedure (TCLP) for selected analytes.

The TCLP test will be used to determine if the soils are a "hazardous waste" under RCRA regulations and to assess leaching potential of contaminants. During the Phase 1 RI, three representative soil samples from the North Recharge Basins Area will be submitted for TCLP testing. At all other areas of concern, one "worst-case" sample will be submitted for TCLP testing with the exception of the Water Meter Room Pit sample. The test results will also be used to evaluate the soil's leachability potential. The standard TCLP test is typically conducted at a pH less than 5 which is less than the Ph range of 6-8 for infiltrating rainfall. A modified TCLP is therefore more appropriate at this site. Since most metals will leach more at acidic pH (i.e., pH less than 5), the standard TCLP test will be used in the Phase 1 RI as an indicator of worst-case leaching potential.

Based upon the results of the Phase 1 RI soil analyses, a PCL will be developed for soil. Soil samples collected in subsequent sampling rounds will be analyzed according to the PCL.

All laboratory and analytical procedures will follow Contract Laboratory Protocol (CLP) according to New York State Analytical Services Protocol (NYSASP), including 12/91 revisions. Laboratories that will be selected at a minimum will be labs that can maintain Department of Health (DOH) Environmental Laboratory Approval Program (ELAP) in all categories of CLP and Solid and Hazardous Waste for the duration of the project.

4.4.2 Groundwater Analyses

Groundwater samples will be analyzed for the following parameters:

- TAL metals
- Full TCL+ 30

Based upon the results of the Phase 1 RI groundwater analyses, a PCL will be developed for groundwater. Groundwater samples collected in subsequent sampling rounds will be analyzed according to the PCL.

All laboratory and analytical procedures will follow Contract Laboratory Protocol (CLP) according to New York State Analytical Services Protocol (NYSASP), including 12/91 revisions. Laboratories that will be selected at a minimum will be labs that can maintain NYSDOH ELAP in all categories of CLP and Solid and Hazardous Waste for the duration of the project.

4.4.3 Data Validation

Data validation will be performed as outlined in the QAPP (Appendix 3). Laboratory data validation will be conducted per Laboratory Data Validation Functional Guideline For Evaluating Inorganics Analyses dated July 1, 1988 revised March 1990 and Laboratory Data Validation Functional Guidelines For Evaluating Organics Analyses dated February 1, 1988 revised March 1990. Validation is a systematic process of reviewing a body of data to provide assurance that the data are adequate for their intended use. The process includes the following activities:

- Auditing measurement system calibration and calibration verification
- Auditing quality control activities
- Screening data sets
- Reviewing data for technical credibility versus the sample site setting
- Auditing field sample data records and chains-of-custody
- Checking intermediate calculations

Ms. Andrea P. Schusseler, C.H.M.M. of Chem World Environmental, Inc. will conduct the data validation. Ms. Schusseler has been approved the NYSDEC, Bureau of Hazardous Site Control, Division of Hazardous Waste, to conduct data validation.

4.5 Task 5 - Data Evaluation

The purpose of this task is to organize validated data and other information collected during the field investigations into a working format for analysis, and then perform the necessary evaluations to meet the project objectives. This task, therefore, has two distinct components: (1) data reduction and tabulation and (2) data evaluation and analysis. The following paragraphs briefly describe these components.

4.5.1 Data Reduction and Tabulation

Data obtained from the various field investigations will be condensed and organized to facilitate evaluation and presentation in this subtask. Reduction of hydrogeologic data will result in the production of various tables, figures, and drawings describing and summarizing the pertinent site features. These might include:

- Figures displaying boring and monitoring well locations and elevations
- Various hydrogeologic cross-sections
- Flow nets and groundwater contour maps

- Descriptive logs of soil borings and monitoring wells

Reduction of analytical (chemical) data will also result in tables, figures, and/or drawings depicting the extent of on-site/off-site contamination in the various media at the site. Data reduction will be facilitated by computerized sorting and manipulation of the validated analytical results.

4.5.2 Data Evaluation and Analysis

This section briefly summarizes the methodologies that will be used to evaluate validated analytical data collected as a result of site field investigations.

Data collected from all media sampled (soil, water) will be compared to background chemical concentrations. Whenever possible, statistical evaluations will be conducted to detect significant differences between on-site and off-site chemical levels and background levels and to identify trends in the data. The principal chemical migration pathways will also be identified through a review of this data.

The chemical loading will be evaluated using data from soils and groundwater. When applicable, simplistic chemical transport models will be utilized to describe on-site and off-site chemical migration. For metal migration, a model such as the EPA's MINTEQA2 equilibrium partitioning model could be used. For groundwater transport, models such as USGS-MOC and PLASM could be used. Other examples of applicable models include: SESOIL (for unsaturated/saturated studies) and SUTRA (for unsaturated/saturated studies).

4.6 Task 6 - Preliminary Risk Assessment

The purpose of the risk assessment for the site is to define and evaluate potential public health and environmental risks associated with site-related compounds of concern in soil and groundwater. The baseline public health and environmental assessment will be conducted in consideration of guidelines published recently by the USEPA in the Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A) (USEPA, 1989a), and the Risk Assessment Guidance for Superfund: Volume II - Environmental Evaluation Manual (USEPA, 1989b).

Results of the assessment will be presented to the NYSDEC in a Risk Assessment Report, prepared as a separate deliverable item.

The risk assessment process will include the following phases:

1.) Review of environmental sampling data for impacted media, and selection of the compounds of concern.

2.) Hazard assessment for the compounds of concern, which includes a characterization of chemical-specific toxicity, environmental fate and mobility, and degree of persistence.

3.) Identification of human and environmental receptors for current and foreseeable future land uses.

4.) Evaluation of current and potential routes of chemical migration.

5.) Development of current and potential chemical and medium-specific exposure point concentrations for the identified human and environmental receptors.

6.) Development of quantitative exposure and dose models for human receptors.

7.) Estimation of current and potential carcinogenic and non-carcinogenic risk for humans, and adverse impacts on flora and fauna.

A detailed discussion of each of these phases follows.

4.6.1 Review of Environmental Sampling Data and Selection of Compounds of Concern

Data from previous studies, as well as additional data gathered during the comprehensive site characterization phase, will be evaluated to determine a list of the compounds of concern for further study at the site. Factors such as occurrence/distribution, carcinogenicity, acute toxicity, persistence, degradation products, and degree of mobility will be utilized to develop the list of compounds of concern. Substances present at the site that do not exhibit any adverse characteristics discussed above will be eliminated at this step in the process.

4.6.2 Hazard Assessment

Hazard Assessment is an evaluation which includes a review of relevant biological and chemical information for each substance of concern. This information, in turn, is pertinent in the determination of whether exposure to a chemical agent is likely to cause a health hazard or increased incidence of an adverse health condition or effect.

The information which typically results from the hazard assessment process includes description of carcinogenic classification, acute and chronic health effects in humans, if available, and acute and chronic health effects in animals, where human effects are not known. Also included in the hazard assessment are potential reproductive, developmental and genotoxic effects, as well as a dose-response analysis. The dose-response assessment is conducted in order to characterize the quantitative relationship between the dose of an agent and the incidence of adverse health effects. The end result of the hazard assessment process is the integration of a large body of information into a weight-of-evidence determination of potential adverse health effects.

4.6.3 Exposure Assessment

The exposure assessment will identify and evaluate potential pathways by which people may be exposed to site contamination. The exposure assessment includes the following steps:

4.6.3.1 Identification of Potential Human Receptors

Based on current land use in and around the site all potentially exposed populations and their activity patterns will be identified. Special emphasis will be placed on the identification of sensitive receptors such as children and the elderly. Potential land use scenarios will be evaluated to determine what populations might be impacted in the future. This evaluation will be based on local zoning and established land use trends in the areas surrounding the site. Table 4-2 provides a preliminary analysis of future land use scenarios for use in the risk assessment.

If off-site groundwater contamination is confirmed during Phases I or II of the RI, additional information will be gathered to verify that no private wells exist near the site. As an initial step, the staff and records of the SCDHS and SCWA will be consulted to identify private wells adjacent to and downgradient of the site. A more complete survey of private water wells on properties immediately adjacent to and downgradient of the site will be conducted by mail after the direction of local groundwater flow has been determined. Once the additional groundwater data becomes available, a list of residences located downgradient of the site will be produced and a survey will be mailed to each home. The survey will request from each household information on the location, depth, and use of any wells on their property. The list of target residences, the design of the questionnaire, and the survey procedure will be reviewed with the NYSDEC project manager prior to conducting the survey. Note that the survey will not be conducted unless groundwater analytical data from downgradient monitoring wells sampled during the RI confirm that chemicals exist in the aquifer at levels exceeding NYSDOH Class GA guidelines as presented in Cleanup Policy and Guidelines, Volume II - Appendix (NYSDEC 1991). This well survey is in addition to the public well supply survey discussed in Section 2.5 and 3.3.13.

4.6.3.2 Identification of Exposure Pathways

The risk assessment will describe and evaluate the sources and mechanisms of chemical releases at the site, the fate and transport of chemicals in environmental media, all points of potential human contact with contaminated media (exposure points) for each receptor group, and the routes by which chemicals might enter the body (exposure routes) for each potential receptor at each exposure point. This information will be integrated to identify complete exposure pathways which will then be subject to further quantitative analysis. Table 4-3 provides a tentative identification of pathways that are likely to be selected for quantitative analysis. Air exposure point concentrations for VOCs and fugitive dust will be obtained from mathematical emission and dispersion models given in the "Superfund Exposure Assessment Manual" (SEAM, EPA 1988) and in "Procedures for Conducting Air Pathway Analyses for Superfund Applications, Volumes 3 and 4 " (EPA 1989) as recommended in the Air Cleanup Criteria section of "Cleanup Policy and Guidelines, Volume II - Appendix A" (NYSDEC 1991).

TABLE 4-2
PRELIMINARY IDENTIFICATION OF FORESEEABLE FUTURE LAND USE SCENARIOS
PHASE 1 RI PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Land Use	Selected for Evaluation?	Rationale
Peerless Photo Products Property		
Active Commercial/Industrial	YES	The entire property is zoned for commercial and industrial use; historic use of the property was industrial; existing buildings are suitable for industrial use; the property's location along/near major roads makes the site suitable for commercial/industrial uses; other properties similarly situated along Rt.25 are zoned and used for commercial/industrial purposes.
Residential	NO	No portion of the property is zoned for residential use; historic use of property as a residence was closely connected with its use as an industrial site; none of the existing buildings are suitable for residential use.
Agricultural	NO	No portion of the property is zoned for agricultural use; the property has not been used for agriculture within this century; nearby properties are not used for agriculture.
Surrounding Properties		
Residential	YES	Current use; most nearby properties are zoned for residential use.
Commercial/Industrial	NO	Only properties along Rt. 25A are zoned commercial/industrial; estimates based on the residential use scenario above will produce the more conservative estimates of risk.

TABLE 4-3
PRELIMINARY EXPOSURE PATHWAY IDENTIFICATION
PHASE 1 RI PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

EXPOSURE MEDIUM	EXPOSURE POINT	POTENTIAL RECEPTOR/ ACTIVITY	EXPOSURE ROUTE	PATHWAY TENTATIVELY SELECTED FOR QUANTITATIVE ANALYSIS ? (OR REASON FOR EXCLUSION)
Air	Site	Children trespassing	Inhalation of volatiles and fugitive dust	YES (current and all future land uses)
	Site	Construction Workers	Inhalation of volatiles and fugitive dust	YES (future commercial/industrial land uses)
	Surrounding Neighborhoods	Residents	Inhalation of volatiles and fugitive dust	YES (current and all future land uses)
Soil	Site	Children trespassing	Dermal	YES (current and all future land uses)
			Ingestion	YES (current and all future land uses)
		Construction Workers	Dermal	YES (future land uses)
			Ingestion	YES (future land uses)
	Surrounding Neighborhoods	Residents	Dermal/Ingestion	NO - No off-site soil contamination is known to have resulted from disposal activities at this site; no migration pathway is expected to be found for future migration of contaminated soils.
Groundwater	Site	Construction Workers	Inhalation/Dermal /Ingestion	NO - Groundwater occurs approximately 120 feet below grade and so would not be contacted during normal construction operations.
	Surrounding Neighborhoods	Residents	Inhalation	NO - At this time volatiles have not been found in groundwater at concentrations > NYSDOH Ambient Quality Standards
			Dermal	YES
			Ingestion	YES

4.6.3.3 Quantification of Exposure

The magnitude, frequency, and duration of human exposure to site chemicals will be estimated for each identified potential human receptor at each exposure point. The analysis will indicate whether exposures are lifetime, chronic, subchronic, or acute in nature and provide justification for any period not evaluated. This information will be combined with environmental sampling data to develop a quantitative exposure model for each pathway. Exposure point concentrations for soil and groundwater will be quantified using the method described in Risk Assessment Guidance for Superfund (EPA 1989), that is, we will calculate the 95% upper confidence limits for the means of the data sets. Air exposure point concentrations for volatiles and fugitive dust will be obtained from mathematical emission and dispersion models given in the Superfund Exposure Assessment Manual (EPA 1988) and in Procedures for Conducting Air Pathway Analyses for Superfund Applications Volumes 3 and 4 (EPA 1989) as recommended in the Air Cleanup Criteria section of Cleanup Policy and Guidelines, Volume II - Appendix (NYSDEC, 1991). The selection of models for use in the risk assessment will be consistent with guidance in Cleanup Policy and Guidelines (NYSDEC 1991), Risk Assessment Guidance for Superfund Volume I (EPA, 1989), and the Superfund Exposure Assessment Manual. Selection of models will be made in consultation with appropriate NYSDEC staff. The risk assessment will present the exposure parameters and equations used to estimate exposure in sufficient detail to enable all calculations to be verified by NYSDEC reviewers.

4.6.4 Ecological Assessment

An ecological assessment will be performed in steps as described in "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (NYSDEC, 1991). The results from each step will be reviewed to determine whether additional steps are necessary, and what specific information will be required to characterize the ecological impact of site contamination. The staff of the Inactive Hazardous Waste Evaluation Unit in the Division of Fish and Wildlife will be consulted regarding any decisions to eliminate steps in the analysis.

The initial phase of the investigation will include the development of a topographic map showing any documented fish and wildlife resources within 2 miles of the site and a cover-type map for the area within 0.5 miles of the site. NYSDEC Natural Heritage Program information resources will be consulted in the development of these maps and limited field checking of information derived from secondary sources will be performed. As surface soil contamination exists at the site, a topographic map of the site will also be provided to show site drainage patterns and describe the potential migration pathway for any chemicals due to erosion. Any areas that appear to be stressed due to site contamination will be identified and discussed. The maps will then be used to identify the fauna expected within each cover-type and any aquatic habitat.

Any habitat identified will be assessed for its value to the associated fauna, and the value of the resource to humans. If no resources are identified, no further steps will be completed.

The next phase of the assessment will begin with a pathway analysis for wildlife resources that have been identified. If no potential pathways exist for the migration of site chemicals, then no further investigations will be made. If pathways are found to exist, then the levels of contamination will be compared to established criteria if such criteria exist. If such criteria do not exist, or the levels exceed the criteria, an analysis of the toxicological effects of the contamination will be performed for each chemical potentially impacting each resource according to the NYSDEC guidelines. If remediation is necessary and fish or wildlife resources exist, an evaluation of the ecological effects of the proposed remedial alternatives will also be performed.

4.6.5 Quantitative Estimation of Risk

The final component of the baseline risk assessment for the site will be a quantitative estimate of public health risk and a semi-quantitative estimate of environmental risk. Dose estimates developed from the exposure assessment models will be compared to federal and state applicable or relevant and appropriate standards. Where estimated exposures exceed acute or chronic health or environmental criteria, the degree of impact expected from such exposure will be described.

4.6.6. Development of Soil Cleanup Criteria

If the results of the risk assessment or environmental impact analysis show that the site soil contamination poses an unacceptable risk to human health or the environment, risk-based cleanup criteria will be developed according to the Soil Media Methodology section of Cleanup Policy and Guidelines, Volume II - Appendix (NYSDEC 1991). These criteria will be protective of human health, fish and wildlife, and groundwater quality. The criteria will be developed in consultation with the NYS Department of Health and Inactive Hazardous Waste Site Remediation Central Office program staff as required in Cleanup Policy and Guidelines (NYSDEC 1991).

The preceding discussion is based on the data available at this time. The final risk assessment will be based on data developed during the RI. It is anticipated that, as new information becomes available during the RI, modifications to the Work Plan presented here will become necessary. Major modifications to the plan, such as the addition or deletion of exposure pathways, will be made in consultation with NYSDEC staff.

4.7 Task 7 - Phase 1 Remedial Investigation Report

A report summarizing Phase 1 RI activities and findings will be prepared and submitted to the NYSDEC for review and comment. Early chapters of the report summarizing the field investigation activities and the analytical data will be submitted to NYSDEC as early as possible to aid in identification of SCGs which will be finalized during the FS. The Phase 1 RI report will also be submitted to the NYSDOH to assist in their health assessment of the site. The Phase 1 RI report will be prepared in accordance with the current RI/FS Guidance (US EPA, 1988a) as well as the NYSDEC TAGMs.

5.0 TASK PLAN FOR PHASE 1 FEASIBILITY STUDY

This section identifies and presents a description of the Phase 1 FS tasks that will be implemented to conduct the Phase 1 FS scope of work for the site. The level of detail and extent of the Phase 1 FS that will be completed will be determined by the data collected during the Phase 1 RI. The Phase 1 FS will consist of the four tasks defined below:

Task 8 - Remedial Alternatives Development and Screening
Task 9 - Detailed Remedial Alternative Evaluation
Task 10 - Feasibility Study Report
Task 11 - Treatability Studies, if necessary

The FS will be conducted in accordance with the USEPA Guidance Document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", October, 1988. This document outlines the following four tasks for the FS:

- Remedial alternatives development and screening
- Detailed analysis of remedial alternatives
- Feasibility study report
- Treatability studies

An expanded series of subtasks has been developed which will be included in USEPA's four tasks. These are discussed in the following paragraphs.

5.1 Task 8 - Remedial Alternatives Development and Screening

5.1.1 Subtask 8-1 - Remedial Action Objectives

In this subtask, the FS scope will be summarized and site background information will be provided. In addition, the remedial action objectives for the site will be developed. Pertinent environmental criteria and standards, including SCGs, will be identified. Wastes and media which may require remediation will be identified and organized into media units. General response actions for each medium that may be taken to satisfy the remedial action objectives will be developed.

5.1.2 Subtask 8-2 - Screening of Technologies

In this subtask, remedial technologies potentially suitable for achieving the remedial objectives will be screened, based on general applicability to site chemicals, media, and site conditions. Suitable technologies and process options will be evaluated, using effectiveness, and implementability criteria. The selected representative technologies will be assembled into appropriate alternatives.

5.1.3 Subtask 8-3 - Development and Screening of Remedial Alternatives

In this subtask, medium-specific remedial alternatives will be developed from the technologies/process options which passed the screening in Subtask 8-2. Alternatives will be developed in three general categories required by the Superfund Amendments and Reauthorization Act of 1986 (SARA); 1), no action, 2), containment, and, 3), treatment. The objective of this section is to narrow the list of potential alternatives that will be evaluated in detail. Key aspects of the screening evaluation are the effectiveness and implementability of each alternative.

This subtask will focus on evaluating the applicability of a number of potential remedial alternatives. The objective will be to recommend or select a remedy (or remedies) for the site which achieves the optimal balance between capital cost, operating and maintenance cost (O&M), residual liability and the requirements of the NCP.

5.1.4 Subtask 8-4 - Develop Preliminary Estimates of Probable Construction Cost

Estimates of the probable construction cost will be prepared for selected remediation alternatives. These estimates will be based on conceptual and preliminary design data such as unit quantities, lists of major equipment, target performance and cleanup standards, and generalized identification of relevant site peculiarities that could impact remediation costs.

These estimates typically include contingencies of 30-50 percent and are based on appropriate adjustment from similar systems and facilities that Groundwater Technology has designed and/or constructed, published information from reference material, and manufacturer's cost data for pre-engineered items. This level of estimate is suitable for overall project planning and management of the site and identification of the most favorable remedial approaches.

5.2 Task 9 - Detailed Remedial Alternative Evaluation

5.2.1 Subtask 9-1 - Detailed Engineering Analysis

In this subtask, the detailed evaluations of the alternatives that were developed in Subtask 8-3 will be presented, including a proper analysis of "secondary" issues. Each alternative will be evaluated individually against two thresholds (i.e., overall protection of human health and the environment and compliance with SCGs and five balancing criteria (i.e., long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability; and cost). A third group of evaluation criteria are modifying considerations that are formally taken into account after public comment is received on the proposed alternative. State and community acceptance are modifying considerations. This subtask includes the development of refined costs for each remedial alternative.

5.2.2 Subtask 9-2 - Comparative Analysis of Remedial Alternatives

Once the individual alternative analysis is completed, a comparative analysis of all of the alternatives for each medium will be performed. After the comparative analysis is completed, the cost effective medium-specific alternatives will be combined into the preferable site-wide alternative.

5.3 Task 10 - Draft Phase 1 Feasibility Study Report

This subtask includes the preparation of the draft FS report that will be comprised of the same sections as in the suggested FS report format, Table 6-5 of the USEPA RI/FS guidance document referenced above.

5.4 Task 11 - Treatability Studies

As discussed earlier, soil excavation and filling/grading are two potentially applicable technologies. These technologies have been used extensively at other hazardous waste sites to remediate metal contamination. It is therefore anticipated that these two technologies will make final selection for site remediation. No treatability studies are planned at this time, because the above technologies are proven ones.

6.0 PROJECT MANAGEMENT APPROACH

6.1 Organization and Approach

While all personnel involved in an investigation and in the generation of data are implicitly a part of the overall project and quality assurance program, certain individuals have specifically delegated responsibilities. Their relative positions are shown on Figure 6-1, the Project Organization Chart. Within Groundwater Technology, Inc., the positions include Project Director, Project Manager, Site Manager, Feasibility Study Manager, Quality Assurance Officer, Data Validation Chemist, Site Health and Safety Officer, Risk Assessment Manager, Citizen's Participation Plan Specialist, and the Environmental Technicians. Professional profiles for key personnel are available in Appendix C of the QAPP. The Laboratory Quality Assurance Coordinator and Sample Custodian will be determined prior to the start-up of this investigation.

Project Director

Mr. Paul Maus is the Project Director for this investigation. The Project Director duties include review of the proposed project scope of work, management plan, and scheduling; review of all formal project documents; and review of each task. He may be reached at Groundwater Technology's Holbrook, New York office; Phone (516) 472-4000.

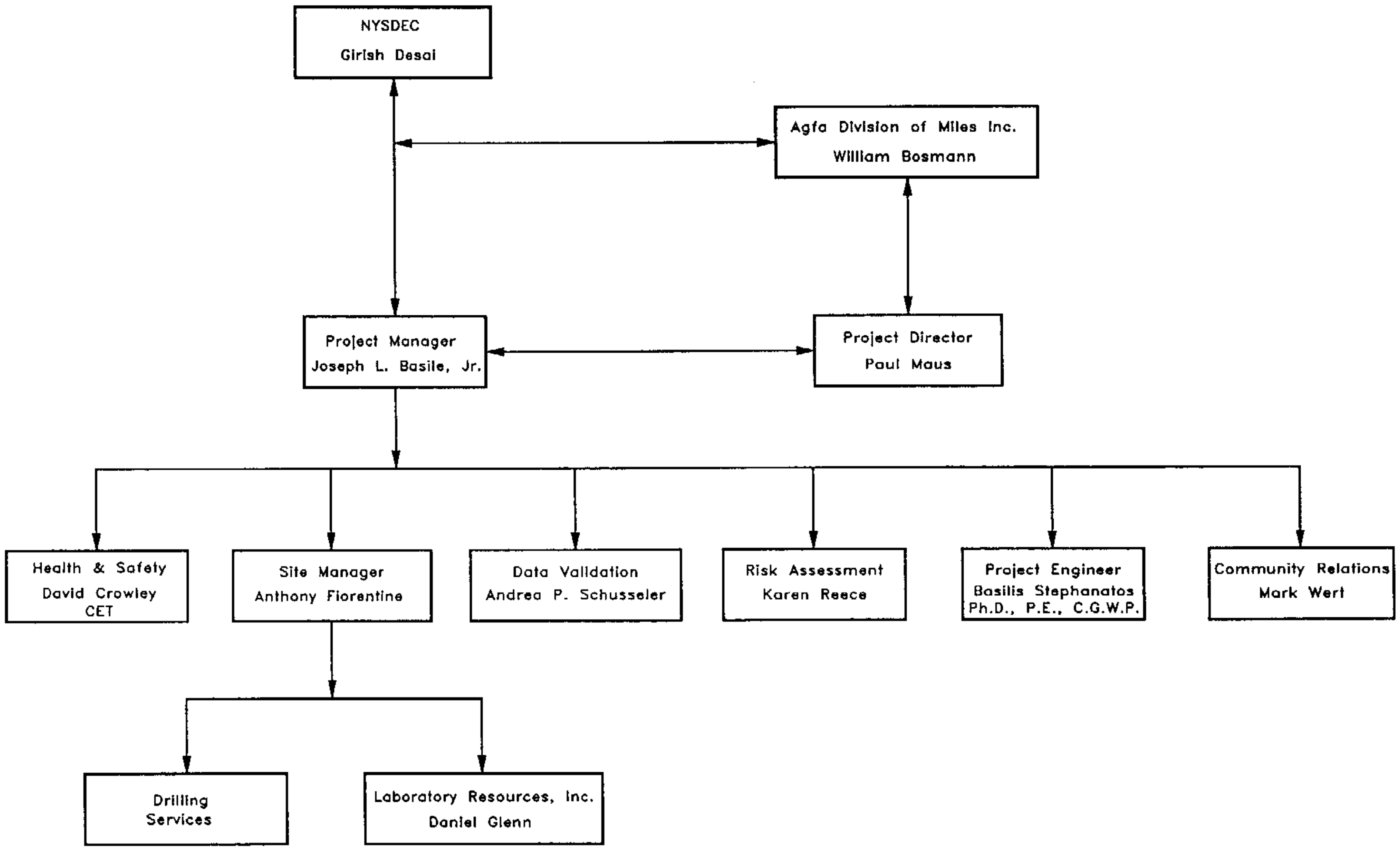
Project Manager

Mr. Joseph L. Basile, Jr. is the Project Manager for this project. The Project Manager maintains routine contact regarding the progress of the investigation and reviews the project schedule and all major work elements prior to submittal. Additionally, the project manager also coordinates all personnel involved in completing the field investigation and report preparations considering budgetary limits. He works closely with the risk assessment manager to insure that sufficient data is collected to complete the risk assessment study. He may be contacted through Groundwater Technology's District office in Schenectady, New York; Phone (518) 370-5631.

Site Manager

Mr. Anthony Fiorentine is the site manager for this project. The site manager is immediately responsible for the site investigation and will be responsible for:

FIGURE 6-1
PROJECT ORGANIZATION
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D.# 1-52-031



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1. All daily quality assurance project activities including proper sample collection, and

2. Verifying and initialing the accuracy of field notebooks and all other field-generated documents.

The site manager also implements the technical aspects of sampling programs, and participates in the data reduction and interpretation and the generation of reports. The site manager is responsible for the day-to-day activities of the field investigation. Specifically, he is responsible for chain-of-custody records, sample labels, packaging of sample jars for shipping, daily coordination with the laboratory sample custodians and providing final quality assurance review of all field generated documents. He may be contacted through Groundwater Technology's Holbrook, New York office; Phone (516) 472-4000.

Feasibility Study Manager

Dr. Basilis N. Stephanatos, P.E., D.E.E., C.G.W.P. is the feasibility study manager for this project. His responsibilities include development, design, and review of feasibility study related tasks and data. He may be contacted through Groundwater Technology's District office in Schenectady, New York; Phone (518) 370-5631.

Quality Assurance Officer

Ms. Kimberly McGhee-Gould is the Quality Assurance Officer for this investigation. In this capacity, she will review project plans and revisions to plans to assure proper quality assurance is being maintained. It is the major responsibility of the Quality Assurance Officer to insure that all personnel have a good understanding of the Quality Assurance Project Plan, an understanding of their respective roles relative to one another, and an appreciation of the importance of the roles to the overall success of the program. She also checks ten percent of the field log books and sample data sheets for completeness. System and performance audits will be conducted prior to the subcontracting of a Laboratory. She may be reached at the Groundwater Technology's Chadds Ford, Pennsylvania; Phone (215) 558-1730.

Data Validation Chemist

Ms. Kimberly McGhee-Gould will be the data validation chemist for this project. The actual decision as to who will be validating the data will not be made until a later date. The individual responsible for validating the project data will be NYSDEC approved (as are both the above mentioned individuals) and will be responsible for reviewing all of the laboratory and QA/QC data, as well as chain-of-custody records and log books to ensure that all of the analyses are being completed using approved methodologies. In addition, the Quality Assurance Officer (QAO) will review all data processing and data processing quality control activities by performing spot checks on ten percent of the reported data. The QAO may be reached at Groundwater Technology's Chadds Ford, Pennsylvania office; Phone (215) 558-1730.

Risk Assessment Manager

Ms. Karen Reece is the risk assessment manager for this project. She works closely with the project manager throughout the development and implementation of the risk assessment. She may be reached at Groundwater Technology's Norwood, Massachusetts's office; Phone (617) 769-7600.

Citizen's Participation Plan Specialist

Mr. Mark Wert will be creating and implementing the Citizen Participation Plan for this project. He can be reached at the Norwood, Massachusetts office; Phone (617) 769-7602.

Health and Safety Officer

Mr. David Crowley is the project health and safety officer. As such, he establishes the site safety plan to include the appropriate level of personal protection in specific investigative or sampling events, performs site inspections and designs emergency procedures. He may be reached at Groundwater Technology's Norwood, Massachusetts office; Phone (617) 769-7600.

Environmental Technicians

The field sampling will be conducted by trained and experienced environmental technicians. Proper sample collection protocols and measurements, equipment decontamination procedures, and chain-of-custody documentation will be adhered to by the Groundwater Technology's Environmental Technicians.

The RI/FS tasks included in this Work Plan, in addition to the schedule and budget, comprise the baseline plans which form an integrated management information system against which work assignment progress can be measured. The baseline plans are a precise description of how the work assignment will be executed in terms of scope, schedule, and budget. The project schedule is presented in Section 6.3.

6.2 Quality Assurance and Data Management

The site-specific quality assurance requirements will be in accordance with the Quality Assurance Project Plan (QAPP). The copy of the QAPP can be found in Appendix 2 of this Work Plan. The QAPP provides general guidance on the following subjects:

- Project organization and responsibility; and
- QA objectives for measurement of data in terms of precision, accuracy, representatives, completeness, and comparability.

6.3 Project Schedule

Table 6-1 depicts a schedule of tasks and activities for completing the Phase 1 RI/FS (presented to show relative durations of tasks). The schedule for the field investigation assumes that no site restrictions will be encountered. This schedule will be revised and submitted to the NYSDEC approximately 10 business days from the commencement of on site activities.

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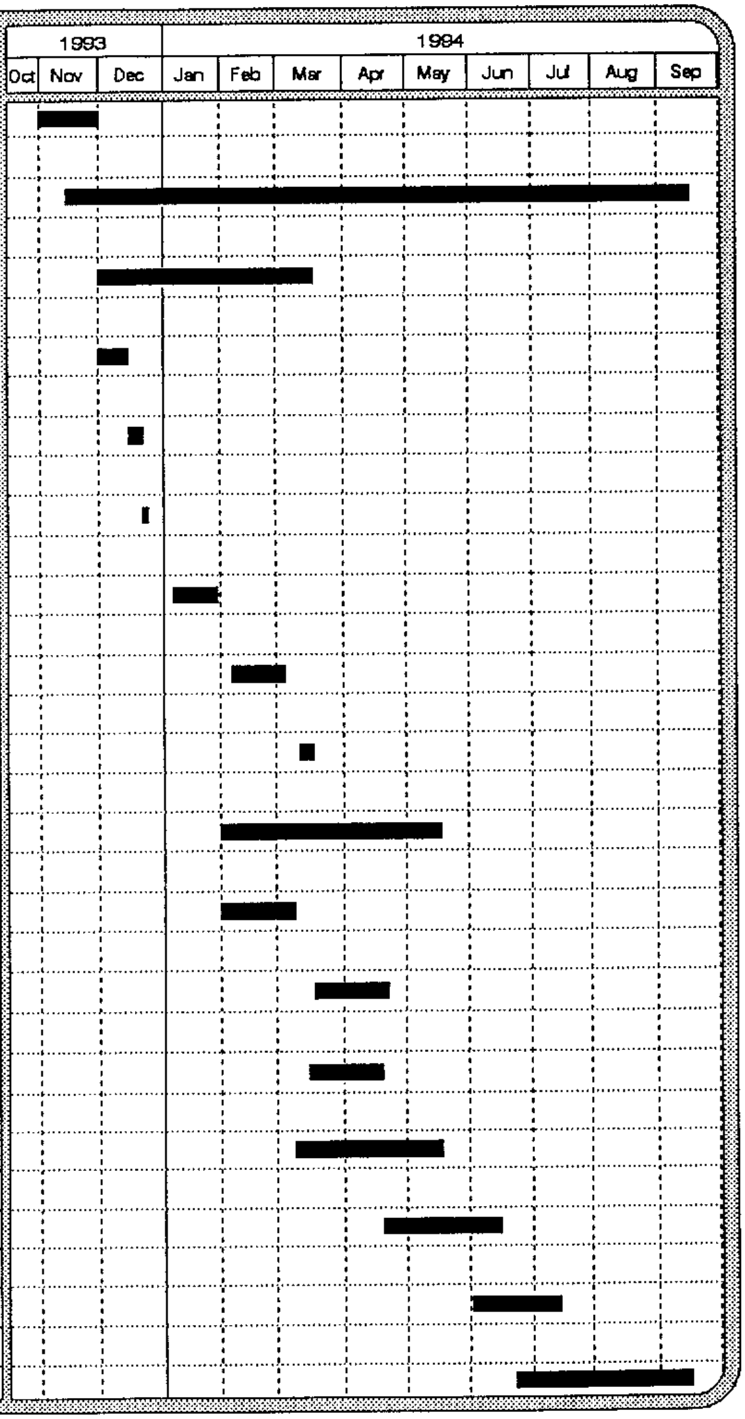
Table 6-1

DRAFT FINAL PHASE 1 RI/FS PROJECT SCHEDULE

Peerless Photo Products (Site ID #: 1-52-031)
Shoreham, New York

Task Name	Duratn (Days)
TASK 1: PROJECT PLANNING	20
TASK 2: COMMUNITY RELATIONS	212
TASK 3: FIELD INVESTIGATION	73
Mobilization	10
Building Inspection	5
Metal Detector Survey	2
Soil Boring Program	15
Monitoring Well Installation	18
Groundwater Sampling	5
TASK 4: ANALYSIS/VALIDATION	75
Laboratory Analysis(CLP)-Soil	25
Laboratory Analysis(CLP)-Water	25
Laboratory Analysis(TCLP)-Soil	25
Laboratory Data Validation	50
TASK 5: DATA EVALUATION	40
TASK 6: RISK ASSESSMENT	30
TASK 7: DRAFT RI REPORT	60



Note 1: FS Tasks will be completed pending NYS DEC approval of RI Report
Note 2: Date/durations are approximate
Note 3: Assumes that off-site property access has been granted
Note 4: Dates will be finalized following 1st public meeting
Prep D: 09/24/93

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Groundwater Technology, Inc.
101-1 Colin Drive, Holbrook, NY 11741
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APPENDIX 1

DRAFT FINAL
LIST OF RAW MATERIALS HISTORICALLY USED AT THE SITE
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK

SITE I.D. #1-52-031

September 30, 1993

Prepared for:
Agfa Division of Miles Inc.
100 Challenger Road
Ridgefield Park, New Jersey 07660-2199

Prepared by:
Groundwater Technology, Inc.
101-1 Colin Drive
Holbrook, New York 11741

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 2, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Acetic Acid (Glacial)		Baker 222 Red School Lane Phillipsburg, N.J. 08865	CH_3COOH	400 lbs.	40 lb. drum	QA Bldg. 4				
Bleach		Meadow Brook P.O. Box 754 Hicksville, NY 11800		6 cases (12XQuart	Quart Plastic	QA Bldg. 4				
Boric Acid		Suburban P.O. Box 485 River Stream St. Patterson, NJ	H_3BO_3	200 lbs.	100 lb. bag	QA Bldg. 4				
Citric Acid	Cas.77-92-9	Suburban	$C_6H_8O_7$ B-hydroxy-tricarballylic acid	200 lbs.	100 lb. bag	QA Bldg. 4				
CP-296 Activator		Metacomet 195 North St. Teterboro, NJ 07608	Triosodium-phosphate glycerine, methylamno-ethanol	100 gals.	2½ gal. plastic	QA Bldg. 4				
CP-290		Metacomet	EDTA Sodium salt Hydroxyethylcellulose Trisodium phosphate Sodium sulfite Potassium-Bromide Sodium thiosulfate Glycerin Isopropanol 2-methylaminoethanol 1 phenol-5-mercaptotetrazol 1-(3,4 Dichlorophenyl)-2 tetrazolidine-5-thion	100 gals.	1 quart plastic	QA Bldg. 4				

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 2, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Ethylenediaminete tra-acetic acid	Cas. 60-00-4	Fisher P.O. Box 375 1 Regent Lane Fairlawn, NJ 07410	$C_{10}H_{16}N_2O_8$	5 lbs.	5 lb. glass bottle	QA Bldg. 4				
G7C		Metacomet 195 North St. Teterboro, NJ 07608	Potassium Hydroxide Hydroquinone l-phenyl 3 pyrazolidone methylalcohol	50 gals.	5 gal. Plastic					
G-335C Fixer Hard same as X-Ray Fix		Metacomet	Ammonium thiosulfate Sodium sulfite, Sodium acetate, Acetic acid Citric acid, Aluminum sulfate	6 gals. 50 quarts	quarts plastic 5 quart plastic	QA Bldg. 4				
Hi N Developer		Metacomet	EDTA tri-sodium salt EDTA disodium salt Potasium hydroxide Potassium metabisulfite Hydroquinone, Sodium sulfite Boric acid, Potassium bromide Methylcellulose, Polyethyleneglycol-200 acetic acid Phenidone A	25 gals.	5 gal. plastic	QA Bldg. 4				

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Company Name Peerless Photo Products, Inc., Shoreham

CHEMICAL SURVEY FORM

Inventory By WCB Date April 2, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
MU Developer		Metacomet 195 North St. Teterboro, NJ 07608	Sodium hexametha-phosphate, Sodium bisulfite, Sodium sulfite, paramethyl-aminophenol sulfate hydroquinone Sodium carbonate Potassium bromide Potassium fluoride	500 gals.	2½ gal. plastic	QA Bldg. 4				
Permabatch Developer		Compugraphic 35 Concord St. North Reading, Mass. 01864	Potassium hydroxide, Hydroquinone	50 gals.	5 gal. plastic	QA Bldg. 4				
Permabatch Fixer		Compugraphic	Acetic acid, Ammonium thiosulfate, Sodium sulfite, Ammonium Thiocyanite, Aluminum chloride	50 gals.	5 gal. plastic	QA Bldg. 4				
pH Buffer So. 4.00		Fisher P.O. Box 375 Regent Lane Fairlawn, NJ 07410		5 gals.	5 gal. plastic	QA Bldg. 4				
pH Buffer Sol. 7.00		Fisher		5 gals.	5 gal. plastic	QA Bldg. 4				
pH Buffer Sol. 10.00		Fisher		5 gals.	5 gal. plastic	QA Bldg. 4				

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Company Name Peerless Photo Products, Inc., Shoreham

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Inventory By WCB Date April 2, 1985

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Potassium Alum		Suburban P.O. Box 485 River Stream St. Patterson, NJ	$\mathrm{AlKO}_{,}\mathrm{S}_2$ Potassium Aluminum sulfate	200 lbs.	100 lb. bag	QA Bldg. 4				
Potassium Biphthalate		American Scientific 100 Ranton Center Pkway Edison, NJ 08818	$C_8H_5KO_4$ Phtalic acid Potassium salt	5 lbs.	5 lb. glass bottle	QA Bldg. 4				
Process 92 BXR-a		Metacomet 195 North St. Teterboro, NJ 07608	Ammonium-Ferric-EDTA EDTA, Ammonium hydroxide	25 gals.	2½ gal. plastic	QA Bldg. 4				
Process 92 BXR-b		Metacomet	Sodium Sulfite, Sodium-bisulfite, Ammonium-thiosulfate	50 gals.	5 gal. plastic	QA Bldg. 4				
Process 92 CDR		Metacomet	Bisulfonic acid, Hostapon T, Diethylene glycerol, Benzol alcohol, Caprolactane Tetraetthylammonium perfluorinel-octane sulfate Sodium sulfite 4-N-ethyl-2-methane-sulfanyl amino ethyl-2-methyl-diamine- Sulfuric acid 1-hydroxethylene bisphosphanate Potassium carbonate, Potassium methabisulfite, nitrilotriacetic acid trisodium salt, Ethylene-diaminotetramethyl phoshonic acid	50 gals.	5 gal. plastic	QA Bldg. 4				

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 2, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Process 92 CDS		Metacomet 195 North St. Teterboro, NJ 07608	Potassium carbonate Potassium bicarbonate Potassium bromide 1- hydroxyethylene-bisphosphanate	60 X 16oz.	16oz. plastic	QA Bldg. 4				
Reference Electrode solution		Fisher P.O. Box 375 1 Regent Lane Fairlawn, NJ 07410		500 ml.	1.1 pp bottle	QA Bldg. 4				
Silver Nitrate Solution	Cas.7761-88-8	Fisher	$AgNO_3$	5 ltr.	2 oz. bottle	QA Bldg. 4				
Sodium Hydroxide	Cas. 1310-73-2	Baker 222 Red School Lane Phillipsburg, NJ 08865	NaOH	110 lbs.	110 lbs. drum	QA Bldg. 4				
Sodium Phosphate	Cas. 7758-79-4	Fisher	Na_2HPO_4	5 lbs.	5lb. glass bottle	QA Bldg. 4				
Sodium Sulfite	Cas. 7757-83-7	Suburban P.O. Box 485 River Stream St. Patterson, NJ	Na_2SO_3	200 lbs.	100 lb. bag	QA Bldg. 4				

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Company Name Peerless Photo Products, Inc., Shoreham

CHEMICAL SURVEY FORM

Inventory By WCB Date April 2, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Sodium Thiosulfate		Fisher P.O. Box 375 1 Regent Lane Fairlawn, NJ 07410	$Na_2S_2O_3\ 5H_2O$	50 lbs.	25 lb. drum	QA Bldg. 4				
Sodium Thiosulfate (Anhyhrous)		Metacomet 195 North St. Teterboro, NJ 07608	$Na_2O_3S_2$	200 lbs.	100 lb. bag	QA Bldg. 4				
Thioacetamide	Ethanethioamide Cas. 62-55-5	Fisher	C_2H_5NS	200 gms	100 gm glass bottle	QA Bldg. 4				
Thymol	Cas. 89-83-8	Fisher	$C_{10}H_{14}O$ 2-isopropyl-5 methyl phenol	200 gms.	100 gms glass bottle	QA Bldg. 4				

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 3, 1985

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Bldg. 18 Location	Toxic Lists	MSDS	Label	Training Needed
Acetic Acid	Cas.64-19-7	AGNV - Europe	$C_2H_4O_2$ H_2O	296,100 ML	Drum	Whse. 3rd fl.				
Aluminum sulfate	Cas.10043-01-3	Holand 153 Holland Ave. Adams, Mass. 01229	$Al_2(SO_4)_3$	2864,000 GM	Drum	Whse. 3rd fl.				
Ammonium Hydroxide		AGNV - Europe	NH_4OH	459,500 ML	Drum	Whse. 3rd fl.				
Ammonium Nitrate	Cas.6484-52-2	AGNV - Europe	NH_4NO_3	227,800 GM	Box Drum	Whse.				
Ammonium Thiocyante	Cas.1762-95-4	AGNV - Europe	NH_4SCN	24,374 GM	Glass	Whse. 3rd fl.				
Antischium		AGNV - Europe	Nonionic tenside	6,600 ML	Bottle	Whse.				
Baryta	Cas.7727-43-7	AGNV - Europe	$BaSO_4$ Barium Sulfate	6,940 KG	Box	Whse.				
CMC	Cas.9004-32-4	Hercules, Inc. Wilmington, Delaware	Sodium caboxymethyl cellulose	675,092 GM	Bag	Whse.				
CS220	Cas.86-93-1	AGNV - Europe	$C_7H_6N_4S$ 5-mercapto-1 phenyl-tetrazole	75,970 GM	Drum	whse.				

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 3, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Bldg. 18 Location	Toxic Lists	MSDS	Label	Training Needed
Cadmium Chloride	Cas. 10108-64-2	AGNV - Europe	$CdCl_2$	4,728,000 GM	Glass	Whse.				
Cadmium Iodide	Cas. 7790-80-9	Baker Chemical Co. 222 Red School Lane Phillipsburg, N.J. 08865	CdI_2	53,885 GM	Glass/box	Whse.				
Citric Acid	Cas. 77-92-9	AGNV - Europe	$C_6H_8O_7H_2O$	140,200 GM	Drum/bag	Whse.				
Copper Chloride	Cas. 1344-67-8	Baker Chemical Co.	$CuCl_2$	554,356 GM	Drum	Whse.				
DI		AGNV - Europe	p-tolusulfinine, sodium salt	376,660 GM	Drum	Whse. 3rd fl.				
Dihydro	Cas. 68072-55-9	AGNV - Europe	$C_{14}H_{16}O_2N_2S$ 2-mercapto-3p-carboxyphenyl-4-metlyl-6-dimethylpyrimidine	5,800 GM	Box	Whse.				
Diphoclor	Cas. 1482-72-3	AGNV - Europe	$C_{12}H_{10}IxCl$ diphenyl iodonium chloride	3,400 GM	Box	Whse.				
DMU	Cas. 96-31-1/ 140-95-4	AGNV - Europe	$C_3H_8N_2O_3$ 1,3 dimethylurea	671,750 GM	Bag	Whse. 3rd fl.				

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 3, 1985

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Bldg. 18 Location	Toxic Lists	MSDS	Label	Training Needed
Hydrochinon	Cas.123-31-9	Kodak 343 State St. Rochester, N.Y. 14650	1,4 Benzenediol	102 KG	Drum	Whse.				
Hydrochloric Acid	Cas.007647010		HCL		Drum	Whse.				
K-14	Cas.7727-43-7		Barium Sulfate							
Lexyl	Cas.79-10-17 140-88-5	AGNV - Europe	$(C_5H_8O_2)_X$ Acrlic acid 2 propanoic acid	3188,950 ML						
Mercaptolat		AGNV - Europe	$C_8H_1N_3O_4S_2$ Thiadiazole denivative heterocyclic compound							
Methanol	Cas.67-56-1	AGNV - Europe	CH_4O	342,000 ML	Drum	Alcohol room				
Nickel Nitrate		AGNV - Europe	$Ni(NO_3)_2 6H_2O$	47,666 GM	Drum	Whse.				
Optical Brightner		Sandoz Chemicals P.O. Box 18278 Charlotte, N.C. 28218	Blakophor B	216,572 GM	Drum	Whse. 3rd fl.				
PSS-15 HM	Cas.9080-79-9	AGNV - Europe	Polystyrene Sulfonic Acid	360,000 ML	Drum					

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 3, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Bldg. 18 Location	Toxic Lists	MSDS	Label	Training Needed
Para-Chloro-Metha-Cresol	Cas.59-50-7	AGNV - Europe	C_7H_7ClO	1407,438 GM	Drum/Box	Whse.				
Phenidon B		AGNV - Europe		62,000 GM	Drum	Whse.				
Phenol	Carbulic Acid Cas.2654-57-1	Fisher Scientific 52 Fadom Rd. Springfield, NJ	C_6H_5OH Hydroxybenzene	5623,192 ML	Glass	Whse.				
Polyfon (PSS)		AGNV - Europe	Polyacrilic Sulfonic acid Sodium salt	1125,000 ML	Drum	Whse. 3rd fl.				
Potassium Bromide	Cas.7758-02-03	Baker Chemical Co. 222 Red School Lane Phillipsburg, NJ 08865	KBr	272,722 ML	Drum/bag	Whse.				
Potassium Iodide	Cas.76-81-11-0	AGNV - Europe	KI	27,811 KG	Glass	Whse.				
Pyrox		AGNV - Europe	p-dimethylamine benzalrhodanine, nonionic methinedye $C_{12}H_{12}NS_2O$	6,027 GM	Box	Whse.				
SD3A Alcohol	Cas.64-47-5 & 67-56-1	Baker Chemical Co.	Ethanol-Methanol mix	533,060 ML	Tank	Outside				

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Company Name Peerless Photo Products, Inc.,Shoreham

CHEMICAL SURVEY FORM

Inventory By WCB   Date April 3, 1985

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Bldg. 18 Location	Toxic Lists	MSDS	Label	Training Needed
Saponine		AGNV - Europe	Saponegin glycoside	309,900 GM	Box	Whse, 3rd fl.				
Sodium Chloride	Cas.7647-14-5	AGNV - Europe	NaCl	26,102 GM	Bag/Drum	Whse.				
Sodium Hexachlorodate		Engelhard 1 W. Central Ave. E. Newark, NJ 07029	Rhodium Chlorine Sodium Salt	125 GM	Glass	Lab.				
Sodium Hydroxide	Cas.1310-73-2	AGNV - Europe	NaOH	69,747 KG	Drum	Whse.				
Sodium Sulfide	Cas.16721-80-8	Baker Chemical Co. 222 Red School Lane Phillipsburg, NJ 08865	NaHS Sodium hydrogen sulfide	37,890 GM	Glass	Whse.				
Sodium Sulfite	Cas.7757-83-7	AGNV - Europe	Na_2SO_3	22,650 GM	Glass	Whse.				
Sodium Thiosulfate	Cas.7772-98-7	AGNV - Europe	$Na_2S_2O_3 5H_2O$ Sodiumhyposulfate	233,44 GM	Box/glass	Whse.				
Sodium Thiosulphate Anhydrous	Cas.7772-98-7	AGNV - Europe	Na_2HSO_4 Sodium hyposulfate	183,183 GM	Box/Glass	Whse.				

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 3, 1985

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Bldg. 18 Location	Toxic Lists	MSDS	Label	Training Needed
Sulfuric Acid	Cas.7664-939	Baker Chemical Co. 222 Red School Lane Phillipsburg, NJ 08865	H_2SO_4	263,104 ML	Glass	Whse.				
Tergitol Annoinic		Niacet PO Box 1034 400 47th St. Niagra Falls, N.Y. 14302	Sodium tetradecyl sulfate	395,825 ML	Drum	Whse. 3rd fl.				
Thymol	Cas.89-83-8	AGNV - Europe	$C_{10}H_{14}O$ 2-isopropyl-5-methylphenol	3 KG	Glass	Lab.				
Tri for Tria		AGNV - Europe	$C_6H_6N_4O$ 7-Hydroxy-5methyl-triazole	27,060 GM	Box	Whse.				
Triton		Unionc Lt	Octylphenoxypoly ethoxyethanol	8,547 LT	Plastic drum	Whse. 3rd fl.				
Zena		AGNV - Europe	Benzotriazol	3 KG						
Zinc Sulfate	Cas.7733-02-0	Rohm & Haas Independence Mall W. Philadelphia, Pa. 19105	$ZnSO_4$	26,548 GM	Box	Whse. 3rd fl.				

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Building 16 BOILER ROOM p. 1 of 2

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
2549		Nalco Chemical		100 lbs.	Drum					
2580		"		100 lbs.	Drum					
2584		"		55 gal.	Glass Bottle					
2802		"		55 gal.	Glass Bottle					
P. Alk Indicator Solution 222		"		35 mls.	Glass Bottle					
Salt		"	NaCl	20/50lb.	Bag					
SO 103	Sulfamic Acid	"	H_3NO_3S	Pint	Glass Bottle					
SO 128 SFD 1		"		Pint	Glass Bottle					
SO 129 SFD 2		"		Pint	Glass Bottle					
SO 130 SFD 3		"		Pint	Glass Bottle					

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Building 16 BOILER ROOM p. 2 of 2

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
SO 226 N/50 SO 4		Nalco Chemical		2 gals.	Glass Bottle					
Solution 224		"		35 mil.	Glass Bottle					
Solution 229		"		Pint	Glass Bottle					
Solution SO 234		"		Pint	Glass Bottle					
Solution 260		"		35 mil.	Glass Bottle					
Solution 729		"		35 mil.	Glass Bottle					

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoruham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300 p.1 of 8

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Alkaline-iodideazide Powder		Hach Chemical Co. Loveland, Colo.	Alkalineiodide Sodium Azide	100 capsules	Plastic	ALL ECO LAB				
Amino-antipyrine		B. C. Chemicals 65 De Vinci Dr. Bohemia, N.Y. 11716	$CH_3NH(C_6H_5)CoC$ (NH_2): CCH_3	100g	Glass bottle					
Ammonium chloride	Cas.83-07-8	B. C. Chemicals	NH_4CL	500gr	Plastic bottle					
Ammonium Hydroxide	Cas.1336-21-6	B. C. Chemicals	NH_4OH	1.8kg jug +	Glass bottle					
Ammonium molybdate	Cas.12027-67-7	B. C. Chemicals	$(NH_4)_6MO_7O_{24}.4H_2O$	500g	Plastic bottle					
Barbituric acid	Cas.67-52-7	B. C. Chemicals	$C_4H_4N_2O_3$	100g	Glass bottle					
Barium chloride	Cas.10361-37-2	B. C. Chemicals	$BaCl_2 2H_2O$	500g	Glass bottle					
Bromo Phenol blue	Cas.115-39-9	Kodak Chemicals 343 State St. Rochester, NY 14650	$C_{19}H_{10}Br_4O_5S$ 3'3"5'5" Tetrabromophenol sulfonphthalien	10g	Glass bottle					

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Brucine sulfate	Cas.38741-38-7	B. C. Chemical 65 De Vinci Dr. Bohemia, N.Y. 11716	$(C_{23}H_{26}N_2O_4)_2$ $H_2SO_4 7H_2O$	25gr	Glass bottle	ALL ECO LAB				
Boric Acid	Cas.10043-35-3	B. C. Chemical	H_3Bo_3	500g	Plastic bottle					
Chloramine T	Cas.127-65-1	Kodak Chemicals 343 State St. Rochester, NY 14650	$P-CH_3C_6H_4SO_2N$ $NaCL - 3H_2O$ N-chloro-p-toluenesulfonamide sodium salt	250g	Glass bottle					
Chloroform	Cas.67-66-3	B. C. Chemical	$CHCL_3$	1 gal	Glass bottle					
Cupric sulfate	Cas.7758-99-8	B. C. Chemicals	$CmSO_4\ 5H_2O$	5 lbs.	Plastic bottle					
S-Diphenyl carbazone	Cas.538-62-5	B. C. Chemical	$C_6H_5NHNHCON$: NC_6H_5NHNH $CONHNHC_6H_5$ Diphenylcarbazone compound with S-diphenylcarbazide	10g	Glass bottle					

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. 14 0300

P. 3 of 8

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
EDTA	Cas.139-33-3	G. Fredrick Smith Chemical Columbus, ohio 43223	(NAO_2CCH_2) $NC_2H_4N(CH_2CO_2H)_2$ $2H_2O$ Disodium dihydrogen ethylenediamine-tetraacetate dihydrate	100g	Plastic bottle	ALL ECO LAB				
Ferrous ammonium sulfate	Cas.10045-89-3	G. Fredrick Smith	$Fe(NH_4)_2(SO_4)_2$ $6H_2O$	100g	Plastic bottle					
Ferrous Sulfate	Cas.7720-78-7	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	$FeSO_4$ $7H_2O$	450gm	Plastic bottle					
Glycerol	Cas.56-81-5	B. C. Chemical	$C_3H_5(OH)_3$	1 ltr.	Glass bottle					
Iodine	Cas.7553-56-2	B. C. Chemical	I_2	100g	Glass bottle					
Isopropyl alcohol	Cas.67-63-0	B. C. Chemical	$CH_3CHOHCH_3$	1 ltr.	Glass bottle					
Hydro chloricacid	Cas.7647-01-0	B. C. Chemical	HCl	275kg	Glass bottle					

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300 p. 4 of 8

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Magnesium chloride	Cas.7791-18-6	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	$MgCl_2\ 6H_2O$	500g	Plastic bottle	ALL ECO LAB				
Manganous sulfate	Cas.10101-68-5	B. C. Chemical	$MnSO_4\ H_2O$	125g	Plastic bottle					
Mercuric nitrate	Cas.7783-34-8	B. C. Chemical	$Hg(NO_3)_2\ H_2O$	100g	Glass bottle					
Mecuric oxide red	Cas.21908-53-2	B. C. Chemical	HgO	125g	Glass bottle					
Mercuric sulfate	Cas.13766-44-4	B. C. Chemical	$HgSO_4$	450g	Glass bottle					
Methylene blue	Cas.61-73-4	B. C. Chemical	$C_{16}H_{18}N_3SCL\ 3H_{20}$	100g	Glass bottle					
Methylene orange	Cas.547-58-0	B. C. Chemical	$C_{14}H_{14}N_3NaO_3S$	100ml	Glass bottle					
Methylene red	Cas.493-52-7	B. C. Chemical	$C_{15}H_{15}N_3O_2$ HCL	10g	Glass bottle					
Phenol	Cas.108-95-2	B. C. Chemical	C_6H_5OH	500g	Glass bottle					

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300 p.5 of 8

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Phenolphtalien 1% in alcohol	Cas. 77-09-8	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	$C_{20}H_{14}O_4$	100ml	Glass bottle	ALL ECO LAB				
Paotitrant		Hach Chemical Co. Loveland, Colo.	Phenylarsine oxide							
Potassium bromide	Cas.7758-02-3	B. C. Chemical	KBr	500g	Plastic bottle					
Potassium cyanide	Cas.151-50-8	B. C. Chemical	KCN	500g	Plastic bottle					
Potassium dichromate		B. C. Chemical	$K_2CR_2O_7$	500g	Glass bottle					
Potassium Ferri-cyanide	Cas.14459-95-1	B. C. Chemical	$K_3Fe(CN)_6$	125g	Plastic bottle					
Potassium Hydroxide	Cas.1310-58-3	B. C. Chemical	KOH	500g	Plastic bottle					
Potassium Iodate	Cas. 7758-05-6	B. C. Chemical	KIO_3	125g	Glass bottle					
Potassium iodide	Cas.7681-11-0	B. C. Chemical	KI	125g	Plastic bottle					

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Potassium nitrate	Cas.7757-79-1	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	KNO_3	25g	Glass bottle	ALL ECO LAB				
Potassium phosphate monobasic	Cas.7778-77-0	B. C. Chemical	KH_2PO_4 Potassium dihydrogen phosphate	500g	Plastic bottle					
Potassium phosphate dibasic	Cas.16788-57-1	B. C. Chemical	$K_2HPO_4\ 3H_2O$	500g	Plastic bottle					
Potassium sulfate	Cas.7778-80-5	B. C. Chemical	K_2SO_4	500g	Plastic bottle					
Pyridine	Cas.110-86-1	B. C. Chemical	C_2H_5N	500ml	Glass bottle					
Sodium borate	Cas.1303-96-4	B. C. Chemical	$Na_2B_4O_7\ 10H_2O$	500gr	Plastic bottle					
Sodium carbonate	Cas.497-19-8	B. C. Chemical	Na_2CO_3	500gr	Glass bottle					
Sodium hydroxide pellets	Cas.1310-73-2	B. C. Chemical	NaOH	2.5kg	Plastic bottle					

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Sodium phosphate dibasil	Cas.7558-79-4	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	Na_2HPO_4	500g	Plastic bottle	ALL ECO LAB				
Sodium phosphate monobasic	Cas.10049-21-5	B. C. Chemical	NaH_2PO_4	2.5kg	Plastic bottle					
Sodium sulfate	Cas.7757-82-6	B. C. Chemical	Na_2SO_4	2.3kg	Glass bottle					
Sodiumthio sulfate anhydrous	Cas.7772-98-7	B. C. Chemical	$Na_2S_2O_3$	400g	Plastic bottle					
Sodiumthio sulfate	Cas.10102-17-7	B. C. Chemical	$Na_2S_2O_3\ 5H_2O$	500g	Plastic bottle					
Stannous chloride	Cas.10025-69-1	B. C. Chemical	$SNCL_2 2H_2O$	500g	Plastic bottle					
Sulfamic acid	Cas.5329-14-6	B. C. Chemical	H_2NSO_3H	100g	Plastic bottle					
Sulfanilic acid	Cas.121-57-3	B. C. Chemical	$NH_2C_6H_4SO_3H\ H_2O$	100g	Glass bottle					

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0300

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Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
LABORATORY ACIDS										
Acetic acid	Cas.64-19-7	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	CH_3COOH	2.2kl	Glass bottle	ECO LAB				
Hydrochloric acid	Cas.7647-01-0	B. C. Chemical	HCL 37%	2.75kl	Glass bottle	"				
Nitric acid	Cas.7697-37-2	B. C. Chemical	HNO_3 70%	3.2kl	Glass bottle	"				
Phosphoric acid	Cas.7664-38-2	B. C. Chemical	H_3PO_4 85%	3.6kl	Glass bottle	"				
Sulfuric acid	Cas7664-93-9	B. C. Chemical	H_2SO_4	4kl	Glass bottle	"				

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 10, 1985

Bldg. #14 0100 p.1 of 1

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Ferric Chloride	Cas.10025-77-1	Acro Chemical Co., Inc. 212 Carmen's Road, E. Farmingdale, NY 11735	$FeCl_3\ 6H_2O$	55 gal.	Drum	ALL ECO PLANT				
Methanol	Cas.67-56-1	B. C. Chemical 65 De Vinci Dr. Bohemia, NY 11716	CH_3OH Methyl Alcohol	55 gal.	Drum					
Potassium Nitrate	Cas.7757-79-1	Agway Chemicals 205 Marcy Ave. Riverhead, NY 11901	KNO_3	50 lbs.	Bag					
Polymer Percol 727		Allied Colloids P.O. Box 820 2301 Wilroy Rd. Suffolk, Va. 23434	Resins	50 lbs.	Drum					
Sodium Hydrogen sulfide	Cas.1672-18-05	B. C. Chemical	45% NaHS H_2O	55 gal.	Drum					
Sulfuric Acid	Cas.766-49-39	B. C. Chemical	H_2SO_4	235 lb. carboys	Drum					
Sodium hydroxide	Cas.1310-73-2	Acro Chemical	NaOH	55 gal.	Drum					

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Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

E&PP Atomic Absorption Room Bldg. 4 p.1 of 1

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Acetylene Gas	Cas.74802	Am-Weld 243 Waverly Ave. Patchogue, N.Y.	C_2H_2	1	Steel tank					
Aluminum Standard	Cas.7429905	Scientific Prod. McGraw Park, Ill. 60085	$Al + H_2O$	500 ml.	Glass bottle					
Barium Standard	Cas.10361372	Scientific Prod.	$BaCl_2 + HCl + H_2O$	500 ml.	Glass bottle					
Cadmium Standard	Cas.7440439	Scientific Prod.	$Cd\ HCl + H_2O$	500 ml	Glass bottle					
Copper Standard	Cas.7758987	Scientific Prod.	$CuSO_4 + H_2SO_4$	500 ml.	Glass bottle					
Iron Standard		Scientific Prod.	$Fe + HCl + H_2O$	500 ml.	Glass bottle					
Lead Standard	Cas.10099748	Scientific Prod.	$Pb(NO_3)_2 +$ $HNO_3 + H_2O$	500 ml.	Glass bottle					

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc.,

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab

p.1 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Acetone	Cas.67641	Fisher Scientific 52 Fadom Road Springfield, NJ (All Fisher unless otherwise noted)	C_3H_6O Dimethyl/ketone	100-500g	All Glass/ Plastic bottles	All Bldg.18 Lab.				
Acentonitrile	Cas.75058		C_2H_3N Methylcyanide	100-500g						
Amino Benzen	Cas.71432		C_6H_4N	100-500g						
Ammonium Bromide	Cas.12124979		$BrNH_4$	100-500g						
Ammonium Chloride	Cas.12125029		NH_4Cl	100-500g						
Ammonium Thiosulfate			$H_8N_2O_3S_2$ Ammonium hyposulfate	100-500g						
Anitec Red	Dye			100g						

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab p.2 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Anitect 2005	Dye			100g						
Anitect Sensitizers 2013,2075,2081				100g						
Anti Fog #5		Kodak 343 State St. Rochester,N.Y. 14650	Benzotriazole	100-500g						
Ascorbic Acid	Cas.50817		$C_6H_8O_6$ 3-OXO-1-glucofuranolactone							
At 320		Mortsel-Europe		1kg						
AT 330		Mortsel-Europe		1kg.						
Benzene	Cas.71432		C_6H_6 benzol	100-500-g						
Benzotri-azole	Cas.95147		$C_6H_5N_3$ azimidobenzene	1kg.						

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab

p. 3 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Calcium Sulfate			$CaSO_4$	100-500g						
Carbowax			polyglycol	100-500g						
Cerium Stearate			$C_{18}H_{35}OCe$ octadecanoic acid cerium salt	100-500g						
Chromotropic acid			$C_{10}H_8O_8S_2$ 1, 8-dihydroxynaphtalene-3-6disulphonic acid	100g						
Cobalt Bromide			$CoBl_2$	100-500g						
Cobalt Chloride			$CoCl_2$	100-500g						
Cobalt Nitrate	Cas.10140-05-6		CoN_2O_6	100-500g						
Dantoin MDMH	Cas.6440-58-0		$C_7H_{12}N_2O_4$	100-500g						

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Diethylune triaminepenta-acetic acid				100-500g						
Dimethyl Sulfoxide			$C_2H_6O_5$ sulfinyl bis(methene) methyl sulfoxide	100-500g						
Dimercapto thiadizole				100-500g						
Dowex HCR			resin	100-500g						
Duponol			wetting agent	100-500g						
Dye 2003			stain	100g						
Elon Developer		Kodak 343 State St. Rochester,NY 14650		100-500g						
Ethyl Acetate	Cas.141979		$C_4H_8O_2$ Acetic acid, ethylester	100-500g						

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985
All Bldg. 18 Lab

p. 5 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
3-ethyl Rhodanine			3 ethyl-2thioxo-4 thiazolidinone $C_3H_3NOS_2$	100g						
Ferric Chloride			$FeCl_3$	100-500g						
Glycerin	Cas.56817		$C_3H_8O_3$	1kg						
Gold Sodium Thiosulfate	Cas.10233882		$AuNa_3O_6S_4$ Bis(monothiosulfate 2-OS) aurate	100g						
Hydrazine	Cas.302012		H_4N	100-500g						
Hydrazine Dihydrochloride	Cas.2644704		$C_2H_6N_2$ 2-hydrazine-5-sulfo-Benzoic Acid	100-500g						
Hydrazine Sulfate	Cas.10034932		$H_6N_2O_4S$ hydraronium sulfate	100-500g						
Hydrophobic Fumed Silica			Silicon Si							

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham
Inventory By WCB Date April 12, 1985
All Bldg. 18 Lab p.6 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Indole	Cas.120729		C_8H_7N 2-3 benzopyrrole	100g						
IRA 68				100- 500g						
IRA 400				100- 500g						
Jeffamine D320										
Lactophenol			Stain	100g						
Leucophor B-302, BCR, C-7002U		Sandoz P.O. Box 18278 Charlotte, N.C. 28218	optical britener	100- 500g						
Magnesium Perchlorate	Cas.10326213		Cl_2MgO_8 dehydrite	100- 500g						
Mercuric Chloride			HgCl	100- 500g						
Mersolat H		Mortsel -Europe	Wetting agent							
Methoxaline										

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab p. 7 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
5-methyl Benxotriazole		Kodak 343 State St. Rochester, NY 14650								
Methylene Blue			Dye							
Methylene Chloride			CH_3Cl							
Metol		Kodak	Amino phenol							
Microsol Blue		Mortsel - Europe								
Monafax 831		Mona Industries 847 Industrial Dr. Bensonville, ILL 60106								
Monamine AI		" "								
Monateric CEM		" "								
Monateric CM 365		" "								

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab. p.8 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Monateric CYA 50		Mona Industries 847 Industrial Dr. Bensonville, ILL. 60106								
Monateric LF 100		"								
Monawet MO 84R2W		"								
Monawet MO 70E		"								
M-pyrol				100-500g						
2 Naphthalene Sulfonic Acid										
N-phenyl glycine	Cas. (anilin 62-53-3)		$C_8H_9NO_2$ Anilino Acetic acid	100-500g						
Oxanol Yellow		Hoescht								

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab p. 9 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Oxidase			enzyme							
Para amino phenol			NH_5C_6O amino carbolic acid							
Pepsin		Kodak 343 State St. Rochester, NY 14650	enzyme							
Periodic Acid			H_5IO_6	100-500g						
Phloro-glucinol			developer							
Phorwite BBU Solution			Britener optical	100-500g						
Phosphoric Acid	Cas. 7664382		H_3PO_4	100-500g						

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab p.10 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Potassium Chloride	Cas.7447407		KCl	100-500g						
Potassium Dichromate			$Cr_2K_2O_7$	100-500g						
Potassium Ferricyanide			$C_6FeK_3N_6$ potassium hexacyanoferrate	100-500g						
Potassium Hydroxide	Cas.1310583		KOH	100-500g						
Potassium Meta Bisulfate	Cas.7646937		HO_4SK potassium hydrogen sulfate	100-500g						
Potassium Nitrate	Cas.7757791		KNO_3	100-500g						
Propionic Acid	Cas.79094		$C_3H_6O_2$ methylacetic acid	100-500g						

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Protozyme			enzyme	100-500g						
Sandopan LA-8 LS-24, TH-AD OTD		Sandoz Chemicals P.O. Box 18278 Charlotte, N.C. 28218	wetting agent	100-500g						
Sandoxylate 5X-208/5X408, 5X412, 5X418, 5X424		Sandoz		100-500g						
Selenious Acid	Cas. 7783008		H_2SeO_3	100-500g						
Silicon Oil				100-500g						
Silver Chloride			AgCl	100-500g						
Sodium Acetate	Cas. 127093		$NaC_2H_3O_2$	100-500g						

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

All Bldg. 18 Lab

p.12 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Sodium Bisulfate	Cas.7681381		$NaHSO_4$ sodium hydrogen sulfate	100-500g						
Sodium Carbonate	Cas.497198		Na_2CO_3	100-500g						
Sodium Citrate			$C_6H_6Na_2O_7$ disodium hydrogen citrate	100-500g						
Sodium Dichromate			$Cr_2Na_2O_7Na$ bichromate sodium salt							
Sodium Diethyl Dithio-carbomate	Cas.147849		$C_5H_{10}N\ NaS_2$ diethyl dithiacarbamic acid sodium salt	100-500g						
Sodium Metaborate			$BNaO_2$	100-500g						

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham
Inventory By WCB Date April 12, 1985
All Bldg. 18 Lab p.13 of 13

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Sodium Phosphate			Na_2HPO_4 dibasic, sodium phosphate	100-500g						
Sodium Propionate	Cas.79094		$C_3H_5NaO_2$ proprionic acid sodium salt	100-500g						
Sulfamic Acid			H_3NO_3S amidosulfonic acid	100-500g						
Sulfynol 440		Sandoz Chemicals P.O. Box 18278 Charlotte, N.C. 28218								
Tetrahydrofuran	Cas.109999		C_4H_8O	100-500g						
Toluene	Cas.108883		C_7H_8 methylbenzene							
Triethylamine	Cas.121448		$C_6H_{15}N$ N,N-diethylethanamine							

HMR ADVISORS

Company Name Peerless Photo Products, Inc., Shoreham

CHEMICAL SURVEY FORM

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

p.1 of 7

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Acetylene gas	Cas.35-629-04	General Welding Westbury, N.Y. Air Weld Patchogue, NY	C_2H_2 Ethylene	3-"B" size	Tanks					
Ajax		Colgate Palmolive Co. New York, NY 10022	Consumer Item	21 oz.	Cardboard & Aluminum	Storage cage				
Boraxo		United States Borax & Chemical Corp Los Anles, Calif. 90010	"	15 gals.	Plastic					
Capella Oil		Texaco Inc. White Plains, NY 10650	"	3 gals.	Steel	Storage cage				
Easy Clean		Janitorial Plus 971 Route 25A Miller Place, NY 11764	"	6 cans	Steel	Storage cage				
Freon 12		ABCO Refrigeration 33 Central Ave. Hauppauge, NY 11801	"	145 lbs.	Steel					
Freon 22		ABCO Refrigeration	"	250 lbs.	Steel					
Gear Lubricant		Kendall Refining Co. Division of Witco Chemical Bradford, Pa. 16701	"	12 qts.	Plastic					

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

p.2 of 7

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Key Cut Cutting Oil		Precision Lubricants Penwalt Corp. Philadelphia, Pa. 19132	Consumer Item	1 gal.	Steel					
LPS Electro Contact Cleaner		Holt Lloyd Corp. Tucker, Ga.	"	16 oz.	Steel	Storage cage				
LPS-1 Greaseless Lubricant		Hold Lloyd Corp.	"	11 oz.	Steel	Storage cage				
LPS-2 General Purpose Lubricant		Holt Lloyd Corp.	"	110 oz.	Steel	Storage cage				
LPS-3 Heavy Duty Rust Inhibitor		Holt Lloyd Corp.	"	132 oz.	Steel	Storage cage				
Lithium chloride	Cas.7447418	Foote Mineral Co. Frazer, Pa. 19355	LiCl	100 lbs.	Cardboard drum	Rack-West of Storage cage				
Lubriplate #8		Fiske Bros. Refining Co. Newark, NJ 07105 Toledo, Ohio 43605	"	7 gals.	Steel	Storage cage				

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

p.3 of 7

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Lubriplate Gr 132		Fiske Bros. Refining Co. Toledo, Ohio 43605	Consumer Item	10 gals.	Steel	Storage cage				
Lubriplate #630-2		Fiske Bros. Refining Co.	"	40 ctrgs.	Cardboard & aluminum	Storage cage				
Niagara clear frost liquid #5	Cas.9036195	Niagara Blower Co. New York, N.Y. 10017 Buffalo, N.Y. 14207	(C_2H_4O) $nC_{14}H_{22}O$ polyalkalene glycol	5 gals.	Plastic	Storage cage				
N-L Concentrate		National Laboratories Lehn & Fink Industrial Products Div. of Sterling Drug Inc. Montvale, NJ 07645 Plant:Toledo Ohio 43612	Consumer Item	5 gals.	Plastic	Storage cage				
Oxygen	Cas.7782447	General Welding Westbury, NY Air Weld Patchogue, NY	O_2	3 tnks.	Steel					
PAINTS										
Floor & Deck #16-466		Allentown Paint Mnfg. Co. P.O. Box 597 Allentown, Pa. 18105	Consumer Item	10 gals.	Steel	Paint cabinet				

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
PAINTS cont. Varathane #97		The Flecto Co., Inc. Flecto International Ltd. Oakland Calif. 94604	Consumer Item	2 gals.	Steel	Paint cabinet				
Hi Hide #13-095		Allentown Paint Mnfg. Co., Inc. P.O. Box 597 Allentown, Pa. 18105	"	6 gals.	Steel	Paint cabinet				
Flat white Devoe #3601-01		Devoe & Raynolds Co. Hood Dupont Circle Louisville, Ky 40207	"	4 gals.	Steel	Paint cabinet.				
Flat Black		Allentown Paint	"	7 gals.	Steel	Paint cabinet				
Preco Mix "B"		Preco 55 Skyline Dr. Plainview, NY 11803	"	5 gals.	Steel	Paint cabinet				
Preco Mix "A"		Preco	"	5 gals.	Steel	Paint cabinet				
Paint Thinner		Nankee Aluminum Paint Co. Engineers La. Farmingdale, N.Y. 11735	"	1 gal.	Plastic	Paint cabinet				
Reducer L Paint thinner		Preco	"	1 gal.	Steel	Paint cabinet				

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

p.5 of 7

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
PVC pipe cleaner		PCI Industries, Inc. P.O. Box 9845 Riviera Beach, Fla. 33404	Consumer Item	6 qts.	Steel	Storage cage				
PVC pipe cleaner		The American Granby Co. 1111 Vine St. Liverpool, NY 13088	Consumer Item	4 qts.	Steel	"				
PVC pipe cement		American Granby	"	6½ qts.	Steel	"				
Pliobond Adhesive		Goodyear Tire & Rubber Co. Akron, Ohio 44316 Packaged & Marketed by W. J. Ruscoe Co. Akron, Ohio 44316	"	4 qts.	Steel	"				
Refrigeration oil		Virginia Chemicals Inc. Dallas, Texas 75237	"	6 gals.	Plastic	"				
Rid All Fly spray		Janitorial Plus 971 Route 25A Miller Place, NY 11764	"	8 cans	Steel	"				
SAE 10W motor oil		Kendall Refining Co. Division of Witco Chemical Corp. Bradford, Pa. 16701	"	5 qts.	Cardboard & steel	"				
SAE 10W - 30 motor oil		Valvoline Oil Co. Division of Ashland Oil Co. Ashland, Kentucky 41114	"	30 qts.	"	"				

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CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

p.6 of 7

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
SAE 30 motor oil		Valvoline Oil Co. Division of Ashland Oil Ashland, Ky 41114	Consumer Item	40 qts.	Cardboard & Steel	Storage case				
Second Base Cement Sealer		Hercules (brand) Janitorial Plus Route 25A Miller Place, NY 11764	"	3 gals.	Steel	"				
SS-5		Banner Chemical Co. P.O. Box 119 Port Jefferson, N.Y. 11777	"	55 gals.	Steel	Outside shed				
Super Strip traffic paint yellow		Fox Valley Systems Inc. Dept. 1528 640 Industrial Dr. Cary, Ill. 60013	"	18 cans	Steel	Storage cage				
Super Strip Traffic Paint Blue		Fox Valley Systems Inc.	"	8 cans	Steel	"				
Super Strip Traffic paint white		Fox Valley Systems Inc.	"	13 cans	Steel	"				
Thread Cutting Oil (dark)		Hercules Chemical Co., Inc. New York, NY 10011	"	3 gals.	Plastic	"				
Thread Cutting Oil Rigid		The Ridge Tool Co. Elyria, Ohio	"	1 gal.	Plastic	"				

HMR ADVISORS

CHEMICAL SURVEY FORM

Company Name Peerless Photo Products, Inc., Shoreham

Inventory By WCB Date April 12, 1985

Maintenance Bldg. 10

Trade Name	Chemical Name	Supplier or Manufacturer/address	Ingredients or Formula	Quantity	Container	Location	Toxic Lists	MSDS	Label	Training Needed
Turpentine	Cas. 8006642	Nankee Aluminum Paint Co. Engineers Lane Farmingdale, NY 11735	Consumer Item	5 gals.	Steel	Paint cabinet				
Varathane Liquid Plastic		Flecto International Ltd. Oakland, Calif. 94604 Flecto Coatings Ltd. Richamond, B.C.	"		Steel	Storage cage				
White Knight Urinal cleaner		Janitorial Plus 971 Route 25A Miller Place, NY 11764	"	15 qts.	Plastic	"				

GROUNDWATER
TECHNOLOGY

Groundwater Technology, Inc.
101-1 Colin Drive, Holbrook, NY 11741
Tel: (516) 472-4000 Fax: (516) 472-4077

APPENDIX 2

DRAFT FINAL

SUMMARY OF SITE ANALYTICAL DATA COLLECTED TO DATE

PEERLESS PHOTO PRODUCTS, INC. SITE

SHOREHAM, NEW YORK

SITE I.D. #1-52-031

September 30, 1993

Prepared for:
Agfa Division of Miles Inc.
100 Challenger Road
Ridgefield Park, New Jersey 07660-2199

Prepared by:
Groundwater Technology, Inc.
101-1 Colin Drive
Holbrook, New York 11741

TABLE OF CONTENTS

PHASE II INVESTIGATION

Water Quality Data

SUMMARY OF GROUND WATER QUALITY DATA: DETECTED PARAMETERS
PHASE II SITE INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
February 8, 1993

SAMPLE LOCATION	MW-1			MW-2			MW-3	AGFA SUPPLY WELL S-65293	AGFA SUPPLY WELL S-56126	BRIARCLIFF ROAD WATER SUPPLY S-08265	
SAMPLE DATE	09/03/86	04/02/87	11/04/87	09/10/86	04/02/87	11/04/87	11/04/87	11/04/87	11/04/87	11/04/87	5/27/92
ORGANICS (1)	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Benzene	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	2.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
Chloroform	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)
Ethyl Benzene	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
Phenol	4.00	ND (1.00)	ND (1.00)	2.50	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	NA
Vinyl Chloride	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
1,1,1-Trichloro ethane	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	1.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (0.50)
INORGANICS (EPA Analysis Method)											
Arsenic (206.3)	30.00	ND (5.00)	19.00	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)	ND (20.00)
Barium (208.2)	240.00	110.00	25.00	80.00	70.00	100.00	50.00	ND (50.00)	ND (50.00)	ND (50.00)	ND
Cadmium (213.2)	4.00	2.00	ND (1.00)	17.00	8.00	9.00	15.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (2.00)
Chloride (4500ClB)	50000.00	24000.00	13000.00	63000.00	44000.00	46000.00	23000.00	7000.00	7000.00	13000.00	16000.00
Chromium (218.1)	NA	NA	60.00	NA	NA	ND (20.00)	ND (20.00)	20.00	ND (20.00)	ND (20.00)	ND (10.00)
Copper (220.1)	130.00	40.00	90.00	ND (20.00)	20.00	30.00	ND (20.00)	ND (20.00)	ND (20.00)	150.00	ND (100.00)
Iron (236.1)	55000.00	7000.00	43000.00	860.00	1900.00	8900.00	7400.00	360.00	400.00	200.00	NS (100.00)
Lead (239.3)	52.00	26.00	52.00	ND (5.00)	ND (5.00)	10.00	10.00	ND (5.00)	ND (5.00)	7.00	1.00
MBAS (425.1)	ND (1.00)	140.00	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.00)	ND
Mercury (245.1)	ND (1.00)	ND (1.00)	ND (1.00)	0.34	ND(0.50)	ND(0.50)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND
Nitrate (351.3)	5900.00	5900.00	4300.00	5700.00	3900.00	3300.00	2800.00	500.00	500.00	1300.00	2000.00
pH (150.1)	NA	5.80	5.80	7.00	6.50	6.40	6.00	6.00	6.00	6.00	6.10
Silver (272.1)	ND (10.00)	10.00	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)	ND (10.00)
Sulfate (375.4)	22000.00	30000.00	34000.00	40000.00	32000.00	41000.00	27000.00	16000.00	16000.00	19000.00	14000.00

ND (XX.XX) = Not Detected (method detection limit, if reported, in ppb)
NA = Not Analyzed
(1) = Organics analyzed by EPA method 601/602

BRIARCLIFF ROAD WELL FIELD

Water Quality Data

GROUNDWATER
TECHNOLOGY

TABLE 1

WATER QUALITY DATA

	Peerless 2/27/80		Shorewood Water Co. 12/28/79		NYS Standards
	Well No. 5	Well No. 6	Well No. 1	Well No. 2	
Parameter (mg/l or s.u.)					
Ammonia nitrogen	<.04	<.04	<.02	<.02	non-applicable
Nitrate nitrogen	5.0	3.2	2.7	2.4	10 mg/l
MBAS	<.1	<.1	<.04	<.04	0.5 mg/l
Chloride	12	12	13	18	250 mg/l
Sulfate	40	32	-	-	250 mg/l
Iron	.71	.11	<0.02	<0.02	0.3 mg/l
Manganese	<0.05	<0.05	<0.02	<0.02	0.3 mg/l
Copper	<0.1	<0.1	-	-	1 mg/l
Zinc	.4	<0.4	-	-	5 mg/l
Sodium	5.9	6.7	-	-	non-applicable
pH	5.8	6.0	6.3	6.0	6.5-8.5
Specific Conductance	200	156	135	135	non-applicable
Cadmium	<0.002	<0.002	-	-	0.01 mg/l
Coliform/100 ml	<2.2	<2.2	-	-	1/100 ml
Parameter (μg/ℓ)					
Trichloroethylene	< 5	< 5			10
Tetrachloroethylene	< 2	< 2			--
Chloroform	< 5	< 5			100
Trichloroethane	< 3	< 3			--
Trichloro trifluoroethane	< 5	< 5			--
Bromodichloromethane	< 3	< 3			--
Bromoform	< 2	< 2			--
Carbontetrachloride	< 3	< 3			5
Chlorodibromomethane	< 5	< 15			100
Total Trihalomethanes	< 15	< 15			100

JUL 29 1988

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                              SUFOLK COUNTY PUBLIC SUPPLY WELL CHEMICAL DATA TO DATE
                                                  05/05/88
*  PURVEYOR             SAMP DATE   TCOL    CD      PB     PH   SPCN   NH3    NO3     CL  MBAS   SO4    FE     MN     CU     ZN     NA
-  WELL NO    DEPTH   WELL LOCATION

*  SHOREWOOD WC         10/14/81 5.                        6.5  129.   <.04   2.90   14.0  <.10  14.0   <.10   <.05   <.10   <.40    8.8
-  S-08265    186.00 BRIARCLIFF RD, WELL #1                                   <2.2
*  SHOREWOOD WC         05/17/82 -1.      <2.0  <10.00     6.0  220.   <.04   2.90   28.0  <.10  29.0   <.10   <.05   <.10   <.10   23.1
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         07/05/83 -1.      <2.0  <10.00     6.1  138.   <.04   2.00   15.0        26.0   <.10   <.05   <.10   <.40   10.9
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         12/29/83                           6.5  140.   <.02   2.00   12.0  <.04          .03   <.02                  9.0
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         04/12/84 -1.      <2.0  <10.00     6.1  132.   <.04   2.00   15.0        21.0   <.10   <.05   <.10    .50    9.2
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         12/04/84                           6.0  141.   <.02   2.30   14.0  <.04         <.02   <.02                  8.7
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         06/12/85 -1.00    <2.0  <10.00     6.0  126.   <.02   1.60   15.0        19.0   <.10   <.05   <.10   <.40    8.2
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         07/30/86 -1.00    <2.0  <10.00     6.0  124.   <.02   2.00   14.0        16.0   <.10   <.05    .57    .50    9.8
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         12/17/86                           6.4  130.    .02   2.00   15.0  <.04          .03   <.02                  9.6
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         06/24/87 -1.00    <2.0  <10.00     6.2  115.   <.02   1.70   13.0         7.0  <1.00   <.50  <1.00   <.40    8.8
-  S-08265    186.00 BRIARCLIFF RD, WELL #1
*  SHOREWOOD WC         12/28/79                           6.0  135.   <.02   2.40   18.0  <.04         <.02   <.02
-  S-11464    175.00 BRIARCLIFF RD, WELL #2


COMPILED BY M TRENT & R GREEN > SUFFOLK COUNTY DEPT OF HEALTH SERVICES <
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SUFOLK COUNTY PUBLIC SUPPLY WELL CHEMICAL DATA TO DATE
05/05/88

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*  PURVEYOR           SAMP DATE   TCOL     CD      PB    PH   SPCN    NH3     NO3     CL   MBAS   SO4     FE     MN     CU     ZN     NA
-  WELL NO   DEPTH   WELL LOCATION

***
*  SHOREWOOD WC        10/23/80 -1                       5.9  134.    <.04    2.90   14.0  <.10   20.0    .13   <.05    .11   <.40   10.5
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        11/17/80                          5.9  115.    <.02    1.70   11.0  <.04           .04   <.02
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        08/08/81                          6.2  110.    <.02    1.60   20.0  <.04           .09   <.02
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        09/14/81          <2.0 <10.00     5.9  135.    <.04    3.20   17.0  <.10   18.0   <.10   <.10          <.40   10.6
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        10/22/81          <2.0 <10.00                  <.04    1.80   16.0  <.10   19.0   <.10   <.10   <.10   <.40   10.7
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        05/17/82 -1.      <2.0 <10.00     5.8  106.    <.04    1.00    9.0  <.10   21.0   <.10   <.05    .24   <.40    7.5
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        07/05/83 -1.      <2.0 <10.00     5.9  96.     <.04     .50   12.0         19.0    .41   <.05    .31   <.40    6.4
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        12/28/83                          6.2  140.    <.02    2.20   13.0  <.04           .46   <.02                  8.8
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        04/12/84 -1.      <2.0 <10.00     6.1  126.    <.04    1.80   18.0         15.0   <.10   <.05   <.10   <.40   10.9
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        12/04/84                          5.7  138.    <.02    1.60   22.0  <.04           .19   <.02                 10.7
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        06/12/85 -1.00    <2.0 <10.00     5.9  143.    <.02    3.70   18.0         17.0    .22   <.05    .30    .10   10.5
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        12/17/85                          6.1  110.    <.02    1.00   17.0  <.04           .31   <.02                 12.2
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        07/30/86 -1.00    <2.0 <10.00     5.8  111.    <.02    1.60   14.0         16.0   1.16   <.05    .50   <.40   10.2
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        12/02/86                          6.0  116.    <.02    1.00   16.0  <.04           .74    .03                  9.6
-  S-11464    175.00 BRIARCLIFF RD, WELL #2

*  SHOREWOOD WC        06/24/87 -1.00    <2.0 <10.00     6.2  125.    <.02    1.80   13.0         17.0    .25   <.05   <.10   <.40    9.1
-  S-11464    175.00 BRIARCLIFF RD, WELL #2
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COMPILED BY M TRENT & R GREEN > SUFFOLK COUNTY DEPT OF HEALTH SERVICES <

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
TRACE ORGANIC ANALYSIS OF WATER

LAB NO.: 592366 LAB ID: 2 NUMBER: 29,897
DATE SAMPLED: 5/27/1992
TIME SAMPLED: 0 RAW/TREATED:RAW
WELL NUMBER: S-08265 COLLECTION POINT: WELL
SUPPLY NAME: SHOREWOOD WC
LOCAL WELL NAME: BRIARCLIFF RD, WELL #1

306	VINYL CHLORIDE	< -0.50	250	BENZENE	-0.50
305	METHYLENE CHLORIDE	< -0.50	251	TOLUENE	-0.50
323	1,1 DICHLOROETHANE	-0.50	258	CHLOROBENZENE	-0.50
309	TRANS 1,2 DICHL"ETHENE	-0.50	259	ETHYLBENZENE	-0.50
300	CHLOROFORM	-0.50	254	O-XYLENE	-0.50
324	1,2 DICHLOROETHANE	-0.50	252	M-XYLENE	-0.50
321	1,1,1 TRICHLOROETHANE	-0.50	253	P-XYLENE	-0.50
304	CARBON TETRACHLORIDE	-0.50	255	TOTAL XYLENES	0.00
294	1 BROMO 2 CHLOROETHANE	-0.50	266	2-CHLOROTOLUENE (O)	-0.50
405	1,2 DICHLOROPROPANE	-0.50	267	M-CHLOROTOLUENE	-0.50

WELL NUMBER: S-08265 DATE SAMPLED: 5/27/1992

310	1,1,2 TRICHLOROETHENE	-0.50	268	4-CHLOROTOLUENE (P)	-0.50
303	CHLORODIBROMOMETHANE	-0.50	265	TOTAL CHLOROTOLUENE	0.00
13	1,2 DIBROMOETHANE	-0.02	419	1,3,5 TRIMETHYLBENZENE	-0.50
20	2 BROMO 1 CHLOROPROPANE	-0.50	418	1,2,4 TRIMETHYLBENZENE	-0.50
301	BROMOFORM	-0.50	415	M,P-DICHLOROBENZENE	-0.50
311	TETRACHLOROETHENE	-0.50	412	1,2 DICHLOROBENZENE (O)	-0.50
308	CIS DICHLOROETHENE	-0.50	432	P-DIETHYLBENZENE	-0.50
320	FREON 113	-0.50	435	1,2,4,5 TETRAMETHYLBENZEN	-0.50
292	DIBROMOMETHANE	-0.50	437	1,2,4 TRICHLOROBENZENE	-0.50
307	1,1 DICHLOROETHENE	-0.50	438	1,2,3 TRICHLOROBENZENE	-0.50
302	BROMODICHLOROMETHANE	-0.50	600	ETHENYLBENZENE (STYRENE)	-0.50
406	2,3 DICHLOROPROPENE	-0.50	601	1 METHYLETHYLBENZ (CUMENE)	-0.50
407	CIS DICHLOROPROPENE	-0.50	602	N-PROPYLBENZENE	-0.50
408	TRANS DICHLOROPROPENE	-0.50	603	TERT-BUTYlBENZENE	-0.50
322	1,1,2 TRICHLOROETHANE	-0.50	604	SEC-BUTYlBENZENE	-0.50

WELL NUMBER: S-08265 DATE SAMPLED: 5/27/1992

409	1,1,1,2 TETRACHLOROETHANE	-0.50	605	ISOPROPYLTOLUENE (P-CYMENE)	-0.50
295	S-TETRACHLOROETHANE	-0.50	606	N-BUTYLBENZENE	-0.50
433	1,2,3 TRICHLOROPROPANE	-0.50	607	HEXACHLOROBUTADIENE	-0.50
450	2,2 DICHLOROPROPANE	-0.50	608	1,2 DIBROMO 3 CHLOROPROPAN	-0.02
451	1,3 DICHLOROPROPANE	-0.50	614	METHYL TERTIART BUTYL ETHE	-0.50
452	2 CHLOROETHYLVINYLETHER	0.00			

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
TRACE ORGANIC ANALYSIS OF WATER

LAB NO.: 592367 LAB ID: 2 NUMBER: 29,898
DATE SAMPLED: 5/27/1992
TIME SAMPLED: 0 RAW/TREATED:RAW
WELL NUMBER: S-11464 COLLECTION POINT: WELL
SUPPLY NAME: SHOREWOOD WC
LOCAL WELL NAME: BRIARCLIFF RD, WELL #2

306	VINYL CHLORIDE	-0.50	250	BENZENE	-0.50
305	METHYLENE CHLORIDE	-0.50	251	TOLUENE	-0.50
323	1,1 DICHLOROETHANE	-0.50	258	CHLOROBENZENE	-0.50
309	TRANS 1,2 DICHL"ETHENE	-0.50	259	ETHYLBENZENE	-0.50
300	CHLOROFORM	-1.00	254	O-XYLENE	-0.50
324	1,2 DICHLOROETHANE	-0.50	252	M-XYLENE	-0.50
321	1,1,1 TRICHLOROETHANE	-0.50	253	P-XYLENE	-0.50
304	CARBON TETRACHLORIDE	-0.50	255	TOTAL XYLENES	0.00
294	1 BROMO 2 CHLOROETHANE	-0.50	266	2-CHLOROTOLUENE (O)	-0.50
405	1,2 DICHLOROPROPANE	-0.50	267	M-CHLOROTOLUENE	-0.50

WELL NUMBER: S-11464 DATE SAMPLED: 5/27/1992

310	1,1,2 TRICHLOROETHENE	-0.50	268	4-CHLOROTOLUENE (P)	-0.50
303	CHLORODIBROMOMETHANE	-0.50	265	TOTAL CHLOROTOLUENE	0.00
93	1,2 DIBROMOETHANE	-0.02	419	1,3,5 TRIMETHYLBENZENE	-0.50
[illegible]20	2 BROMO 1 CHLOROPROPANE	-0.50	418	1,2,4 TRIMETHYLBENZENE	-0.50
301	BROMOFORM	-0.50	415	M,P-DICHLOROBENZENE	-0.50
311	TETRACHLOROETHENE	-0.50	412	1,2 DICHLOROBENZENE (O)	-0.50
308	CIS DICHLOROETHENE	-0.50	432	P-DIETHYLBENZENE	-0.50
320	FREON 113	-0.50	435	1,2,4,5 TETRAMETHYLBENZEN	-0.50
292	DIBROMOMETHANE	-0.50	437	1,2,4 TRICHLOROBENZENE	-0.50
307	1,1 DICHLOROETHENE	-0.50	438	1,2,3 TRICHLOROBENZENE	-0.50
302	BROMODICHLOROMETHANE	-0.50	600	ETHENYLBENZENE (STYRENE)	-0.50
406	2,3 DICHLOROPROPENE	-0.50	601	1 METHYLETHYLBENZ (CUMENE)	-0.50
407	CIS DICHLOROPROPENE	-0.50	602	N-PROPYLBENZENE	-0.50
408	TRANS DICHLOROPROPENE	-0.50	603	TERT-BUTYlBENZENE	-0.50
322	1,1,2 TRICHLOROETHANE	-0.50	604	SEC-BUTYlBENZENE	-0.50

WELL NUMBER: S-11464 DATE SAMPLED: 5/27/1992

409	1,1,1,2 TETRACHLOROETHANE	-0.50	605	ISOPROPYLTOLUENE(P-CYMENE)	-0.50
295	S-TETRACHLOROETHANE	-0.50	606	N-BUTYLBENZENE	-0.50
433	1,2,3 TRICHLOROPROPANE	-0.50	607	HEXACHLOROBUTADIENE	-0.50
450	2,2 DICHLOROPROPANE	-0.50	608	1,2 DIBROMO 3 CHLOROPROPAN	-0.02
451	1,3 DICHLOROPROPANE	-0.50	614	METHYL TERTIART BUTYL ETHE	-0.50
452	2 CHLOROETHYLVINYLETHER	0.00			

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
CHEMICAL EXAMINATION OF WATER

LAB NO.: 0592323 LAB ID: 2 NUMBER 29,897
DATE SAMPLED: 5/27/1992
TIME SAMPLED: 0 RAW/TREATED RAW
WELL NUMBER: S-08265 COLLECTION POINT: WELL TAP
LOCAL WELL NAME: BRIARCLIFF RD, WELL #1

75	SPEC.COND	132	84	T.ALKALINIT	0.0081		MBAS	0.00
73	pH	6.1	82	T.HARDNESS	0.0	88	T.Hyd P	0.0
78	NITRATES+NITRATES	2.00	83	Ca HARDNES	0.0	90	FLUORIDE	0.00
76	FREE AMMONIA	<0.02				77	NITRITES	0.00
80	CHLORIDES	16			ug/l			
87	SULFATES	14	120	ARSENIC	<20.0			
100	IRON	<0.10	125	SELENIUM	<2.0			
101	MANGANESE	<0.05	122	CADMIUM	<2.00			
102	COPPER	<0.10	123	LEAD	1.00			
106	SODIUM	8.8	126	SILVER	<10.0			
103	ZINC	<0.40	104	CHROMIUM	<10.00			
			124	MERCURY	0.0			
			121	BARIUM	0.0			

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
CHEMICAL EXAMINATION OF WATER

LAB NO.: 0592324 LAB ID: 2 NUMBER 29,898
DATE SAMPLED: 5/27/1992
TIME SAMPLED: 0 RAW/TREATED RAW
WELL NUMBER: S-11464 COLLECTION POINT: WELL TAP
LOCAL WELL NAME: BRIARCLIFF RD, WELL #2

75	SPEC.COND	125	84	T.ALKALINIT	0.0081		MBAS	0.00
73	pH	6.0	82	T.HARDNESS	0.0	88	T.Hyd P	0.0
78	NITRATES+NITRATES	2.20	83	Ca HARDNES	0.0	90	FLUORIDE	0.00
76	FREE AMMONIA	<0.02				77	NITRITES	0.00
80	CHLORIDES	14			ug/l			
87	SULFATES	16	120	ARSENIC	<20.0			
100	IRON	<0.10	125	SELENIUM	<2.0			
101	MANGANESE	<0.05	122	CADMIUM	<2.00			
102	COPPER	<0.10	123	LEAD	2.00			
106	SODIUM	8.2	126	SILVER	<10.0			
103	ZINC	<0.40	104	CHROMIUM	<10.00			
			124	MERCURY	0.0			
			121	BARIUM	0.0			

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
ORGANOHALIDE PESTICIDE ANALYSIS OF WATER

LAB NO.: 592366 LAB ID: 2 NUMBER 29,897
DATE SAMPLED: 5/27/1992
TIME SAMPLED: 0 RAW/TREATED RAW
WELL NUMBER: S-08265 COLLECTION POINT:
SUPPLY NAME: SHOREWOOD WC
LOCAL WELL NAME: BRIARCLIFF RD, WELL #1

	ppb		ppb
ALPHA-BHC	<0.20	4,4 DDE	<0.20
BETA-BHC	<0.20	4,4 DDD	<0.20
GAMMA-BHC	<0.20	4,4 DDT	<0.20
DELTA-BHC	<0.20	ENDRIN	<0.20
HEPTACHLOR	<0.20	ENDRIN ALDEHYDE	<0.20
HEPTACHLOR EPOXIDE	<0.20	CHLORDANE	<1.00
ALDRIN	<0.20	ALACHLOR	<0.50
DIELDRIN	<0.20	METHOXYCHLOR	<0.50
ENDOSULFAN-I	<0.20	ENDOSULFAN-II	<0.20

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
ORGANOHALIDE PESTICIDE ANALYSIS OF WATER

LAB NO.: 592367 LAB ID: 2 NUMBER 29,898
DATE SAMPLED: 5/27/1992
TIME SAMPLED: 0 RAW/TREATED RAW
WELL NUMBER: S-11464 COLLECTION POINT:
SUPPLY NAME: SHOREWOOD WC
LOCAL WELL NAME: BRIARCLIFF RD, WELL #2

	ppb		ppb
ALPHA-BHC	<0.20	4,4 DDE	<0.20
BETA-BHC	<0.20	4,4 DDD	<0.20
GAMMA-BHC	<0.20	4,4 DDT	<0.20
DELTA-BHC	<0.20	ENDRIN	<0.20
HEPTACHLOR	<0.20	ENDRIN ALDEHYDE	<0.20
HEPTACHLOR EPOXIDE	<0.20	CHLORDANE	<1.00
ALDRIN	<0.20	ALACHLOR	<0.50
DIELDRIN	<0.20	METHOXYCHLOR	<0.50
ENDOSULFAN-I	<0.20	ENDOSULFAN-II	<0.20

TABLE 2

CHLORIDE LEVELS

Dates	Shorewood Water Co. Cl-(mg/l)	Peerless Photo, Inc. Cl-(mg/l)
10/6/80	11.5	10
10/7/80	11.5	9
10/8/80	12	9
10/9/80	12	8
10/10/80	12	6

PHASE II INVESTIGATION

Soil Quality Data

SUMMARY OF SOIL QUALITY DATA: DETECTED PARAMETERS
PHASE II INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
February 8, 1993

AREA	NORTH RECHARGE BASINS						SOIL STORAGE		STORM DRAIN (DW-9)	DRUM STORAGE
SAMPLE	WEST			EAST			WEST	EAST		
INTERVAL (FEET	0-2	2-4	4-6	0-2	2-4	4-6	0-2	0-2	0-2	0-2
# OF SAMPLES COMPOSITED	4	4	4	4	4	4	4	4	4	4
INORGANICS (EPA analytical method, if reported)										
Arsenic (206.3)	0.480	0.430	0.560	0.730	0.860	0.170	3.400	1.000	0.800	1.100
Barium (208.2)	24.000	2.400	7.500	130.000	120.000	22.000	38.000	11.000	5.000	22.000
Cadmium (213.2)	1.800	0.200	1.200	3.800	4.300	0.360	2.700	0.400	0.065	0.750
Chromium (215.1)	NA	1.300	2.200	NA	1.400	4.000	NA	NA	NA	NA
Copper (220.1)	34.000	NA	NA	23.000	NA	NA	6.000	1.800	1.800	4.000
Iron (236.1)	1700.000	NA	NA	1700.000	NA	NA	7500.000	4800.000	2500.000	5500.000
Lead (239.2)	2.200	0.800	0.340	4.200	1.500	3.600	4.200	2.200	1.700	3.300
Mercury (245.1)	0.021	0.022	ND (0.005)	0.053	0.025	0.042	0.024	0.011	ND (0.005)	0.013
Nickel (249.1)	1.500	NA	NA	1.500	NA	NA	3.500	2.500	1.500	3.000
Selenium (270.3)	0.100	0.097	ND (0.075)	0.063	0.079	ND (0.075)	0.230	0.130	0.140	0.140
Silver (272.1)	160.000	200.000	6.800	440.000	320.000	550.000	65.000	6.500	0.500	9.500
EP TOXICITY										
Barium	1.100	NA	NA	0.060	NA	NA	0.090	0.050	0.070	0.090
Cadmium	0.053	NA	NA	0.036	NA	NA	0.036	0.005	ND (0.001)	0.005
Mercury	ND (0.0005)	NA	NA	ND (0.0005)	NA	NA	0.001	0.001	ND (0.0005)	ND (0.0005)
Silver	ND (0.01)	NA	NA	0.050	NA	NA	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)

All Concentrations in mg/kg (ppm); Leaching data in mg/L (ppm)
NA = Not Analyzed
ND (XX.XX) = Not Detected (method detection limit, if reported, in ppm)
Analytical data from July 1986

GROUNDWATER TECHNOLOGY

SUMMARY OF SOIL QUALITY DATA: DETECTED PARAMETERS
PHASE II INVESTIGATION
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
February 8, 1992

AREA	EMULSION BUILDING	TESLA TOWER BASE		
SAMPLE	SUMP	SS-1	SS-2	SS-3
DEPTH (FEET)	0-14	0-20	0-20	0-20
# OF SAMPLES COMPOSITED	7	10	10	10
INORGANICS (EPA analytical method)				
Aluminum (202.2)	NA	1480.000	1180.000	3220.000
Barium (208.2)	22.000	3.900	19.000	66.000
Cadmium (213.2)	9.200	1.300	16.000	36.000
Calcium (215.1)	NA	190.000	190.000	50.000
Chromium (218.1)	14.000	15.000	17.000	45.000
Cobalt (219.1)	NA	3.100	3.100	4.100
Copper (220.1)	NA	1.500	33.000	85.000
Iron (236.1)	NA	2310.000	1890.000	4172.000
Lead (239.2)	10.000	ND (5.200)	301.000	80.000
Magnesium (242.1)	NA	160.000	160.000	660.000
Manganese (243.1)	NA	27.000	12.000	39.000
Mercury (245.1)	ND (0.210)	ND (0.210)	0.220	0.380
Nickel (249.1)	NA	8.000	9.300	16.000
Potassium (258.1)	NA	34.000	47.000	87.000
Silver (272.1)	48.000	46.000	337.000	366.000
Sodium (273.1)	NA	98.000	94.000	99.000
Vanadium (286.2)	NA	4.400	5.600	9.200
Zinc (289.1)	NA	4.700	27.000	56.000
EP TOXICITY				
Barium	0.390	NA	NA	NA
Cadmium	0.210	NA	NA	NA
Mercury	ND (0.0005)	NA	NA	NA
Silver	0.010	NA	NA	NA
ORGANICS (by EPA method 624/625)				
Toluene	NA	0.011	ND (0.005)	0.022
Carbon Disulfide	NA	0.046	ND (0.005)	ND (0.005)

All Concentrations in mg/kg (ppm); Leaching data in mg/L (ppm)
NA = Not Analyzed
ND (XX.XX) = Not Detected (method detection limit, if reported, in ppm)
Analytical Data from November, 1987

UNDERGROUND STORAGE TANK PROGRAM

Soil Quality Data

GROUNDWATER
TECHNOLOGY

SUMMARY OF SOIL ANALYTICAL RESULTS: DETECTED PARAMETERS IN UST ENDPOINT SAMPLES
PEERLES PHOTO PRODUCTS INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-032
February 8, 1993

TENTATIVELY IDENTIFIED SEMI-VOLATILE ORGANICS

TANK NUMBER	1A (ppb)	1B/1C (ppb)	2A (ppb)	2B (ppb)	3A (ppb)	6A (ppb)	7A (ppb)	8A (ppb)	8B (ppb)	9A (ppb)	9B (ppb)
COMPOUND											
Unknowns	ND	560	150	ND	ND	1400	730	440	240	910	2530
Unknown C8 Alkenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	960	750
Unknown Acid/Esters	1630	4050	4960	5790	2900	6280	7090	3610	4120	1680	1580
4-Methyl, 3-Pentene-2-One	ND	ND	ND	ND	ND	ND	ND	ND	ND	630	710
Unknown Cycloalkanes	ND	ND	ND	ND	ND	160	240	ND	ND	ND	ND
Unknown Cycloketones	ND	ND	ND	ND	840	ND	ND	ND	ND	ND	ND
Unknown Alkenes	610	ND	ND	270	ND	1240	ND	1250	ND	ND	ND
Unknown Isomer of Dimethyl Pentene	ND	ND	460	ND	ND	ND	ND	ND	ND	ND	ND
Unknown Ketones	ND	ND	ND	ND	1690	ND	ND	ND	ND	ND	ND
Unknown Isomer of 1-Propene-Chloro	ND	ND	170	240	ND	ND	ND	ND	ND	ND	ND
Ethanone, 1-Phenyl	ND	ND	ND	180	ND	ND	ND	ND	ND	ND	ND
Unknown Alkyl Benzene	ND	ND	ND	330	ND	ND	ND	ND	ND	ND	ND
Unknown Alkanes	ND	ND	1150	ND	ND	1940	1400	700	ND	ND	510
Hexanedoic Acid	ND	ND	ND	ND	ND	ND	180	ND	ND	ND	ND
Unknown Isomer of Octadecenal	ND	ND	ND	ND	ND	160	ND	ND	ND	ND	ND
Unknown Acids	ND	ND	ND	430	ND	410	ND	ND	ND	ND	ND
Unknown Alcohols	ND	ND	ND	ND	ND	ND	950	ND	ND	ND	ND
Hexadecanal	ND	ND	ND	ND	ND	ND	220	ND	ND	ND	ND
Unknown Alkene/Cycloalkane	ND	ND	ND	ND	ND	ND	ND	1690	2670	ND	ND
Unknown Phthalates	ND	ND	ND	ND	ND	ND	ND	150	ND	ND	ND
Unknown Alkene C7H8	ND	ND	ND	ND	ND	ND	ND	ND	960	ND	ND
TIC TOTAL	**2240**	**4610**	**6910**	**7240**	**5430**	**11590**	**10810**	**7840**	**7990**	**4180**	**6080**
TIC BLANK TOTAL	**4670**	**4670**	**4670**	**4670**	**4670**	**4670**	**4670**	**7350**	**7350**	**3170**	**3170**

TOTAL PETROLEUM HYDROCARBONS

TANK NUMBER	1A (ppm)	1B/1C (ppm)	2A (ppm)	2B (ppm)	3A (ppm)	6A (ppm)	7A (ppm)	8A (ppm)	9A (ppm)
Petroleum Hydrocarbons	17.6	38.9	28.8	12.3	55.3	281	223	16.6	730

ND = Not Detected
ppm = parts per million
ppb = parts per billion

TIC = Tentatively Identified Compounds
NOTE: Letter suffixes denote separate sample duplicates.

TREATMENT PLANT
EFFLUENT WATER
Quality Data

GROUNDWATER
TECHNOLOGY

TABLE 4

PROCESS WATER DISCHARGE

Parameter	Average Concentration* (mg/l)
Silver	.35
Cadmium	.2
Copper	<.1
Iron	5
Chloride	500
Barium	0.1
Sulfate	100
Lead	<.01
Phenols	0.2
COD	180
Dissolved Solids	2000
Nitrates	45

*Based on samples between August 1980 and October 1980.

TO: A. Y. Beckers

FROM: W. C. Bosmann

DATE: March 6, 1985

SUBJECT: REPORT OF FEBRUARY 1985 WASTE-WATER TREATMENT PLANT PERFORMANCE
PEERLESS PHOTO PRODUCTS, INC., SHOREHAM, N.Y.
Per Telex O/REF. 4402/82 - B.4045

February - Metals Data

Total Waste-Water Treated - 331,800 gal - 1,255,999 ltr

Average Daily Total - 16,590 gal - 62,799 ltr

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
Silver	3.1	0.37	0.14	0.02	0.10
Cadmium	9.59	0.39	0.19	0.02	0.02
Iron	123.3	1.77	0.49	0.07	0.6
Lead	NA	NA	0.08	0.01	0.05
Copper	0.68	0.05	0.03	0.004	1.0

Efficiency of Metals Removal - February

Waste Material	Removal Efficiency
Silver	95.5
Cadmium	98.1
Iron	99.6
Copper	95.6

February - Biological Data

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
COD	794	NA	58	8.3	150
TSS	NA	NA	41.6	5.9	45 avg/60 max
TDS	NA	NA	1004	143	1,000
Phenol	1.48	0.38	0.03	0.004	0.002
Nitrates	64	51	21.6	3.1	NA
TKN	2.76	1.7	1.6	0.23	NA
Total Nitrogen	66.76	52.7	23.2	3.33	10
MBAS	0.42	2.95	0.33	0.05	1.0
Chlorides	276.4	638.6	560.6	80	500
Sulfates	224.8	280	389.6	55.7	500

William C Bosmann

William C. Bosmann
Manager of Environmental & Personnel
Protection

TO: A. Y. Beckers

FROM: W. C. Bosmann

DATE: April 9, 1985

SUBJECT: REPORT OF March, 1985 WASTE-WATER TREATMENT PLANT PERFORMANCE
PEERLESS PHOTO PRODUCTS, INC., SHOREHAM, N.Y.
Per Telex O/REF. 4402/82 - B.4045

March, 1985 - Metals Data

Total Waste-Water Treated - 360,730 gal. 1,365,511 ltr.

Average Daily Total - 15,684 gal. 59,370 ltr.

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
Silver	2.6	0.02	0.12	0.02	0.10
Cadmium	8.9	0.056	0.049	0.007	0.02
Iron	25.5	0.83	0.53	0.08	0.6
Lead	NA	NA	0.027	0.004	0.05
Copper	0.70	0.066	0.10	0.016	1.0

Efficiency of Metals Removal - March

Waste Material	Removal Efficiency
Silver	95.4
Cadmium	99.4
Iron	96.8
Copper	90.6

March, 1985 Biological Data

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
COD	375	NA	22	3	150
TSS	NA	NA	40	6	45 avg/60 max
TDS	NA	NA	984	140	1,000
Phenol	0.55	0.69	0.01	0.001	0.002
Nitrates	72	70	7	1	NA
TKN	0.6	0.3	0.3	0.05	NA
Total Nitrogen	72.6	70.3	7.3	1.05	10
MBAS	0.42	0.53	0.43	0.06	1.0
Chlorides	272	586	546	78	500
Sulfates	166	95	521	74	500

William C. Bosmann

William C. Bosmann
Manager of Environmental & Personnel
Protection

WCB/ed

TO: A. Y. Beckers

FROM: W. C. Bosmann

DATE: May 7, 1985

SUBJECT: REPORT OF April 1985 WASTE-WATER TREATMENT PLANT PERFORMANCE
PEERLESS PHOTO PRODUCTS, INC., SHOREHAM, N.Y.
Per Telex O/REF. 4402/82 - B.4045

April 1985 - Metals Data

Total Waste-Water Treated - 218,100 gal. 825,598 ltr.

Average Daily Total --- 15,578 gal. 58,971 ltr.

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
Silver	2.6	0.43	0.04	0.006	0.10
Cadmium	2.8	0.11	0.05	0.007	0.02
Iron	24.3	3.86	0.36	0.051	0.6
Lead	NA	NA	0.05	0.007	0.05
Copper	0.54	0.06	0.04	0.006	1.0

Efficiency of Metals Removal - April 1985

Waste Material	Removal Efficiency
Silver	98.5
Cadmium	98.2
Iron	98.5
Copper	92.9

April 1985 Biological Data

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
COD	720	NA	13	2	150
TSS	NA	NA	36	5	.45 avg/60 max
TDS	NA	NA	949	136	1,000
Phenol	0.19	0.24	0.01	0.002	0.002
Nitrates	58	70	15	2	NA
TKN	6.9	7.7	2.4	0.35	NA
Total Nitrogen	64.9	77.7	17.4	2.35	10
MBAS	0.45	0.27	0.33	0.05	1.0
Chlorides	325	650	473	68	500
Sulfates	208	208	423	60	500

William C Bosmann

William C. Bosmann
Company Manager of Environmental &
Personnel Protection

WCB/ed

TO: A. Y. Beckers

FROM: W. C. Bosmann

DATE: June 12, 1985

SUBJECT: REPORT OF MAY, 1985 WASTE-WATER TREATMENT PLANT PERFORMANCE
PEERLESS PHOTO PRODUCTS, INC., SHOREHAM, N.Y.
Per Telex O/REF. 4402/82 - B.4045

May, 1985 - Metals Data

Total Waste-Water Treated - 419,200 gal- 1,586,844 ltr

Average Daily Total - 19,964 gal- 75,564 ltr

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
Silver	1.9	0.05	0.03	0.005	0.10
Cadmium	1.44	0.06	0.046	0.006	0.02
Iron	17.7	0.83	0.43	0.06	0.6
Lead	NA	NA	0.008	0.001	0.05
Copper	0.37	0.04	0.03	0.004	1.0

Efficiency of Metals Removal - May

Waste Material	Removal Efficiency
Silver	98.5
Cadmium	96.8
Iron	97.6
Copper	92.0

May, 1985 Biological Data

Parameter	ppm Raw Waste	ppm After Phase I Treatment	ppm Final After Phase II Treatment	ppm With Dilution	Standard
COD	878	NA	4	<1	150
TSS	NA	NA	39	5.6	45 avg/60 max
TDS	NA	NA	1016	145	1,000
Phenol	0.15	0.12	0.004	0.006	0.002
Nitrates	45	50	3	0.4	NA
TKN	2.68	3.1	4.8	0.68	NA
Total Nitrogen	47.7	53.1	7.8	1.08	10
MBAS	0.35	0.39	0.28	0.04	1.0
Chlorides	382	504	450	64	500
Sulfates	238	518	432	62	500

William C Bosmann

William C. Bosmann
Company Manager of Environmental &
Personnel Protection

WCB/ed

RAW WASTE CHARACTERISTICS

Raw Material Analysis

A review of the raw materials used in the production operation was completed to define the type of contaminants that could be present in the plant wastewaters. For materials with a specific trade name, the parent company was contacted and an analysis of the material in question was furnished by them. Judgment was exercised to define which materials could be present in the plant effluents. For example, gold chloride is used in making of one of the emulsions but amount is so minute that in excess of 90 percent of the emulsion produced on a given day would have to be lost to the sewer system before a measurable gold concentration would be detected in the plant wastewaters. Thus gold is not reported as a contaminant.

Based upon a review of the raw materials and the applicable effluent criteria, the following contaminants are now present in the plant wastewaters at select times depending upon the production schedule. The applicable effluent criteria are presented for a sub-surface discharge:

weekly Contaminant		Maximum Allowable Concentration (mg/l)
COD ppp		150.
~~BOD~~		~~30~~
Suspended Solids ppp		30. 760
~~Organic~~ Nitrogen)		
~~Ammonia~~)	Total	10
~~Nitrate~~ 10)		20 max
Nitrite 10		
Silver		0.1
Cadmium con.		0.02
Copper		0.4
Nickel? 10		1.0
Phenol 25-30		0.002
total N out 15-17		

Source of Contaminants

The sources of the contaminants are generally discussed as follows. Organic material, such as alcohol and gelatin are used in all of the production steps and thus BOD and COD is present in the effluent on all production days. The source of the suspended solids discharged from the plant is the gelatin. Depending upon the wastewater temperature the gelatin may be present as an emulsion or dissolved. The solids losses are minor. Organic nitrogen is present in the gelatin and in select organic chemicals used in the operation. Ammonia water is used in the preparation of one of the

PEERLESS P[illegible]O COMPANY

TABLE 2

WASTEWATER CHARACTERISTICS

Kjeldahl ✓

Date	Flow gpd	Ag (T)		Phenol		NH_3-N		NO_3-N		TKN		COD		Cu (T)	
		mg/l	lbs/day	µg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs
6-25	25,170	2.38	0.52	7.0	0.0015	3.6	0.79	<0.05	<0.011	16.5	3.61	200	43.8 ✓	0.20	0.0
5-27	27,340														
6-26	26,380														
6-28	25,970	0.325	0,07	1.0	0.0002	4.8	1.05	0.055	0.012	8.8	1.93	62.4	13.7	0.10	0.0
6-29	26,560														
8-6	5,560	8.2	0.38	88.0	0.0041			1.73	0.08	7.2	0.334	594	27.5		
8-7	5,560														
8-8	18,750	14.0	2.19	21.2	0.0033	2.36	0.37	139.1	21.75	48.2	7.54	271	42.4 ✓		
8-9	3,810														
8-10	4,690	3.13	0.13	157	0.0067			8.49	0.36	9.7	0.41	773	33.0		
8-11	6,880														
8-12	7,880	2.4	0.16	72.0	0.0047			2.38	0.16	68.4	4.46	1206	78.6 ✓	0.40	0.0
8-13	7,750														
8-14	21,130	12.0	2.12	32.8	0.0058			81.15	14.3	6.24	1.10	206	36.3 ✓	0.31	0.0
8-15	7,690	10.3	0.66	340	0.0218			0.024	0.002	8.48	0.54	406	26.0		
8-16	3,810	4.45	0.15	137.6	0.0046			0.17	0.006	11.44	0.38	213	7.1		
8-17	4,190														
8-18	8,560	4.0	0.29	192	0.0137			12.9	0.92	11.84	0.85	520	37.1	1.95	0.1
8-20	21,880	10.6	1.93					8.90	16.24	7.76	1.42	93	20.0		
8-19	7,940	10.2	.63					0.024	0.001	9.92	0.61				
8-21	6,880														
8-22	5,810	13.75	0.67					0.488	0.024	24.4	1.18	384	18.6		
8-23	5,380	0.16	0.008					0.023	0.001	9.88	0.48	105	5.1		
8-24	6,380														
8-25	14,560	–													
8-26	14,810	9.8	1.21					2.37	0.292	0.56	0.07	65	8.0		
8-27	7,060	1.1	0.07					5.50	0.345	2.72	0.17	480	30.1		
8-28	8,000														
8-29	13,000	4.25	0.46					87.6	9.50	10.4	1.13	123	13.3 ✓		
8-30	5,060	0.3	0.013					0.143	0.006	11.12	0.47				
8-31	5,000														
9-1	3,190														
9-2	5,940	7.25	0.36					4.72	0.234	3.4	0.17				

SUBJECT

Peerless Photo Company, Shoreham, L.I.

Wastewater Characteristics

Date	Flow	COD T		COD =		Ag		Cd		Remark
	GPD	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	
10/29-30	10,687	1292	115.2	1024	91.3					WASH – 400 CPN coated – 532 R90 [illegible] – [illegible] [illegible] [illegible]
11/1-2	18,437	230	35.4	214	32.9					MADE – 800 CPN WASH – 800 CPN COATED – 252 Col-3
11/2-3	14,812	318	39.3	296	36.6					WASH – 600 CPN DIGEST – 800 CPN COATED – 370 Col-0
11/3-4	13,562	272	30.8	224	25.3					MADE – 800 CPN WASH – 600 CPN COAT – 192 Col-1
11/4-5	15,437	528	68.0	372	47.9					MADE – 800 CPN WASH – 600 CPN COAT – [illegible] Col-1 & CPPE-1
11/5-6	17,125	336	48.0	328	46.8					WASH – 600 CPN DIGT – 800 CPN
11/6-7	3,437	690	19.8	662	19.0					COAT – 267 – Col-1 267 – Col-1 [illegible] 267 – Col-1 [illegible]
11/7-8	2,750	[illegible]		[illegible]						MADE – 1200 UNIT CPN-E WASH – 800 " COAT – 1000 ft CPP-E [illegible]
11/8-9	14,375	710	85.1	650	77.9					MADE – 400 CPN WASH – 400 CPN

waters is required to distribute the nitrate loading to the subsequent treatment steps. Essentially all of the nitrate load emanate from the washing step. For the case where emulsion is washed twice per week, it is not feasible to design a biological system to remove nitrate twice per week. Considering the possible waste load variation, equalization of the nitrate load is a process requirement of the subsequent treatment steps. The design procedure to size the basin and project the output is presented in another section. Finally a maximum day for design purposes is presented. The projections take into account factors which could not be specifically assigned to various steps. The projections were made by examining the future production levels and the variation in the waste load determined during the sampling program.

TABLE 3
WASTE LOAD PROJECTION (1977)

(Expressed as lbs/day except where noted)

	Minimum Day	Average Annual	Maximum Production Day [1]		
			With Equalization	Without Equalization	Maximum Day For Design Purposes
Flow (gallons/day	1,500	7,600	18,100	25,300	18,100
Silver (lbs/day)	0.15	0.6	2.0	2.4	2.0
NO_3-N "	0.02	5.6	9.2	24	9.2
COD "	6	30	73	100	150[2]
TKN "	0.1	0.9	1.3	1.8	5
Phenols "	0	.007	.02	.02	.02

[1] Assumes the following operations occurring simultaneously: washing, making, digestion, and coating of the emulsion.

[2] To design oxygen transfer equipment only.

MISCELLANEOUS

Soil Quality Data

PEERLESS
PHOTO PRODUCTS, INC.

CORPORATE OFFICE & MANUFACTURING PLANT
P O Box 700
Shoreham, N.Y. 11786
(516) 744-6600

A SUBSIDIARY OF AGFA-GEVAERT, INC.

October 9, 1984

Mr. Alexander M. Santino, P. E.
Hazardous Waste Management
Suffolk County Department of
Health Services
15 Horseblock Place
Farmingville, N.Y. 11738

Re: Spill #1984-72
Peerless Photo Products, Inc.
February 27, 1984

Dear Alex:

Enclosed are the EP Toxicity Test Results from soil around point of spill on February 27, 1984.

Enclosed is the sketch of the sample points in relation to the source of spill.

Samples were taken from worst case areas from total metals analysis done and where highest flow from spill was observed that night.

As can be seen from the data, EP Toxicity testing shows levels approximating ground water quality limits.

Sincerely,

William C. Bosmann

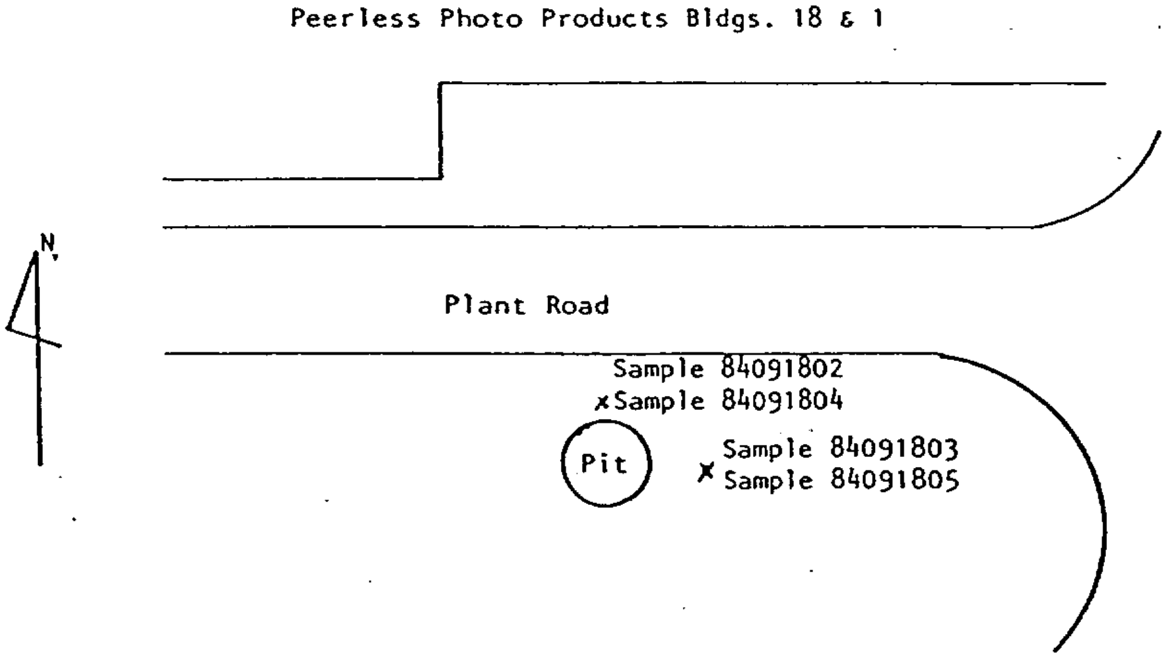
William C. Bosmann
Manager of Environmental & Personnel
Protection

WCB/ed

encls.

cc: F. E. Toner

Sketch of Spill #1984-72 Area and Soil Sampling Points



METRIC TECHNIQUES, LTD.
E CE DRIVE
, NEW YORK 11705
2-4848

DER R. STERNIG
CTOR OF LABORATORIES

SAMPLED BY Laboratory
DATE:
COLLECTED 9/18/84
RECEIVED 9/18/84
COMPLETED 10/4/84
REPORTED BY

Peerless Photo
Route 25A
Shoreham, N.Y. 11786

Attn: Agnes Gera

MPLE:	SAMPLE No.
Soil 3' Depth 1' from Pit	84091802

PARAMETERS	RESULTS	PARAMETERS	RESULTS ppm (mg/l)*
	ppm (mg/l)*		
dmium	<0.01		
Chromium Total	<0.01		
Hex Chrome	< 0.01		
Copper	<0.05		
Iron	0.61		
Nickel	<0.01		
Lead	<0.01		
Silver	<0.01		
Zinc	0.10		
Arsenic	<0.01		
Selenium	<0.01		
Mercury	<0.001		
Flash Point	>100^0C		

otherwise noted

ments:

VOLUMETRIC TECHNIQUES, LTD.
317 BERNICE DRIVE
BAYPORT, NEW YORK 11705
[illegible]72-4848

ANDER R. STERNIG
DIRECTOR OF LABORATORIES

SAMPLED BY Laboratory
DATE:
COLLECTED 9/18/84
RECEIVED 9/18/84
COMPLETED 10/4/84
REPORTED BY

TO: Peerless Photo
Route 25A
Shoreham, N.Y. 11786

Attn: Agnes Gera

SAMPLE:
Soil 3' Depth 3' from Pit

SAMPLE No.
84091803

PARAMETERS	RESULTS	PARAMETERS	RESULTS ppm (mg/l)*
	ppm (mg/l)*		
Cadmium	< 0.01		
Chromium Total	< 0.01		
Hex Chrome	< 0.01		
Copper	< 0.05		
Iron	< 0.06		
Nickel	< 0.01		
Lead	< 0.01		
Silver	< 0.01		
Zinc	0.15		
Arsenic	< 0.01		
Selenium	< 0.01		
Mercury	< 0.001		
Flash Point	> 100^{0}C		

[illegible]rwise noted

[illegible]ts:

VOLUMETRIC TECHNIQUES, LTD.
317 BERNICE DRIVE
YPORT, NEW YORK 11705
472-4848

SANDER R. STERNIG
DIRECTOR OF LABORATORIES

SAMPLED BY Laboratory
DATE:
COLLECTED 9/18/84
RECEIVED 9/18/84
COMPLETED 10/4/84
REPORTED BY

TO: Peerless Photo
Route 25A
Shoreham, N.Y. 11786

Attn: Agnes Gera

SAMPLE: Soil Surface Sample 1' from Pit

SAMPLE No. 84091804

PARAMETERS	RESULTS	PARAMETERS	RESULTS ppm (mg/l)*
pH			
	ppm (mg/l)*		
Cadmium	0.04		
Chromium Total	< 0.01		
Hex Chrome	< 0.01		
Copper	< 0.05		
Iron	0.46		
Nickel	< 0.01		
Lead	< 0.01		
Silver	0.09		
Zinc	0.15		
Arsenic	< 0.01		
Selenium	< 0.01		
Mercury	< 0.001		
Flash Point	> 100°C		

otherwise noted

mments:

METRIC TECHNIQUES, LTD.
E DRIVE
NEW YORK 11705
-4848

ER R. STERNIG
CTOR OF LABORATORIES

SAMPLED BY Laboratory
DATE:
COLLECTED 9/18/84
RECEIVED 9/18/84
COMPLETED 10/4/84
REPORTED BY

eerless Photo
oute 25A
horeham, N.Y. 11786

ttn: Agnes Gera

MPLE: Soil Surface Sample 3' from Pit

SAMPLE No. 84091805

PARAMETERS	RESULTS	PARAMETERS	RESULTS ppm (mg/l)*
	ppm (mg/l)*		
mium	0.01		
hromium Total	< 0.01		
ex Chrome	< 0.01		
opper	0.05		
ron	0.36		
Nickel	< 0.01		
Lead	< 0.01		
ilver	< 0.01		
Zinc	0.09		
Arsenic	< 0.01		
elenium	< 0.01		
Mercury	< 0.001		
Flash Point	$>100^{0}$C		

erwise noted

ents:

70 CENTRAL AVE. • UNIT 1 • FARMINGDALE, N.Y. 11735 • (516) 752-9055

Dec. 7, 1981

Peerless Photo
Route 25A
Shoreham, NY 11786

COLLECTED: 11/11/81 BY: Chemical Mgt. REC'D: 11/11/81

SAMPLE#1: Soil Sample

LAB# C011317

ANALYTICAL PARAMETERS	#1
C10 Aliphatic hydrocarbons, µg/kgm	<1000
ene, µg/kgm	<250
ene, µg/kgm	<250
lene, µg/kgm	<250
lene, µg/kgm	<250
lene, µg/kgm	<250
2-Trichloro-1,2,2 Tri-roethane, µg/kgm	<100
ene Chloride, µg/kgm	<500
,2-dichloroethene, µg/kgm	<500
Dichloroethane, µg/kgm	<500
-1,2-dichloroethene, µg/kgm	<500
roform, µg/kgm	<100
,1-Trichloroethane, µg/kgm	<100
bon Tetrachloride, µg/kgm	<100
Dichloroethane, µg/kgm	<500
chloroethylene, µg/kgm	<100
hloropropane, µg/kgm	<500
modichloromethane, µg/kgm	<100
rachloroethylene, µg/kgm	<100
orodibromomethane, µg/kgm	<100
moform, µg/kgm	<100

DIRECTOR

CENTRAL AVE. • UNIT 1 • FA

Aug. 21, 1981

o Products Inc.

11786

MPLE: Soil Sample

RECEIVED: 7/29/81

y Chemical Management

LAB#CP10871/1

Total Material
UNITS: mg/Kg unless otherwise noted.

LAB#CP10871/2

EP Extract*
UNITS: mg/L unless otherwise noted.

— G.W Standards

LYTICAL PARAMETERS

ity
l Oxygen Demand
Organic Carbon
ose
Dissolved Solids
Volatile Solids
ific Conductance, micro mho
as N
as Phenol
as CN
as As
as Cd
as Cr
as Cr
as Pb
as Hg
as Mo
el as Ni
as Se
as Ag

mg/Kg 1	2	G.W Standards
	0.018	
96	5.0	
6.3	<40	
4,800	9	
230	<10	
<50	180	
No Free Liquid	130	
2,800	48	
270	0.8	
12.6	0.018	0.4
0.025	<0.05	0.1
<0.35	<0.005	0.02
2.7	0.26	.40
12	<0.02	0.01
7.7	<0.02	0.10
1.3	<0.005	
[illegible]	<0.0005	
0.025	<0.05	0.02
<1.3	<0.1	0.10
<2.5	<0.005	
0.1	<0.01	
25		

* Extracted according to EPA Toxicity Test procedure (Federal Register, Vol.45, No.98, May 19, 1980, pp [illegible]-33128.

ECOTEST LABORATORIES, INC.
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F.

Peerless Photo Products, Inc.
Route 25A
Shoreham, NY 11786

Dec. 7, 1981

COLLECTED: 11/11/81 BY: Chemical Mgt. REC'D 11/12/81

SAMPLE #1 Soil Sample

LAB# C311317

ANALYTICAL PARAMETERS	#1
PESTICIDES	
ane, ppb	<5
achlor, ppb	<5
ppb	<5
achlor epoxide, ppb	<5
drin, ppb	<5
rin, ppb	<5
-DDT, ppb	<5
-DDT, ppb	<5
hoxychlor, ppb	<1.0
al Arochlors (PCB), ppb	<1.000

ARKS:

DIRECTOR

ECOTEST LABORATORIES, INC.

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Secondary Check
for silver for
removed soil

Sept. 3, 1982

Peerless Photo Products, Inc.
Route 25A
Shoreham, New York 11786

SOURCE OF SAMPLE: Soil Sample, Shoreham Facility
COLLECTED: 8/12/82 BY: Client RECEIVED: 8/17/82

SAMPLE#1: Soil Sample - EP Extract LAB# C821113

ANALYTICAL PARAMETERS	#1
Arsenic as As, mg/L	<0.005
Barium as Ba, mg/L	0.50
Cadmium as Cd, mg/L	0.11
Chromium as Cr, mg/L	<0.05
Lead as Pb, mg/L	<0.005
Mercury as Hg, mg/L	0.0005
Selenium as Se, mg/L	<0.005
Copper as Cu, mg/L	0.02
Iron as Fe, mg/L	0.12
Phenols as phenol, mg/L	0.008
Cyanide as CN, mg/L	<0.02
Nitrate as N, mg/L	0.6
Total Kjeldahl nitrogen as N, mg/L	1.2
Silver as Ag, mg/L	0.11

REMARKS: Samples prepared according to USEPA EP Toxicity test method (Fed. Reg., May 19, 1980.)

DIRECTOR

ECOTEST LABORATORIES, INC.

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SOIL IN PIT
REMOVED JULY 82
TO BROOKHAVEN
LANDFILL

July 15, 1982

Peerless Photo Products, Inc.
Route 25A
Shoreham, N.Y. 11786

SOURCE OF SAMPLE: Same
COLLECTED BY: Client RECEIVED: 6/29/82

SAMPLE#1: Soil Sample - EP Extract* LAB# C820265

ANALYTICAL PARAMETERS	#1
Arsenic as As, mg/L	<0.005
Barium as Ba, mg/L	0.33
Cadmium as Cd, mg/L	0.01
Chromium as Cr, mg/L	<0.02
Lead as Pb, mg/L	<0.005
Mercury as Hg, mg/L	<0.0005
Selenium as Se, mg/L	<0.005
Copper as Cu, mg/L	<0.02
Iron as Fe, mg/L	<0.05
Phenols as phenol, mg/L	0.002
Cyanide as CN, mg/L	<0.02
Nitrate as N, mg/L	<1.0
Total Kjeldahl nitrogen as N, mg/L	1.2

REMARKS: * Sample prepared acc'd to USEPA EP Toxicity Test Method (Fed. Reg. Vol 45, No. 98, May 19, 1980 pp 33127-130)

DIRECTOR ____________________

GROUNDWATER
TECHNOLOGY

Groundwater Technology, Inc.

101-1 Colin Drive, Holbrook, NY 11741
Tel: (516) 472-4000 Fax: (516) 472-4077

APPENDIX 3

DRAFT FINAL

QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY PEERLESS PHOTO PRODUCTS, INC. SITE SHOREHAM, NEW YORK

SITE I.D. #1-52-031

September 30, 1993

Prepared for:
Agfa Division of Miles Inc.
100 Challenger Road
Ridgefield Park, New Jersey 07660-2199

Prepared by:
Groundwater Technology, Inc.
101-1 Colin Drive
Holbrook, New York 11741

Groundwater Technology, Inc.
Written/Submitted by

Kimberly McGhee-Gould
Kimberly McGhee-Gould
Quality Assurance Officer

Groundwater Technology, Inc.
Reviewed/Approved by

Paul Maus
Paul Maus
Project Director

Joseph L. Basile, Jr.
National Industry Division
Senior Project Manager

QUALITY ASSURANCE PROJECT PLAN
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APPENDICES

QAPP Recipients

1. William Bosmann - Agfa
2. Ajay Shah - NYSDEC
3. Seth Davis, Esq. - Huber, Lawrence & Abell
4. Girish Desai - NYSDEC
5. Paul Maus - Groundwater Technology, Inc.
6. Kimberly McGhee-Gould - Groundwater Technology, Inc.
7. Michael J. O'Toole - NYSDEC
8. Richard Rocha - Agfa
9. David S. Rubinton, Esq. - NYSDEC
10. Basilis Stephanatos - Groundwater Technology, Inc.
11. Dr. G.A. Carlson, NYSDOH

3.0 PROJECT DESCRIPTION

This section provides a brief description of the site and the purpose and objectives of this Quality Assurance Project Plan (QAPP). In this document, the terms "chemical", "constituent", "compound", and "contaminant" are used interchangeably.

3.1 Introduction

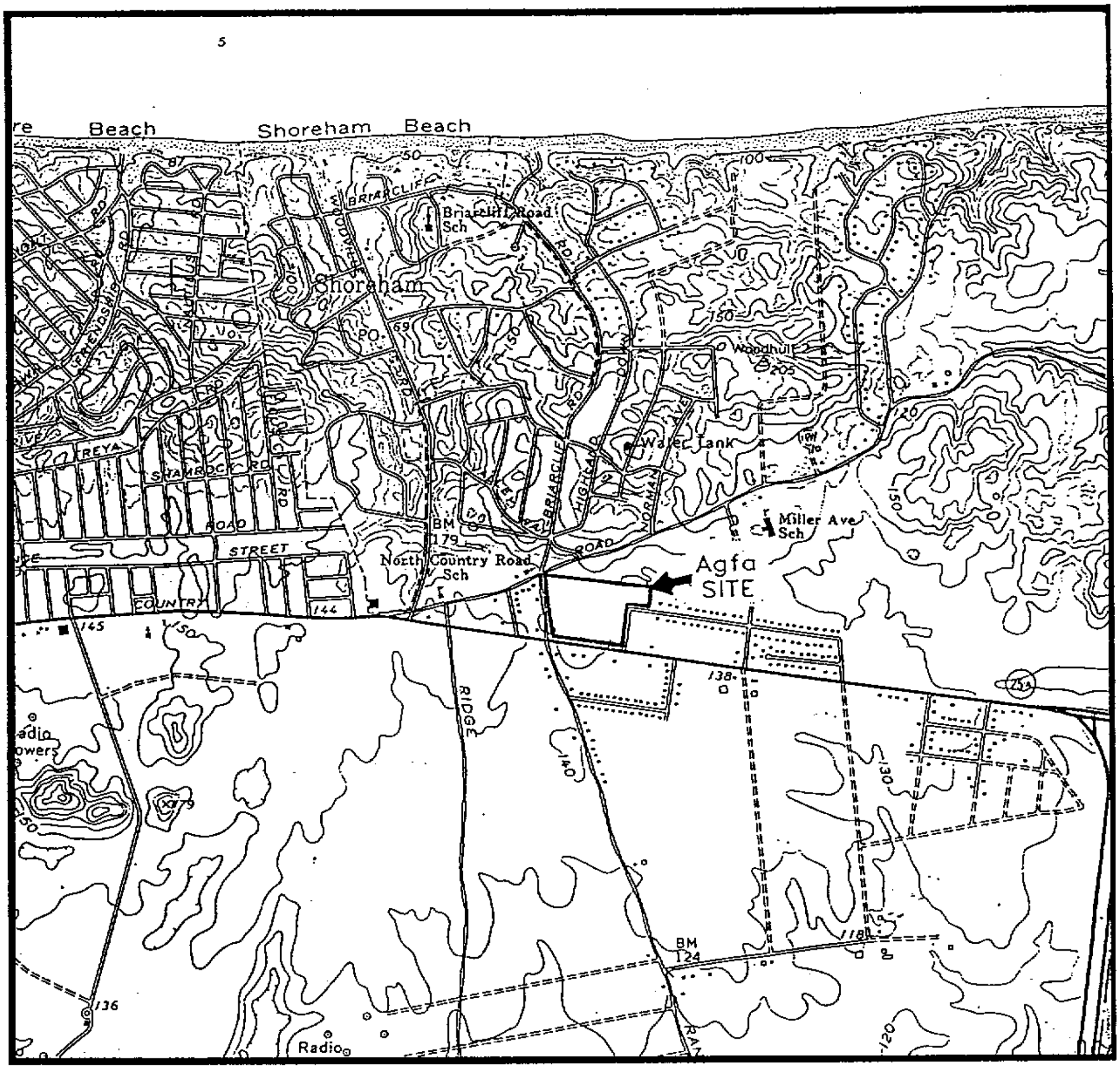
This Quality Assurance Project Plan (QAPP) has been prepared as an Appendix to the Phase 1 Work Plan to conduct the Remedial Investigation and Feasibility Study (RI/FS) at the Peerless Photo Products Site in Shoreham, New York, Site #1-52-031. This document has been prepared in accordance with the U.S. Environmental Protection Agency's (USEPA) "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans", QAMS-005/80, dated December 29, 1980. The QAPP focuses on specific quality assurance and quality control (QA/QC) activities, policies, applicable organization, objectives, and functional activities that are designed to achieve data quality goals for this specific project. The QAPP along with the Field Sampling and Analysis Plan (FSAP) contain detailed procedures to be utilized during all field investigation and analysis activities relating to the site.

This section briefly describes the site and the purpose and objectives of this QAPP.

3.2 Site Description

The Peerless Photo Products, Inc. [currently Agfa Division of Miles Inc. (Agfa)] Site (site) is located in Shoreham in the town of Brookhaven, Suffolk County, New York (see Figure 3-1).

The site is formerly a manufacturing plant where primarily operations included production and coating of photographic emulsions. A detailed site description can be found in Section 2.0 of the Phase 1 RI Work Plan.



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
MIDDLE ISLAND, N.Y.
7.5 MINUTE SERIES
DATE: 1967

SCALE 1:24,000

0 2,000 4,000

SCALE FEET

N

GROUNDWATER TECHNOLOGY

101-1 COLIN DRIVE
HOLBROOK, NEW YORK
(516) 472-4000

DESIGNED: TLD

DETAILED: TRS

CHECKED: TLD

SITE LOCATION

NAME: Agfa Division of Miles Inc.

LOCATION: SITE ID# 1-52-031
RANDALL ROAD
SHOREHAM, NEW YORK

DRAWING DATE: 9/30/93

FIGURE: 3-1

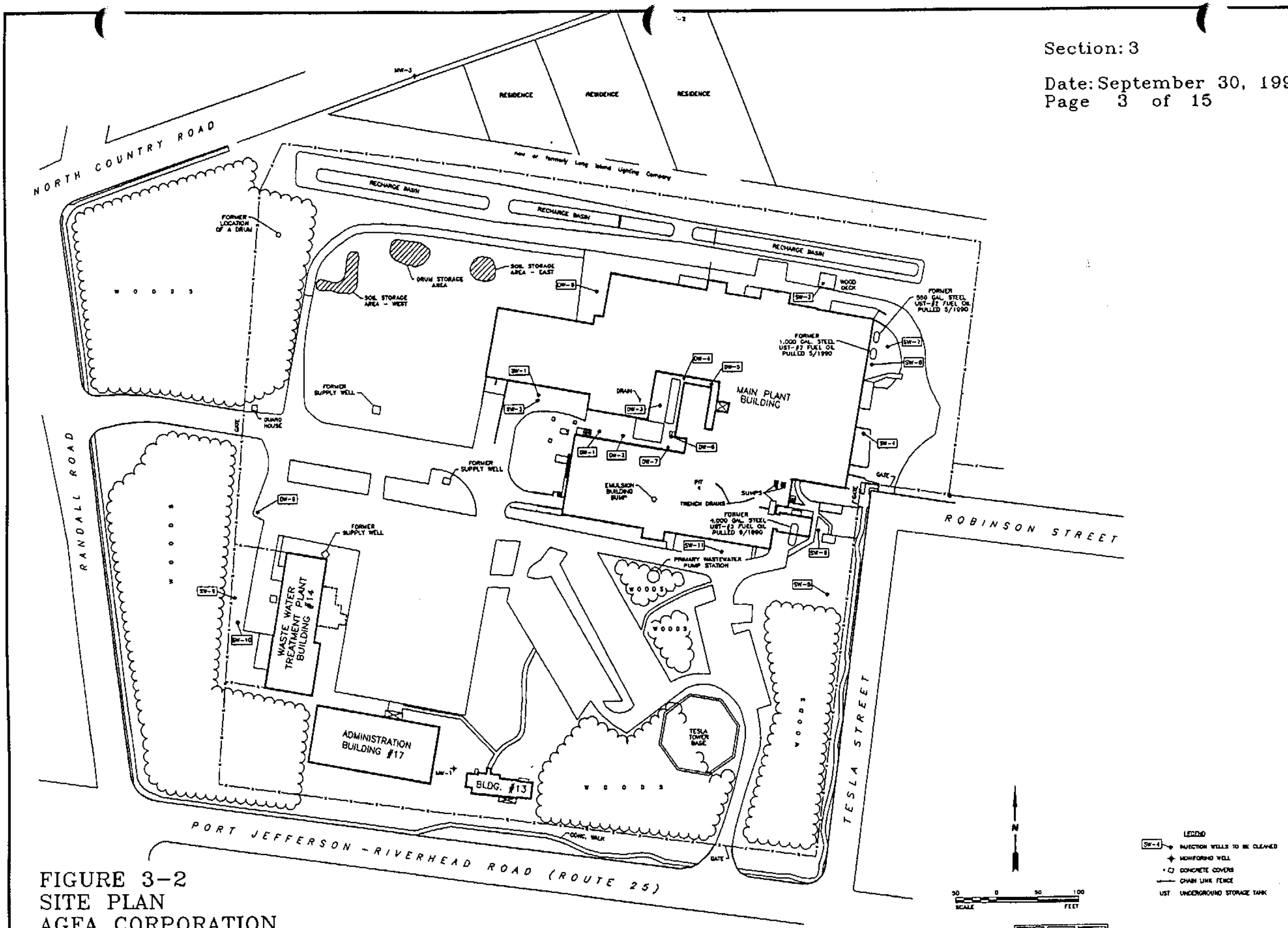


FIGURE 3-2
SITE PLAN
AGFA CORPORATION
SHOREHAM, N.Y.

GROUNDWATER
TECHNOLOGY

3.3 Site Operational History

The property was first developed after it was purchased by Nikola Tesla. Tesla constructed a building in 1903 which served as a residence and a laboratory. In addition, he constructed a radio tower, which subsequently was demolished between 1917 and 1918. The building is currently part of the main plant structure and the former tower base is still located on the site. Peerless Photo Products, Inc. began operating at the Shoreham site in 1939.

Peerless Photo Products, Inc. operated at the Shoreham site from 1939 until 1969. Primary operations included production and coating of photographic emulsions. From 1939 until 1979, Peerless disposed of untreated process water into an 800 foot long, 25 foot wide recharge basin along the north side of the property. During this period, production and flow to the recharge basin were much lower than in later periods. This recharge basin was formerly a depression in which was located a Long Island Railroad track.

In 1979, the wastewater treatment plant was installed and a New York State Pollution Discharge Elimination Systems (SPDES) permit for discharging effluent into the recharge basin was obtained. Between 1979 and 1988, Peerless Photo Products, Inc. treated and discharged 15,000 to 20,000 gallons per day of process water and 200,000 gallons of cooling water per day into the recharge basin. This effluent contained silver, cadmium, copper, iron, chloride, barium, sulfate, lead, phenols, nitrates and dissolved solids. Between 1979 and 1985, analyses of the effluent indicated violation of SPDES permit limitations for these constituents. Violations after 1985 were less significant and less frequent. On July 31, 1987, the wastewater treatment plant was closed.

In 1979, as part of the treatment plant construction, soil from the bottom of the recharge basin was excavated to a depth of 4 feet, and was stored for approximately one year on the northwest side of the site prior to disposal in a secure landfill operated by CECOS in Niagara Falls, New York. In 1981, Peerless Photo Products, Inc. was subject to a Consent Order to upgrade the wastewater treatment plant. As part of this improvement, an additional 250 cubic yards of soil were again excavated from the recharge basin and stockpiled for approximately one year on a plastic liner on the northwest side of the site near where the previous soil pile had been. The SCDHS analyzed soil samples from this stockpile and determined that the soil was non-hazardous and Peerless Photo Products, Inc. subsequently disposed of the soil in the Brookhaven Town Landfill.

Manufacturing at the site stopped in June 1987. The site was used for warehousing of packaged, finished articles and paper until 1991. Both the supply wells and treatment plant have been shut down. The facility is now closed. A detailed description of the site history, geology, hydrogeology, topography, and a summary of previous investigations and cleanup activities can be found in Section 2.0 of the Phase 1 RI Work Plan.

3.4 Project Objectives

The RI Work Plan fully defines the approach to be taken in this RI/FS. The sampling media available (i.e., groundwater and soils) will be analyzed to characterize the potential transport mechanism and fate of the site-related chemicals. In summary, the ultimate goals of the project are to:

1. Identify types and concentrations of chemical substances present in soils and groundwater at the areas of environmental concern and surrounding the site.
2. Identify vertical and horizontal groundwater flow patterns with respect to the areas of environmental concern on the site.
3. Characterize the potential risk to human health and the environment, especially to the Briarcliff Road wells, resulting from the off-site migration of contamination in groundwater.

During the collection of data, it will be understood by all personnel involved in the project that the best quality samples are to be obtained, and observing and practicing good field techniques at all times.

A NYSDOH-approved laboratory will be chosen to perform the analyses. The laboratory selection will also be based on past outstanding performance evaluations, analytical ability, and desirable data deliverables packages.

3.5 Investigation Synopsis

The investigations designed for the site will address the presence of chemicals of concern, as necessary, in soils and groundwater on-site, as well as off-site, as associated with the site.

Work activities planned as part of the investigation program are highlighted below.

3.5.1 Soils

The on-site soils program is designed to:

- Determine the type of site related contaminants and the vertical and horizontal distribution of contaminants in soil.
- Assess the leaching potential of the site-related constituents.

3.5.2 Groundwater

The groundwater investigation program is designed to:

- Establish the presence or not of groundwater impacts,
- Establish the downgradient extent of impacts, and
- Strategically install monitoring wells and sample the wells to assess water quality and site hydrogeology.

3.6 Data Gathering Objectives

Definition of specific work activities and their objectives are derived from the data quality objectives, which are reflected in the overall project approach. The overall project approach shows that the risk assessment for the site is based on a combination of physical, analytical, and remedial action data.

3.6.1 Physical Characterization Activities

As such, these data belong to the physical characterization category and are fundamentally different from both analytical and remedial action data in how they are gathered, reduced, analyzed, managed, and used.

Physical characterization data relates to the physical properties of the site that may affect site-related chemical distribution, both laterally and vertically. The data can be grouped into three categories, roughly corresponding to the potential site-related chemical distribution pathways:

1. Soil (both surface and subsurface),
2. Groundwater, and
3. Buildings.

On-site soil data will determine the chemical concentration distribution potential present on the site, and estimate the potential exposure concentrations for later use in the baseline risk assessment. The potential for site-related chemical migration from specific areas of interest will be assessed.

The potential impact of site-related chemicals on groundwater will be monitored to address several factors that may affect migration of site-related chemicals. Characterization and interpretation of the soils, such as the thickness of the unsaturated zone (distance from the ground surface to the water table), description of the underlying soils, and absence of any indication of site-related chemicals in the soil matrix below the shallow fill materials profile will provide insight as to the potential for affected groundwater.

All physical characterization data types are described in detail in the Data Quality Objectives (DQO) Summary in Section 5.4.

3.6.2 Chemical Characterization Activities

Chemical characterization data relates to the nature of compounds potentially present throughout the site. These data are related within the chemical characterization category and are fundamentally different from both physical characterization and remedial action data in how they are gathered, reduced, analyzed, managed, and used.

Chemical characterization data all relate to mutually-exclusive portions of the site that bear on the nature and mode of occurrence of site-related chemicals on-site. The data can be grouped into three categories, roughly corresponding to mutually-exclusive physico-chemical domains:

1. Undefined sources,
2. Immediate property, and
3. Areas indicated by previous information.

Undefined sources refers to possibility of identifying compounds from unknown sources that may be revealed by chemical tests of surface water or deep ground water samples, both on-site and off-site. It may be discovered by these chemical tests that the site-related chemicals distribution is related to other items in the above listing.

3.7 Project Schedule

An overall summary of the Phase 1 RI program and master schedule for the project are provided in the Phase 1 RI Work Plan, Section 6.3.

3.8 Chemical Parameters to be Measured

Table 3-1 shows the Project Compound List (PCL). The Phase 1 PCL consists of the full TCL + 30 and TAL metals. Areas on-site that are to have elevated concentrations of site-related chemicals will be sampled and analyzed. Table 3-2 is a list of the target compounds and contract required limits. Table 3-3 is a list of the target compound list method references. The PCL will be updated as necessary.

Laboratory detection limits for each of the PCL compounds will be determined using the appropriate analytical method.

Table 3-1

Project Compound List
Peerless Photo Products, Inc. Site
Shoreham, New York
Site ID# 1-52-031
September 30, 1993

Soil Boring Locations	Soil Boring Number	Analytical Parameters
PRIMARY WASTE WATER PUMP STATION	SB-1	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
WEST SOIL STORAGE	SB-2	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
FORMER DRUM STORAGE	SB-3	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
EAST SOIL STORAGE	SB-4	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
EMULSION BUILDING SUMP	SB-20	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
ROUTE 25-A	SB-5(MW-[illegible]	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
TESLA TOWER BASE	SB-6(MW-6)	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
NORTH RECHARGE BASINS	SB-7	FULL SUPERFUND TCL+30/TAL METALS TCLP TAL METALS (B)
NORTH RECHARGE BASINS	SB-10	FULL SUPERFUND TCL+30/TAL METALS TCLP TAL METALS (B)
NORTH RECHARGE BASINS	SB-11	FULL SUPERFUND TCL+30/TAL METALS TCLP TAL METALS (B)
NORTH RECHARGE BASINS	SB-12	FULL SUPERFUND TCL+30/TAL METALS TCLP TAL METALS (B)
NORTH RECHARGE BASINS	SB-13	FULL SUPERFUND TCL+30/TAL METALS TCLP TAL METALS (B)
NORTH RECHARGE BASINS	SB-8	FULL SUPERFUND TCL+30/TAL METALS C
NORTH RECHARGE BASINS	SB-9(MW-9)	FULL SUPERFUND TCL+30/TAL METALS C
FORMER DRUM LOCATION	SB-14	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
NORTHEAST PHOTO AREA	SB-15	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
BRIARCLIFF ROAD WELLFIELD	SB-16	FULL SUPERFUND TCL+30/TAL METALS TCLP SELECT ANALYTES (A)
WATER METER ROOM PIT	SB-21	FULL SUPERFUND TCL+30/TAL METALS
FORMER UST AREA	USTB-17	TCL VOLATILES AND TCL SEMI-VOLATILES
FORMER UST AREA	USTB-18	TCL VOLATILES AND TCL SEMI-VOLATILES
FORMER UST AREA	USTB-19	TCL VOLATILES AND TCL SEMI-VOLATILES

(A) = TCLP analyses will be run specifically for those analytes detected in concentrations > 20 times their respective class GA groundwater standard.
(B) = Three samples from the North Recharge Basins will be sumitted for TCLP analyses specifically for those metals detected in total TAL metals analyses.
(C) = TCL+30 on top, worst case and bottom sample. If a worst case sample is not identified, then the sample collected proximate to the water table will be analyzed.
TAL Metals at all sampling intervals.

Table 3-1 (Continued)
Project Compound List
Peerless Photo Products, Inc. Site
Shoreham, New York
Site ID# 1-52-031
September 30, 1993

Well Locations	Well Number	Analytical Parameters
NORTH COUNTRY ROAD	MW-2A	FULL SUPERFUND TCL + 30/TAL METALS
ADMINISTRATION BUILDING	MW-1	FULL SUPERFUND TCL + 30/TAL METALS
NORTH COUNTRY ROAD	MW-2	FULL SUPERFUND TCL + 30/TAL METALS
NORTH COUNTRY ROAD	MW-3	FULL SUPERFUND TCL + 30/TAL METALS
JAMES STREET	MW-4	FULL SUPERFUND TCL + 30/TAL METALS
ROUTE 25A	MW-5	FULL SUPERFUND TCL + 30/TAL METALS
TESLA TOWER	MW-6	FULL SUPERFUND TCL + 30/TAL METALS
NORTH RECHARGE BASINS	MW-9	FULL SUPERFUND TCL + 30/TAL METALS
NORTH SIDE MAIN PLANT STRUCTURE	MW-10	FULL SUPERFUND TCL + 30/TAL METALS

Revised 1/24/94

Table 3-2
Peerless Photo Products, Inc. Site
Shoreham, New York
Site I.D. #1-52-031
Project Compound List
Target Compound List (TCL) and
Contract Required Limits (CRQL)[1]

Volatile Compounds	Quantitation Limits	
	Water µg/L	Low Soil/Sediment[3] µg/kg
Chloromethane	10	10
Bromomethane	10	10
Vinyl Chloride	10	10
Chloroethane	10	10
Methylene Chloride	10	10
Acetone	10	10
Carbon Disulfide	10	10
1,1-Dichloroethene	10	10
1,1-Dichloroethane	10	10
1,2-Dichloroethene (total)	10	10
Chloroform	10	10
1,2-Dichloroethane	10	10
2-Butanone	10	10
1,1,1-Trichloroethane	10	10
Carbon Tetrachloride	10	10
Bromodichloromethane	10	10
1,2-Dichloropropane	10	10
cis-1,3-Dichloropropene	10	10
Trichloroethene	10	10
Dibromochloromethane	10	10
1,1,2-Trichloroethane	10	10
Benzene	10	10
Trans-1,3-Dichloropropene	10	10
Bromoform	10	10
4-Methyl-2-pentanone	10	10
2-Hexanone	10	10
Tetrachloroethene	10	10
Toluene	10	10
1,1,2,2-Tetrachloroethane	10	10
Chlorobenzene	10	10
Ethyl Benzene	10	10
Styrene	10	10
Xylenes (total)	10	10

Table 3-2 (cont'd)
Peerless Photo Products, Inc. Site
Shoreham, New York
Site I.D. #1-52-031
Project Compound List
Target Compound List (TCL) and
Contract Required Limits (CRQL)[1]

	Quantitation Limits[2]	
Semi-Volatile Compounds	**Water µg/L**	**Low Soil/Sediment[4] µg/kg**
Phenol	10	330
Bis(2-Chloroethyl) ether	10	330
2-Chlorophenol	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobenzene	10	330
1,2-Dichlorobenzene	10	330
2-Methylphenol	10	330
2,2'-Oxy(bis-1-chloropropane)	10	330
4-Methylphenol	10	330
N-Nitroso-di-n-dipropylamine	10	330
Hexachloroethane	10	330
Nitrobenzene	10	330
Isophorone	10	330
2-Nitrophenol	10	330
2,4-Dimethylphenol	10	330
Bis-(2-Chloroethoxy) methane	10	330
2,4-Dichlorophenol	10	330
1,2,4-Trichlorobenzene	10	330
Naphthalene	10	330
4-Chloroaniline	10	330
Hexachlorobutadiene	10	330
4-Chloro-3-methylphenol	10	330
2-Methylnaphthalene	10	330
Hexachlorocyclopentadiene	10	330
2,4,6-Trichlorophenol	10	330
2,4,5-Trichlorophenol	25	800
2-Chloronaphthalene	10	330
2-Nitroaniline	25	800
Dimethylphthalate	10	330
Acenaphthylene	10	330
2,6-Dinitrotoluene	10	330
3-Nitroaniline	25	800
Acenaphthene	10	330

Table 3-2 (cont'd)
Peerless Photo Products, Inc. Site
Shoreham, New York
Site I.D. #1-52-031
Project Compound List
Target Compound List (TCL) and
Contract Required Limits (CRQL)[1]

Semi-Volatile Compounds	Quantitation Limits[2]	
	Water µg/L	Low Soil/Sediment[4] µg/kg
2,4-Dinitrophenol	25	800
4-Nitrophenol	25	800
Dibenzofuran	10	330
2,4-Dinitrotoluene	10	330
Diethylphthalate	10	330
4-Chlorophenyl ether	10	330
Fluorene	10	330
4-Nitroaniline	25	800
4,6-Dinitro-2-methylphenol	25	800
N-nitrosodiphenylamine	10	330
4-Bromophenyl-phenylether	10	330
Hexachlorobenzene	10	330
Pentachlorophenol	25	800
Phenanthrene	10	330
Anthracene	10	330
Carbazole	10	330
Di-n-butylphthalate	10	330
Fluoranthene	10	330
Pyrene	10	330
Butylbenzylphthalate	10	330
3,3'-Dichlorobenzidine	10	330
Benzo(a) anthracene	10	330
Chrysene	10	330
Bis(2-Ethylhexyl) phthalate	10	330
Di-n-octylphthalate	10	330
Benzo(b) fluoranthene	10	330
Benzo(k) fluoranthene	10	330
Benzo(a) pyrene	10	330
Indeno(1,2,3-cd) pyrene	10	330
Dibenz(a,h) anthracene	10	330
Benzo(g,h,i)perylene	10	330

Table 3-2 (cont'd)
Peerless Photo Products, Inc. Site
Shoreham, New York
Site I.D. #1-52-031
Project Compound List
Target Compound List (TCL) and
Contract Required Limits (CRQL)[1]

Pesticides/PCBs	Quantitation Limits[2] Water µg/L	 Low Soil/Sediment µg/kg
alpha-BHC	0.05	1.7
beta-BHC	0.05	1.7
delta-BHC	0.05	1.7
gamma-BHC (Lindane)	0.05	1.7
Heptachlor	0.05	1.7
Aldrin	0.05	1.7
Heptachlor epoxide	0.05	1.7
Endosulfan I	0.05	1.7
Dieldrin	0.10	3.3
4,4'-DDE	0.10	3.3
Endrin	0.10	3.3
Endosulfan II	0.10	3.3
4,4'-DDD	0.10	3.3
Endosulfan Sulfate	0.10	3.3
4,4'-DDT	0.10	3.3
Methoxychlor	0.5	17.0
Endrin ketone	0.10	3.3
alpha-Chlordane	0.5	1.7
gamma-Chlordane	0.05	1.7
Toxaphene	5.0	170.0
Endrin Aldehyde	0.10	3.3
Aroclor-1016/1242	1.0	33.0
Aroclor-1221	1.0	67.0
Aroclor-1232	1.0	33.0
Aroclor-1242/1016	1.0	33.0
Aroclor-1248	1.0	33.0
Aroclor-1254	1.0	33.0
Aroclor-1260	1.0	33.0

Table 3-2 (cont'd)
Peerless Photo Products, Inc. Site
Shoreham, New York
Site I.D. #1-52-031
Project Compound List
Target Compound List (TCL) and
Contract Required Limits (CRQL)[1]

METAL ANALYTES	CRQL (µg/l)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20

NOTES:

1. Specific quantification limits are highly matrix dependent. The limits listed herein are provided for guidance and may not always be achievable.

2. Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the protocol, will be higher.

3. Medium Soil/Sediment contract Required Quantification Limits for Volatile TCL Compounds are 120 times the individual Low/Soil Sediment CRQL.

4. Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semi-Volatile TCL Compounds are 30 times the individual Low Soil/Sediment CRQL.

5. Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Pesticide PCB/TCL Compounds are 15 times the individual Low Soil/Sediment CRQL.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITY

While all personnel involved in an investigation and in the generation of data are implicitly a part of the overall project and quality assurance program, certain individuals have specifically delegated responsibilities. Within Groundwater Technology, Inc., the positions include the Project Director, the Project Manager, the Risk Assessment Manager and Staff Scientists, the Site Manager/Project Hydrogeologist, the Quality Assurance Officer/Data Validation Chemist, the Health and Safety Officer, the Site Health and Safety Officer, the Project Engineers, the Field Operations Manager, Citizen's Participation Plan Specialist, and the Environmental Technicians. Professional profiles of the project team members are available in Appendix C of this QAPP. A NYSDOH approved laboratory will provide all analytical services for the project. The NYSDOH approved Laboratory Quality Assurance Coordinator and Sample Custodian will be determined prior to the start-up of this investigation. Figure 4-1 shows the Project Organization structure.

Project Director

Mr. Paul Maus is the Project Director for this investigation. The Project Director reviews all major work elements prior to submittal. Mr. Maus can be reached at the Groundwater Technology's, Holbrook, New York office; 516-472-4000.

Project Manager

Mr. Joseph L Basile, Jr. is the Project Manager for this project. The Project Manager maintains routine contact with the progress of the investigation and reviews the project schedule and all major work elements prior to submittal. Additionally, the Project Manager is the primary contact between the client and regulatory agencies. Mr. Basile may be reached at 518-370-5631, in Groundwater Technology's Schenectady, New York office.

Risk Assessment Manager and Staff Scientists

Ms. Karen Reece is the Risk Assessment Manager for this project. She works closely with the Project Manager throughout the development and implementation of the Risk Assessment and Endangerment Assessment. Ms. Chaudhuri may be reached at Groundwater Technology's Norwood, Massachusetts office; 617-769-7600.

Site Health and Safety Officer/Site Manager

Mr. Anthony Fiorentine is the Site Manager and Site Health and Safety Officer for this project. The Site Manager reports directly to the Project Manager and is along with the Project Manager immediately responsible for the field investigation. He is responsible for:

1. All daily quality assurance project activities including proper sample collection, and
2. Verifying and initialing the accuracy of technician's field notebooks and all other field-generated documents.

He oversees the technical aspects of sampling programs, and participates in the data reduction and interpretation and the generation of reports.

He also acts as the Field Documentation Coordinator and is responsible for the day-to-day activities of the field investigation. Specifically, he is responsible for chain-of-custody records, sample labels, packaging of sample jars for shipping, daily coordination with the laboratory sample custodians and provides a final quality assurance review of all field generated documents. As Site Health and Safety Officer, Mr. Fiorentine consults the site Health and Safety Plan (HASP) to include the appropriate level of personal protection in specific investigative or sampling events, and performs site inspections and designs emergency procedures. Mr. Fiorentine may be reached at the Groundwater Technology, Inc., Holbrook, New York office; 516-472-4000.

Project Engineer

Dr. Basilis Stephanatos, P.E., D.E.E., C.G.W.P.is the Project Engineer for this investigation. His responsibilities include development, design, and review of engineering related tasks and data to complete the Feasibility Study. The status of the engineering tasks will be reported to the Project Manager. Dr. Stephanatos may be reached at the Groundwater Technology, Inc., Schenectady, New York office; 518-370-5631.

Quality Assurance Officer

Ms. Kimberly McGhee-Gould is the Quality Assurance Officer for this investigation. In this capacity, she will review project plans and revision to plans to assure proper quality assurance is being maintained. It is the major responsibility of the Quality Assurance Officer to insure that all personnel have a good understanding of the QAPP, an understanding of their respective roles relative to one another, and an appreciation of the importance of the roles to the overall success of the program. Ms. Gould also checks ten percent of the field log books and sample data sheets for completeness. System and performance audits will be conducted as needed in the field and following laboratory subcontracting. Ms. Gould will review all data processing and data quality control activities by performing spot checks on ten percent of the reduced and reported data. Ms. Gould may be reached at the Groundwater Technology, Inc. Chadds Ford, Pennsylvania office; 215-558-1730.

Data Validation Chemist

Ms. Andrea Schusseler has been selected as the Data Validation specialist. As such, she is responsible for reviewing all of the laboratory and QA/QC data, as well as the chain-of-custody records and log books, to insure that all of the analyses are being completed using approved methodologies.

Health and Safety Officer

David Crowley is the Health and Safety Officer. He establishes the HASP to include the appropriate level of personal protection in specific investigative or sampling events, performs site inspections and designs emergency procedures. Mr. Crowley trains Site Health and Safety Officers to manage daily safe practices. He may be reached at the Groundwater Technology, Inc., Norwood, Massachusetts office; 617-769-7600.

Citizen's Participation Plan Specialist

Mr. Mark L. Wert will be creating the citizen participation plan. Mr. Wert can be reached at the Norwood, Massachusetts office; 617-769-7602.

Environmental Technicians

The field sampling will be conducted by trained and experienced environmental technicians. Proper sample collection protocols and measurements, equipment decontamination procedures, and chain-of-custody documentation will be adhered to by the Environmental Technicians.

Laboratory Quality Assurance Coordinator

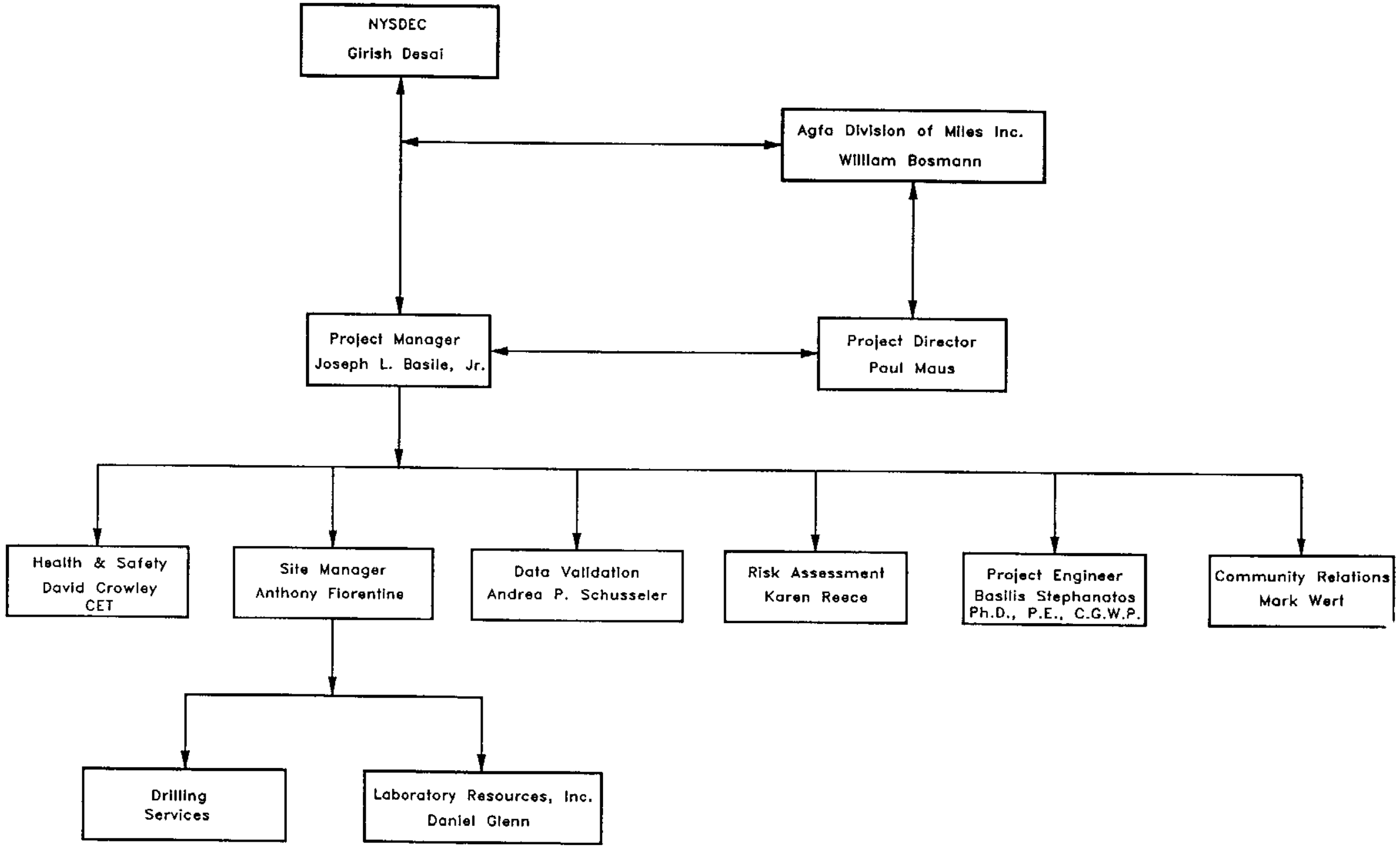
The Lab QAO will be Mr. Daniel Glenn of Laboratory Resources, Inc. (LRI). He can be reached at 201-288-3700.

Sample Custodian

The Lab Sample Custodian is Mr. Daniel Glenn of Laboratory Resources, Inc. (LRI). He can be reached at 201-288-3700.

Revised 1/24/94

FIGURE 4-1
PROJECT ORGANIZATION
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D.# 1-52-031



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GROUNDWATER
TECHNOLOGY

5.0 QUALITY ASSURANCE OBJECTIVES AND CRITERIA

It is expected that by the design of separate data quality requirements for field sampling and laboratory analysis, clear distinctions between any problems found in the system can be isolated with respect to the cause. Conversely, the data quality requirements are also designed to provide an indication of the variability inherent to the overall system. The quality control samples, duplicates, specific field sampling protocol, and standard operating procedures are the measures that are taken to address the variability in the total system, not only in the laboratory.

5.1 Overall Project Objectives

The data from the current (remedial investigation) phase of the project in conjunction with the previously obtained data will be used to answer the following questions:

1. Are compounds present or absent (qualitatively)?
2. If the compounds are present, what are the types or classes that are present?
3. What quantities (concentrations) of compounds are present (quantitative)?
4. What are the pathways for compound release?
5. What are the contaminant sources?
6. What are the pathway analytical and physical characteristics with respect to receptors?

To complete this investigation, the sample media to be collected are groundwater and soil.

To achieve the overall objectives, specific data quality requirements will need to be met. The Data Quality Objectives (DQOs) outlined in sections 5.2 through 5.4 are quantitative and qualitative statements specifying the quality of the environmental data required to support the decision making process for this project. The DQOs define the uncertainty that is acceptable for individual activities or for overall sequences of processes when the individual activities cannot be isolated.

The general definitions of the data quality indicators used in the subsequent sections are defined below.

Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. For a pair of measurements, relative percent difference (RPD, as defined in Section 14) will be used in this project. For a series of measurements, relative standard deviation (RSD, as defined in Section 14) will be used. The total precision of a series of measurements can be related by the additive nature of the variances (the square of the standard deviations shown in Equation 5.1.)

$$S^2_T = S^2_i + S^2_a \qquad \text{(Equation 5.1)}$$

where: S = the standard deviation of a process

S^2_T = the total variance

S^2_i = the variance of the implementation (sampling) phase

S^2_a = the variance of the analytical phase

Accuracy

Accuracy is a measure of bias, or the difference between a measurement and an accepted or true value. This difference can be expressed as a percent of the true value, as is done for the parameter, % Recovery, defined in Section 14. A central goal of the accuracy objective is to identify, evaluate, and limit systematic and random errors in the measurement system.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represents the characteristic of an environmental condition. Multiple random measurements or samplings improves the accuracy of a determination when random errors are involved. In this way, the effects of random error are minimized. Systematic errors affect the representativeness as well and are covered by the accuracy DQOs. The precision of random samplings is the primary measure to be used to monitor the effects of the various factors, such as medium homogeneity, which affect representativeness.

Completeness

Completeness is the ratio of the amount of valid data obtained from measurement system compared to the amount expected under ideal conditions. For the current project, this ratio is expressed as a percent, as indicated in Section 14. The amount of data expected from a measurement system is by design a sufficient amount to achieve the overall project objectives. An evaluation of completeness necessarily involves an evaluation of the impact of missing data on the ability of the project to achieve its goals.

Comparability

Comparability expresses the confidence with which one data set can be compared with another data set from a different phase or from a different program. Comparability involves a composite of the above parameters as well as design factors such as sampling and analytical protocols. Inter-laboratory evaluations can play a role in the evaluation of analytical comparability.

5.2 Field Investigation Data Quality Objectives

The general quality goal for the field investigation is to maximize the confidence in the data in terms of each of the data quality indicators.

Precision

The data quality objective for the field is to achieve a precision on field duplicates equal to or better than the laboratory data objectives in Section 5.3. Measurement of a field duplicate inevitably involves laboratory measurement precision as well as field measurement precision. The actual laboratory and actual field precision cannot be isolated. Hence, as a result of the additive property of variance (Equation 5.1) and the above stated equality of the field and laboratory variability criteria, the total variability as measured by standard deviation of field replicates, should be no more than 1.4 times the lab variability (Equation 5.3).

$$\text{Maximum} \quad S^2_T = 2 \ S^2_L \qquad \text{(Equation 5.2)}$$

$$\text{Maximum} \quad S_T = 1.4 \ S_L \qquad \text{(Equation 5.3)}$$

Where: S_T = Total variability
S_L = Standard deviation from laboratory variability

Accuracy

The objective for total accuracy is to meet the laboratory accuracy limits for the target compound list as published in the appropriate NYS DEC ASP method. Hence, the field component of accuracy will have to be negligible as compared to the laboratory component. Losses are expected to be negligible if the sampling, preservation, and handling technique outlined in the FSAP are followed. The remaining major source of bias is field contamination of samples. To assure that this factor is negligible, field blanks will be monitored. The associated objective is to achieve field blanks less than the EPA Contract Laboratory Contract Required Quantification Limits (CRQL) for the target compound list. Monitoring field blanks will provide assurance that a very common source of bias has been avoided.

Representativeness

The field objectives for representativeness are to: a) minimize the effects of bias resulting from loss and contamination during sampling and handling; and b) to assess and minimize the affects of factors, such as medium inhomogeneity, which leads to imprecision.

Rinsate blanks will be taken from batches of sampling equipment. This rinsate blank will be applicable to all samples collected or composited by the use of this sampling equipment decontaminated on that particular date.

The representativeness will be assured by the fulfillment of the DQOs for accuracy and precision and will be evaluated by means of the precision and duplicate collocated samples separately procured but otherwise hypothetically identical samples.

Completeness

The field objective for completeness is 90%. Every effort will be made to obtain valid samples for every sampling point in the plan. However, due to complications in homogeneity, some difficulty is expected in generating data from samples that require all of the DQOs. The overall project objective for completeness is also 90%. Due to the potential uniqueness of each sampling point, this project will require a high return of valid data to attain the project goals. Sufficient duplicates and backup samples will be taken to assure a high return of valid samples. As discussed in Section 5.3, a high return for the laboratory data is also expected.

Comparability

The field objective for comparability is to: a) provide samples collected by standardized protocols, and, b) to collect sufficient information concerning geological and physical characteristics of the sampling sites to allow determination of the physical comparability so that the new data can be compared with all past data. The data collection personnel will use standardized methods of field analysis, sample collection, holding times, and preservation. In addition, field conditions will be considered prior to sampling to attain a high degree of data comparability. The attainment of the DQO's for accuracy and precision, representativeness, and completeness will also contribute to the comparability of the data collected.

5.3 Laboratory Data Quality Objectives

The laboratory will demonstrate analytical precision and accuracy, defined in Section 5.1, by the analysis of laboratory duplicates, matrix spikes, and matrix spike duplicates. Laboratory accuracy will be demonstrated by the addition of surrogate and matrix spike compounds to characterize the behavior of mylar analytes if contained in the particular sample matrix.

Accuracy will be presented as percent recovery (Equation 5.4).

$$\%\ \text{Recovery} = \frac{(\text{Spiked Sample Result} - \text{Sample Result})}{\text{Amount of Spiking Solution Added}} \times 100 \qquad \text{(Equation 5.4)}$$

Precision will be reported as relative percent difference (RPD) and calculated as specified in Equation 5.5.

$$\text{RPD} = \frac{|(\text{Sample Result} - \text{Sample Duplicate Result})|}{\frac{(\text{Sample Result} + \text{Sample Duplicate Result})}{2}} \times 100 \qquad \text{(Equation 5.5)}$$

The RPD between matrix spikes and matrix spike duplicates will also be determined as a part of laboratory QA protocol. Laboratory blanks will also demonstrate accuracy with respect to the analyses. The frequency of laboratory duplicates, matrix spikes, and blanks and standard calibration checks are specified in Table 5-1.

The laboratory will be expected to perform all analyses to provide the best possible representation of the sampling point. The laboratory will also be expected to document any analytical problems encountered during the course of analysis and reported in the narrative section of the deliverables package. The deliverables package provided will contain CLP level deliverables to assure that analytical methods, parameters, and reporting units are comparable with other existing data.

5.4 Criteria Objectives

The quantitative objectives (criteria) that Groundwater Technology, Inc. will require for both field and laboratory accuracy and precision are summarized in Tables 5-1 and 5-2.

The laboratory will be required to report the method detection limits (MDL) for all compounds appearing in the Project Compound List (Table 3-1), and for all samples in the appropriate statistical reporting units (See Table 5-3) for the appropriate analyses.

TABLE 5-1
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

I. VOLATILE ORGANICS

MEASUREMENT PARAMETER	CAS#	REFERENCE
1,4-DICHLOROBENZENE	106-46-7	1
1,1-DICHLOROETHANE	75-34-3	1
1,2-DICHLOROETHANE	107-06-2	1
1,1-DICHLOROETHENE	75-35-4	1
TRANS-1,2-DICHLOROETHENE	56-60-5	1
1,2-DICHLOROPROPENE	78-87-5	1
CIS-1,3-DICHLOROPROPENE	10061-02-5	1
TRANS-1,3-DICHLOROPROPENE	10061-02-6	1
ETHYL BENZENE	100-41-4	1
METHYLENE CHLORIDE	75-09-2	1
1,1,2,2-TETRACHLOROETHANE	79-34-5	1
TETRACHLOROETHENE	127-18-4	1
TOLUENE	108-88-3	1
1,1,1-TRICHLOROETHANE	71-55-6	1
1,1,2-TRICHLOROETHANE	79-00-5	1
TRICHLOROETHENE	79-01-6	1
TRICHLOROFLUOROMETHANE	75-69-4	1
VINYL CHLORIDE	75-01-4	1
1,2-DICHLOROETHENE (TOTAL)	540-59-0	1
ACETONE	67-64-1	1
2-BUTANONE	78-93-3	1
CARBON DISULFIDE	75-15-0	1
2-HEXANONE	591-78-6	1

TABLE 5-1 (CONTINUED)
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

MEASUREMENT PARAMETER	CAS#	REFERENCE
4-METHYL-2-PENTANONE	108-10-1	1
STYRENE	100-42-5	1
M-XYLENE	108-38-3	1
O-XYLENE	95-57-6	1
P-XYLENE	106-42-3	1
XYLENES (TOTAL)	1330-20-7	1

II. SEMI-VOLATILE ORGANICS - BASE NEUTRAL/ACID EXTRACTABLE

MEASUREMENT PARAMETER	CAS#	REFERENCE
ACENAPHTHENE	83-32-9	1
ACENAPHTHYLENE	208-96-8	1
ANTHRACENE	120-12-07	1
BENZO(a) ANTHRACENE	56-55-3	1
BENZO(b) FLUORANTHENE	205-99-2	1
BENZO(k) FLUORANTHENE	207-08-9	1
BENZO(ghi) PERYLENE	191-24-2	1
BENZO(a) PYRENE	50-32-8	1
BENZYL BUTYL PHTHALATE	85-68-1	1
BIS(2-CHLOROETHOXY) METHANE	111-91-1	1
2,2'-OXY(BIS-1-CHLOROPROPANE)	108-60-1	1
BIS(2-CHLOROISOPROPYL) ETHER	108-60-1	1
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	1

TABLE 5-1 (CONTINUED)
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

MEASUREMENT PARAMETER	CAS#	REFERENCE
4-BROMOPHENYL PHENYL ETHER	101-55-3	1
2-CHLORONAPHTHALENE	91-58-7	1
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	1
CHRYSENE	218-01-9	1
DIBENZO(ah) ANTHRACENE	53-70-3	1
DI-N-BUTYLPHTHALATE	84-74-2	1
1,2-DICHLOROBENZENE	95-50-1	1
1,3-DICHLOROBENZENE	541-73-1	1
1,4-DICHLOROBENZENE	106-46-7	1
3,3-DICHLOROBENZIDINE	91-94-1	1
DIETHYLPHTHALATE	84-66-2	1
DIMETHYLPHTHALATE	131-11-3	1
2,4-DINITROTOLUENE	121-14-2	1
2,6-DINITROTOLUENE	606-20-2	1
DI-N-OCTYLPHTHALATE	117-84-0	1
FLUORANTHENE	206-44-0	1
FLUORENE	86-73-7	1
HEXACHLOROBENZENE	118-74-1	1
HEXACHLOROBUTADIENE	87-68-3	1
HEXACHLOROETHANE	67-72-1	1
INDENO(1,2,3-cd) PYRENE	193-39-5	1
ISOPHORONE	78-59-1	1
1-METHYL-NAPHTHALENE	90-12-0	1
2-METHYL-NAPHTHALENE	91-57-6	1
NAPHTHALENE	91-20-3	1

TABLE 5-1 (CONTINUED)
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

MEASUREMENT PARAMETER	CAS#	REFERENCE
NITROBENZENE	98-95-3	1
N-NITROSODI-N-PROPYLAMINE	621-64-7	1
PHENANTHRENE	85-01-8	1
PYRENE	129-00-0	1
1,2,4-TRICHLOROBENZENE	120-82-1	1
2-NITROANILINE	88-74-4	1
3-NITROANILINE	98-95-3	1
DIBENZOFURAN	132-64-9	1
4-NITROANILINE	100-01-6	1
N-NITROSO-DIPHENYLAMINE	86-30-6	1
4-METHYLPHENOL	106-44-5	1
4-CHLOROANILINE	106-47-8	1
2-METHYLNAPHTHALENE	91-57-6	1
HEXACHLOROCYCLOPENTADIENE	77-47-4	1
4-CHLORO-3-METHYLPHENOL	59-50-7	1
2-CHLOROPHENOL	95-57-8	1
2,4-DICHLOROPHENOL	120-83-2	1
2,4-DIMETHYLPHENOL	105-67-9	1
2,4-DINTROPHENOL	51-28-5	1
2-METHYL-4,6-DINTROPHENOL	534-52-1	1
2-NITROPHENOL	88-75-5	1
4-NITROPHENOL	100-02-7	1
PENTACHLOROPHENOL	87-86-5	1
2,4,6-TRICHLOROPHENOL	87-86-2	1
PHENOL	108-95-2	1

TABLE 5-1 (CONTINUED)
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

MEASUREMENT PARAMETER	CAS#	REFERENCE
2,4,5-TRICHLOROPHENOL	95-95-4	1

III. PESTICIDE/PCB COMPOUNDS

MEASUREMENT PARAMETER	CAS#	REFERENCE
ALPHA-BHC	319-84-6	1
BETA-BHC	319-85-7	1
DELTA-BHC	319-86-8	1
GAMMA-BHC (LINDANE)	58-89-9	1
HEPTACHLOR	76-44-8	1
ALDRIN	309-00-2	1
HEPTACHLOR EPOXIDE	1024-57-3	1
ENDOSULFAN I	959-98-8	1
DIELDRIN	60-57-1	1
4,4'-DDE	72-55-9	1
ENDRIN	72-20-8	1
ENDOSUFAN II	33213-65-9	1
4,4'-DDT	50-29-3	1
METHOXYCHLOR	72-43-5	1
ENDRIN KETONE	53494-70-5	1
ENDRIN ALDEHYDE	7421-36-3	1
ALPHA-CHLORDANE	5103-71-9	1
GAMMA-CHLORDANE	5103-74-2	1
TOXAPHENE	8001-35-2	1

TABLE 5-1 (CONTINUED)
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

MEASUREMENT PARAMETER	CAS#	REFERENCE
AROCHLOR-1016	12674-11-2	1
AROCHLOR-1221	11104-28-2	1
AROCHLOR-1232	11141-16-5	1
AROCHLOR-1242	53469-21-9	1
AROCHLOR-1248	12672-29-6	1
AR0CHLOR-1254	11097-69-1	1
AROCHLOR-1260	11096-82-5	1

IV. INORGANIC COMPOUNDS

MEASUREMENT PARAMETER	CAS#	REFERENCE
ALUMINUM	7429-90-5	1
ANTIMONY	7440-36-0	1
ARSENIC	7440-38-2	1
BARIUM	7440-39-3	1
BERYLLIUM	7440-41-7	1
CADMIUM	7440-43-9	1
CALCIUM	7440-70-2	1
CHROMIUM	7440-47-3	1
COBALT	7440-48-4	1
COPPER	7440-50-8	1
IRON	7439-89-6	1
LEAD	7439-92-1	1
MAGNESIUM	7439-95-4	1

TABLE 5-1 (CONTINUED)
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
TARGET COMPOUND LIST METHOD REFERENCES

MANGANESE	7439-96-5	1
MERCURY	7439-97-6	1
NICKEL	7440-02-0	1
POTASSIUM	7440-09-7	1
SELENIUM	7782-49-2	1
SILVER	7440-22-4	1
SODIUM	7440-23-5	1
THALLIUM	7440-28-0	1
VANADIUM	7440-62-2	1
ZINC	7440-66-6	1
CYANIDE	N/A	1

1 - NYSDEC ASP SUPERFUND-CLP (12-91 EDITION)

TABLE 5-2
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
FIELD ACCURACY AND PRECISION

PARAMETER	SPIKING COMPOUND	WATER ACCURACY % RECOVERY	WATER PRECISION % RPD (1)	SOIL ACCURACY % RECOVERY	SOIL PRECISION % RPD (1)
VOA (3)	1,1 DCE	(5)	+/- 14% RPD	(5)	+/- 22% RPD
VOA (3)	TCE	(5)	+/- 14% RPD	(5)	+/- 24% RPD
VOA (3)	BENZENE	(5)	+/- 11% RPD	(5)	+/- 21% RPD
VOA (3)	TOLUENE	(5)	+/- 13% RPD	(5)	+/- 21% RPD
VOA (3)	CHLOROBENZENE	(5)	+/- 13% RPD	(5)	+/- 21% RPD
BNA (3)	PHENOL	(5)	+/- 42% RPD	(5)	+/- 35% RPD
BNA (3)	2-CHLOROPHENOL	(5)	+/- 40% RPD	(5)	+/- 50% RPD
BNA (3)	1,4-DICHLOROBENZENE	(5)	+/- 28% RPD	(5)	+/- 27% RPD
BNA (3)	N-NITROSO-DI-N-PROPYLAMINE	(5)	+/- 38% RPD	(5)	+/- 38% RPD
BNA (3)	1,2,4-TRICHLORO BENZENE	(5)	+/- 28% RPD	(5)	+/- 23% RPD
BNA (3)	4-CHLORO-3-METHYLPHENOL	(5)	+/- 42% RPD	(5)	+/- 33% RPD
BNA (3)	ACENAPTHENE	(5)	+/- 31% RPD	(5)	+/- 19% RPD
BNA (3)	4-NITROPHENOL	(5)	+/- 50% RPD	(5)	+/- 50% RPD
BNA (3)	2,4-DINITROTOLUENE	(5)	+/- 38% RPD	(5)	+/- 47% RPD
BNA (3)	PENTACHLORO PHENOL	(5)	+/- 50% RPD	(5)	+/- 47% RPD
BNA (3)	PYRENE	(5)	+/- 31% RPD	(5)	+/- 36% RPD
PEST (3)	LINDANE	(5)	+/- 15% RPD	(5)	+/- 50% RPD

PARAMETER	SPIKING COMPOUND	WATER ACCURACY % RECOVERY	WATER PRECISION % RPD (1)	SOIL ACCURACY % RECOVERY	SOIL PRECISION % RPD (1)
VOA (3)	1,1 DCE	(5)	+/- 14% RPD	(5)	+/- 22% RPD
PEST (3)	HEPTACHLOR	(5)	+/- 20% RPD	(5)	+/- 31% RPD
PEST (3)	ALDRIN	(5)	+/- 22% RPD	(5)	+/- 43% RPD
PEST (3)	DIELDRIN	(5)	+/- 18% RPD	(5)	+/- 38% RPD
PEST (3)	ENDRIN	(5)	+/- 21% RPD	(5)	+/- 45% RPD
PEST (3)	4,4-DDT	(5)	+/- 27% RPD	(5)	+/- 50% RPD
METALS (2) (4)	*	(5)	+/-20% RPD	(5)	+/-20% RPD

(1) %RPD is applicable above five times the contract required detection limit (CRDL). Below five times the CRDL use control limit of +/- the CRDL.

(2) Laboratory Accuracy and Precision control limits obtained from USEPA Statement of Work (SOW 3/90) For Inorganics Analysis, Document No. ILM01.0, Section E-14 through and including E-16, and Section E-18 through and including Section E-19.

(3) Laboratory Accuracy and Precision Control Limits obtained from USEPA Statement of Work (3/90) for Organics Analysis, Document Number OLM01.0, Section D-55, Table 7, Section D-59, Table 7 and Section D-60, Subsection 16.4.

(4) Pre-digestion spikes for metals, if matrix spikes are required by the method, the percent recovery range will be adjusted to 85-115%.

(5) For organic parameters, control limits for individual matrix spike compounds are to be found in Tables 11.1 and 11.2.

VOA - Volatile Organic Compounds
BNA - Semi-Volatile Organic Compounds
PEST - Pesticides/PCBs

* Spiking compound contains all metals being analyzed for.

TABLE 5-3
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
LABORATORY ACCURACY AND PRECISION

PARAMETER	SPIKING COMPOUND	WATER ACCURACY % RECOVERY	WATER PRECISION % RPD (1)	SOIL ACCURACY % RECOVERY	SOIL PRECISION % RPD (1)
VOA (3)	1,1 DCE	(5)	+/- 14% RPD	(5)	+/- 22% RPD
VOA (3)	TCE	(5)	+/- 14% RPD	(5)	+/- 24% RPD
VOA (3)	BENZENE	(5)	+/- 11% RPD	(5)	+/- 21% RPD
VOA (3)	TOLUENE	(5)	+/- 13% RPD	(5)	+/- 21% RPD
VOA (3)	CHLOROBENZENE	(5)	+/- 13% RPD	(5)	+/- 21% RPD
BNA (3)	PHENOL	(5)	+/- 42% RPD	(5)	+/- 35% RPD
BNA (3)	2-CHLOROPHENOL	(5)	+/- 40% RPD	(5)	+/- 50% RPD
BNA (3)	1,4-DICHLOROBENZENE	(5)	+/- 28% RPD	(5)	+/- 27% RPD
BNA (3)	N-NITROSO-DI-N-PROPYLAMINE	(5)	+/- 38% RPD	(5)	+/- 38% RPD
BNA (3)	1,2,4-TRICHLORO BENZENE	(5)	+/- 28% RPD	(5)	+/- 23% RPD
BNA (3)	4-CHLORO-3-METHYLPHENOL	(5)	+/- 42% RPD	(5)	+/- 33% RPD
BNA (3)	ACENAPTHENE	(5)	+/- 31% RPD	(5)	+/- 19% RPD
BNA (3)	4-NITROPHENOL	(5)	+/- 50% RPD	(5)	+/- 50% RPD
BNA (3)	2,4-DINITROTOLUENE	(5)	+/- 38% RPD	(5)	+/- 47% RPD
BNA (3)	PENTACHLORO PHENOL	(5)	+/- 50% RPD	(5)	+/- 47% RPD
BNA (3)	PYRENE	(5)	+/- 31% RPD	(5)	+/- 36% RPD
PEST (3)	LINDANE	(5)	+/- 15% RPD	(5)	+/- 50% RPD
PEST (3)	HEPTACHLOR	(5)	+/- 20% RPD	(5)	+/- 31% RPD
PEST (3)	ALDRIN	(5)	+/- 22% RPD	(5)	+/- 43% RPD
PEST (3)	DIELDRIN	(5)	+/- 18% RPD	(5)	+/- 38% RPD
PEST (3)	ENDRIN	(5)	+/- 21% RPD	(5)	+/- 45% RPD
PEST (3)	4,4-DDT	(5)	+/- 27% RPD	(5)	+/- 50% RPD
METALS (2) (4)	*	(5)	+/-20% RPD	(5)	+/-20% RPD

(1) %RPD is applicable above five times the contract required detection limit (CRDL). Below five times the CRDL use control limit of +/- the CRDL.

(2) Laboratory Accuracy and Precision control limits obtained from USEPA Statement of Work (SOW 3/90) For Inorganics Analysis, Document No. ILM01.0, Section E-14 through and including E-16, and Section E-18 through and including Section E-19.

(3) Laboratory Accuracy and Precision Control Limits obtained from USEPA Statement of Work (3/90) for Organics Analysis, Document Number OLM01.0, Section D-55, Table 7, Section D-59, Table 7 and Section D-60, Subsection 16.4.

(4) Pre-digestion spikes for metals, if matrix spikes are required by the method, the percent recovery range will be adjusted to 85-115%.

(5) For organic parameters, control limits for individual matrix spike compounds are to be found in Tables 11.1 and 11.2.

VOA - Volatile Organic Compounds
BNA - Semi-volatile Organic Compounds
PEST - Pesticides/PCBs

* Spiking compound contains all metals being analyzed for.

TABLE 5-4
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
DATA REPORTING CONVENTIONS

NAME OF ANALYSIS	UNITS	DECIMAL ACCURACY
VOLATILES BY GC/MS		
SOIL	µg/kg	0.1
SEMI-VOLATILES BY GC/MS		
SOIL	µg/kg	0.1
WATER	µg/L	0.1
VOLATILES BY GC		
SOIL	µg/kg	0.1
WATER	µg/L	0.1
PESTICIDES/PCBs BY GC/ECD		
SOIL	µg/kg	0.1
WATER	µg/L	0.1
METALS BY ICP		
SOIL	mg/kg	0.10
WATER	µg/L	0.01
METALS BY FURNACE		
SOIL	mg/kg	0.01
WATER	µg/L	0.10
TEMPERATURE	°C	0.10
pH	pH UNITS	0.10
SPECIFIC CONDUCTANCE	µmhos/cm	0.10
TURBIDITY	NTU	0.1

6.0 SAMPLING PROCEDURES

Numerous work steps in the Work Plan require sampling of soils and water to identify the presence/absence and concentration of compounds in these locations. Sample media will be analyzed for additional compounds in specific locations as determined from evaluation of a chemical inventory. Specific sampling procedures are set forth in this section to meet the QA objectives outlined in Section 5 of the QAPP. Sampling containers, preservation, and holding times can be found in Table 6-1. The Field Sampling and Analysis Plan (FSAP) deals specifically with field operational and sampling procedures during the Phase 1 RI.

Individual work steps for each task will be described in this section. The following discussion will also describe sampling devices for each task as well as sample preservatives for each matrix. At the end of each task, a sampling procedure field checklist is provided. The individual tasks include sampling to following areas:

- North Recharge Basins,
- East Soil Storage Area,
- West Soil Storage Area,
- Former Drum Storage Area,
- Northeast Corner Aerial Photography Anomaly,
- Primary Wastewater Pump Station,
- Tesla Tower Base,
- Emulsion Building Sump,
- Water Meter Room Pit,
- Three Former Fuel Oil Underground Storage Tank Locations,
- Monitoring Wells,
- Off-Site locations including James Street, North Country Road, Route 25A, and
- Briarcliff Road Well Field.

6.1 Monitoring and Public Supply Well Sampling

A sampling program will be conducted to procure and analyze groundwater samples from seven shallow wells and four deep wells. All new wells will be drilled using either Tigre Tierra® (Registered trademark of Aardvark Corporation) casing or hollow stem auger driver drilling methods. Shallow wells will be constructed of schedule 40 PVC pipe, 4 inch in diameter, and deep wells will be constructed of schedule 80 PVC pipe, 4 inch in diameter. Following well installation, surge and pump methods will be used to develop the wells. A surge block will be used to agitate the well. This technique is used by capping the top of the well and by means of a plunger type action rapidly pulling the well water up and down. This is an excellent technique of well development in that it links the well to the aquifer. Because of the coarse nature of the aquifer, it is anticipated that three hours of surging and well pumping will be sufficient to achieve a turbidity level of 50 NTU or less. Development will continue until the 50 NTU turbidity level is achieved. Refer to Table 1-A, of the FSAP for well locations and analytical parameters. Prior to any sample collection at public supply wells, an inspection and assessment of possible sample collection methods will be performed.

All drill cuttings generated during the well installation will be stored on and covered with plastic sheeting and stockpiled for later treatment and/or disposal.

A single source of potable water will be established, prior to the initiation of field activities, for decontamination procedures which specify the use of clean potable water, as well as for drilling water and water used in the mixing of well construction materials (i.e. grout, etc.). This potable water source will be sampled and analyzed to ensure that no contaminants are being introduced from the outside.

6.1.1 Sampling Procedures

Analytes of concern during this investigation include TCL volatile organic compounds, TCL semi-volatile organic compounds, TCL pesticide/PCB compounds, TAL metals, and total cyanide. In addition, field measurements including pH, Eh, conductivity, temperature, and turbidity will also be procured.

Work steps to be followed are:

1) Obtain appropriate laboratory prepared sample containers (as per Table 1-2 of the FSAP) prior to sampling.

2) Determine the appropriate level of health and safety according to the approved Health and Safety Plan.

3) Calibrate a pH pen, conductivity meter, turbidity meter, and thermometer according to procedures outlined in Section 3 of the FSAP.

4) Obtain a depth to water measurement, then determine the volume of water in each well by using $V = \pi r^2 h$ where:

V = volume of water (feet^3)
π = 3.14
r = radius of well (feet)
h = height of column of water in well (feet)

Determine four well volumes in gallons by using $ft^3 \times 7.48\ gallons/ft^3 \times 4$.

5) Use a decontaminated polyethylene or teflon bladder-type positive displacement or decontaminated stainless steel centrifugal submersible pump to purge low-yield wells to dryness and high-yield wells of four to ten well volumes.

6) All purged water will be containerized in 55-gallon drums, stored on-site and disposed of properly according to the concentrations and types of compounds present (if any).

7) Label the purge water containers with the following information: sample name, time and date of sampling, accumulation start date, generator name, address and phone number, location of purge water source and volume of water from each source.

8) Put on disposable latex sampling gloves prior to procuring samples.

9) Procure water from positive displacement purge pump after pH, conductivity and temperature have stabilized, turbidity is 50 NTUs or less, and four to ten well volumes have been removed (high-yield wells) or well has been pumped dry (low-yield wells). Note that no sampling is to be undertaken until the water level in the well has recovered. Additionally, water samples may not be obtained from a stainless steel centrifugal submersible purge pump.

10) If a stainless steel submersible pump is used for purging, remove it subsequent to sufficient purging and procure a water sample with a clean Polyethylene, steel, PVC, or Teflon bailer and monofilament line.

11) Collect water samples in 40 ml glass vials (for volatiles) first. Fill the vial with sample water from the bailer to overflowing. Carefully but quickly slip the cap with the septum onto the vial with the teflon face of the septum toward the water (especially when sampling for volatile compounds). Tighten the cap securely, invert the vial and tap the cap against your hand to assure that there are no air bubbles inside. If bubbles are present, add a few more drops of sample water and reseal.

12) Collect samples for semi-volatiles in one quart (liter) amber glass jars next. Replace the teflon-lined cap. Place the sample in an ice chest at 4° C after labeling. Collect samples for pesticides/PCBs in one quart (liter) amber glass jars. Replace the teflon-lined cap. Place the samples in an ice chest at 4° C after labeling.

13) Collect samples for metals in one quart (liter) polyethylene jars, fill to the neck of the jar. Acidify the sample with trace grade nitric acid to a pH of 2 or less. Replace the cap.

14) Collect samples for cyanide in 500 ml plastic containers. Preserve samples with sodium hydroxide to a pH of 12 or more. Replace the cap.

15) Obtain duplicate and blank samples at the frequency required by Table 1-3 of the FSAP.

16) Label the sample containers using cloth labels and waterproof ink and seal containers with custody seals. Labels will include the following information:

    a. sample identification number,
    b. job name and identification number,
    c. date and time of sample collection,
    d. type of analysis requested, and
    e. name of sampler.

17) Fill out chain-of-custody form and reference the preservation technique in the remarks section.

18) Check to make sure the vial caps are tight, then place on ice immediately.

19) Store the collected samples together with any blank samples collected for that sampling event. The sample set and blanks must be stored together, under refrigeration, in an area known to be free of contamination.

20) Transport the sample set, on ice, via overnight courier, maintaining custody as described in Section 2 of the FSAP.

6.1.2 Sampling Equipment

During this task, prior to sampling, wells will be purged with either a bladder-type positive displacement pump or a stainless steel submersible pump. Purge pumps will be leakproof and free of other adulterating components. If a bladder pump is used, it will be constructed of polyethylene or teflon. Samples will be procured directly with the positive displacement pump or indirectly with a Polyethylene, steel, PVC, or Teflon bailer. If possible, the pumps and bailers will be dedicated solely to this project.

In the event that it is not economically feasible to use dedicated equipment, decontaminated equipment will be used to collect all samples and the decontamination procedures in section 1.1.4 of the FSAP will be utilized.

6.1.3 Sample Preservatives

Samples will be preserved according to guidelines listed in Table 6-1 of the QAPP and Table 1-2 of the FSAP. Regardless of type of contaminant suspected, all samples will be iced from time of collection to time of analysis.

6.1.4 Decontamination

Decontamination procedures will vary depending upon the sampling/purging procedures. If a pneumatic pump is used for both purging and sampling, the pump and associated piping will be decontaminated as follows:

1) In the predetermined decontamination area fill three forty-gallon polyethylene (e.g. "Rubbermaid") containers. The first with an alconox and water solution, the second with a 10% volume/volume methanol (trace or nanograde) in clean water solution, the third, a clean water rinse.

2) Place the sampling pump and discharge hose in the alconox-water solution. Start the pump and cycle a minimum of five gallons through the system.

3) Repeat step 2 in the methanol water rinse.

4) Repeat step 2 in the clean water rinse.

5) Fluids used for decontamination should be collected in 55-gallon drums (or the tank truck) and treated and disposed of as necessary.

This method is described in Keely and Boateng (1987) and has been proven as an effective method of decontamination.

If a stainless steel centrifugal submersible pump is used for purging and a Polyethylene, steel, PVC, or Teflon bailer is used for sampling, all equipment will be decontaminated by the following procedure:

1) In the predetermined decontamination area, using potable water from an established, contaminant-free source, steam clean the bed liner of the sampling truck with the truck parked to allow proper drainage.

2) Place a piece of clean plastic in the bed of the sampling truck and place the pump, power cord, discharge hose and Polyethylene, steel, PVC, or Teflon bailer on the plastic.

3) Steam clean all the above sampling equipment first with an alconox water solution and followed by clean potable water.

4) Rinse all above equipment thoroughly with distilled water.

5) Water draining from decontamination procedures will be collected and stored in 55-gallon drums and/or tank truck for disposal or treatment.

6) Let equipment air dry.

If dedicated pumps are utilized, the above procedure will not be necessary.

Internal components of the stainless steel centrifugal submersible pump need not go through rigorous decontamination procedures because this pump will be used for pumping only and not for sampling.

Regardless of sampling method, all disposable sampling equipment (e.g., latex gloves) will be collected in plastic garbage bags. Full bags will be placed in a designated storage area.

6.1.5 Field Checklist

During shallow well and select deep well sampling, the field personnel responsibilities for sampling will review the following checklist to assure consistency and quality of sampling procedures.

Field Checklist
Monitor and Public Supply Well Sampling

Preparation

1) Thoroughly familiar with task before proceeding?

2) Appropriate level of health and safety determined?

3) Lab given estimate of sample quantity and arrival time?

4) Proper and sufficient number of sample containers?

5) Sample preservation requirements understood and preservatives available?

6) Have ice for preservation?

7) Have conductivity meter, pH pen, thermometer, turbidity meter, and calibration solutions?

8) Understand calibration procedures?

9) Have pumps with discharge hoses, clamps, valves and fittings?

10) Have polyethylene, steel, PVC or teflon bailer and interface probe?

11) Have required purge water treatment (storage drums or tank trucks)?

12) Have field books, sample labels, chain-of-custody forms, custody seals, calculator, writing instruments (including waterproof pen), sampling gloves and site map enlargements?

13) Have decontamination equipment supplies including: Polyethylene containers, plastic five gallon buckets, alconox, methanol (trace grade), distilled water, steam cleaner (fueled), water supply hoses, electric power source, clean potable water source, clean roll of plastic, garbage bags?

14) Have tools, 100 tape, spare fittings, fuses, batteries and other parts.

15) Procured all necessary permits?

Task

1) Equipment (pumps, discharge hoses, bailer, interface probes) decontaminated?

    a. Decontamination area prepared?
    b. Sample truck bed steam cleaned?
    c. Clean plastic used?
    d. Equipment steam cleaned thoroughly or passed through fluid baths properly?
    e. Equipment rinsed twice with distilled water?
    f. Equipment air dried?
    g. Equipment carefully reloaded on truck to prevent contamination?

2) Monitoring equipment calibrated when necessary?

3) Pre-sampling information logged (location, personnel, date, weather)?

4) Water level obtained?

5) Pump set at correct level and plumbed with discharge treatment?

6) Time, temperature, pH, conductivity, turbidity, and volume recorded?

7) Well purged sufficiently? (four to ten well volumes and pH, conductivity, and temperature stabilized, and turbidity 50 NTUs or less)

8) Sample gloves put on?

9) Samples procured, labeled, sealed, preserved and secured properly?

10) Blanks and duplicates taken when required?

11) Blanks labeled as regular samples?

12) Sample information data sheet completed (if necessary)?

13) All disposable sampling equipment collected in a plastic garbage bag?

14) Decontamination procedures repeated when necessary?

15) Holding times and shipment times for samples known?

16) Sample with chain-of-custody shipped when necessary and proper icing of samples confirmed immediately prior to shipment?

17) Confirm that lab received samples?

18) Does sampler require any amendments to checklist? If so, report these amendments.

6.2 Soil Sampling From Test Borings

A sampling program will be conducted to procure and analyze soils obtained during split-spoon sampling of test borings. Specific sample locations can be found in Table 1-B and Figure 1-2 of the FSAP. All borings will be drilled using Tigre Tierra® casing driver drilling methods. Some test borings are collocated with monitoring well locations. It should be noted that during sampling in some predetermined locations only the worst case ("hottest") sample will be analyzed for full TCL/TAL metals constituents. The worst case sample will be determined by field, as well as, visual characterizations. Several "worst-case" samples will also be submitted for TCLP testing to evaluate the metal leaching potential from the on-site soils. In the former underground storage tank locations, samples will be collected on five foot intervals starting ten feet below grade until two consecutive samples are collected which are clean based on field and visual characterizations. Then the deeper clean sample will be submitted for laboratory analysis. During the Phase 1 RI, seven surface soil samples (0 to 3 inches deep) will be collected from the North Recharge Basin boring area and from the background soil boring area. These soil samples will be submitted to the lab for full TCL/TAL metals analyses. Field characterizations will be assessed using a portable ionization detector (PID) or its equivalent.

All soils generated during the boring process will be stored on and covered with plastic sheeting for disposal as appropriate, pending the waste characterization results.

6.2.1 Sampling Procedures

Analytes of interest in this investigation include TCL volatile organic compounds, TCL semi-volatile organic compounds, TCL pesticide/PCB compounds, TAL metals and total cyanide. In addition, samples collected from the underground storage tank area will be analyzed for toxicity characteristic leachate procedure (TCLP) semi-volatile organic compounds. Furthermore, representative ("worst-case") soil samples from the various areas of concern will be submitted to the lab for TCLP testing for 8 TAL metals to determine the leachability potential from site soils. Work steps to be followed while performing this task are:

1) Clear underground utilities as specified in the Health and Safety Plan.

2) Determine the appropriate level of health and safety according to the approved Health and Safety Plan.

3) Calibrate organic vapor meter according to steps outlined in Section 3 of the FSAP.

4) Obtain decontaminated standard split-spoon (24 inches long by 4 inches inside diameter).

5) Obtain by driving the split-spoon samples the depth of the spoon, through the center of the auger and ahead of the cutting teeth on the auger. These samples are to be collected from the appropriate intervals described in the Work Plan and the FSAP.

6) Put on disposable latex sampling gloves prior to procuring samples.

7) Upon retrieval of each split-spoon, open and quickly scoop the sample into the appropriate containers for the analytical parameters specified in Table 1-1 of the FSAP.

8) Obtain an organic vapor meter reading from this sample, remaining in the spoon.

9) Label the sample container with cloth labels and water-proof ink and seal containers and caps with custody seals. Labels will include the following information:

   a. sample identification number
   b. job name and identification number
   c. date and time of sample collection
   d. type of analysis requested
   e. name of sampler

10) Check to make sure sample is tightly sealed and place on ice immediately.

11) Fill out chain of custody form and reference the preservation techniques in the remarks section.

12) Obtain a trans-located duplicate sample and appropriate blank samples at the frequency outlined in Table 1-3 of the FSAP.

13) Blank samples should be marked as regular samples on both sample containers and on the chain-of-custody forms.

14) Store the collected samples obtained during that sampling event. The samples must be stored together, under refrigeration in an area known to be free of contamination.

15) Log the sample remaining in the split-spoon.

16) Enter into bound field log book, at a minimum, the following:

   a. location where sample was obtained,
   b. sample identification number,
   c. date and time of sample collection,
   d. depths of sample collected,
   e. valuable remark concerning the drilling rates, etc.,

   f. geologic log of the samples,
   g. depth of samples, and
   h. weather conditions during operations.

17) Mark location on enlargement of sampling site specific map.

18) Collect the appropriate number of samples for each boring as specified in Table 1-B.

19) Transport the iced sample set via overnight carrier maintaining chain of custody as described in Section 2 of the FSAP.

6.2.2 Sampling Equipment

During this task, 4 inch inside diameter by 24 inch long ASTM standard split-spoons will be used for sampling. The split-spoons will be driven by a standard 140 pound hammer through augers. Surface soil samples will be collected with a stainless steel trowel.

6.2.3 Sample Preservatives

All samples will be preserved by placing on ice. No other preservation methods are necessary.

6.2.4 Decontamination

Decontamination procedures will consist of the following:

1) Between individual samples from the same boring, scrub the split-spoons with the alconox and water solution, rinse with a clean potable water solution, rinse twice with distilled water and let air dry on a clean plastic sheet. A new plastic sand trap will be placed in the head of each split-spoon prior to collecting a sample.

2) Certain locations will require more than one split-spoon of soil to provide adequate sample weight for analysis.

3) Decontaminate augers and split-spoon rods between locations but not between borings on the same location.

4) When augers are to be decontaminated, in a predetermined decontamination area, using potable water, steam clean the bed liner of the sampling truck with the truck parked to allow proper drainage.

5) Place a piece of clean plastic in the bed of the sampling truck and place augers, split-spoons, and sampling rods on the plastic.

6) Steam clean all the above sampling equipment first with an alconox and water solution followed by clean potable water.

7) Rinse all above equipment thoroughly with distilled water.

8) Water draining from decontamination procedures should be collected and stored in 55-gallon drums or above ground storage vessels pumped from tank trucks for later disposal or treatment.

9) Let equipment air dry.

Regardless of sampling method, all disposable sampling equipment (e.g., latex gloves) will be collected in plastic garbage bags. Full bags will be placed in a designated storage area.

6.2.5 Field Checklist

During soil sampling, personnel responsible for sampling will review the following checklist to assure consistency and quality of sampling procedures.

Soil Sampling From Test Borings

Preparation

1) Thoroughly familiar with task before proceeding?

2) Appropriate level of health and safety determined?

3) Lab given estimate of sample quantity and arrival time?

4) Proper and sufficient number of sample containers?

5) Sample preservation requirements understood?

6) Have ice for preservation?

7) Have Organic Vapor Meter?

8) Understand calibration procedures?

9) Have field books, sample labels, chain-of-custody forms, custody seals, calculator, writing instruments (including water proof pen), sampling gloves, photo camera, film, batteries, and site map enlargements?

10) Have decontamination equipment supplies including: plastic five gallon buckets, alconox, distilled water, steam cleaner (fueled), water supply hoses, electric power source, clean potable water source, clean roll of plastic, garbage bags?

11) Have tools, 100' tape, spare fittings, duct tape, fuses, batteries and other parts?

Task

1) Equipment (split-spoon, split-spoon rods, augers) decontaminated?

   a. Decontamination area prepared?
   b. Sample truck bed steam cleaned?
   c. Clean plastic used?
   d. Equipment steam cleaned thoroughly?
   e. Equipment rinsed twice with distilled water?
   f. Equipment air dried?
   g. Equipment carefully reloaded on truck to prevent contamination?

2) Organic vapor meter calibrated when necessary?

3) Pre-sampling information logged (location, personnel, date, weather)?

4) Sample gloves put on?

5) Was an OVM reading obtained?

6) Samples preserved and secured properly?

7) Blanks and duplicates taken when required?

8) Blanks labeled as regular samples?

   Label each bottle with the following information:
   a. Job Number,
   b. Owner/Client,
   c. Facility Location,
   d. Boring Number or Designation,
   e. Sample Identification Number or Designation,
   f. Date,
   g. Time,
   h. Type of Laboratory Analysis (i.e., VOA, TAL, metals, etc.), and
   i. Name of Person Collecting the Sample.

9) Sample information data sheet completed?

10) All disposable sampling equipment collected in a plastic garbage bag?

11) Decontamination procedures repeated when necessary?

12) Holding times and shipment times for samples known?

13) Sample with chain-of-custody shipped when necessary and proper icing of samples confirmed immediately prior to shipment?

14) Confirm that lab received samples?

15) Does sampler require any amendments to checklist? If so, report these amendments.

6.3 Surface Soil Sampling

Surface soil samples will be collected from the 0 to 3 inch depth interval at selected boring locations. The surface soil sample will be obtained using a stainless steel trowel, which will be decontaminated between each use as discussed earlier for the soil boring sampling program.

6.4 Soil Sampling From Hand Augers

A sampling program will be conducted to procure and analyze soils obtained by hand auger sampling. The specific sample location (Water Meter Room Pit), can be found in Table 1-B and Figure 1-2. All soils generated during hand augering in the Water Meter Room Pit will be left in the Water Meter Room Pit.

6.4.1 Sampling Procedures

Analytes of interest in this investigation include TCL volatile organic compounds, TCL semi-volatile organic compounds, TCL pesticide/PCB compounds, TAL metals and total cyanide. Work steps to be followed while performing this task are:

1.) Equipment (hand augers) decontaminated?

   a. Decontamination area prepared?
   b. Sample truck bed steam cleaned?
   c. Clean plastic used?
   d. Equipment steam cleaned thoroughly?
   e. Equipment rinsed twice with distilled water?
   f. Equipment air dried?
   g. Equipment carefully reloaded on truck to prevent contamination?

2.) Organic vapor meter calibrated when necessary?

3.) Pre-sampling information logged (location, personnel, date, weather)?

4.) Sample gloves put on?

5.) Was an OVM reading obtained?

6.) Samples preserved and secured properly?

7.) Each bottle labeled with the following information:

   a. Job number,
   b. owner/client,
   c. facility location,
   d. boring number or designation,
   e. sample identification number or designation,
   f. date,
   g. time,
   h. type of laboratory analysis (i.e., VOA, TAL, metals, etc.), and
   i. name of person collecting the sample.

8.) Blanks and duplicates taken when required?

9.) Blanks labeled as regular samples?

10.) Sample information data sheet completed?

11.) All disposable sampling equipment collected in a plastic garbage bag?

12.) Decontamination procedures repeated when necessary?

13.) Holding times and shipment times for samples known?

14.) Sample with chain-of-custody shipped when necessary and proper icing of samples confirmed immediately prior to shipment?

15.) Confirm that lab received samples?

6.4.2 Sampling Equipment

During this task, a stainless steel hand auger will be used for sampling.

6.4.3 Sample Preservatives

All samples will be preserved by placing on ice. No other preservation methods are necessary.

6.4.4 Decontamination

Decontamination procedures will consist of the following:

   1.) Between individual samples from the same boring, scrub the hand auger with the alconox and water solution, rinse with a clean water solution, rinse thoroughly with distilled water and let air dry on a clean plastic sheet.

2.) Decontaminate hand augers between locations at the predetermined decontamination area.

3.) Steam clean the hand auger followed by an alconox and water solution followed by clean potable water.

4.) Rinse all above equipment thoroughly with distilled water.

5.) Water draining from decontamination procedures should be collected and stored in 55-gallon drums which will be transferred to above ground tanks located at the waste water treatment plant.

6.) Let equipment air dry.

Regardless of sampling method, all disposable sampling equipment (e.g., latex gloves) will be collected in plastic garbage bags. Full bags will be placed in a designated storage area.

6.4.5 Field Checklist

During soil sampling, personnel responsible for sampling will review the following checklist to assure consistency and quality of sampling procedures.

Soil Sampling From Hand Augers

Preparation

1) Thoroughly familiar with task before proceeding?

2) Appropriate level of health and safety determined?

3) Lab given estimate of sample quantity and arrival time?

4) Proper and sufficient number of sample containers?

5) Sample preservation requirements understood?

6) Have ice for preservation?

7) Have Organic Vapor Meter?

8) Understand calibration procedures?

9) Have field books, sample labels, chain-of-custody forms, custody seals, calculator, writing instruments (including water proof pen), sampling gloves, photo camera, film, batteries, and site map enlargements?

10) Have decontamination equipment supplies including: plastic five gallon buckets, alconox, distilled water, steam cleaner (fueled), water supply hoses, electric power source, clean water source, clean roll of plastic, garbage bags?

11) Have tools, 100' tape, spare fittings, duct tape, fuses, batteries and other parts?

<u>Task</u>

1) Equipment (split-spoon, split-spoon rods, augers) decontaminated?

   a. Decontamination area prepared?
   b. Sample truck bed steam cleaned?
   c. Clean plastic used?
   d. Equipment steam cleaned thoroughly?
   e. Equipment rinsed twice with distilled water?
   f. Equipment air dried?
   g. Equipment carefully reloaded on truck to prevent contamination?

2) Organic vapor meter calibrated when necessary?

3) Pre-sampling information logged (location, personnel, date, weather)?

4) Sample gloves put on?

5) Was an OVM reading obtained?

6) Samples preserved and secured properly?

7) Blanks and duplicates taken when required?

8) Blanks labeled as regular samples?

   Label each bottle with the following information:
   a. Job Number,
   b. Owner/Client,
   c. Facility Location,
   d. Boring Number or Designation,
   e. Sample Identification Number or Designation,
   f. Date,
   g. Time,
   h. Type of Laboratory Analysis (i.e., VOA, TAL, metals, etc.), and
   i. Name of Person Collecting the Sample.

9) Sample information data sheet completed?

10) All disposable sampling equipment collected in a plastic garbage bag?

11) Decontamination procedures repeated when necessary?

12) Holding times and shipment times for samples known?

13) Sample with chain-of-custody shipped when necessary and proper icing of samples confirmed immediately prior to shipment?

14) Confirm that lab received samples?

15) Does sampler require any amendments to checklist? If so, report these amendments.

6.5 Metal Detector Survey

A metal detector survey will be conducted around the Former Drum Location in the Northwest corner of the site. The purpose of the survey is to determine the existence or not of other drums or metal objects in this area.

Prior to conducting metal detector surveys, a planimetric survey will be conducted to establish a grid coordinate system at 100 foot intervals across the Northwest corner of the site. The grid coordinate system will be used to locate geophysical survey lines and measurement stations.

The Electromagnetic Induction (EM) survey will be performed using a Geonics EM31 terrain conductivity meter equipped with an EM31DL data logger or equivalent device. The EM survey will be completed along survey lines spaced every 20 feet. Readings will be taken every 20 feet along each survey line. Field calibration checks of the EM instrument's sensitivity will be performed prior to the start of the survey in an area considered to represent background readings.

Both the quadrature component and in-phase component of the electromagnetic field will be recorded by the data logger at each station. The quadrature component of the electromagnetic field is linearly proportional to the apparent ground conductivity and will be used to delineate areas of past metallic waste disposal, if any. The in-phase component of the electromagnetic field is sensitive to electrically conductive materials, such as metals, and will be used to delineate areas of buried metals. All work will be performed in accordance with the manufacturer's operation manual for the EM31.

The quadrature and in-phase readings will be downloaded daily from the digital data logger to a laptop computer for further processing and contouring. Contour maps of both the quadrature and in-phase component readings will be prepared for the Northwest corner of the site.

The potential exists that the high voltage LILCO power lines will adversely effect the EM31. If this occurs, alternative metal detector survey equipment will be evaluated.

6.6 Visual Inspection of Main Plant Structure, Two Storage Sheds and Waste Water Treatment Plant

Prior to the initiation of on-site sampling, a thorough visual inspection of the main plant structure, two storage sheds and waste water treatment plant will be performed. The intention of this inspection is to: verify and document the presence or non-presence of residual contamination in the buildings; and to verify that pathways from spillage of contaminants in the interior of the buildings to soils beneath the buildings do not exist.

6.6.1 Visual Inspection of Structures

Work steps to be followed while performing this task include:

1.) Develop a base map based on existing site plans for plotting information gathered during visual inspection of building.

2.) Develop audit checklist for use.

3.) Inspect existing reports and file information regarding historical use of structures.

4.) Visually inspect each room within each structure for industrial process discharges. Discharge lines and pipes for leaks or spills, and inspect condition of floors for cracks, holes, drains or stains.

Note any abnormalities or non-conformities.

6.7 References

Keely, J.F. and K. Boateng, 1987. Monitoring well installation, purging and sampling techniques - Port 1: Conceptualizations. Groundwater, v. 25, no. 3, pp. 300-131.

TABLE 6-1
Phase 1 RI
Peerless Photo Products, Inc. Site
Shoreham, New York
Site ID # 1-52-031
SAMPLING CONTAINERS, PRESERVATION AND HOLDING TIMES

PARAMETER	MATRIX	CONTAINER (4)	PRESERVATION	HOLDING TIME (1)
TCL Volatiles	Aqueous	40 ml. VOA Vial w/TFE lined septum cap	4°C	7 days
TCL Volatiles	Soils	40 ml. VOA Vial w/TFE lined septum cap	4°C	7 days
TCL Semi-Volatiles	Aqueous	Amber glass w/TFE lined cap (1 liter)	4°C	5 days until extraction 40 days from extraction until analysis
TCL Semi-Volatiles	Soils	Glass wide-mouth w/TFE lined septum cap/4 oz.	4°C	5 days until extraction 40 days from extraction until analysis
TCL Pest/PCBs	Aqueous	Amber glass w/TFE lined cap (1 liter)	None	5 days until extraction 40 days from extraction until analysis
TCL Pest/PCBs	Soils	Glass wide-mouth w/TFE lined septum cap/4 oz.	None	5 days until extraction 40 days from extraction until analysis
TAL Metals (total)	Aqueous	Polyethylene 1 qt.	HNO_3 to ph < 2.0 (3)	Hg: 26 days All other metals: 6 months
TAL Metals	Soil	Polyethylene 1 qt. or 4 oz. glass wide-mouth w/TFE lined septum	4°C	Hg: 26 days All other metals: 6 months
pH	Aqueous	None	None	Performed on-site
Specific Conductance	Aqueous	None	None	Performed on-site
Dissolved Oxygen	Aqueous	None	None	Performed on-site
Eh	Aqueous	None	None	Performed on-site
Cyanide	Aqueous	1 liter wide-mouth polyethylene	HNO_3 to pH > 12.0	12 days

TABLE 6-1 (continued)

PARAMETER	MATRIX	CONTAINER (4)	PRESERVATION	HOLDING TIME (1)
TCLP Semi-volatiles	Soil	Glass wide-mouth w/TFE line septum Cap/8 oz.	4°C	14 days until TCLP Extraction; for Complete analysis, 7 days until extraction, 40 days from extraction until analysis.

(1) Verified Time of Sample Receipt (VTSR - time from lab sample receipt until sample analysis) will be used to audit results.

(2) Percent solids will be performed using a soil sample aliquot already submitted for analysis.

(3) Nitric acid and Sodium Hydroxide will be procured from a chemical supplier, trace grade.

(4) I-Chem 300 series or equivalent grade sample containers will be used to procure samples.

Notes:

TCL = Full Superfund Target Compound List
TAL = Target Analyte List
TCLP = Toxicity Characteristic Leaching Procedures
Pest/PCBs = Pesticides and Polychlorinated Biphenyl

TABLE 6-2

NUMBER OF SAMPLES TO BE COLLECTED FOR EACH SAMPLING MEDIA AND ANALYSES TO BE PERFORMED
PHASE 1 RI PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, NEW YORK
SITE I.D. # 1-52-031
September 30, 1993

Type	Source	Monitoring Well or Soil Boring No.	No. of Matrix Samples (Minimum)	No. of Wells or Borings (Minimum)	Matrix	QA/QC Required					Analysis
						(Blind)[1] Replicate	Field[2] (Minimum)	Rinse[3] (Minimum)	Trip[4] (Minimum)	MS/ MSD[5]	
Groundwater	Monitoring Wells	MW's 1, 2, 3, 2A, 4, 5, 6, 9, 10	9	9	Aqueous	1	1	1	1	1	Full Superfund TCL+30/TAL Metals
Hand Auger	Predetermined Locations	SB-21	1	1	Soil	1	1	1	NA	1	Full Superfund TCL+30/TAL Metals
Soil Boring	Predetermined Locations	SB's 5, 6, 14, 15, 16	9	5	Soil	1	4	1	NA	1	Full Superfund TCL+30/TAL Metals on all samples; TCLP analysis of select anaytes detected at > 20 times their respective class GA groundwater standards in one worst case sample per boring
Soil Boring	Predetermined Locations	SB's 8, 9	34	2	Soil	2	4	1	NA	2	TCL+30 on top, worst case, and bottom sample. If not worst case sample is identified, the sample collected from proximate to the water table willbe analyzed. TAL Metals on all samples.
Soil Boring	Predetermined Locations	SB's 1, 2, 3, 4, 20	27	5	Soil	2	4	1	NA	2	Full Superfund TCL+30/TAL Metals and TCLP analysis of select analytes detected at > 20 times their respective class GA groundwater standards in one worst case sample per boring; TAL Metals only for all other samples
Soil Boring	Predetermined Locations	SB's 7, 10, 11, 12, 13	35	5	Soil	2	4	1	NA	2	TAL Metals for all samples. Additionally, Full Superfund TCL + 30 for the 0 - 0.25 foot interval and the worst case sample per boring; TCLP analysis of select TAL Metals for three worst case samples of the 35 collected
Soil Boring	Former UST Locations	USTB'S 17, 18, 19	6	3	Soil	1	2	1	NA	1	TCL Semi-Volatiles and TCL Volatiles

[1] 1 per 20 samples/matrix
[2] 1 per day
[3] 1 per week/sampling equipment used
[4] 1 per 20 samples/day
[5] 1 per 20 samples/matrix

NA = Not Applicable

Revised 1/24/94

7.0 SAMPLE CUSTODY

A sample is the physical evidence collected from a site or the environment. An important part of Groundwater Technology, Inc. investigations is the control and tracking of the evidence collected.

The primary objectives of sample custody procedures are to create accurately written records that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. Sample custody for samples collected during this investigation will be maintained by the Site Manager or other field personnel collecting the samples. The field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory.

7.1 Field Custody Procedures

All necessary sample bottles will be shipped by the laboratory. The chain-of-custody (COC) will begin with the laboratory relinquishing sampling bottles to Groundwater Technology, Inc.'s Field Operations Manager. Sample bottles needed for a specific sampling task will then be relinquished by the Site Manager to the sampling team after the Site Manager has checked the integrity of the bottles and assured that the proper bottles have been assigned to the task to be conducted.

Immediately after sample collection, each sample bottle will be sealed with an individual custody seal. The samples will then be placed into an insulated cooler for shipment to the laboratory. Groundwater Technology, Inc. field chain-of-custody records (Figure 7-2) completed at the time of sample collection will accompany the sample cooler placed inside the cooler in a Zip-Lock Baggie, the cooler is sealed for shipment to the laboratory. The samples will be properly relinquished on the field chain-of-custody record by the sampling team. Each cooler will contain sufficient ice and/or ice packs to insure proper temperature is maintained, and will be packed in a manner to prevent damage to sample containers. The Site Manager or Sample Documentation Coordinator will initial and place a custody seal (Figure 7-3) on each sample cooler. All coolers will be relinquished to an overnight courier. The name of the overnight courier will be written on the chain-of-custody, along with the air bill number.

7.1.1 Sample Identification

Each separate sample will be identified using the sample label shown in Figure 2-1. The sampler will complete all information, using a black waterproof pen, as follows:

A. The sample ID number will be the number assigned to the particular sampling station, including the depth of sampling, if relevant.

Example: Well/Boring I.D.: B-14
Matrix: Soil
Depth: 5' - 10'

B. The job number will be the number assigned to the particular site.

Example: 01113-5396

C. The analysis required will be indicated for each sample.

Example: TAL Metals

D. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 08-15-86

E. Time will be the time the sample was collected, using military time.

Example: 1430

F. The sampler's name will be printed in the "Sampled By" section.

G. Other information relevant to the sample.

Example: Field Blank

An example sample label is presented below:

JOB NO.:	01113-5396
CLIENT:	Agfa
SAMPLE I.D.:	B-14
MATRIX:	Soil
SAMPLING DEPTH:	5' - 10'
DATE TAKEN:	08-15-86
TIME TAKEN:	14:30
SAMPLER:	Tim Douthit
OTHER:	

Prior to going to the field, this sample identification procedure will be further refined (if necessary), so that a sample is accurately and easily identified.

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples.

All samples analyzed by the laboratory are to be considered to be of an evidentiary nature. The possession of samples must be traceable from the time samples are collected in the field until the analysis is completed and the data are entered as evidence. The tracing of the samples is accomplished by "chain-of-custody" procedures as follows:

1.) A chain-of-custody record (Figure 2-2) will be completed for each set of samples.

2.) Samples will not leave custody of the field investigator until relinquished to another party.

- Custody is defined as:

1.) In the actual physical possession of field personnel.

2.) In the field personnel's view after being in physical possession.

3.) In a locked area after being in physical possession.

4.) In a designated, locked storage area.

7.2 Laboratory Chain-of-Custody

Upon arrival at the laboratory, the Sample Custodian at the lab must maintain possession of the chain-of-custody samples and all records documenting that possession. Upon receipt of samples, the sample custodian removes the chain-of-custody from the sealed cooler and must sign the shipping report accompanying each sample and records the date and time. Samples received are verified to match those listed on the chain-of-custody, and the custody seals inspected. A copy of this record becomes part of the report file. The custodian must sign the COC "Received By" laboratory space. The samples are then secured under lock and key in refrigerated storage.

After each extraction or analysis of a sample fraction, the custody record must be signed by the analyst, indicating the date and time of completion, which samples were used, and to which location they were returned.

By signing the custody record, the individual affirms that he was completely responsible for the sample fraction during the period of time it was not in the secure storage.

7.3 Laboratory Sample Tracking and Management

The laboratory will maintain sample information records in a LIMS (Laboratory Information Management System) computer system. The sample receipt and data entry activity (called "login") is reflected in a daily report, which is immediately entered into the master logbook. This chronological file contains all samples.

Each laboratory manager gets a report of pertinent analyses not yet completed including the daily update from the login activity. The tracking continues until the LIMS registers the completion of report and invoice mailing.

Sample:

Type of Analysis:

Date:

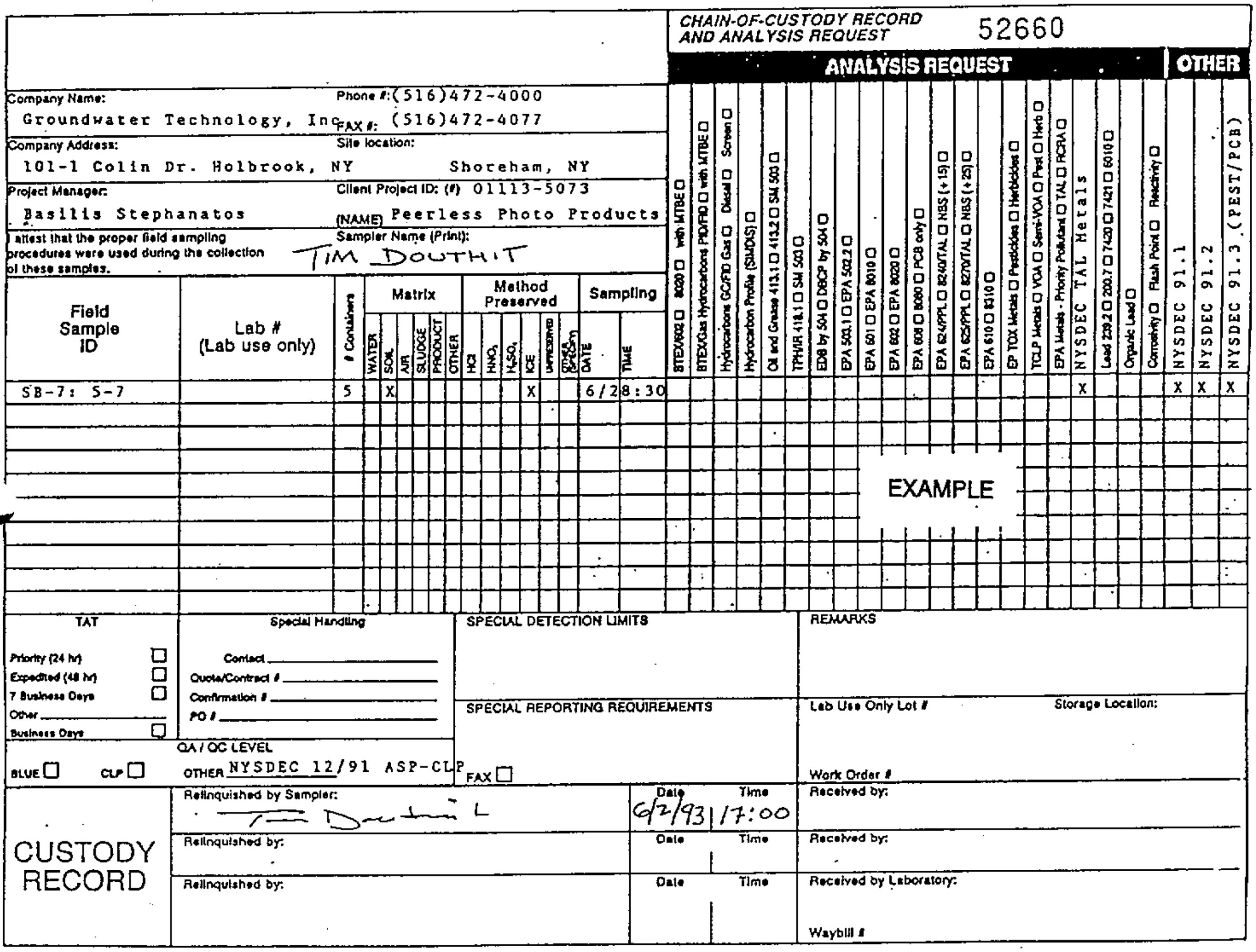
Job ID:
Time:

ID #:

Preservatives Added:

Sample Type:

FIGURE 7-1
EXAMPLE SAMPLE LABEL
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031



CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST 52660

Company Name: Groundwater Technology, Inc
Phone #: (516)472-4000
FAX #: (516)472-4077
Company Address: 101-1 Colin Dr. Holbrook, NY
Site location: Shoreham, NY
Project Manager: Basilis Stephanatos
Client Project ID: (#) 01113-5073
(NAME) Peerless Photo Products
I attest that the proper field sampling procedures were used during the collection of these samples.
Sampler Name (Print): TIM DOUTHIT

Field Sample ID	Lab # (Lab use only)	# Containers	Matrix						Method Preserved						Sampling	
			WATER	SOIL	AIR	SLUDGE	PRODUCT	OTHER	HCl	HNO$_3$	H$_2$SO$_4$	ICE	UNPRESERVED	[illegible]	DATE	TIME
SB-7: 5-7		5		X								X			6/2	8:30

Field Sample ID	ANALYSIS REQUEST																					OTHER		
	BTEX/602 ☐ 8020 ☐ with MTBE ☐	BTEX/Gas Hydrocarbons PID/FID ☐ with MTBE ☐	Hydrocarbons GC/FID Gas ☐ Diesel ☐ Screen ☐	Hydrocarbon Profile (SIMDIS) ☐	Oil and Grease 413.1 ☐ 413.2 ☐ SM 503 ☐	TPH/IR 418.1 ☐ SM 503 ☐	EDB by 504 ☐ DBCP by 504 ☐	EPA 503.1 ☐ EPA 502.2 ☐	EPA 601 ☐ EPA 8010 ☐	EPA 602 ☐ EPA 8020 ☐	EPA 608 ☐ 8080 ☐ PCB only ☐	EPA 624/PPL ☐ 8240/TAL ☐ NBS (+15) ☐	EPA 625/PPL ☐ 8270/TAL ☐ NBS (+25) ☐	EPA 610 ☐ 8310 ☐	EP TOX Metals ☐ Pesticides ☐ Herbicides ☐	TCLP Metals ☐ VOA ☐ Semi-VOA ☐ Pest ☐ Herb ☐	EPA Metals - Priority Pollutant ☐ TAL ☐ RCRA ☐	NYSDEC TAL Metals	Lead 239.2 ☐ 200.7 ☐ 7420 ☐ 7421 ☐ 6010 ☐	Organic Lead ☐	Corrosivity ☐ Flash Point ☐ Reactivity ☐	NYSDEC 91.1	NYSDEC 91.2	NYSDEC 91.3 (PEST/PCB)
SB-7: 5-7																		X				X	X	X

EXAMPLE

TAT
Priority (24 hr) ☐
Expedited (48 hr) ☐
7 Business Days ☐
Other ______ Business Days ☐

Special Handling
Contact ______
Quote/Contract # ______
Confirmation # ______
PO # ______

QA / QC LEVEL
BLUE ☐ CLP ☐ OTHER NYSDEC 12/91 ASP-CLP

SPECIAL DETECTION LIMITS

SPECIAL REPORTING REQUIREMENTS
FAX ☐

REMARKS

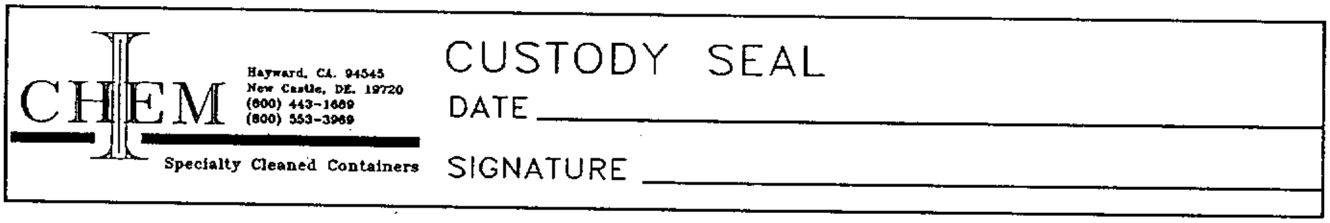
Lab Use Only Lot #
Storage Location:
Work Order #

CUSTODY RECORD

Relinquished by	Date	Time	Received by
Relinquished by Sampler:	6/2/93	17:00	Received by:
Relinquished by:			Received by:
Relinquished by:			Received by Laboratory: Waybill #

FIGURE 7-2
EXAMPLE CHAIN OF CUSTODY FORM
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

GROUNDWATER TECHNOLOGY



I CHEM

Hayward, CA. 94545
New Castle, DE. 19720
(800) 443-1689
(800) 553-3969

Specialty Cleaned Containers

CUSTODY SEAL

DATE ______________________

SIGNATURE ______________________

FIGURE 7-3
EXAMPLE CUSTODY SEAL
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

8.0 CALIBRATION PROCEDURES AND FREQUENCY

8.1 Laboratory Calibration

The analytical laboratory will analyze water, soil, wipe, and air samples for the project compound list by gas chromatography and mass spectroscopy, inductively coupled plasma (ICP), and furnace and flame atomic absorption (AA). The confirmation calibration frequency required by these methods is dependent on the outcome of daily calibration checks made with QC standards. Reference materials must be a minimum of 97% pure and can be obtained from companies such as Supelco Inc., (Supelco Park, Bellefonte, PA 16823), Inorganic Ventures, or Chem Service Inc. Spiked reference samples (spiked into reagent water) are introduced into the analytical system to determine recovery and to further validate calibration at a frequency dependent on the matrix spike performance.

8.2 Field Calibration

In addition to the laboratory analysis conducted during the course of this investigation, field measurements will be taken utilizing an FID during soil boring, and air sampling. Specific conductance, pH, turbidity, and temperature will be measured in water samples.

Field calibration procedures will, at a minimum, include the following:

All instruments will be calibrated as specified and documented as follows:

a. Each instrument/meter shall have a dedicated log book to record all calibrations, maintenance/repair work, and usage, in a standard format including the information below.

b. Entries to the instrument log books shall be made at least daily whenever the instrument is in use.

c. Calibration records shall include:
    - calibrator's name
    - standards used and source
    - date/time of calibration
    - corrective actions taken
    - instrument name/model
    - temperature/barometric pressure/humidity conditions (if known)

d. All standards used shall be checked monthly to determine stability and operating condition, and a record kept of these inspections.

e. All personnel performing instrument calibrations shall be trained in its operational calibrating procedures.

8.2.1 pH Meters

pH meters will be calibrated according to the manufacturer's instructions and two standard buffer solutions (4, 6, 7, or 10) obtained from chemical supply houses. The pH values of these buffers will be compensated slightly by temperature according to the values supplied on the manufacturer's bottle label. The temperature (measured as below) at which the sample pH was measured will then be used to compensate for the temperature on the meter.

8.2.2 Thermometers

Temperature measurement will be performed using field thermometers calibrated at 10 °C and 45 °C to an NBS certified thermometer. This correction factor will be clearly marked on each thermometer, and the corrected data recorded as the raw measurement in °C. This level of accuracy is sufficient for the temperature measurements required.

8.2.3 Conductivity Meters

Specific conductance meters will be calibrated using a 1413.0 μmho (0.01N KCl) solution prepared by a qualified laboratory according to Standard Methods for the Analysis of Water and Wastewater, 16th Edition, 1985-Method 205, 3b, page 79.

The conductivity probe cell constant will be calculated according to the formula:

$$C = (0.001413)\,(R_{KCL})\,\left(1 + 0.02\,(T - 25^{\circ}C)\right)$$

Where:
C = probe cell constant (unitless)
(R_{KCL}) = measured resistance (ohms) of standard solution
T = Temperature (°C)

Using the cell constant calculated above and the following formula, field specific conductance measurements will be corrected to 25°C.

$$K = \frac{1000000\ (C)}{R_m\ ((1 + 0.02\ (T - 25))}$$

Where K = specific conductance at 25oC (μ ohms/cm)
C = Calculated cell constant
R_m = filed specific conductance (μ ohms/cm)
T = temperature (°C) of sample at which conductance was measured

8.2.4 FlameIonization Detector (FID)

Startup Procedure

a. Connect the Probe/Readout Assembly to the Sidepack Assembly by attaching the sample line and electronic jack to the Sidepack.

b. Select the desired sample probe (close area sampler or telescoping probe) and connect the probe handle. Before tightening the knurled nut, check that the probe accessory is firmly seated against the flat seals in the probe handle and in the tip of the telescoping probe.

c. Move the Instr/Batt Switch to the test position. The meter needle should move to a point beyond the white line, indicating that the integral battery has more than 4 hours of operating life before recharging is necessary.

d. Move the Instr/Batt switch to the "ON" position and allow a 5 minute warm-up.

e. Turn the Pump Switch on.

f. Use the Calibrate Adjust knob to set the meter needle to the level desired for activating the audible alarm. If this alarm level is other than zero, the Calibrate Switch must be set to the appropriate range.

g. Turn the volume knob fully clockwise.

h. Using the Alarm Level Adjust knob, turn the knob until the audible alarm is activated.

i. Move the Calibrate Switch to X1 and adjust the meter reading to zero using the Calibrate Adjust (Zero knob).

j. Open the Hydrogen Tank Valve 1 or 2 turns and observe the reading on the Hydrogen Tank Pressure Indicator.

k. Open the Hydrogen Supply Valve 1 or 2 turns and observe the reading on the Hydrogen Supply Pressure Indicator. The reading should be between 8 and 12 psi.

l. After approximately one minute, depress the Igniter Button until the hydrogen flame lights. The meter needle will travel upscale and begin to read "Total Organic Vapors". Caution: do not depress igniter for more than six seconds. If flame does not ignite, wait one minute and try again.

m. The instrument is ready for use. NOTE: If the ambient background organic vapors are "zeroed out" using the Calibrate Adjust knob, the meter needle may move off-scale in the negative direction when the FID is moved to a location with lower background. If the FID is to be used in the 0 to 10 ppm range, it should be "zeroed" in an area with very low background. A charcoal filter (Part No. 51--95-1) can be used to generate the clean background sample.

<u>Operating Procedures</u>

The following procedure describes operation of the FID in the "Survey Mode" to detect total organic vapors.

a. Set the CALIBRATE Switch to the desired range. Survey the areas of interest while observing the meter and/or listening for the audible alarm indication. For ease of operation, carry the Side Pack Assembly positioned on the side opposite the hand which holds the Probe/Readout Assembly. For broad surveys outdoors, the pickup fixture should be positioned several feet above ground level. When making quantitative readings or pinpointing, the pickup fixture should be positioned at the point of interest.

b. When organic vapors are detected, the meter pointer will move upscale and the audible alarm will sound when the setpoint is exceeded. The frequency of the alarm will increase as the detection level increases.

8.2.5 Turbidity Meter

8.2.5.1 General Operation

The USEPA recommends that cuvette used for instrument calibration or sample measurement be matched or indexed. For accurate measurements in the low range rotate the cuvettes in the well to obtain the minimum reading. Mark the cuvette and the instrument so the orientation of the cuvette will be identical each time it is placed in the instrument.

1. To operate the Turbidity meter, switch to the "20" range and place the Reference Standard (0.1 NTU) in the optical well.
2. With the light shield in place over the well, adjust the Reference Adjust knob to cause the meter to read the reference standard value on the scale. The unit is now ready for use in either range.
3. To make a measurement of a sample, clean one of the cuvettes and fill to within approximately 1/2" of top with the sample. Place the top on the cuvette and carefully clean the outside surface of the cuvetted with a lint free wiper such as Kimwipes. Place the sample in the well and place the light shield over the well.
4. If the instrument has been subjected to cold (below 10 degrees Celsius) and then brought indoors, it should be allowed to warm up before use, since condensation may from on the various lenses. This can be aided by leaving the case open and the instrument on for approximately one-half hour.

8.2.5.2 Calibration Procedures

Standard Formazin Solutions

Calibration of this instrument is based on Formazin, a material which can be made by synthesis and reproduced repeatedly within one percent. When properly mixed, it is uniform in the number, size and shape of its particles, thus making it an ideal turbidity standard. The unit of measure, and thus the calibration of this instrument is in Nephelometric Turbidity Units (NTU) based on Formazin.

Calibration samples may be obtained by diluting Formazin stock suspension using "Turbidity-free" water. Formazin stock suspension may be prepared by the user (Reference A.W.W.A. "Standard Methods", 14th Edition) or it may be purchased in kit form, HF scientific part number 50040. The following table gives the recommended dilutions of the stock suspension. Be sure to adequately mix the stock suspension prior to removing a portion for dilution.

Pipettes Required	**Formazin Standard in NTU's**	**Pipette amount below in ml into 200 ml flask and dilute to mark with "Turbidity-free water"**
9 ml and 1 ml in 1/100	198	9.9 ml of 4000 NTU stock suspension
9 ml and 1 ml in 1/100	19.8	9.9 ml of 400 NTU Formazin dilution
1 ml in 1/100	20	0.95 ml of 400 NTU Formazin dilution

Note: 1. When the prepared samples start to flocculate, they are unreliable and fresh ones must be made. This occurs more rapidly for the lower value diluted suspension.

2. The value of "turbidity-free" water is approximately 0.1 NTU. This value has been added to low value dilution, i.e., 2.0 NTU include 0.1 NTU for water.

Electronic Calibration Using Freshly Prepared Formazin Solutions

The DRT Turbidity meters have been carefully calibrated by the factory. However, should the electronic P.C. board, the photo detector, or the light source be replaced, or, if very carefully prepared Formazin suspensions indicate a need for recalibration, this may be easily accomplished.

To carry out a complete calibration, the following Formazin suspension values are required: 198 NTU, 19.8 NTU and 2.0 NTU.

1. Fill, cap and label a separate cuvette with a sample of each.
2. Always mix the contents of each cuvette by inverting several times before placing in the Optical Well for a reading.
3. Keep the outside surface of cuvettes clean.
4. When placing any standards in the well, always use the light shield to cover the well in order to keep out ambient light.

To gain access to the trimpots, remove the accessories from the foam holder. Refer to Figure 8-1 for trimpot identification during the next few steps.

1. Center the reference adjust control on top of the instrument.
2. Insert the reference standard and turn the range control on the DRT-150 to the 20 range. Adjust the "Course Zero" trimpot (R2) until a reading of 0.10 NTU is obtained.
3. Replace the reference standard with the 19.8 Formazin standard and adjust the "20 Range Adjust" trimpot (R2) to obtain a reading of 19.8 NTU + 0.1 NTU.
4. Replace the 19.8 NTU Formazin standard with the reference standard and adjust the reference adjust control to obtain a reading of 0.10 NTU.
5. Repeat steps 3 and 4 until no further adjustments are required.
6. Turn the range control on 150 to the 200 range. Insert the 198 NTU Formazin standard and adjust the "200 Range Adjust" trimpot to obtain a reading of 198 ± 1 NTU.

9.0 ANALYTICAL PROCEDURES

9.1 Laboratory Analyses

The methods indicated in Table 3-3 are derived from the following referenced manuals:

1. "Statement of Work for Organics Analysis," Multi- Media, Multi-Concentration, USEPA Contract Laboratory Program, October 1986, and all subsequent revisions.
2. "NYS DEC ASP Superfund - CLP Protocol 12/91."
3. United States Environmental Protection Agency. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846. November, 1986 and all subsequent revisions.

The laboratory is under obligation to perform analytical cleanups when matrix interferences are present, in order to achieve the required detection limits. Samples shall not be diluted any more than 1:5. Re-extraction, re-sonication or re-steam distillation is warranted along with cleanup to provide the best prepared sample possible.

The methods described above will be used by the designated laboratory to analyze all samples with the exception of compounds that are not detectable by the methods above. All laboratory reporting will utilize forms similar to those included in Appendix B including those prescribed by the NYSDEC. The laboratory will submit its working standard operating procedures (SOP) manual along with a working Quality Assurance Plan.

9.2 Method Selection

The methods specified cover the project compound list to include those compounds that may be found on-site. All methods are selected to get the most accurate representation of the sampling point possible. Method detection limit selection is based on the real assessment and analytical characterization data quality objectives. The complete deliverables package was deemed necessary to ensure the best quality control data availability to Groundwater Technology, Inc.'s Data Validation Chemist. The methods selected specify the frequency and acceptance criteria for all associated quality control samples.

Quality Control samples include one method blank, matrix spike, and matrix spike duplicate every twenty samples or every twelve hours, whichever occurs most frequently. Surrogate spikes are compounds that are added to every sample, method, field or trip blank, matrix spike and matrix spike duplicate sample; and surrogate recoveries are monitored to indicate the necessity of reanalysis if more than two surrogates in any analytical fraction and/or any one volatile surrogate is outside criteria.

Tables 5-2 and 5-3 summarize the quality assurance requirements set forth in this QAPP. Acceptance of the data will be based on the results of a full-scale review of the entire data deliverables package. A detailed account of the data validation process is presented in Section 10 of this document.

9.3 Laboratory Selection

Laboratory Resources, Inc. (LRI) has been selected as the project Laboratory. LRI is a NYSDOH approved Lab. LRI will perform all NYSDEC ASP protocols and provide an ASP deliverables package. Additionally, the laboratory will perform all analyses by current NYSDEC ASP protocols, as stated in section 9.1 above. The names of the laboratories that bid on this work were provided to the NYSDEC for their approval prior to the final selection of a project specific Lab.

10.0 DATA REDUCTION, VALIDATION, AND REPORTING

Data validation practices will be followed to insure that new data is not altered and that an audit trail is developed for data that will be reduced. Data validation practices occur in the laboratory and the Groundwater Technology office.

10.1 Data Reduction

10.1.1 Field Data Collection and Reduction

Groundwater Technology field personnel will log all field measurements, observations, and field instrument calibrations in bound, waterproof field notebooks. Notebook entries will be dated, legible, and contain accurate and inclusive documentation of an individual's project activities. Because the logbook will be used to write reports, it will contain only facts and observations. Language will be objective, factual, and free of personal feelings or other terminology that may prove inappropriate. Each individual making an entry into the field notebook will date and sign their entry.

It is anticipated that the data reduction for this investigation will be minimal and will consist primarily of tabulating analytical results.

10.1.2 Laboratory Data Collection and Reduction

The data reduction scheme used in the lab for each of the measurement parameters, including the formulas used for calculating concentrations for both water and soils, will be that stated in the standard operating procedure for the analytical method used. The "method reference" column of Table 5-1 lists the analytical methods for each measurement parameter. All analyses will utilize a bound notebook into which will be recorded the following items, at a minimum:

a) analyst,
b) date,
c) sample number (lab #), and
d) analysis set-up conditions, e.g., dilutions, auto-sampler position number, or other instrument specifics not covered by an SOP.

For instrumental analysis, this analysis notebook will be instrument-specific and referred to as an instrument log. For other types of analysis, this analysis logbook will also contain all raw data collected by the analyst.

The volatile organic analysis involves electronic data handling, resulting in values bearing the conventional units (Table 10-1), already corrected for dilutions. The analyst will need to round the answers appropriately and sometimes sum columns of data. The in-process data report forms onto which data are to be transcribed are shown in Appendix B. For extractable organics, sample volume, and amount of injection enter into the calculation. In this case the electronic data handling system will report in-solution concentration, and the analyst will apply the corresponding correction using the sample volume recorded on the extractions lab bench sheet (Appendix B), and the injection volume recorded in the analysis logbook. The resulting run factor and how it is derived will be transcribed onto the in-process data from to assist in the validation process. (Text continues on page 6.)

TABLE 10-1
Peerless Photo Products, Inc.
Shoreham, New York
Site I.D. #1-52-031
Sample Calculation Equations for Analyses Volatile and Semi-Volatile Organics by Gas Chromatography/Mass Spectroscopy

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Relative Response Factors

$$RRF = \frac{(A_x)(C_{is})}{(A_{is})(C_x)} \qquad \text{(Equation 10-1)}$$

where: RRF = Relative Response Factor

A_x = Area of the characteristic ion for the compound to be measured

A_{is} = Area of the characteristic ion for the internal standard

C_{is} = Concentration of internal standard (mg/μL)

C_x = Concentration of the compound to be measured (mg/μL)

Percent Moisture =

$$\frac{\text{g of sample - g of dry sample}}{\text{g of sample}} \qquad \text{(Equation 10-2)}$$

External Standard Calibration Method

Aqueous samples

$$\text{Conc } (\mu g/l) = (A_x)(A)(V_t)(D)/(A_s)(V_i)(V_s) \qquad \text{(Equation 10 - 3)}$$

A_x = Response for the analyte in the sample, units may be in area counts or peak height

A = Amount of standard injected or purged, ng.

A_s = Response for the external standard, units same as for A_x

V_i = Volume of extract injected, μL. For purge-and-trap analysis, V_i is not applicable and therefore = 1.

D = Dilution factor. If no Dilution, D = 1

V_t = Volume of total extract, μL. For purge-and -trap analysis, V_t is not applicable and therefore = 1.

V_s = Volume of sample extracted or purged, mL

Nonaqueous samples

Concentration (ng/g) = $\frac{(A_x)(A)(V_t)(D)}{(A_s)(V_i)(W)}$ (Equation 10-4)

A_x, A_s, A, V_t, D and V_i = same as for Aqueous

W = Weight of sample extracted or purged, g.

Internal Standard Calibration Method

Aqueous Samples

Concentrations (μg/L) = $\frac{(A_x)\ (C_{is})(D)}{(A_{is})(RRF)\ (V_s)}$ (Equation 10-5)

A_x, D, and Vs = same as for external standard

Cis = Amount of internal standard added to extracted or volume purged, ng

RRF = Relative Response Factor (Equation 10-1)

A_{is} = Response of internal standard, units same as A_x .

Nonaqueous Samples

Concentration (μg/kg) = $\frac{(A_s)(C_{is})(D)}{(A_{is})(RRF)(W_s)}$ (Equation 10-6)

A_s, C_{is}, D, A_{is}, RRF, and Ws = same as above

Pesticides/ PCBs by Gas Chromatography

Aqueous

Concentration, μg/L = $\frac{(A_x)(I_s)(v_t)}{(A_{is})(V_i)(V_s)}$ (Equation 10-7)

where: A_x = area of the characteristic ion for the compound to be measured,

A_{is} = the area of the characteristic ion for the internal standard,

I_s = amount of internal standard injected, in nanograms (ng),

V_s = volume of water extracted in milliliters (mL),

V_i = Volume of extract injected, μL. For purge-and-trap analysis, V_i is not applicable and therefore = 1.

V_t = volume of total extract. Use 2000 μL or a factor of this for dilutions).

Nonaqueous

Concentration, μg/kg = $\frac{(A_x)(I_s)(V_t)}{(A_s)(V_i)(W_s)(D)}$ (Equation 10-8)

where:

A_x, I_s, A_s, V_i = same as above,

V_t = volume of low level total extract (Use 20,000 μg/L or a factor of this when dilutions are made other than those accounted for below):

- 1/20 total extract taken for pesticide analysis (derived from 0.5 Ml to 10 mL extract)
- final concentration to 1.0 mL for pesticide analysis.

or V_t = volume of medium level total extract (Use 10,000 μg/L or a factor of this when dilutions are made).

D = $\frac{100 - \%\text{ moisture}}{100}$

W_s = weight of sample extracted (g)

For soil analyses, the separate determination of the dry weight of the soil sample will be necessary. For all analyses, the data will not be blank-corrected and will be flagged if blanks do not meet acceptability criteria. Additionally, any result that is less than ten times the value of the blank will be considered suspect.

Chemists and technicians will be responsible for the measurement/ analysis of any specific parameter, and for any calculations associated with the determination of parameter concentrations. All calculations are listed in the referenced method ("method reference" column of Table 5-1). The chemists and their supervisors will be responsible for reviewing all results, applying calculation checks on a minimum of 10 percent of the results on each report. These individuals will be responsible for determining whether or not the results are acceptable, though the ultimate authority to determine acceptability will be with the Director of Quality Assurance. The laboratory section manager will be responsible for the final review of all data and for the proofing of reports prior to submittal of the reports to Groundwater Technology.

Final reports will be typed from the in-process report forms approved by the supervisor after the review of all supporting data. The in-process forms along with all hard copy data output and other case records will be stored together in a single secure location indexed by project number for at least five years. This location will be in Groundwater Technology's Holbrook, New York office.

All data will be cross-checked for correctness by Groundwater Technology's QA officer for reported values, detection limits, percent moisture and dilution factors (if applicable), after data has been reduced and transcribed into the final reporting format. The procedure to be used in the final cross-check of the data in the final report format will be as follows:

1. obtain the laboratory data or field notebooks and final reports,
2. compare the sample numbers and description,
3. compare the sample date and time (if provided),
4. compare all positive results with those reported in the laboratory report, and
5. laboratory data will be checked for corrections with mathematical calculations during the data validation process.

10.2 Field and Laboratory Validation

10.2.1 Field Validation

The Groundwater Technology quality assurance officer will proof ten percent of the entries in the bound field notebook for completeness and correctness.

10.2.2 Laboratory Validation

A complete record of each sample's history will be available for documenting its progress from the time of sample collection to arrival at the laboratory and through the laboratory from sample receipt to reporting. Data validation will include the use of dated entries, signed by analysts and supervisors, on worksheets and logbooks used for all samples, the use of sample tracking and numbering systems to logically follow the progress of samples through the laboratory, and the use of quality control criteria to reject or accept specific data (see Section 11).

10.2.3 Project Data Validation

The purpose of the project data validation performed by Groundwater Technology's data validation chemist is to verify and retrace the path of the sample from the time of receipt of analysis to the time the final report is generated. The data validation chemist will review the entire deliverables package for chain-of-custody completeness, holding time limitations, blank contamination, instrument tuning, initial and continuing calibration sample recoveries, matrix spike and matrix spike duplicate recovery and precision, and overall system performance. A brief report describing the difficulties encountered and shortcomings of the deliverables package will be written to assist the project manager in making decisions based on the analytical results.

Upon receipt of the hard copy analytical results, the Groundwater Technology data validation chemist will validate the data using the procedures outlined in "Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analysis"[1] and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses".[2] In addition, the results of the field duplicates and blanks will be evaluated at this time along with comparisons using previous and field screening data.

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[1] Prepared for Hazardous Site Control Division (USEPA) by USEPA Data Validation Work Group, February 1, 1988 (with updates).

[2] Prepared for Hazardous Site Evaluation Division (USEPA) by the USEPA Data Validation Work Group, July 1, 1988 (with updates).

10.3 Identification and Treatment of Outliers

Outliers are unusually large or unusually small values in a population of observations. Outliers may be the result of a variety of circumstances, including any of the following:

(a) errors in recording of data,
(b) calculation errors,
(c) analytical errors,
(d) inaccurate reading of meters,
(e) faulty or defective instruments,
(f) actual values due to comparatively unique conditions,
(g) sample identification incorrectly transcribed in the field or lab,
(h) sampling artifact(s), or
(i) sample integrity problem(s).

10.3.1 Identification of Outliers

Procedures for the identification of outliers will be followed at both the analytical stage and at the ensuing data reduction stage. Outliers in laboratory data can arise from errors in analysis or from site-specific conditions that are out of control of the laboratory. Errors in the laboratory are most often detected in the data review and validation process. In the event that quality control processes, which directly affect only 20 percent of the samples, detect an outlier, the statistical approach of Dixon (1953) will be used to eliminate outliers.

It is necessary to eliminate outliers from QC data because of the skewing effect which can destroy the effectiveness of the QC data. Outliers will be identified at the data reduction stage by the project manager. When any particular value is suspected to be an outlier, the following steps will be taken:

(a) Other data from the same sample will be checked to see if they are also anomalous.

(b) The project manager will interrogate any individuals involved in generating the anomalous value. This will include questioning the field crew and the analyst(s).

(c) If samplers demonstrate standard competency in the sampling procedure used at the time the sample with the anomalous value was obtained, then sampling error will be dismissed as a possible cause of the outlier.

(d) The analyst(s) will be asked to examine his/her notes and calculations and, if possible, to rerun the sample for the specific parameter in question. The sample will be rerun even if the holding time has been exceeded, but the rerun value will be used for purposes of comparison only.

10.3.2 Treatment of Outliers

Rejection of any suspect data or outliers will only be done by the project manager. The data will be rejected as an unacceptable outlier by the project manager, if:

(a) A problem with equipment or an incorrect procedure during the sampling stage is identified.

(b) The rerun by the analyst generates a value that significantly differs from the value being examined.

10.4 Data Flow

An overall view of data flow from the point of raw data collection through storage of validated data is shown in Figure 10-1.

10.5 Data Production, Reporting, and Report Storage

10.5.1 Data Production

Analytical data will be generated from direct-reading instruments, reporting integrators or data management computer software. The automated outputs will include identifications of compounds, concentrations, and retention times. Outputs will be in graphic form (chromatograms), spectra, recorder charts, and in printed tabular form. The outputs will be in a standard format specified for each analysis and monitored for consistency. For direct reading instruments, the analyst will be required to record all results into a bound lab notebook.

Auxiliary data produced for internal records, which will not normally be reported to customers as part of the analytical data, will include the following: laboratory worksheets, laboratory notebooks, sample tracking system forms, instrument logs, standard records, maintenance records, calibration records, and associated quality control records. These sources will be available, however, for inspection during audits to determine the validity of data.

10.5.2 Data Reporting

The analytical laboratory will report TCL and TAL results of analyses using the NYSDEC's 12/91 ASP Standard data package. Such data package will contain at a minimum, the following information:

(a) laboratory ID number,
(b) site ID number,
(c) sample ID number,
(d) date sampled,
(e) date analyzed,
(f) parameters measured,
(g) units in which each parameter is reported,
(h) analytical methods used,
(i) detection limits,
(j) certification statement by the person responsible for validation of the data concerning sample integrity and QA acceptance, and
(k) date of extraction, if applicable.

The field notebook will require, at minimum, the following entries:

a. date and time of information recorded;
b. all personnel on-site on that date:
c. sampling location (and map referenced);
d. sample date, time, source of sample containers;
e. weather conditions (temperature, humidity, wind speed and direction, observation of skies, and other physical observations);
f. sample matrix;
g. sample depth;
h. note if sample is duplicate, blank, composite or grab;
i. well purging information (volume purged, temperature, pH and conductivity, depth to water);
j. number of sample containers collected in chronological order and the parameter to be analyzed;
k. the method of sample shipment with air bill number, name of overnight courier and laboratory receiving the samples;
l. all samples shipped on the chain-of-custody;
m. calibration of all instruments (pH pens, conductivity meters, OVMs, turbidity meters, etc); and,
n. readings from all field parameters measured.

10.5.3 Report Storage

All final customer report folders will be filed in a secure area in the laboratory documentation office. Quality control sample reports are maintained in a separate file. All data, chromatograms, calculations, and reports will be stored for a minimum of five years.

10.6 Reference

Dixon, W.J., Processing Data for Outliers, **Biometrics**, Vol. 9, No.1, March 1953, pp. 74-89.

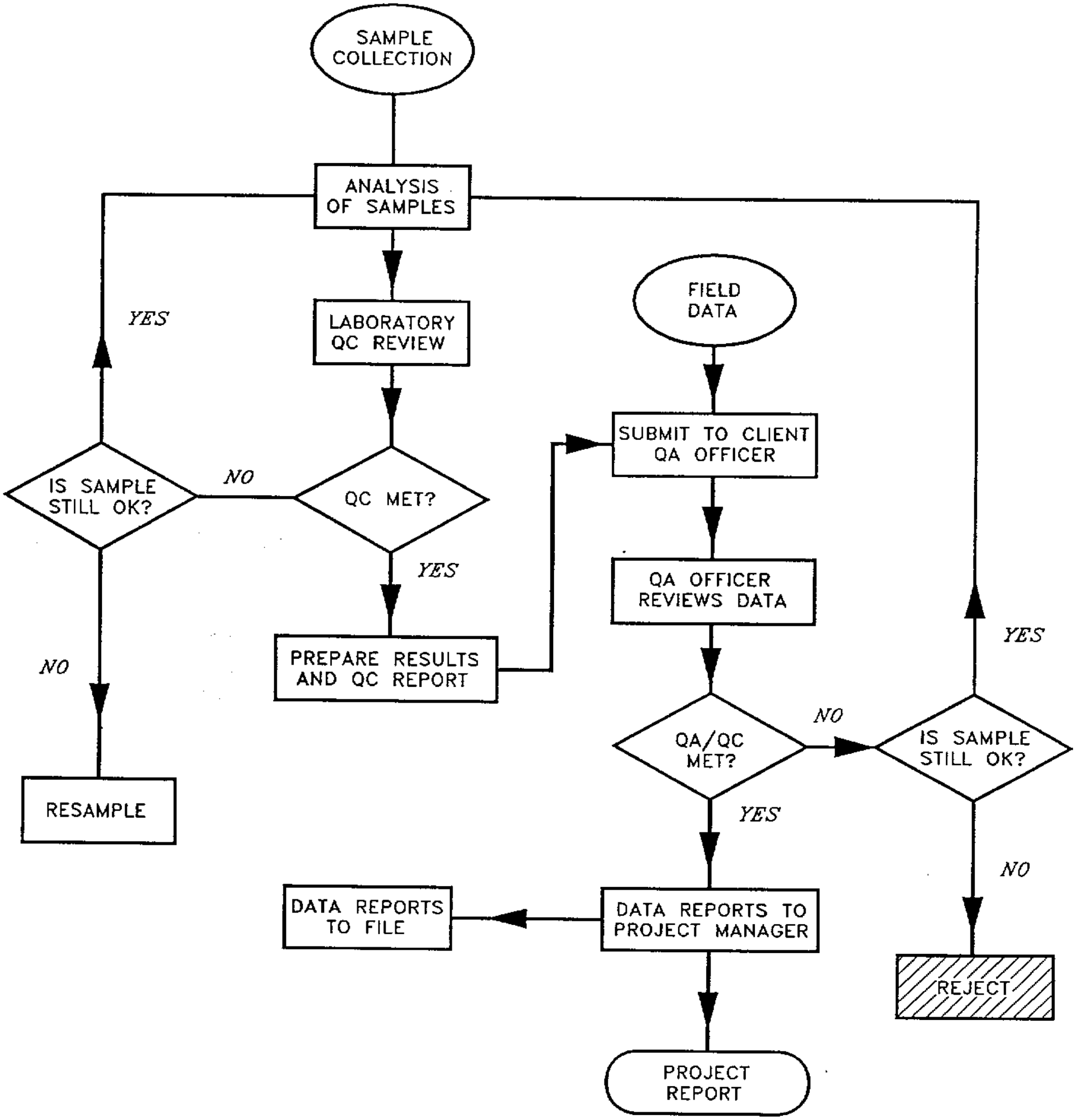

FIGURE 10-1
DATA FLOW
PEERLESS PHOTO PRODUCTS, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

11.0 INTERNAL QUALITY CONTROL CHECKS

The intent of the internal quality control program is to detect potential problems at the source and, if necessary, trace the sample analytical pathways for introduction of contamination. The quality control data generated in the field will be used to monitor sampling technique reproducibility and cleanliness. Quality control data generated by the laboratory will not only monitor reproducibility (precision) in laboratory methods and cleanliness but accuracy in analyzed samples submitted for analysis. During the data validation process (performed by Groundwater Technology, Inc's data validation chemist), variability in sampling technique and laboratory performance will be assessed separately. All samples will be collected using I-Chem 300 level series containers. In the event that I-Chem containers are not available a substitute brand of containers that possess the same level of cleanliness will be used.

11.1 Field Quality Control Checks

The field quality control checks monitor the data quality as it is affected by field procedures and conditions to the degree feasible as discussed in Section 5. The acceptability criteria were outlined in Section 5.6. All field quality control samples will be submitted to the laboratory and labeled as such.

11.1.1 Blanks

Equipment (or Rinsate) blank - Reagent water poured through the sampling equipment after routine cleaning. This sample is preserved and subsequently handled like all others. This blank is used to assess the potential for carryover contamination on non-disposable sampling equipment. These blanks may be applied to all matrices sampled by equipment cleaned in the field. A minimum of one rinsate blank will be submitted per sampling day.

Field blank - a sample of the water used to generate the equipment blank, preserved and handled like all others. These blanks are always water and are applicable to all matrices. One field blank per equipment blank will be submitted.

Trip blank - Reagent water prepared by the laboratory and sealed in the proper sampling container. In the case of organics sampling, the trip blank is surrounded with activated carbon until the sampling event. It is henceforth handled as other samples except that it is not opened or preserved (other than chilling). This sample focuses on external sources of contamination and sampling container quality and cleanliness. For each shipment of at least 20 aqueous client samples, one trip blank will be submitted. A minimum of one trip blank will be submitted for each batch of glassware (plastic included) received by the field crew from the laboratory.

The acceptability limits for all blanks is to be below the contract required quantification limits or less than 1/10 of the level in the lowest sample in the batch.

Matrix or site control - For each significant geological or geographical feature identifiable among sampling sites a representative uncontaminated sample, such as an upstream surface water sample or an upgradient soil sample from similar strata, may be sought. This sample will provide perspective to the site conditions found and demonstrate the ability of the entire measurement system to generate a clean sample given the techniques and ambient conditions. This sample is taken as a collocated duplicate because it is often depended upon to provide perspective to site conditions and to site remediation goals.

11.1.2 Duplicates

Blind field duplicates (as opposed to duplicate containers full of sample intended as backup) are sequential or collocated grab samples collected to monitor field precision (actually entire measurement system precision as described in Section 5). One duplicate will be taken and submitted per twenty (20) samples, or one (1) per area and matrix type, as described in Section 5, whichever is greater.

11.2 Laboratory Quality Control

The laboratory will be required to analyze the following list of quality control samples for each of the matrices: soil, sediment, and ground water. Samples will be collected to provide the proper amount required to analyzed matrix spikes and matrix spike duplicates.

The internal quality control checks to be routinely implemented by the lab include the following:

A) Replicates - A minimum of 5% of all samples will be duplicated in the lab, usually in the form of a spiked sample duplicate (MSD).

B) Spikes - Spiked samples will be prepared in the lab and will be analyzed with the samples at a rate of 5%. The control limits are outlined in Table 11-1.

C) Surrogate spikes - surrogate compound spikes are placed into all samples of every matrix for analysis prior to sample preparation. The control limits are outlined in Table 11-2.

D) Blanks - Blanks will be analyzed at a minimum of one daily. These blanks are referred to as method blanks. The acceptability limits for method blanks is to be below the contract required quantification limits or less than 1/10 of the lowest sample in the batch.

E) Quality Control Standards - Quality control standards (often referred to as spiked reference materials) traceable to the USEPA or generated from concentrates prepared separately from calibration standards, will be included at a rate dependent on sample matrix and lab performance with matrix spikes. The minimum is one QC standard to validate the initial calibration. For inorganic analysis after every twenty (20) samples, a QC or mid-range calibration standard will be analyzed to continuously verify that the calibration is within 10% of the initial calibration. USEPA or NBS traceable standards will be run at least quarterly. The acceptability limits will be 90 - 110% for inorganic QC samples and as determined by the USEPA for organic analyses.

F) The method detection limit will be determined for all analyses within one month of the start of the project and subsequently quarterly. See Section 14 for the definition of detection limit. The detection limit so determined must be equal to or below the contract required quantification limits listed with the project compound list in Section 3.

TABLE 11-1
PEERLESS PHOTO PRODUCTS, INC.
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
PERCENT SPIKE RECOVERIES

FRACTION	MATRIX SPIKE COMPOUND	WATER (%)	LOW/MEDIUM SOIL (%)
VOA	1,1-DICHLOROETHENE	61-145	59-172
VOA	TRICHLOROETHENE	71-120	62-137
VOA	CHLOROBENZENE	75-130	60-133
VOA	TOLUENE	76-125	59-139
VOA	BENZENE	76-127	66-142
BN	1,2,4-TRICHLOROBENZENE	39-98	38-107
BN	ACENAPTHENE	46-118	31-137
BN	2,4-DINITROTOLUENE	24-96	28-89
BN	PYRENE	26-127	35-142
BN	N-NITROSO-DI-N-PROPYLAMINE	41-116	41-126
BN	1,4-DICHLOROBENZENE	36-97	28-104
ACID	PENTACHLOROPHENOL	9-103	17-109
ACID	PHENOL	12-110	26-90
ACID	2-CHLOROPHENOL	27-123	25-102
ACID	4-CHLORO-3-METHYLPHENOL	23-97	26-103
ACID	4-NITROPHENOL	10-80	11-114
PEST	LINDANE	56-123	46-127
PEST	HEPTACHLOR	40-131	35-130
PEST	ALDRIN	40-120	34-132
PEST	DIELDRIN	52-126	31-134
PEST	ENDRIN	56-121	42-139
PEST	4,4'-DDT	38-127	23-134
METALS	ALL PRE-DIGEST SPIKES	75-125	75-125
METALS	MATRIX SPIKES	85-115	85-115

TABLE 11-2
PEERLESS PHOTO PRODUCTS, INC.
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
PERCENT SURROGATE SPIKE RECOVERY LIMITS[1]

FRACTION	SURROGATE COMPOUND	WATER (%)	LOW/MEDIUM SOIL (%)
VOA	TOLUENE-d_8	88-110	84-138
VOA	4-BROMOFLUOROBENZENE	86-115	59-113
VOA	1,2-DICHLOROETHANE-d_4	76-114	70-121
BN	NITROBENZENE-d_5	35-114	23-120
BN	2-FLUOROBIPHENYL	43-116	30-115
BN	TERPHENYL-d_5	33-141	18-137
BN	1,2-DICHLOROBENZENE-d_4	16-110[2]	20-130[2]
ACID	PHENOL-d_5	10-110	24-113
ACID	2-FLUOROPHENOL	21-110	25-121
ACID	2,4,6-TRIBROMOPHENOL	10-123	19-122
ACID	2-CHLOROPHENOL-d_4	33-110[2]	20-130[2]
PEST	DECACHLOROBIPHENYL	60-150[2]	60-150[2]
PEST	TETRA-CHLORO-M-XYLENE	60-150[2]	60-150[2]

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[1] Once 20 samples of a given matrix are evaluated, statistical control should be developed as described in section 14. The surrogate limits for other parameters should also be updated when 50 samples of a given matrix have been evaluated, or sooner as needed.

[2] These limits are advisory purposes only. They are not used to determine if a sample should be reanalyzed. When sufficient data becomes available, the NYSDEC ASP may set performance based contract required windows.

11.0 INTERNAL QUALITY CONTROL CHECKS

The intent of the internal quality control program is to detect potential problems at the source and, if necessary, trace the sample analytical pathways for introduction of contamination. The quality control data generated in the field will be used to monitor sampling technique reproducibility and cleanliness. Quality control data generated by the laboratory will not only monitor reproducibility (precision) in laboratory methods and cleanliness but accuracy in analyzed samples submitted for analysis. During the data validation process (performed by Groundwater Technology, Inc's data validation chemist), variability in sampling technique and laboratory performance will be assessed separately. All samples will be collected using I-Chem 300 level series containers. In the event that I-Chem containers are not available a substitute brand of containers that possess the same level of cleanliness will be used.

11.1 Field Quality Control Checks

The field quality control checks monitor the data quality as it is affected by field procedures and conditions to the degree feasible as discussed in Section 5. The acceptability criteria were outlined in Section 5.6. All field quality control samples will be submitted to the laboratory and labeled as such.

11.1.1 Blanks

Equipment (or Rinsate) blank - Reagent water poured through the sampling equipment after routine cleaning. This sample is preserved and subsequently handled like all others. This blank is used to assess the potential for carryover contamination on non-disposable sampling equipment. These blanks may be applied to all matrices sampled by equipment cleaned in the field. A minimum of one rinsate blank will be submitted per sampling day.

Field blank - a sample of the water used to generate the equipment blank, preserved and handled like all others. These blanks are always water and are applicable to all matrices. One field blank per equipment blank will be submitted.

Trip blank - Reagent water prepared by the laboratory and sealed in the proper sampling container. In the case of organics sampling, the trip blank is surrounded with activated carbon until the sampling event. It is henceforth handled as other samples except that it is not opened or preserved (other than chilling). This sample focuses on external sources of contamination and sampling container quality and cleanliness. For each shipment of at least 20 aqueous client samples, one trip blank will be submitted. A minimum of one trip blank will be submitted for each batch of glassware (plastic included) received by the field crew from the laboratory.

The acceptability limits for all blanks is to be below the contract required quantification limits or less than 1/10 of the level in the lowest sample in the batch.

Matrix or site control - For each significant geological or geographical feature identifiable among sampling sites a representative uncontaminated sample, such as an upstream surface water sample or an upgradient soil sample from similar strata, may be sought. This sample will provide perspective to the site conditions found and demonstrate the ability of the entire measurement system to generate a clean sample given the techniques and ambient conditions. This sample is taken as a collocated duplicate because it is often depended upon to provide perspective to site conditions and to site remediation goals.

11.1.2 Duplicates

Blind field duplicates (as opposed to duplicate containers full of sample intended as backup) are sequential or collocated grab samples collected to monitor field precision (actually entire measurement system precision as described in Section 5). One duplicate will be taken and submitted per twenty (20) samples, or one (1) per area and matrix type, as described in Section 5, whichever is greater.

11.2 Laboratory Quality Control

The laboratory will be required to analyze the following list of quality control samples for each of the matrices: soil, sediment, and ground water. Samples will be collected to provide the proper amount required to analyzed matrix spikes and matrix spike duplicates.

The internal quality control checks to be routinely implemented by the lab include the following:

A) Replicates - A minimum of 5% of all samples will be duplicated in the lab, usually in the form of a spiked sample duplicate (MSD).

B) Spikes - Spiked samples will be prepared in the lab and will be analyzed with the samples at a rate of 5%. The control limits are outlined in Table 11-1.

C) Surrogate spikes - surrogate compound spikes are placed into all samples of every matrix for analysis prior to sample preparation. The control limits are outlined in Table 11-2.

D) Blanks - Blanks will be analyzed at a minimum of one daily. These blanks are referred to as method blanks. The acceptability limits for method blanks is to be below the contract required quantification limits or less than 1/10 of the lowest sample in the batch.

E) Quality Control Standards - Quality control standards (often referred to as spiked reference materials) traceable to the USEPA or generated from concentrates prepared separately from calibration standards, will be included at a rate dependent on sample matrix and lab performance with matrix spikes. The minimum is one QC standard to validate the initial calibration. For inorganic analysis after every twenty (20) samples, a QC or mid-range calibration standard will be analyzed to continuously verify that the calibration is within 10% of the initial calibration. USEPA or NBS traceable standards will be run at least quarterly. The acceptability limits will be 90 - 110% for inorganic QC samples and as determined by the USEPA for organic analyses.

F) The method detection limit will be determined for all analyses within one month of the start of the project and subsequently quarterly. See Section 14 for the definition of detection limit. The detection limit so determined must be equal to or below the contract required quantification limits listed with the project compound list in Section 3.

TABLE 11-1
PEERLESS PHOTO PRODUCTS, INC.
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
PERCENT SPIKE RECOVERIES

FRACTION	MATRIX SPIKE COMPOUND	WATER (%)	LOW/MEDIUM SOIL (%)
VOA	1,1-DICHLOROETHENE	61-145	59-172
VOA	TRICHLOROETHENE	71-120	62-137
VOA	CHLOROBENZENE	75-130	60-133
VOA	TOLUENE	76-125	59-139
VOA	BENZENE	76-127	66-142
BN	1,2,4-TRICHLOROBENZENE	39-98	38-107
BN	ACENAPTHENE	46-118	31-137
BN	2,4-DINITROTOLUENE	24-96	28-89
BN	PYRENE	26-127	35-142
BN	N-NITROSO-DI-N-PROPYLAMINE	41-116	41-126
BN	1,4-DICHLOROBENZENE	36-97	28-104
ACID	PENTACHLOROPHENOL	9-103	17-109
ACID	PHENOL	12-110	26-90
ACID	2-CHLOROPHENOL	27-123	25-102
ACID	4-CHLORO-3-METHYLPHENOL	23-97	26-103
ACID	4-NITROPHENOL	10-80	11-114
PEST	LINDANE	56-123	46-127
PEST	HEPTACHLOR	40-131	35-130
PEST	ALDRIN	40-120	34-132
PEST	DIELDRIN	52-126	31-134
PEST	ENDRIN	56-121	42-139
PEST	4,4'-DDT	38-127	23-134
METALS	ALL PRE-DIGEST SPIKES	75-125	75-125
METALS	MATRIX SPIKES	85-115	85-115

TABLE 11-2
PEERLESS PHOTO PRODUCTS, INC.
SHOREHAM, NEW YORK
SITE I.D. #1-52-031
PERCENT SURROGATE SPIKE RECOVERY LIMITS[1]

FRACTION	SURROGATE COMPOUND	WATER (%)	LOW/MEDIUM SOIL (%)
VOA	TOLUENE-d_8	88-110	84-138
VOA	4-BROMOFLUOROBENZENE	86-115	59-113
VOA	1,2-DICHLOROETHANE-d_4	76-114	70-121
BN	NITROBENZENE-d_5	35-114	23-120
BN	2-FLUOROBIPHENYL	43-116	30-115
BN	TERPHENYL-d_5	33-141	18-137
BN	1,2-DICHLOROBENZENE-d_4	16-110[2]	20-130[2]
ACID	PHENOL-d_5	10-110	24-113
ACID	2-FLUOROPHENOL	21-110	25-121
ACID	2,4,6-TRIBROMOPHENOL	10-123	19-122
ACID	2-CHLOROPHENOL-d_4	33-110[2]	20-130[2]
PEST	DECACHLOROBIPHENYL	60-150[2]	60-150[2]
PEST	TETRA-CHLORO-M-XYLENE	60-150[2]	60-150[2]

---

[1] Once 20 samples of a given matrix are evaluated, statistical control should be developed as described in section 14. The surrogate limits for other parameters should also be updated when 50 samples of a given matrix have been evaluated, or sooner as needed.

[2] These limits are advisory purposes only. They are not used to determine if a sample should be reanalyzed. When sufficient data becomes available, the NYSDEC ASP may set performance based contract required windows.

12.0 PERFORMANCE AND SYSTEM AUDITS

12.1 Performance Audits

Laboratory QC audits are to be carried out by the laboratory quality assurance staff semi-annually for each method. Blind audit samples will be utilized. Results of blind audit sample analyses will be reviewed by the quality assurance officer and will be reported as part of the quality assurance reports to management.

In addition to blind audit samples, the laboratory will be involved in performance audits conducted semi-annually by the USEPA in which USEPA performance evaluation samples will be analyzed.

12.2 System Audits

The Groundwater Technology quality assurance officer will conduct a systems audit of field quality control procedures (see Figure 12-1) and of laboratory quality control procedures shortly after these systems are operational for the project.

12.3 On-Site Inspections

The laboratory should be regularly inspected by state agencies in order to document compliance with the various certification programs in which the laboratory participates. The laboratory will maintain DOH "Technically Acceptable" ELAP certification for all sub-categories of solid and hazardous waste.

FIGURE 12-1

GROUNDWATER TECHNOLOGY, INC.'S SYSTEM AUDIT CHECKLIST FOR LABORATORY

I Chain-of-Custody

- Log-in procedures evaluated,
- Sample custodian is assigned and oversees sample transfers,
- Sample routing and pickup is documented and accounted for, and
- Locate separate area for sample storage.

II Sample Preparation

- Correct sample preparation procedures are followed,
- Areas designated for sample preparation (organics and inorganics), and
- Holding times maintained.

III QA/QC Procedures

- Procedures are being followed according to methods specified,
- Data validation and reduction process reviewed by group leaders,
- Proper documentation of QA procedures,
- Internal QC maintained,
- Data transfers and reporting checked by group leaders, and
- Awareness of personnel of QA requirements.

FIGURE 12-2

GROUNDWATER TECHNOLOGY, INC. QA/QC FIELD AUDIT

	Y	N	N/A
Field Notebook:			
-bound-page numbered, No missing pages			
Pre-Task Info:			
-personnel and responsibilities noted			
-field checklist on hand and followed			
-sampling location (on-site specific map)			
-location number (well boring, etc.)			
-weather conditions noted			
-additional pre-sampling observation (if applicable)			
-parameters to be sampled noted			
Sample Containers:			
-proper type and size			
-proper preservation			
-proper labeling			
-proper quantity			
-proper source of container			
-cooler(s)			
-proper amount of ice			
-proper packing materials			
-proper custody seals			
-proper courier			
Field QC Samples:			
-proper frequency			

CONTINUED ON FOLLOWING PAGE

FIGURE 12-2

GROUNDWATER TECHNOLOGY, INC. QA/QC FIELD AUDIT

	Y	N	N/A
-proper field blanks			
-proper trip blanks			
-proper duplicate samples			
-proper water source used for blanks			
Field Measurements:	▨	▨	▨
-proper calibration of pH pen			
-proper calibration of conductivity meter			
-proper calibration of thermometer			
-proper standards used for pH meter			
-proper standards used for conductivity meter			
-proper units used for pH			
-proper units used for conductivity meter			
-proper units used for temperature			
-steady state achieved for pH			
-steady state achieved for conductivity			
-steady state achieved for temperature			
-proper gallons of water purged			
Sampling Technique:	▨	▨	▨
-volatiles sampled first			
-samples stored properly			
-sample bottles inspected			

CONTINUED ON FOLLOWING PAGE

FIGURE 12-2

GROUNDWATER TECHNOLOGY, INC. QA/QC FIELD AUDIT

	Y	N	N/A
-Consistency in technique			
-FSP or QAPP available			
<u>Chain-of-Custody Form Complete with:</u>	▨	▨	▨
-client & location			
-date			
-sample numbers			
-time collected			
-matrix			
-number of containers			
-preservation technique			
-blanks identified in notebook			
-proper signatures			
-proper time & date			
-proper continuity			
-sample travel			

13.0 PREVENTATIVE MAINTENANCE

13.1 Laboratory Maintenance

To assure minimum storage times for samples, the laboratory will maintain equipment to the manufacturer's specifications and keep enough overcapacity to have instruments available should one fail.

The following maintenance and assurance procedures will be followed routinely:

A. Gas Chromatograph and Gas Chromatograph/Mass Spectrometer (GC and GC/MS)

1. Maintenance log will be kept for each instrument.
2. GC septa will be changed daily.
3. Detectors will be cleaned on a schedule recommended by the manufacturer or more frequently as needed: FID monthly, PID monthly, MS quarterly.
4. Laboratory will be vacuumed weekly.
5. Instrument electronics will be visually inspected and cleaned quarterly.
6. Room temperature and humidity will be maintained according to manufacturer's specifications.
7. Refrigerator temperatures will be logged daily.
8. Raw data will be archived electronically if possible at least until report is accepted by the client or the Groundwater Technology, Inc. QA officer.
9. Fume hoods will be cleaned and checked quarterly to assure minimum laboratory contamination and maximum safety conditions.
10. Broken glassware will be sent for repair bi-monthly.
11. GC columns and PAT traps will be numbered and logged and will be baked out daily. Changes and monthly flow checks will be logged.
12. Teflon tips will be replaced bi-weekly.

13. Temperature measurement devices will be checked against NBS traceable standards semi-annually.

14. Analytical balances will be under service contract and maintained semi-annually.

15. PAT devices will be pressure-tested monthly and whenever glassware is changed.

16. Electronic flow meters will be calibrated monthly.

B. Infrared/Spectrophotometers (Total Petroleum Hydrocarbon Analysis)

Daily maintenance:

1. Clean windows with freon and lens paper.

2. Check sensitivity and adjust gain, if necessary.

3. Run spectrum of polystyrene or other standard for ultraviolet such as holmium oxide glass.

C. The following maintenance supplies are kept on hand for regular and emergency maintenance:

1. septa
2. purge-and-trap sparger
3. purge-and-trap traps
4. tubing and fittings
5. thermal conductivity leak detector
6. chart paper
7. column ferrules
8. u.v. lamp for PID detector
9. syringes for spiking
10. mass spectrometer source filaments
11. jet separator
12. pump oil

13. analytical columns (all analyses)

14. flow meter bubble solution

15. extra flow meter

The laboratory will maintain written logs defining specific routine and preventive procedures for all instruments. Also, all instruments will be maintained through service contracts with the manufacturers.

13.2 Field Maintenance

GTI's field equipment is maintained through the use of a tracking system incorporating the tagging of each equipment item. This tag identifies its most recent maintenance, battery charge, and condition. When damaged equipment in need of repair is returned to the equipment warehouse, it is appropriately flagged for the required maintenance to be performed. This process assures only operable and properly maintained equipment enters the field. Routine daily maintenance procedures conducted in the field will include:

1. Removal of surface dirt and debris from exposed surfaces of sampling equipment and measurement systems;
2. Cleansing of filters in the organic vapor analyzer;
3. Storage of equipment away from the elements;
4. Daily inspections of sampling equipment and measurement systems for possible problems (e.g., cracked or clogged lines or tubing or weak batteries);
5. Check instruments calibrations; and
6. Charging any battery packs for equipment when not in use.

Spare replacement parts stored in the field to minimize downtime include:

1. Appropriately sized batteries;
2. Locks;
3. Extra sample containers and preservatives;

4. Extra pH probes, conductivity probes, thermometers, sample coolers, packing material, and sample location stakes;

5. Additional supply of health and safety equipment (i.e., respirator cartridges, boots, gloves, tyvek, etc.); and

6. Additional equipment as necessary for the field tasks.

14.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, COMPLETENESS, DETECTION LIMIT, AND METHOD OF CONTROL

14.1 Precision

When more than two measurements are to be evaluated, such as for a series of daily reference samples, the standard deviation is derived from equation 14.1:

$$S = [\Sigma^{n}_{i=1}(x_i-\bar{x})^2/n-1]^{1/2} \qquad \text{(Equation 14.1)}$$

Where: S = standard deviation
x_i = each observed value
x = the arithmetic mean of all observed values
n = total number of values

The precision of laboratory test results will be expressed as the percent relative standard deviation (RSD) or relative percent difference (RPD). The %RSD is obtained by dividing the S by X, expressing the ratio as a percent. RPD is derived from the absolute difference between duplicate analyses divided by the mean value of the duplicates (Equation 14.2).

$$RPD = \frac{|\ D1 - D2\ |}{(D1 + D2)/2} X\ 100 \qquad \text{(Equation 14.2)}$$

where D1 and D2 are the two replicate values

RSD is related to RPD by the relationship in Equation 14.3

$$\%\ \text{rel. std. dev.} = 0.707\ RPD \qquad \text{(Equation 14.3)}$$

As the RPD generally has a dependency on concentration, it may be necessary to apply these statistics over a limited range of concentrations.

The day-to-day acceptability of the analytical precision will be based on the QC charts with the control limit at the 99% confidence level (3.27 times the mean RPD as discussed in Section 14.5).

14.2 Accuracy

Bias (accuracy) will be based on the average % recoveries of spiked samples (Equation 14.4).

$$\%R = \frac{SSR - SR}{SA} \times 100 \qquad \text{(Equation 14.4)}$$

Where: %R = % Recovery
SSR = spiked sample result
SR = sample result
SA = amount of spiking solution added

The accuracy interval reported to management will be expressed as follows: accuracy interval = mean recovery +/- 2 std. dev. Day-to-day acceptability of accuracy will be based on the QC charts with the control limits at the 99% confidence level (see Section 14.5).

Reference materials are essential to the evaluation of accuracy. Stock solutions for accuracy spikes shall be traceable to a source independent from the calibration solutions. Quality Control Standards (used for calibration verification) will, if possible, likewise be traceable to a source independent from the calibration solutions. In such cases, QC Standards will be acceptable to use for accuracy assessments in addition to matrix spikes. When using commercial sources for solutions, the QA Department will verify that the materials are from an independent source.

14.3 Completeness

Completeness is evaluated by dividing the total number of verifiable data points by the maximum number of data points possible and expressing the ratio as a percent. The following calculation is useful in random sampling procedures.

$$C (\%) = \frac{D}{P \times n} \times 100 \qquad \text{(Equation 14.5)}$$

Where: D = number of verifiable quantifications (not suspect due to QC or sample integrity shortcomings)
P = number of analytical parameters per sample requested for analysis
n = number of samples requested for analysis

14.4 Definition of Detection Limit

For methods operating under this document, the Method Detection Limit (MDL) will be defined according to Appendix A, EPA 600/4-82-057, "The minimum concentration that can be measured and reported with 99% confidence that the value is above zero." The procedure for its determination is in Appendix A. It is approximately three times the standard deviation of a set of seven replicates at a concentration very near (within five times) the detection limit.

The MDL defines a limit above which false positives are very unlikely. However, the relative precision at this limit is expected to be very large and quantification is not reliable. For methods operating under this document, quantification is considered reliable at 10 standard deviations above background, (i.e., at about three times the MDL.) Data above this level can be reliably compared to regulatory limits.

14.5 Method Control

Method control is based on a statistical evaluation of quality control results and is usually displayed as a quality control chart. The control limit for a method under statistical control is +/- three standard deviations. In the case of precision control charts the control limit and warning limit are 3.27 and 2.51 times the mean RPD, respectively. In certain instances where the method explicitly states a control limit the referenced control limit will be used unless a statistical evaluation indicates that laboratory performance is significantly better than the referenced limit. For certain difficult matrices it may be necessary to establish statistically-based limits which are broader than initially accepted limits. This will be done with a minimum of five samples and will be fully documented as part of a corrective action.

Statistical control is also dependent on the following trends of greater than seven results:

a) ascending
b) descending
c) one side of mean (central) line

As a minimum, the lab will maintain control charts for matrix spikes for accuracy and either duplicate matrix spikes for duplicate samples for precision. Additionally for organic methods, the lab will maintain charts for surrogate spike results.

15.0 CORRECTIVE ACTION

15.1 Laboratory Corrective Action

The quality control samples are designed to imitate client samples and indicate possible sources of error or laboratory contamination.

Any corrective actions taken by the laboratory will all be documented and initialed. The Laboratory Manager will provide documentation as to what, if any, corrective actions were initiated during this study and report them to Groundwater Technology Inc.'s Quality Assurance Officer or Project Manager.

The laboratory must take corrective action if any of the quality control data generated during the laboratory analysis is outside criteria. By comparison of blank results, contamination may be attributed to either laboratory or field sampling techniques.

Corrective action for out-of-control calibrations is to re-calibrate the instrument and reanalyze the samples. A sequence is specified in the procedure used to analyze the sample. When problems in analyses are encountered, the laboratory will be expected to follow this procedure exactly, and document the problems encountered and corrective action in a case narrative enclosed with each deliverables package.

The analyses for total metals are prepared with a digestion method blank, a predigestion spike in the designated sample, two duplicates of the designated sample, plus the sample (one of the two duplicates are used as a post-digestion spiked sample). The laboratory analyzes the series of calibration standards, a standard on the curve, and a method blank. One calibration standard is analyzed every tenth sample. If the standard is significantly off the curve, the previous ten samples must be re-analyzed after the instrument problem has been corrected. If the concentrations are outside the limits of the calibration curve, sample dilution and re-analysis is required. The duplicate sample results may not differ by more than 20% RPD.

15.2 Groundwater Technology, Inc.'s Corrective Action

Field quality assurance activities will be reported to the Project Manager. The corrective action decision matrix as presented in Figure 15-1 will be followed as closely as possible. Problems encountered during the study affecting quality assurance will be reported on a Corrective Action Form as presented in Figure 15-2. If any data fail to meet the precision, accuracy, and completeness criteria listed in Table 5-1 (Field Accuracy, Precision, and Frequency), the lab manager will be notified and will be required to make any necessary systematic changes and then if necessary, re-analyze the samples in question. If the samples in question cannot be re-analyzed for some reason, the Groundwater Technology, Inc.'s Project Manager will decide whether or not the suspect data will be used.

If, for example, field or rinsate blank contamination is a problem, the Quality Assurance Officer will notify the Project Manager of the problem and a field audit by the QA Officer of the sampling and decontamination procedure will be conducted and documented. Field and rinsate blanks are reanalyzed (if time allows) and the results are reviewed by the Quality Assurance Officer.

The Project Manager will be responsible for initiating the corrective actions and for insuring that the actions are taken in a timely manner, and also that the desired results are produced. The Project Manager will report to the Quality Assurance Officer all the necessary corrective actions taken, the outcome of these actions, and their effect on data produced. All corrective actions taken will be reported to the appropriate regulatory agencies in the final report.

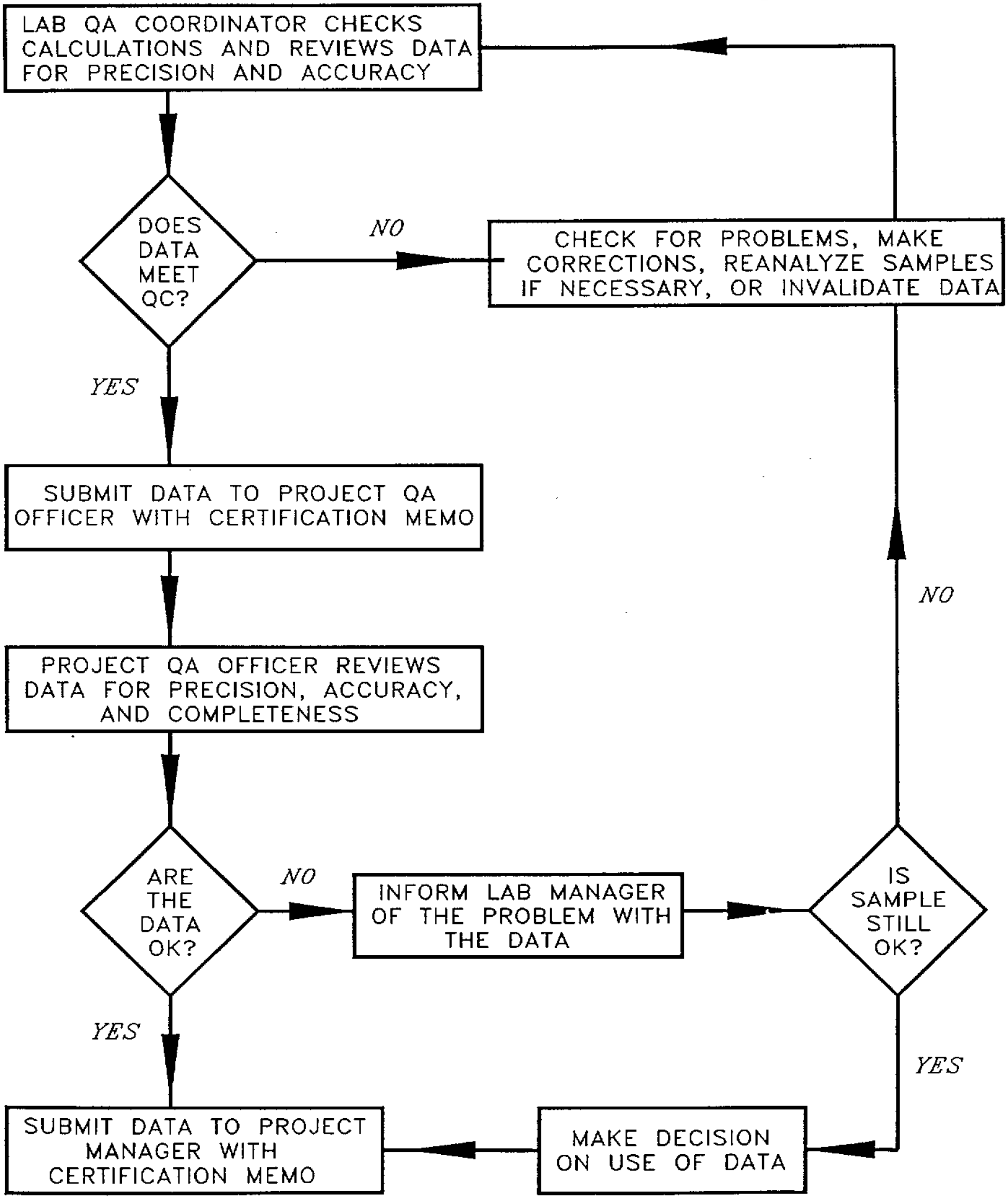

FIGURE 15-1
CORRECTIVE ACTION DECISION MATRIX
PEERLESS PHOTO PRODUCT, INC. SITE
SHOREHAM, N.Y.
SITE ID# 1-52-031

GROUNDWATER TECHNOLOGY

Figure 15-2

Corrective Action Form

Date: ____________________

Job Name and W.O. No.: ____________________

Initiator's Name and Title: ____________________

Problem Description: ____________________

Reported To: ____________________

Corrective Action Taken: ____________________

Reviewed and Implemented By: ____________________

CC: ____________________

16.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The Quality Assurance Officer will submit reports of all applicable quality assurance activities to the Project Manager. These reports, which will be provided to the NYSDEC Project Officer, will contain at least the following information:

1. The status and coverage of various laboratory and field quality assurance project activities;
2. Data quality assurance reviews including assessment accuracy, precision, completeness, representativeness, and comparability;
3. Significant quality assurance problems discovered, corrective actions taken, progress and improvements, plans and recommendations for further implementation or updating of the investigative QAPP. The QA reports have been specified to contain any and all changes in the Quality Assurance Project Plan during the course of the project;
4. Any significant field observations noted in the field notebook during the sampling procedure; and,
5. A summarization of the results of performance and system audits, if conducted.

Examples of items considered during quality control checks are as follows:

1. Field Activities Which are Discussed in Various Section of the QAPP:
   - Standardized checklists and field notebooks;
   - Verification of checklists' information by an independent person;
   - Strict adherence to chain-of-custody procedures;
   - Calibration of field devices;
   - Collection of replicate samples; and
   - Submission of field blanks, where appropriate.

2. Analytical Activities:
   - Method blank(s);
   - Laboratory control sample(s);
   - Calibration check sample(s);
   - Replicate sample(s);
   - Matrix-spiked sample(s);
   - "Blind" quality control sample(s);
   - Control charts;
   - Surrogate samples;
   - Zero and span gases; and
   - Reagent quality control checks.

The level of laboratory reporting will be equivalent to an USEPA Superfund Contract Laboratory Program (CLP) deliverables package.

APPENDIX A

DEFINITION AND PROCEDURE FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT

APPENDIX A

DEFINITION AND PROCEDURE FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be identified, measured and reported with 99 percent confidence that the analyte concentration is greater than zero and determined from analysis of a sample in a given matrix containing analyte.

Scope and Application

This procedure is designed for applicability to a wide variety of sample types ranging from reagent (blank) water containing analyte to wastewater containing analyte. The MDL for an analytical procedure may vary as a function of sample type. The procedure requires a complete, specific and well defined analytical method. It is essential that all sample processing steps of the method be included in the determination of the MDL.

The MDL obtained by this procedure is used to judge the significance of a single measurement of a future sample.

The MDL procedure was designed for applicability to a broad variety of physical and chemical methods. To accomplish this, the procedure was made device or instrument independent.

Procedure:

1. Make an estimate of the detection limit using one of the following:
    - a. The concentration value that corresponds to an instrument signal/noise ratio in the range of 2.5 to 5. If the criteria for qualitative identification of the analyte is based upon pattern recognition techniques, the least abundant signal necessary to achieve identification must be considered in making the estimate.
    - b. The concentration value that corresponds to three times the standard deviation of replicate instrumental measurements for the analyte in reagent water.
    - c. The concentration value that corresponds to the region of the standard curve where there is a significant change in sensitivity at low analyte concentrations i.e. a break in the slope of the standard curve.
    - d. The concentration value that corresponds to known instrumental limitations.

It is recognized that the experience of the analyst is important to this process. However, the analyst must include the above considerations in the estimate of the detection limit.

2. Prepare reagent (blank) water that is as free of analyte as possible. Reagent or interference free water is defined as a water sample is which analyte and interferant concentrations are not detected at the method detection limit of each analyte of interest. Interferences are defined as systematic errors in the measured analytical signal of an established procedure caused by the presence of interfering species (interferant). The interferant concentration is presupposed to be normally distributed in representative samples of a given matrix.

3. a. If the MDL is to be determined in reagent water (blank), prepare a laboratory standard (analyte in reagent water) at a concentration which is at least equal to or in the same concentration range as the estimated MDL (Recommend between 1 and 5 times in estimated MDL). Proceed to Step 4.

   b. If the MDL is to be determined in another sample matrix, analyze the sample. If the measured level of the analyte is in the recommended range of one to five times the estimated MDL, proceed to step 4.

   If the measured concentration of analyte is less than the estimated MDL add a known amount of analyte to bring the concentration of analyte to between one and five times the MDL.

   If the measured level of analyte is greater than five times the estimated MDL, there are two options:

   1. Obtain another sample of lower level of analyte is same matrix if possible.

   2. The sample may be used as is, for determining the MDL if the analyte level does not exceed 10 times the MDL of the analyte in reagent water. The variance of the analytical method changes as the analyte concentration increases from the MDL, hence the MDL determined under these circumstances may not truly reflect method variance at lower analyte concentrations.

4. Take a minimum of seven aliquots of the sample to be used to calculate the MDL and process each through the entire analytical method. Make all computations according to the defined method with final results in the method reporting units. If blank measurements are required to calculate the measured level of analyte, obtain separate blank measurements for each sample aliquot analyzed. The average blank measurement is subtracted from the respective sample measurements.

5. Calculate the standard deviation(S) of the replicates.

6. Calculate the MDL as follows using (T) from the table below:

MDL = T x S

Table of Students' t values at the 99 Percent Confidence Level

Number of Replicates	**Degrees of Freedom (n-1)**	**t(n-1, 1-a = .99)**
7	6	3.143
8	7	2.998
9	8	2.896
10	9	2.821

REFERENCE: "Appendix A, Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, July 1982.

APPENDIX B

OUTLIER TEST

APPENDIX B

OUTLIER TEST

An extreme observation (outlier) is a datum that appears to be different from the main data pattern. The principal safeguards against obtaining or using an outlier are vigilance during all operations and visual inspection of data before performing statistical analyses.

If a datum falls above or below the control limits of either the X or R control chart, the value shall be investigated. Sometimes the investigation will reveal a recording or computational mistake that can be revised to obtain the correct value. If an error is found but the correct value cannot be determined, the erroneous value shall not be used in statistical calculations. When errors are found, either correctable or uncorrectable, all analytical results for that lot must be inspected to ensure that erroneous results are not reported. If an uncorrectable error affected results of environmental samples, the lot shall be judged as out of control, and analyses must be repeated.

If no assignable cause for the outlier can be found, the datum shall be statistically tested using tables of the probability that an outlier would be observed if the data were normal and conformed to the assumed model. Dixon's Test expresses the gap between an outlier and the nearest value as a fraction of the range between the smaller and largest value. A datum so determined to be an outlier will be removed from the data set before statistical calculations. Likewise, data sets of environmental measurements which can be assumed to be normally distributed can be evaluated for outliers with this test.

Dixon's Test

The datum to be tested will be X and/or R, depending on which values fall outside the control limits on X-R control charts.

The entire data set must be ordered from highest to lowest, with the highest value assigned a rank of 1 (x) and the lowest value a rank of N (x). The test criterion (r) varies with sample size, as follows:

For less than eight measurements, reject x if:

$$\frac{(X_n - X_{n-1})}{(X_n - X_1)} > r_{10} \text{ (or accept x if } \frac{(X_n - X_{n-1})}{(X_n - X_{n-2})} < r_{10})$$

Between eight and ten measurements, reject x if:

$$\frac{(X_n - X_{n-1})}{(X_n - X_2)} > r_{11} \text{ (or accept x if } \frac{(X_n - X_{n-1})}{(X_n - X_2)} < r_{11}\text{)}$$

Between eleven and thirteen measurements, reject x if:

$$\frac{(X_n - X_{n-2})}{(X_n - X_2)} > r_{21} \text{ (or accept x if } \frac{(X_n - X_{n-2})}{(X_n - X_2)} < r_{21}\text{)}$$

Over thirteen measurements, reject x if:

$$\frac{(X_n - X_{n-2})}{(X_n - X_3)} > r_{22} \text{ (or accept x if } \frac{(X_n - X_{n-2})}{(X_n - X_3)} < r_{22}\text{)}$$

The critical values for the test statistic at 99 percent confidences level are shown in Table K-1. If the test statistic is greater than the critical value from the table, then the datum is an outlier.

Table K-1

Critical Values for Dixon's Outlier Test

Number of Measurements (N)	Criterion (r)	Critical Value or r
3	10	0.988
4		0.889
5		0.780
6		0.698
7		0.637
8	11	0.683
9		0.643
10		0.615
11	21	0.679
12		0.642
13		0.615
14	22	0.641
15		0.616
16		0.595
17		0.577
18		0.561
19		0.547
20		0.535
21		0.524
22		0.516
23		0.505
24		0.497
25		0.489

APPENDIX C

KEY PERSONNEL

Joseph L. Basile, Jr.
Project Hydrogeologist
Hydrogeologist IV

EDUCATION

M.S., Hydrogeology, Wright State University, 1989

B.S., Geology, State University of New York College at Cortland, New York, 1986

PROFESSIONAL PROFILE

Project manager and hydrogeologist for the New York/Vermont District. Responsible for the technical staff and field management of a variety of environmental projects.

Work scope and proposal preparation, budget and schedule management, resource scheduling, customer and regulatory interface, report preparation, data reduction/evaluation, and senior level technical/operational oversight.

Mr. Basile has designed and successfully implemented work scopes regulated by the New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage, Inactive Hazardous Waste Site, and RCRA Facility Management divisions. Most of his projects involve fugitive petroleum/chlorinated hydrocarbon subsurface assessment and abatement, and regulatory compliance.

Mr. Basile has a working knowledge of both Federal and selected State RCRA facility closure regulations, and has successfully gained regulatory approval of several RCRA facility closure plans for a solvent recycling firm's service centers in New York, Massachussetts, Vermont, and West Virgina. Various project descriptions include:

PROJECT EXPERIENCE

Design/Implementation of RCRA Facility Closures, Investigations and Corrective Action Measures at Several RCRA Permitted Facilities in New York
Facility closure operations have included preparation of closure and partial closure plans, a sampling visit work plan, various RCRA Part B permit Corrective Action submittals, hazardous waste management unit decontamination and certified closure.

Groundwater Assessment/Remedial System Design/Installation for an Airport Fuel Farm
The work scope included performing a subsurface assessment, and the design and installation of a multi-well groundwater extraction, soil venting and passive bioremediation system. The remedial system has removed approximately 4,000 gallons of hydrocarbons to date.

Design/Oversight of an Underground Storage Tank Removal Program for a Retail Facility
Following tank removal, a soil ventilation and bioremediation system was installed during tank pit backfilling operations. Implementation of in-situ remedial activities allowed the customer to treat impacted soils on-site, thereby reducing environmental liabilities associated with off-site disposal.

Groundwater Assessment/Tank Removal at a Chlorinated Hydrocarbon Impacted Site
The work scope that was designed, and which received regulatory approval included completion of soil borings, monitoring wells, on-site soil sample screening using a portable gas chromatograph, a soil gas survey, aquifer pump testing, multiple underground storage tank closures, and a remedial alternatives evaluation.

Water Quality Assessment
Identification and evaluation of the effects of point and non-point pollution sources on surface and groundwater quality for the Little Miami River Basin. The project (funded by the Ohio EPA) is an update to the Miami Valley Region 208 Area-wide Water Quality Management Plan. Specific responsibilities were to complete a detailed pollution source inventory, construct both groundwater and surface water resources management plans, and technician report preparation.

Expert Witness Testimony
Court presentation for a major US oil company. The presentation addressed the impacts of a hydrocarbon loss on both the environment and human health.

Hydrogeologic Investigation/Risk Assessment
Site hydrogeologic and environmental risk assessment of a former 25-acre water front industrial site. this project has included developing an extensive subsurface site assessment work plan for state and regulatory agency approval.

Hydrogeologic Assessment/Chemical Recovery and Abatement Program
Hydrogeologic assessment and development of a recovery/abatement program for a major organic chemical spill in southern Vermont. The project necessitated formulating bother surface and groundwater recovery/abatement strategies. Chemical recovery and on-site water treatment programs have been formulated for contaminant abatement.

Computer Modeling Program Development
Regional program development of computer modeling capabilities. Models include MOC Solute Transport Model, Modflow USGS 3-D flow model, and the USGS 2-D flow model.

Fate And Transport Modeling
Theoretical chemical modeling of the unsaturated zone of the fate and transport of a specific chemical group for a major materials preserving manufacturer. The project has included specific model delineation and selection, and detailed research as to applicability and reliability.

SPECIAL QUALIFICATIONS

Affiliations
National Water Well Association
Association of Ground Water Scientists and Engineers

Publications/Presentations
"Little Miami River Basin: Summary and Recommendations. Area Wide Water Quality Management Plan", Miami Valley Regional Planning Commission, with Richard Hupman, 1987.

"A Dual Approach to Evaluating the Ground Water Pollution Potential to a Glacial Aquifer System in Cortland County, New York" with Dr. R. Ritzi. The paper was presented at the NWWA sponsored, FOCUS Eastern Region Conference in October, 1990.

Ishrat S. Chaudhuri, Ph.D.
Environmental Health Scientist IV
Toxicology Group Manager

EDUCATION

Ph.D., Toxicology, Massachusetts Institute of Technology, Massachusetts, 1989

B.A., Biology, Wellesley College, Massachusetts, 1983

PROFESSIONAL PROFILE

Dr. Chaudhuri is an Environmental Health Scientist and Toxicology Group Manager in the eastern region of Groundwater Technology, Inc. Risk Assessment Services. Her responsibilities include project management and oversight of risk assessments. Before joining Groundwater Technology, Risk Assessment Services, Dr. Chaudhuri was employed as Senior Toxicologist at ABB Environmental Services where she performed toxicology, risk assessment and chemical exposure assessment consulting, and project management. She performed many Superfund public health risk assessments for industrial facilities and military sites. She also conducted risk assessments according to guidance provided in the Massachusetts Contingency Plan. Dr. Chaudhuri's expertise in toxicology helped her to evaluate and, in various cases, develop dose-response values for several chemicals, such as fuel-related alkanes and PAHs, and volatile compounds. She is also experienced in modelling exposure concentrations in cases where actual data are unavailable, such as shower concentrations, volatilization from soil, and vapor migration into basements.

Dr. Chaudhuri also collaborated with ABB Environmental Bioremediation Systems on several treatability studies and research and development projects. These projects included studying bacterial degradation of military munitions wastes and chlorinated solvents under both aerobic and anaerobic conditions. Her doctoral thesis at the Massachusetts Institute of Technology involved studying the molecular mechanisms of mutagenesis in bacteria.

PROJECT EXPERIENCE

Military Superfund Site, MA
Conducted risk and exposure assessments for more than 30 sites at the military base. Developed method to determine toxicity of various fuel-related compounds, including alkanes and PAHs. Used several models to determine air concentrations and basement concentrations of chemicals.

Chemical Company, NJ
Developed alternate concentration limits for groundwater contaminants. These limits were developed using a groundwater dilution model.

Superfund Site, MA
Conducted a multi-exposure pathway risk assessment on an industrial site containing dye manufacturing plants. Addressed several public concerns, including vapor migration into basements, and contaminants in garden soil.

Superfund Site, RI
Modelled fate and transport of chlorinated solvents in groundwater under anaerobic conditions.

Chemical Company, NC
Developed bioavailability factors for chemicals through various routes of exposure. These absorption adjustment factors helped to estimate body dose levels of chemicals more accurately.

Superfund Site, VA
Project manager for a multi-exposure pathway risk assessment for a Superfund site owned by a chemical corporation. Mercury was the main contaminant at this site - a byproduct of previous chloralkali plant operations. Risk assessment involved fate and transport studies to predict the chemical form of mercury in various media, such as sediment, surface water, fish and other biota. Project management responsibilities included client interactions, and oversite of budget and schedule.

Chemical Company, MA
Conducted a risk assessment for a manufacturing facility according to guidance issued by the Massachusetts Contingency Plan. Developed a dose-response value for the chemical tetrahydrofuran, which lacks a USEPA-derived value. Also estimated a Henry's Law constant for tetrahydrofuran, which was subsequently used to estimate air concentrations while showering.

Martin-Marietta Systems, TN
Conducted various risk assessments under contract to Hazwrap, a division of Martin-Marietta that supervises site characterizations and cleanups for the military and National Guard. For several sites, developed a risk-based approach to screen out sites that would not have to go through the full RI/FS procedure.

Gas Transport Company, GA
Conducted a risk assessment and fate and transport assessment of PCBs present in sediment. Developed clean-up levels for PCBs based on specific exposure at the site.

Gasoline Service Stations
Conducted many risk assessments for service stations in Massachusetts and other states. Developed standard format for typical exposure profiles at service stations.

Bioremediation Projects
Conducted a research and development project to study the biodegradation of military munitions wastes such as TNT; studied growth of bacteria on TNT and analyzed metabolic byproducts of degradation.

Determined nutrient requirements for bacterial growth in soil from fuel-contaminated sites. Analyzed for chemical breakdown products following bacterial degradation.

Conducted bench-scale studies on anaerobic degradation of chlorinated compounds.

SPECIAL QUALIFICATIONS

Publications/Presentations

Chaudhuri, I., B.A. Donahue, L.B. Couto, and J.M. Essigmann. 1987. "Alkylation Mutagenesis under Conditions of SOS Induction"; Proc. Amer. Assoc. Cancer Res. Vol. 28; abs. no. 422.

Chaudhuri, I., and J.M. Essigmann. 3-Methyladenine mutagenesis under conditions of SOS induction in Escherichia coli. Carcinogenesis 12(12): 2283-2289.

Conner, M.W., I. Chaudhuri, A.E. Rogers and M.O. Amdur. 1985. "Kinetics of respiratory tract absorption and plasma clearance of horseradish peroxidase in guinea pigs" Fundam. Appl. Toxicol. 5(1):99-104.

Couto, L.B., I. Chaudhuri, B.A. Donahue, B. Demple, and J.M. Essigmann. 1989. "Separation of the SOS Dependent and Independent Components of Alkylating Agent Mutagenesis" J. Bacteriol. 171(8):4170-4177.

Lecture on "Fundamentals of Toxicology." Presented as part of a course on Fundamentals of Industrial Hygiene. American Industrial Hygiene Association, MA. April 1992.

Affiliations

Sigma Xi
American Association for Advancement of Science (AAAS)
Society for Risk Analysis
ASTM Standards for Materials, Products, Systems and Services

Honors and Awards

Graduated *cum laude*, Wellesley College
Upjohn Travel Award, American Association of Cancer Research

David T. Crowley, P.E., C.S.P., C.E.T., C.H.M.M.
Health and Safety Manager
Health Scientist IV

EDUCATION

B.S., Toxicology, Northeastern University, Boston, Massachusetts, 1986

PROFESSIONAL PROFILE

As Health and Safety Manager for Groundwater Technology's eastern region, Mr. Crowley is responsible for the coordination, development and implementation of a comprehensive program to ensure employee health and safety. Health and safety programs are developed in accordance with Groundwater Technology company policy as well as federal and state regulations. Mr. Crowley's duties include management of the compliance audit program, development and field implementation of site safety plans, personnel medical monitoring, industrial hygiene monitoring, accident investigation and claims management. He is also responsible for the administration and coordination of Groundwater Technology's safety training program in conjunction with corporate health and safety representatives. Mr. Crowley holds credentials as a Professional Engineer (P.E.), Certified Safety Professional (C.S.P.), Certified Hazardous Materials Manager (C.H.M.M.) and Certified Environmental Trainer (C.E.T.).

Previous experience includes work as the New England District Health and Safety Manager for Chemical Waste Management, Inc. (C.W.M.), where Mr. Crowley focused primarily on employee health and safety programs governing hazardous waste site activities. Duties included responsibility for project compliance with local, state and federal regulations including RCRA/SARA, TSCA, OSHA and DOT.

Prior to his employment with CWM, Mr. Crowley worked as an Environmental Compliance Manager for an environmental service company and as a Toxicology Intern for the Massachusetts Department of Environmental Quality Engineering.

PROJECT EXPERIENCE

Soil Excavation/Site Assessment, Chemical Corporation, MA
Site Safety Officer for a site assessment conducted at a chemical manufacturing facility where the contaminants of concern include chlorinated solvents, pesticides and metals. The project involved the completion of soil borings and test pits to enable the quantification of soil contamination as well as the excavation and removal of contaminated soils. Responsibilities of the site safety officer included developing the safety plan, conducting air monitoring activities, documenting monitoring results and providing support services to field personnel regarding level B personal protective equipment and safe working procedures.

Site Assessment, Industrial Landfill, NY
Developed site safety plan, monitored and documented air quality, and served as Site Safety Officer for an environmental assessment at an industrial site where the contaminants of concern include chlorinated solvents and metals. Project involved the installation of monitoring wells and the collection and analysis of soil and groundwater samples to determine the environmental impact of leachate runoff from the landfill. This was a level B site requiring the use of self-contained breathing apparatus (SCBA).

Site Restoration/Soil Excavation, Computer Corporation, ME
Site Safety Officer responsible for health and safety supervision of staff during site remediation and soil excavation activities. Developed the site safety plan and monitored and documented air quality in order to ensure safe working procedures for field staff. The project required the cleaning of storm drainage system catch basins contaminated with chlorinated and petroleum hydrocarbons and metals. Catch basins were cleaned using water blasting and vacuum-removal techniques. This was a level B site, requiring air-supplied respirators using self-contained breathing apparatus (SCBA) and hip-air breathing apparatus (HABA).

Site Restoration: PCB Surface Contamination, MA
Site Safety Officer responsible for health and safety supervision of a staff of 15 involved in the cleaning of an industrial boiler house contaminated with PCBs as a result of a capacitor fire. Surface cleaning required the use of industrial solvents and soap solutions. Developed site safety plan, conducted air monitoring activities and documented monitoring results and provided support services to field personnel regarding personal protective equipment (PPE) and safe working procedures. This was a level C site requiring air-purifying cartridge respirators.

Soil Remediation, Superfund Site, MA
Site Safety Officer responsible for health and safety supervision of a staff of 12 at a Superfund site. On-site soil contaminants included total petroleum hydrocarbons (TPH) and metals including lead, selenium, arsenic and chromium. As site safety officer, developed site safety plan, conducted air monitoring activities, documented monitoring results and provided support services to field personnel regarding safety equipment and safe working procedures. This was a level C site requiring air-purifying cartridge respirators.

Emergency Response/Soil Excavation, Chemical Corporation, MA
Coordinated emergency response services to respond to an acrylonitrile release from an aboveground storage tank. Conducted initial reconnaissance, perimeter air monitoring, soil boring and sampling, and subsequent construction activities. Directed efforts to excavate, characterize, transport and dispose of approximately 1,000 cubic yards of contaminated soils. This was a level B site requiring the use of an air-supplied cascade system.

Industrial Hygiene Air Monitoring, Residential Settings
Conducted ambient air monitoring of residential structures impacted by fugitive vapors from nearby leaking underground petroleum storage vessels. Utilized low-flow personal air monitoring pumps with charcoal tube media for a predetermined time period. Submitted tubes to laboratory for analysis, tabulated results and submitted report to client in a form suitable for regulatory agency review.

Underground Storage Tank Replacement, National Gas Pipeline Company
Coordinated a multi-location tank replacement project involving the removal of seven steel underground steel storage tanks and installation of seven double-walled fiberglass underground storage tanks. The project was managed from initial permit applications to local officials, tank removal and disposal, disposal of associated hazardous waste, design and construction of new tank area, tank placement and installation and precision tightness testing according to manufacturer and regulatory agency specifications. Additional work included installation of monitoring wells and development of spill prevention control and countermeasure plans for each location.

Surface Water Maintenance, Industrial Clients, Shoreline Locations, MA
Provided weekly boom maintenance services related to changing petroleum-saturated absorbent booms. Activities involved scheduling and coordination of containment, transportation and subsequent disposal of drummed waste. Efforts also included periodically repositioning the weighted maritime curtain boom.

Emergency Response/Gasoline Release, School Bus Depot
Responsible for on-scene coordinator duties involving a community-owned vehicle storage depot where a release of approximately 250 gallons of gasoline had occurred. Spill resulted from an unattended dispenser island overfill event. Conducted initial reconnaissance, site security and site control management, project management and site supervision of cleanup personnel, as well as site safety officer responsibilities. Remedial activities involved extensive air monitoring surveys of impacted catch basin drainage system. Followed project to completion and prepared job summary report for client in a form suitable for regulatory agency submittal.

Emergency Response, Fuel Release Resulting from Vehicle Accident
Provided services involving a vehicle accident where a municipal trash truck spilled approximately 75 gallons of diesel and hydraulic fluid. Responsible for site security and control, site safety, and overall project management coordination of cleanup efforts. The released petroleum products were controlled by utilizing speedi-dri and sand on the affected roadway to absorb all material on surface locations. An adjacent vegetated wetland area was impacted by the spill and was cleaned up using oil-skimming vacuum trucks, petroleum absorbent pads and boom. Project was followed to completion including final waste characterization, transportation and ultimate disposal of all waste generated.

Emergency Response/Tank Overfill, Computer Manufacturing Facility
Responded to a spill involving a release of approximately 8,000 gallons of No. 2 fuel oil impacting client parking lot areas and a subsurface runoff drainage system. Techniques used in the recovery of pooled oil on paved parking lot surfaces included sand berm/containment, application of absorbent media in the drainage system, and deployment of a weighted curtain/absorbent boom on nearby waterways.

Hazardous Material Transportation
Duties included environmental compliance responsibilities such as maintaining state-issued transporter licenses and permits, manifesting and reporting requirements to various state agencies, and vehicle registration.

Environmental Compliance Management
Prepared cost estimates and contractual agreements and procured waste-stream approvals at major treatment, storage and disposal facilities. Customer relations activities involved hazardous waste characterization, evaluation and disposal option consultation.

Hazardous Material Transportation
Duties included environmental compliance responsibilities such as maintaining state-issued transporter licenses and permits, manifesting and reporting requirements to various state agencies, and vehicle registration.

Health and Safety Auditing
Conducted audits of hazardous waste treatment, storage, disposal facilities and field remediation operations for safety and health regulations compliance. Routinely inspected jobs using level B and C personal protection equipment. Assisted in the management of the health and safety program. Operations included bulk hazardous waste shipping and receiving, industrial solvent recovery, laboratory analysis, and flammable and corrosive liquids handling.

Health and Safety Program Development
Researched and developed written health and safety programs. These corporate-specific programs included policies and procedures for Accident Investigation, Respiratory Protection, Grounding and Bonding of Flammable and Combustible Liquid Transfers, Procedures for the Cleaning of Utility Manholes: PCB and Non-PCB contaminated and developed checklists to aid safety inspections and confined space entry permit auditing.

Industrial Hygiene Monitoring
Conducted various industrial hygiene functions to monitor employee exposure to toxic and physical hazards. Air monitoring included area asbestos sampling, sodium and potassium cyanide/hydrogen cyanide personnel exposure sampling and lead dust exposure sampling. Also performed area and personal noise monitoring.

SPECIAL QUALIFICATIONS

Affiliations
American Industrial Hygiene Association (AIHA)
New England Industrial Hygiene Association (NEIHA)
American Society of Safety Engineers (ASSE)
National Environmental Training Association (NETA)
Society of Toxicology (SOT), Northeast Regional Chapter
Institute of Hazardous Material Management (IHMM)

Certifications

OSHA 29 CFR 1910.120 40-Hour Safety Training (CWM, 1988)
OSHA 29 CFR 1910.120 8-Hour Refresher Training (EPA, 1989, Groundwater Technology, 1990)
OSHA 29 CFR 1910.120 8-Hour Supervisor Training (CWM, 1988, GZA, 1991)
OSHA 29 CFR 1910.120 8-Hour Refresher Training (EPA, 1989, Groundwater Technology, 1990)
OSHA 36-hour Safety Training for Site Safety Officers (CWM, 1988)
ASSE 36-hour Certified Safety Professional Review (ASSE, OSHA 8-hour Safety Training for Supervisors (CWM, 1988)
ASP, Board of Certified Safety Professionals (1990)
Certified Hazardous Materials Manager (CHMM) (1991)
Certified Environmental Trainer (CET) (1991)
Associate Safety Professional (BSCP/ASP 1990)
OSHA 8-hour Safety Training Refresher (Groundwater Technology, Inc., 1991)
OSHA 8-hour Safety Training for Supervisors (GZA, 1991)
Seminar: Safety for Line Supervisors (DuPont, 1992)
Certified Safety Professional (BSCP/CSP 1992)
Professional Engineer in Safety Engineering (Comm. of MA, 1992)

Continuing Education

RCRA 16-hour EPA Overview Seminar (Blum Assoc., 1986)
EPA 8-hour EPA Overview Seminar (Lion Tech., 1987)
EPA 16-hour Mock Emergency Drill (Lowell, MA, 1987)
ASSE 36-hour CSP Core Exam Review (ASSE, 1988)
DOT 16-hour DOT Regulation Seminar (TSP, 1989)
OSHA Record Keeping Seminar (Massachusetts Safety Council (MSC), 1990)
Back Power/Ergonomics Seminar (MSC, 1991)

Timothy L. Douthit
Geologist

EDUCATION

M.S. Geology, 1990, State University of New York at Stony Brook, Stony Brook, New York.
B.S. Geology, 1984, University of Michigan, Ann Arbor, Michigan

PROFESSIONAL PROFILE

Mr. Douthit is a geologist in the New York/Vermont district of Groundwater Technology's eastern region. Mr. Douthit is responsible for the collection and analysis of geologic data for the detailed development and evaluation of remediation technologies. As site manager of numerous petroleum retail sites, Mr. Douthit's responsibilities include the coordination and supervision of drilling activities, as well as the design, implementation and analysis of aquifer, vapor extraction and air sparging pilot tests.

PROJECT EXPERIENCE

Petroleum Retail Site Assessment, Various Sites, NY.
Supervised the installation of monitoring wells, characterized soils and sampled groundwater to assess the nature and extent of subsurface contamination.

Air Sparging/Soil Vapor Extraction Pilot Testing, Various Sites, NY
Supervised the installation of air sparge/soil vapor extraction test and monitoring points, designed and implemented the pilot test protocols and analyzed the resultant data.

Implementation of Remedial Action Plan, NY
Supervised the installation of recovery wells, designed and implemented aquifer tests and analyzed the data for four retail petroleum sites.

Conceptual Design, NY
Based on the results of pilot testing, generated the conceptual design of an air sparge/soil vapor extraction remediation system at a petroleum retail site.

SPECIAL QUALIFICATIONS

Certification
OSHA 29 CFR 1910.120 40 Hour Safety Training, November 8, 1991

OSHA 29 CFR 1910.120 8 Hour Refresher Course, June 11, 1992

OSHA 29 CFR 1910.120 8 Hour Refresher Course, May 6, 1993

Continuing Education
Seminar: Remediation Specialist Training, November 12 to October 2, 1992

Affiliations
National Ground Water Association, Association of Ground Water Scientists and Engineers division

Society of Economic Paleontologists and Mineralogists

International Association of Sedimentologists

Publications

Douthit, T.L., Hanson, G.N. and Meyers, W.J. (1990) Structure in the secular variation of seawater $^{87}Sr/^{86}Sr$ for the Ivorian/Chadian (Osagean, lower Carboniferous)(abs.). 13th International Sedimentological Congress, Nottingham, England, Abstracts of Papers, p.139.

Schoonen, M.A.A and Douthit, T.L (1992) Experimental determination of the solubility product of dolomite (abs.) Goldschmidt Conference, May 8 - 10, 1992.

Douthit, T.L., Meyers, W.J. and Hanson, G.N. (1993) Non-monotonic Variation of Seawater $^{87}Sr/^{86}Sr$ across the Ivorian/Chadian boundary (Mississippian, Osagean): Evidence from marine cements within the Irish Waulsortian Limestone. Journal of Sedimentary Petrology Vol. 63, No. 3, 539-549.

Kimberly McGhee-Gould
QA/QC Supervisor

EDUCATION

BS, Agriculture, University of Delaware

PROFESSIONAL PROFILE

Validation Chemist for the Chadds Ford District of Eastern Region. Also performs the duties of Project Chemist, field QA/QC supervisor develops quality assurance project plans (QAPjP), and provides technical assistance to all offices.

Previous experience includes activities focused on the collection of data, validation of data, and generating deliverable CLP packages by means of a computer as a Contract Laboratory Program package coordinator. Other experience includes laboratory technician work involving the analysis of soil and water samples, and validation of outside laboratory packages in the Inorganic CLP program.

PROJECT EXPERIENCE

Data Validation for Laboratory Analysis of Inorganics,
Project Validation Chemist - PA, DE, NJ, NY, MD, NC
Evaluated inorganic data for validity, taking into account several factors, including instrument calibration, spike recoveries, duplicate recoveries, blank contamination, and holding times. Also included spot checking of raw data for the possibility of transcriptional and calculational errors.

Data Validation for Laboratory Analysis of Volatile Organics, Project Validation Chemist - PA, DE, NJ, NY, MD, NC
Evaluation volatile organic data for validity, taking into account several factors such as surrogate recoveries, instrument tuning, blank contamination, matrix spike/matrix spike duplicate recoveries, and the meeting of SPCC and CCC criteria. Project also included spot checking of raw data for the possibility of transcriptional and calculational errors.

Data Validation for Laboratory Analysis of Semi-Volatile Organics, Project Validation Chemist - PA, DE, NJ, NY, MD, NC
Evaluated semi-volatile data for validity, taking into account several factors, including GC/MS tuning and performance, DFTPP ion abundance, holding times, blank analysis results, instrument calibration retention times, and internal standard results. Project also included spot checking of raw data for the possibility of transcriptional and calculational errors.

Data Validation for Laboratory Analysis of Pesticides, Project Validation Chemist - PA, DE, NJ, NY, MD, NC
Evaluated pesticide data for its validity, taking into account several factors including instrument performance, DDT retention time, DDT/Endrin degradation, calibration, linearity, blank analysis results, and quantitation results. Also include spot checking of raw data for the possibility of transcriptional and calculational errors.

SPECIAL QUALIFICATIONS

Continuing Education
Completed 40-hour Hazardous Site Safety Training Course, meeting the requirements of 29 CFR 1910.120.

American Chemical Society, Environmental Analytical Chemistry: Water and Waste Samples. New York, New York, August, 1991.

US EPA Region III 40 Hour Data Validation Course

Portable Gas Chromatography Course

Data Useability Seminar

Air Pathway Analysis at Superfund Sites

Affiliations
Member American Chemical Society

Delaware Valley Chromatography Forum

Paul Maus
Operations Manager
Geologist IV

EDUCATION

B.S., Geology, Southampton College of Long Island University, 1979

PROFESSIONAL PROFILE

Territory Manager for the Long Island District. Senior Hydrogeologist for Eastern Regional Operations. Responsibilities include technical overview on selected projects, business promotional activities and development of hydrogeologic services/technologies.

PROJECT EXPERIENCE

Superfund Sites

Preparation, negotiation and implementation of New York State Phase II superfund investigations at sites on Long Island and upstate New York. Two of these sites include landfill areas containing heavy metals, coal tar derivatives, PCB and chlorinated volatiles at sites. Presentation of the Phase II results at public meeting.

Remedial Investigation, Feasibility Study

Preparation, negotiation and implementation of remedial investigation feasibility studies at two New York State inactive hazardous waste sites.

Site Assessment

Site assessment of over 100 petroleum facilities including service stations and bulk storage terminals and refineries in New York State and Long Island.

Hydrocarbon Recovery System

Hydrogeologic investigations, conceptual design, final design and permitting, installation and operation of numerous soil vent systems, vapor abatement systems and two pump dissolved and separate-phase hydrocarbon systems on Long Island. This work includes hydrocarbon releases within, beneath and around multi story structures within the complex infrastructure of New York City.

Sanitary Landfill

State-of-the-art hydrogeologic investigation of sanitary landfills located in Suffolk County New York utilizing monitoring well networks, geophysical surveying, groundwater flow and solute transport modeling for establishing extent of leachate plumes and remediation options.

ECRA/RCRA

Preparation of ECRA/RCRA sampling plans.

Waste Management

Development and implementation of waste management program for major retail service station customer on Long Island, New York. The program developed included selection and auditing of waste disposal facilities and transporters, development of generic waste profiles, waste characterization, coordination of tank removal and UIC drywell closures with waste transporters, verification of shipments and approval of associated invoicing.

Pre Tank Pull Assessments
Developed and implemented a pretank pull soil management program that reduces the time and cost to handle contaminated soils resulting from under storage tank removals at sites on Long Island. Conducted approximately 15 pretank pull assessments of which 12 were conducted for a major oil company under a single contract within 3 months. Program involved regulatory file search, soil gas surveys, soil borings, monitoring wells, design of remedial systems installed during the tank removal and replacement, prenegotiation with NYSDEC and SCDHS of soils management program, supervision of tank removal contractors and operation and maintenance of subsequent remedial systems.

NDPES Permit
Negotiation of NDPES discharge to groundwater permit limits and monitoring requirements at sites on Long Island New York.

Chlorinated Organic Spill
Investigation of numerous chlorinated organic soils and groundwater contamination spills, designs, installation and operation of remedial systems on Long Island.

Carbonate Rock Hydrocarbon Site
Hydrogeologic investigation of numerous carbonate rock hydrocarbon sites including terminals in PA, NY and Bonaire, NV.

Northville Industries Corp.
As a project manager conducted the delineation and hydrogeological design of a multi well 1,000,000 gallon perday hydrocarbon recovery system at the Holtsville New York facility. Designed and conducted pump tests, pond permeability tests and verification of capture zones for single well and multi-well pumping recharge systems utilizing water level data, geoflow direction data, flow nets. This data was compared against a groundwater flow model as verification of the models predictability.

Verification of Capture Zone
Hydrogeological verification of capture zones for single well and multi-well pumping recharge systems utilizing water level data, geoflow direction data, flow nets and groundwater modeling techniques.

Hydrogeological Investigation
Hydrogeological investigations and design of remedial systems at numerous refineries on the east coast.

Salt Water Intrusion Investigation
Investigation of salt water intrusion on Long Island, New York and the Jersey coast.

Electromagnetic Surveying
Electromagnetic surveying of landfill leachate plumes, salt water interfaces and dissolved organic plumes.

SPECIAL QUALIFICATIONS

Affiliations
National Water Well Association

Continuing Education
Graduate credits in Hydrogeology/City College of New York

Publications
Maus, P., Wexler, E., "Ground-Water Flow and Solute Transport at a Municipal Landfill Site on Long Island, New York - Part 2: Simulation of Ground-Water Flow." Syosset, New York 1988. U.S. Geological Survey Water-Resources Investigations Report 86-4106.

Maus, P., Wexler, E., "Ground-Water Flow and Solute Transport at a Municipal Landfill Site on Long Island, New York - Part 3: Simulation of Solute Transport." Syosset, New York 1988.

Basilis N. Stephanatos, Ph.D., P.E., C.G.W.P., D.E.E., P.H.
New York/Vermont District Engineering Manager

EDUCATION

B.S. Civil Engineering, Aristotles University of Thessaloniki, Greece, 1981.
M.S., Ph.D., Civil/Environmental Engineering, University of Illinois at Urbana-Champaign, 1987.

PROFESSIONAL PROFILE

Dr. Stephanatos directs remedial engineers and technicians in comprehensive site remediation. He has more than eleven years of experience in designing waste treatment systems and in modeling air, ground water, surface water, and contaminant transport. He has modeled the transport of water, sediment, nutrients, and toxic chemicals in aquifers, lakes, streams and rivers. This experience has included modeling of remedial alternatives at uncontrolled hazardous waste sites as part of feasibility studies, modeling the transport of volatile organics in the unsaturated zone at several RCRA and CERCLA sites, and fate and transport modeling as part of risk assessment studies for numerous hazardous waste facilities. He has also modelled air emissions at numerous manufacturing facilities and waste sites.

Other responsibilities include cleanup level development and negotiation with the State and Federal Agencies, treatability studies, closure plans for landfills and other waste disposal units, SPDES and CAA permitting, design of remediation systems, solid waste facility design and permitting, and delisting of hazardous wastes. Dr. Stephanatos has participated in numerous RI/FSs and RFI/CMSs for which he managed endangerment assessment tasks, engineering feasibility tasks, development of work plans, project planning, budgeting, training, staffing, interpreting of hydrogeologic and contaminant distribution data, recommendations for additional investigations and remedial actions, recommendations for cost-effective remedial alternatives, cleanup level determination/negotiation, and the preparation of comprehensive reports.

PROJECT EXPERIENCE

Engineering Design/RCRA, CERCLA and State Experience
Designed, installed and maintained numerous groundwater pump and treat systems utilizing free product recovery, metal treatment, ion exchange, filtration, coagulation, air stripping, carbon adsorption, vacuum extraction and air sparging. Clients included Shell, Chevron, Mobil, Sun, Philips, and others.

Evaluated the performance and overall protectiveness of proposed engineering alternatives at several hazardous waste sites and determined the more cost effective design.

Lead tasks on sampling and analysis, health and environmental assessments, feasibility studies, and system design/installation. Specifically he worked at the PP&L electric plant site in Brunner Island, Pennsylvania. Contaminants included coal tar, fly ash, heavy metals, and PAHs. ECRA assessments include a manufacturing facility in Robinsville, New Jersey. Contaminants found at the site included xylenes, pesticides and heavy metals.

Dr. Stephanatos also worked at other sites throughout the United States, such as Ciba-Geigy sites in Greensboro and Charlotte, North Carolina, Honeywell Signal Analysis Center in Annapolis, Maryland, and Rohm and Haas in Bristol, Pennsylvania.

Permitted, installed, operated and maintained a large number of soil, groundwater, and air remedial systems.

Performed comprehensive feasibility studies at several hazardous waste sites.

Interfaced with both State and Federal Agencies on numerous projects regarding cleanup criteria and fate of chemicals in the various environmental media.

Developed methods for determining health-based cleanup levels in soil and groundwater underneath petroleum refinery facilities.

Performed comprehensive risk assessments at several hazardous waste sites.

Performed corrective measure studies and prepared SWMU and HWMU closure plans at several RCRA sites.

Prepared the Delisting Petitions for several hazardous waste streams, including F002, F003, F005, F006, F019 and K061 wastes.

Prepared the scope of work for the remedial design of the source control operable unit for the Sand Springs Petrochemical Complex in Oklahoma in which he interfaced with clients and EPA regarding the remedial design cleanup standards

Completed the preparation of the Environmental health and Impact Statement, the Engineering Report, and the Closure/Post-Closure Car Plan for the solid waste landfills in New Jersey, New York and Pennsylvania.

Prepared Part B permits for several manufacturing facilities.

Hydrogeologic and site design evaluation for 16 solid waste disposal facilities in the State of Illinois.

Air Quality Experience
Prepared and obtained numerous air discharge permits for remediation systems and manufacturing facilities in New York, New Jersey, and Pennsylvania.

Modelled air emissions from numerous facilities and waste sites using models such as ISCLT, ISCST, HEM, and other air transport models.

Assisted in the preparation of customized client-specific Clean Air Act Compliance manuals for several Fortune 500 manufacturing companies. The purpose of the manuals were to assist operating facilities determine the impacts of the CAAA of 1990 on facility operations.

Assisted in the preparation of SARA 312 and 313 reporting for numerous industrial facilities.

Fate and Transport Modeling
Developed modeling technologies for the determination of necessary soil clean-up levels for over thirty NPL and non-NPL sites including Sand Springs in Tulsa, Oklahoma; Tyson's in Upper Merion County and Brodhead Creek in Stroudsburgh, Pennsylvania; and the Sheridan site in Texas.

Modeled remedial alternatives at uncontrolled hazardous waste sites as part of feasibility studies.

Modeled the transport of volatile organics and metals in the unsaturated zone at several RCRA and CERCLA sites.

Investigated the erosion of stream bed and banks at a Superfund site through the use of HEC-2 and HEC-6 models.

Performed watershed and lake water quality modeling as part of an NPDES permit application.

Assessed the impacts of the Lake Michigan allocations in the Cambrian-Ordovician aquifer system in northeastern Illinois.

Modeled the transport of water and nutrients in the Mississippi River (Pool 19) as part of the Long Term Ecological Research Project.

Modeled the transport of heat, phosphorus, and other water quality parameters as part of the environmental assessment for a proposed water supply project in the State of Pennsylvania.

Modeled the transport of gasoline vapors emanating from a 1,000,000-gallon gasoline leak in Long Island, New York.

Modeled the transport of sediment and toxic substances at several lakes, streams, and rivers.

Developed comprehensive soil and sediment sampling programs at several hazardous and non-hazardous waste sites.

Assisted in the evaluation of the unsaturated zone sampling data for radioactive chemicals at a low-level waste disposal site in Illinois.

SPECIAL QUALIFICATIONS	**Registration** Registered Professional Engineer in Pennsylvania No. PE-039291-E, Virginia No. 0402-022133, Illinois No. 062-046785, Ohio No. E-55654, Maryland No. 18447, New Mexico No. 11692, Massachusetts No. 44316, New Jersey No. 44135, New York No. 69175, Vermont No. 6295, and Delaware No. 8676.

Certified Groundwater Professional (C.G.W.P.) by the NGWA No. 377.

Certified Professional Hydrogeologist (P.H.) by the American Institute of Hydrology No. 945.

Diplomate of the American Academy of Environmental Engineers (D.E.E) in Hazardous Waste Management.

Affiliations
American Society of Civil Engineers
American Chemical Society
National Ground Water Association
American Academy of Environmental Engineers
American Institute of Hydrology
American Geophysical Union
Hazardous Materials Control Research Institute
The Business Council of New York State, Inc.

Certifications
OSHA 29 CFR 1910.120 40-Hour Safety Training
OSHA 29 CFR 1910.120 8-Hour Supervisor Training

Presentations
Author of more than forty-five publications in professional conference proceedings.

Publications
Author of several proprietary numerical codes, including: AGRICULI, SOILVENT, STREAMTUBE, and SURGRO.

Mark L. Wert
Environmental Health Scientist
Risk Assessment Services, Eastern Region

EDUCATION

B.S., Urban & Regional Studies, Cornell University

Master of Regional Planning, Cornell University, candidate (pending thesis)

PROFESSIONAL PROFILE

Mr. Wert's responsibilities in the Eastern Region Risk Assessment Services include risk communication and community relations for hazardous waste sites; quantitative analysis, modeling, and data presentation for risk assessment project work; and computer systems administration for the region's networks. Mr. Wert also provides support to environmental policy projects for public clients. Mr. Wert is especially skilled in translating technical regulations and procedures into nontechnical terms and in the production of high-quality graphic materials for presentations and publications.

Prior to joining Groundwater Technology, Mr. Wert acquired more than four years of experience in environmental communications, environmental planning, and microcomputer administration. His academic background includes quantitative methods and statistical computing. Mr. Wert's previous professional experience also includes work with land development and environmental issues for town, city, and regional governments where he was responsible for policy development, permitting, site review, citizen participation, media relations, and intergovernmental coordination.

PROJECT EXPERIENCE

Environmental Communications, Community Relations Superfund Hazardous Waste Sites, EPA Region I
Mr. Wert has planned and implemented public participation/community relations programs at numerous Superfund hazardous waste sites in EPA Region I. He has written fact sheets and proposed plans under very tight deadlines and has been recognized for his responsiveness to EPA's schedules. One of his documents was recently used by EPA as a model for the training of Remedial Project Managers and state officials in Superfund community relations. Mr. Wert has experience interviewing local officials and residents to determine community concerns, and in developing community relations plans responsive to those concerns. He has been responsible for planning public meetings, designing presentation materials, producing meeting summaries, and providing advice to clients on how to improve program effectiveness.

RCRA Community Relations
Mr. Wert recently managed community relations support to EPA Region I for a RCRA Corrective Action Permit at a site where the community has been sharply critical of EPA in the past. Mr. Wert developed a public involvement program that addresses the public's confusion over the complex regulatory structure under which the plant operates.

Local Level Public Participation Campaign Design
Mr. Wert was a significant contributor to the design and implementation of the citizen participation campaign for a master plan in the Town of Acton, Massachusetts. This effort resulted in the successful adoption of a complete comprehensive zoning plan by town meeting and an award from the American Planning Association. For the effort, Mr. Wert was instrumental in the production of the high-quality booklets, fliers, and posters necessary to support this project. As part of this work, Mr. Wert also designed and administered a public opinion survey to inform the town planning council on the political feasibility of various land use policy proposals. Mr. Wert has assisted in planning for large public meetings, facilitated focus groups, and explained complex regulatory issues to affected landowners and the general public. Mr. Wert has also co-produced two television programs introducing planning issues to the general public.

Public Involvement in Permitting
As a town planner, Mr. Wert was responsible for attending public hearings to answer questions and give presentations, and for meeting with concerned citizens formally and informally regarding local zoning permits. He also provided information to local newspapers concerning commercial development activities, land use regulations, and planning efforts in the town.

Environmental Planning and Policy Hazardous Waste Site Program Evaluation
Mr. Wert compiled and analyzed quantitative data for an evaluation of the Massachusetts Department of Environmental Protection's waiver program for hazardous waste site remediation. He produced documents and graphic materials for use by MADEP at meetings with other state officials and site owners, as well as for the presentation of the project results at a professional conference.

Environmental Auditing
Mr. Wert has participated in more than a dozen environmental audits of commercial and residential facilities for private clients.

Local Groundwater Protection Zoning
Mr. Wert managed the implementation of groundwater protection district regulations for new commercial development in Acton, Massachusetts. He coordinated intergovernmental review of development projects affecting the surface drinking water supply for a neighboring town.

State and Local Environmental Permitting
Mr Wert assisted with a project to obtain underground storage tank and sewer connection permits for a fleet vehicle maintenance center. He represented the client at a City Council public hearing for the storage tank permit.

Pollution Prevention
Mr. Wert developed project ideas for reducing automobile pollution for an EPA Region I Pollution Prevention Council catalog. The catalog will be used by the Council to solicit private support for implementation of the projects.

Hazardous Waste Site Investigations
Mr. Wert is 40-hour health and safety trained. He was responsible for sampling and air monitoring as part of the field team on a soil remediation project for a private client. Mr. Wert assisted with the file review and wrote the quality assurance plan for the investigation of former underground storage tank locations at a military base. Mr. Wert also assisted with the development of the health and safety plan for a remedial design study at a Superfund site.

Local Land Data Analysis
Mr. Wert managed the preparation of a computerized land data base from town tax files for Acton, Massachusetts. He reviewed build-out calculations and analyzed data to determine the potential impact of proposed zoning regulations. Mr. Wert was also responsible for training other staff to use the database.

Jail Planning and Population Projections
Mr. Wert performed an in-depth study of jail overcrowding for Rockland County, New York. Mr. Wert prepared the final report, which included a critique of previously used inmate population projection methods, a quantitative investigation of the causes of recent inmate population trends, and recommendations regarding proposed jail expansions. Mr. Wert also assisted the Sheriff's department in its search for an automated jail management system.

Community Profile
Mr. Wert managed data compilation, design, and publication of the statistical volume of a city-wide comprehensive plan for Glendale, Arizona. This document proved so useful for public information and commercial development that it has gone through two printings.

Microcomputer Use, Management Manuals
Mr. Wert wrote a users' guide for the New Jersey Department of Environmental Protection Community Right-to-Know electronic bulletin board. The purpose of the bulletin board is to provide up-to-date information on emergency planning and hazardous materials reporting for industry, consultants, local planners, and the general public.

Management, Training
Mr. Wert has been responsible for the formal and informal training of staff; selection, installation, and management of equipment and software; and repair and trouble-shooting for IBM PCs.

Local Land Development Permitting, Site Plan Review
Mr. Wert managed commercial land development reviews for the Board of Selectmen in Acton, Massachusetts. Mr. Wert coordinated project reviews among town departments and with other town governments and state agencies. He prepared reports for the Board on zoning compliance, technical adequacy of applications, potential community and environmental impacts, and measures to mitigate those impacts. He also negotiated impact mitigation measures with developers. Mr. Wert wrote administrative regulations for commercial development applications and condominium conversion reviews that were adopted by the Board.

Regional Planning
Mr. Wert managed regional level reviews by county and state agencies of site plans, subdivisions, and zoning ordinances from the 22 municipalities in Rockland County, New York.

SPECIAL QUALIFICATIONS

Certifications
OSHA 29 CFR 1910.120 40-Hour Safety Training

Publications
Neil M. Ram, Sara Weinstein, Elizabeth G. Read, and Mark L. Wert, 1991, "Evaluation of the Massachusetts Waiver Program and Waste Site Cleanup Program Improvements", paper presented at the Hazardous Materials Control conference in Boston, Massachusetts.