PHILIPS DISPLAY COMPONENTS COMPANY
SENECA FALLS, NY
RCRA FACILITY ASSESSMENT SAMPLING VISIT WORK PLAN / RCRA FACILITY INVESTIGATION OF THE MW-1 AREA

QUALITY ASSURANCE PROJECT PLAN (QAPjP)

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PROJECT NO. 288788

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SIGNATURE PAGE
Quality Assurance Project Plan (QAPjP)

Project Title: **RCRA Facility Assessment Sampling Visit Work PLAN**
RCRA Facility Investigation of the MW-1 Area
Philips Display Components Company, Inc.
Seneca Falls, New York Site

Prepared by: **Keystone Environmental Resources, Inc.**

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Appendix C	SPDES Permit - Philips Display Components Company, Seneca Falls, New York.
Appendix D	Certification for Documentation of Use of Appropriate Bottle Precleaning Requirements from Sample Bottle Vendor

Official copies of this document and any subsequent revisions, if necessary, will be sent to:

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1.0 INTRODUCTION

The purpose of this Quality Assurance Project Plan (QAPjP) is to document the procedures and criteria that will be used to provide accurate, precise, comparable, representative and complete data during the performance of the RCRA Facility Assessment and Investigation Phases of work at the Philips Display Components Company site in Seneca Falls, New York.

The procedures and criteria that will be used to accomplish the work objectives will be responsive to requirements of the U.S. Environmental Protection Agency (U.S. EPA) and the New York State Department of Environmental Conservation (NYSDEC). The work objectives are summarized in Section 2 of this document. Requirements of the U.S. EPA and NYSDEC are based on several sources including U.S. EPA and NYSDEC guidance documents [e.g. Interim Guidelines and Specifications For Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980; U.S. EPA Region III Quality Assurance Branch QAPjP Workshop Participant Workbook, February 27, 1990; and NYS Department of Environmental Conservation (Division of Hazardous Substances Regulation) RCRA Quality Assurance Project Plan Guidance, January 19, 1990].

In general, the QAPjP addresses: a) the quality assurance (QA) objectives of the project; b) specific QA and quality control (QC) procedures that will be implemented to achieve these objectives; and c) project organization and responsibility. These three areas are addressed in the QAPjP for the field work and laboratory analysis aspects of the project in accordance with requirements of the U.S. EPA which focus on the acquisition of environmental data of known and acceptable quality.

2.0 PROJECT DESCRIPTION

The primary objective of the investigation at the Philips Display Components Company's Seneca Falls, NY facility is to define the nature and extent of the potential constituent impact at the site. This investigation will be undertaken at 1) Work areas described in the document entitled "RCRA Facility Assessment Sampling Visit Work Plan" prepared by Keystone Environmental Resources, May 1990 (hereafter referred to as RFA SVWP); and 2) the MW-1 area which has been identified as part of the RCRA Facility Investigation Work Plan (hereafter referred to as RFIWP). Sections 2.1 and 2.2 describe the current site conditions and give some perspective on past operations at the facility. In addition, they provide the rationale for choosing sampling locations and analytical parameters of interest along with the number of samples to be taken. These will be summarized in Tables 2-1 and 2-2 for the RFA SVWP and RFIWP, respectively.

2.1 Site Description

Philips Display Components Company operated a facility in the village of Seneca Falls, New York. A schematic plan view of the facility is shown in Figure 1 in Volume I, Management Plan. The facility is bordered by Van Cleef Lake and the Seneca River/Barge Canal to the south, undeveloped and agricultural areas to the north and east, and residential area to the west.

The plant facility is underlain by glacial till deposited as a result of Wisconsinian Glaciation and ranges in depth from 21 to 37 feet beneath the surface. Site topography across the site is generally flat with ground surface decreasing in elevation towards the barge canal.

The facility was used to manufacture color television tubes and served as headquarters for other Philips operations. Hazardous waste was generated in television glass and metal tube component fabrication, cleaning, finishing, coating, and tube salvage operations.

TABLE 2-1
RFA SVWP
ON-SITE SOIL AND UNDERGROUND SEWER LEAK TEST WATER SAMPLE ANALYSIS SUMMARY

Area/Matrix	Samples Per Location	No. of Locations	Parameter	Analytical Method	Detection Limit (ppb)	DQO Level	(5) Duplicates	Field Blanks	Rinsate Blanks	Trip Blanks	Total No. of Sample Analyses
Primary Storage Area/Soils	2	4	Chromium	SW6010	1000	III	1	-	1	-	10
			Lead	SW7421	500						
			Aromatic Volatiles(1)	SW8020	20-30						
			Halogenated Volatiles(2)	SW8010	2-25						
Interim Storage Area/Soils	2	2	Chromium	SW6010	1000	III	-	-	1	-	5
			Lead	SW7421	500						
			Aromatic Volatiles(1)	SW8020	20-30						
			Halogenated Volatiles(2)	SW8010	2-25						
Satellite Stoage Area-Loading Dock/Soils	2	3	Chromium	SW6010	1000	III	-	-	1	-	7
			Lead	SW7421	500						
			Aromatic Volatiles(1)	SW8020	20-30						
			Halogenated Volatiles(2)	SW8010	2-25						
Fuel Oil Tank/Soils	2	3	Total Petroleum Hydrocarbons	SW8015(3)	NA	III	1	-	1	-	8
Open Burning Area/Soils	4	6	Aromatic Volatiles(1)	SW8020	20-30	III	1	-	1	-	26
			Halogenated Volatiles(2)	SW8010	2-25						
PCB Capacitor Area Soils	2	4	Polychlorinated Biphenyls	SW8080	80-160	III	1	-	1	-	10
Room 7A-Bldg 13 Drain Soils	2	1	Fluoride(4)	EPA 340.2	100	III	-	-	1	-	3
			Cadmium	SW6010	500						
			Chromium	SW6010	1000						
			Lead	SW7421	500						
			Zinc	SW6010	2000						
			pH	SW9045	-						
Room 6A-Bldg 13 Sump/Soils	2	1	Fluoride(4)	EPA 340.2	100	III	-	-	1	-	3
			Cadmium	SW6010	500						
			Chromium	SW6010	1000						
			Lead	SW7421	500						
			Zinc	SW6010	2000						
			pH	SW9045	-						
Room 4A-Bldg Sump Soils	2	1	Fluoride(4)	EPA 340.2	100	III	-	-	1	-	3
			Cadmium	SW6010	500						
			Chromium	SW6010	1000						
			Lead	SW7421	500						
			Zinc	SW6010	2000						
			pH	SW9045	-						

TABLE 2-1
RFA SVWP
ON-SITE SOIL AND UNDERGROUND SEWER LEAK TEST WATER SAMPLE ANALYSIS SUMMARY

Area/Matrix	Samples Per Location	No. of Locations	Parameter	Analytical Method	Detection Limit (ppb)	DQO Level	(5) Duplicates	Field Blanks	Rinsate Blanks	Trip Blanks	Total No. of Sample Analyses
Former Degreaser Area-Bldg 11/ Soils	2	2	Fluoride(4)	EPA 340.2	100	III	1	-	1	-	6
			Cadmium	SW6010	500						
			Chromium	SW6010	1000						
			Lead	SW7421	500						
			Zinc	SW6010	2000						
			pH	SW9045	-						
			Aromatic Volatiles(1)	SW8020	20-30						
			Halogenated Volatiles(2)	SW8010	2-25						
Lead Treatment Room-Bldg 7A/ Soils	2	6	Fluoride(4)	EPA 340.2	100	III	1	-	1	-	14
			Cadmium	SW6010	500						
			Chromium	SW6010	1000						
			Lead	SW7421	500						
			Zinc	SW6010	2000						
			pH	SW9045	-						
Bldg 9A Sump/Soils	2	4	Fluoride(4)	EPA 340.2	100	III	-	-	1	-	9
			Cadmium	SW6010	500						
			Chromium	SW6010	1000						
			Lead	SW7421	500						
			Zinc	SW6010	2000						
			pH	SW9045	-						
Underground Sewer Leak Test Water - Sewers in Bldgs. 13, 13A to Outside Lift Station & luent Lines	2	3(6)	Fluoride	EPA 340.2	100	III	1	-	1	-	8
			Cadmium	EPA 200.7	5						
			Chromium	EPA 200.7	10						
			Lead	EPA 239.2	5						
			Zinc	EPA 200.7	20						
			pH	EPA 150.1	-						

(1) Aromatic volatile compounds toluene, benzene, ethylbenzene, and total xylenes only.

(2) Halogenated volatile compounds 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethene, methylene chloride, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, and vinyl chloride only.

(3) TPH analysis performed by extraction using SW3540 and analysis using a gas chromatograph with flame ionization detector (GC/FID).

(4) Fluoride analysis performed by extraction using a shake method described in Keystone's Analytical Division Laboratory Standard Operating Procedure and analysis by the stated method.

(5) The number of rinsate blanks and duplicates to be taken per media is estimated as the exact number will be based on the number of samples taken per day and the groupings of areas by analysis and by media.

(6) One leak and one flush water sample for each of the three sewer sections will be sampled.

TABLE 2-2
RFIWP
SAMPLE ANALYSIS SUMMARY FOR THE MW-1 RFI AREA

Area/Matrix	Samples Per Location	No. of (1) Locations	Parameter	Analytical Method	Detection Limit (ppb)	DQO Level	(7) Duplicates	Field Blanks	Rinsate Blanks	(7) Trip Blanks	Total No. of Sample Analyses
Area around MW-1/Soil gas	1	96(2)	Halogenated Volatiles(3)	EPA 601(4)	0.1-1.0	II	3	3	-	3	65
Area around MW-1/Groundwater	2(5)	20-28(5)	Volatile Organics	SW8240	5-100	III	2(6)	-	2(6)	2(6)	46-62
Area around MW-1/Soils	0-5(8)	2-6(8)	Aromatic Volatile Organics Halogenated Volatile Organics	SW8020 SW8010	20-30 2-25	III	0-2	-	0-2	0-2	0-36

(1) The number of locations for the RFI WP are presently estimates. Definitive totals will be based on constituents detected in field screening.

(2) 5 of the 96 soil gas samples will be analyzed in the field as part of the Feasibility Phase of the soil gas survey. If the survey is determined to be feasible, 51 additional soil gas samples will be taken. If the plume is shown to extend beyond the current grid, an additional 40 soil gas samples will be taken on a larger grid.

(3) Halogenated volatile compounds 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, trichloroethene, methylene chloride, cis-1,2-dichloroethene, and trans-1,1-dichloroethene only.

(4) The field screened samples will be analyzed by a portable GC and the remaining samples will be analyzed by the subcontractor's dedicted fixed base laboratory by GC with an electron capture detector.

(5) Groundwater samples will be taken in two sampling rounds from each of the installed monitoring wells as well as the 16 previous monitoring wells. Three to six well "nests" (1 shallow and 1 deep well) will be installed, based on constituents detected in the soil gas survey for the MW-1 area. Thus, the number of sample locations for the monitoring wells sampled during well construction will be between 22 and 28. Three well nests will be installed if the survey is successful and four to six well nests will be installed if the survey is not successful. If the soil gas survey indicates volatile constituents are restricted to the MW-1 area, only two monitoring wells will be installed.

(6) The number of duplicates and blanks for the groundwater is based on the two sampling rounds, with one duplicate , one rinsate blank, and one trip blank per sampling round.

(7) The number of duplicates and trip blanks to be taken per media is estimated as the exact number will be based on the number of samples taken per day and the groupings of the media.

(8) Only the shallow monitoring wells of the well "nest(s)" will be sampled for soils. Each of the samples taken in the test borings will be field screened with an HNU and only those samples 5 ppm over background will be sent for analysis.

2.2 Site Conditions

Sylvania manufactured television picture tubes at this facility from 1948 to 1971. The facility was then sold to GTE in 1971, who in turn sold it to Philips in 1981. Philips stopped manufacturing at the facility in 1986 and sold it to Seneca County in 1989. The original manufacturing by Sylvania was done in buildings 7, 7A & 8. Through the years, the manufacturing was moved to buildings 9 through 13A.

The closure plan for the facility includes the removal of all hazardous solid wastes from all units, in addition to liquids and materials which may have come into contact with the hazardous waste. Soil sampling is required beneath sumps and pits within the facility that contained hazardous process water and where releases may have occurred. Soil sampling is also required within the Primary and Interim Storage Areas, the Open Burning Area, the Former PCB Capacitor Area, and at locations of underground storage tanks.

Six monitoring wells were originally installed around the two hazardous waste management units as part of the RCRA monitoring program at the Seneca Falls facility. Because of the complex hydrogeology and natural geochemistry the wells yielded insufficient water for proper monitoring under the RCRA program. The NYSDEC required Philips to install additional monitoring wells in order to provide for sufficient monitoring of the impoundments. As a result, 16 wells have been installed at the Seneca Falls facility under the RCRA monitoring program.

RCRA closure of the two impoundments occurred in 1987. Groundwater monitoring has continued as part of the post closure requirements. The post-closure quarterly monitoring program includes determination of the groundwater flow pattern and sampling for common groundwater ions and heavy metals. At the request of the NYSDEC, volatile organic analysis is being performed on groundwater samples to provide background data under the Corrective Action Program. The data continues to support the conclusion that no hazardous constituents have entered the groundwater due to the RCRA regulated impoundments.

The underground sewers in the older manufacturing buildings may have received hazardous wastes prior to Philips' ownership. It is believed that these early floor drains are constructed from unsealed terra cotta pipe. Many of the original sumps, pits, and their drains in the original sewer system were filled with concrete prior to Philips' ownership. The segregated sewer systems in the newer buildings were installed during GTE ownership. Investigation of the original sewer system will be addressed in a supplemental QAPjP and sampling visit work plan.

All the existing sumps and pits in the facility and the wastewater treatment plant (WTP) were previously high pressure washed. The sumps, pits, and WTP are visually clean, free of residue, and do not require additional washing. Philips flushed the underground sewers that handled hazardous wastewaters from the sumps in buildings 13 and 13A to the outside Lift Station No. 1 sump until analysis of the flush water samples collected at the Lift Station sump met the facilities SPDES permit requirements (Appendix C). Philips also static water pressure leak tested these underground sewers in buildings 13 and 13A and found no measurable leakage. After these underground sewer lines are retested for leakage as part of the sampling visit, the water flushed to the Lift Station sump will be drummed, sampled, and analyzed for the parameters shown in Table 2-2. If the analyses reveal the rinse water concentrations exceed SPDES permit levels, the sewer lines will be rerinsed and reanalyzed until the permit levels are met.

These tests are further described in Section 5.0 of this document, the Sewer Evaluation Report (Keystone, August, 1990) and WTP Decommission Report (Keystone, August, 1990).

Sampling under the RFA SVWP and RFIWP investigations will be covered in this document with regards to quality assurance/quality control procedures pertaining to field activities and laboratory analyses. Under the RFA SVWP, surface and subsurface soils will be evaluated in areas around and inside the facility where materials and waste were either produced, utilized, or stored including areas in the sumps and pits where wastes were collected for transfer to the wastewater treatment plant. Additionally, the recleaning and rinse water sampling events will be evaluated under the RFA SVWP. Data obtained from the RCRA Facility Assessment will be used for site characterization. A tentative schedule for this investigation is presented in the RFA SVWP Management Plan (Vol. I), which highlights the benchmarks of progression of the investigation.

Activities outlined in the RFI Work Plan (July, 1990) constitute assessments around the MW-1 monitoring well east of Building 13A and north of the former Wastewater Treatment Plant. Initially, a soil gas study will be performed in order to screen the surrounding area for potential constituents of concern. Additional monitoring wells will be installed for a more in-depth evaluation of the surrounding groundwater and constituent impact. Data obtained from the RCRA Facility Investigation will be used for additional site characterization and for a preliminary evaluation of remedial alternatives. A tentative schedule for this investigation is presented in the RFIWP, which highlights the benchmarks of progression of the investigation.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The following section describes the duties of key personnel assigned to the RCRA investigation at the Philips Display Components Company site Seneca Falls, New York.

Project Manager - Henry Owoc (Keystone) (412) 825-9821

The Project Manager will be the primary point of contact and will have primary responsibility for technical, financial and scheduling matters. His duties will include:

- Procurement, along with administrative personnel, and supervision of subcontractor services;
- Assignment of duties to, and orientation of the staff to the needs and requirements of the project;
- Review of subcontractor work and approval of subcontract invoices;
- Establishment of a project record keeping system;
- Review of all major project deliverables for technical accuracy and completeness; and,
- Project closeout.

Team Leader/Sampling Coordinator - Gianni Chieruzzi (Keystone) (412) 825-9820

The Team Leader will be responsible for field activities and data evaluation, including items as follows:

- Supervising the collection of the samples and providing for their proper documentation, handling and shipping;

- Maintaining a completion log for each borehole and monitoring well installed;

- Monitoring the drilling and sampling operations to verify that the drilling subcontractor and sampling team members adhere to the QAPjP;

- Coordinating activities with the Project Manager; and

- Preparing and presenting the relevant field investigation data.

Laboratory Director - Penny Gardner (Keystone) (412) 825-9767

Responsibilities of the Laboratory Director include:

- Collaborating with the project management in establishing sampling and testing programs;

- Serving as liaison between the laboratory and other project personnel;

- Serving as the "collection point" for reporting of nonconformances and changes in laboratory activities;

- Notifying the laboratory and project management of specific laboratory nonconformances and changes;

- Maintenance of laboratory data;

- Releasing of testing data and results; and,

- Responsible for laboratory and data activities by the analytical services staff.

Site Health and Safety Officer - James Thomas, II (Keystone) (412) 825-9639

The Site Health and Safety Officer (SHSO) will be responsible for verifying that project personnel adhere to the site safety requirement. These responsibilities include:

- Conducting the health and safety training for project personnel and subcontractors, as appropriate;
- Modifying health and safety equipment or procedure requirements based on data gathered during the site work;
- Determining and posting locations and routes to medical facilities, including poison control centers; and arranging for emergency transportation to medical facilities;
- Notifying local public emergency officers, i.e., police and fire departments, of the nature of the field operations and posting their telephone numbers;
- Observing work party members for symptoms of exposure or stress;
- Providing first aid if necessary on-site; and,
- Performing site audits to verify adherence to the requirements of the project health and safety plan.

The SHSO has the authority to stop any operation that threatens the health or safety of the team or surrounding populace. The daily health and safety activities may be conducted by the SHSO or his designee.

4.0 QUALITY ASSURANCE OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements to ensure that data of known and appropriate quality are obtained during investigative activities. Data obtained from the RCRA Facility Assessment will be used for site characterization. Data obtained from the RCRA Facility Investigation will be used for additional site characterization and for a preliminary evaluation of remedial alternatives.

4.1 Data Quality Levels

There are five analytical levels of data quality available to accomplish the objectives of the investigation. They are:

o	Level I -	field screening
o	Level II -	field analysis
o	Level III -	SW-846 RAS methods
o	Level IV -	non-standard methods
o	Level V -	physical property and engineering material analysis

Levels II and III procedures are planned for this project. Section 4.2 describes the use of these analytical levels.

4.2 Non-CLP Laboratory Methods

4.2.1 Level III Analyses

Level III analysis will be performed for those parameters where the rigid CLP reporting is not necessary to accomplish the objectives of the investigation. Level III analyses will still receive rigorous QA/QC protocols and documentation as described in the appropriate SW-846 methods (3rd Edition). The following analyses will receive Level III analytical treatment.

Soils

Cadmium	SW6010
Chromium	SW6010
Lead	SW7421
Zinc	SW 6010
Fluoride	EPA 340.2
Total Petroleum Hydrocarbons	SW 8015
pH	SW 9045
Polychlorinated Biphenyls	SW8080
Toluene	SW 8020
Benzene	SW 8020
Ethylbenzene	SW 8020
Xylenes	SW 8020
1,1,1-Trichloroethane	SW 8010
1,1,2-Trichloroethane	SW 8010
Trichloroethene	SW 8010
Methylene chloride	SW 8010
Vinyl chloride	SW 8010
Cis-1,2-dichloroethene	SW 8010
Trans-1,2-dichloroethene	SW 8010
1,1-Dichloroethene	SW 8010
1,1-Dichloroethane	SW 8010
1,2-Dichloroethane	SW 8010

Underground Sewer Leak Test Rinse Water (SPDES methods) ok

Fluoride	EPA 340.2	electrode
Cadmium	EPA 200.7	ICP
Chromium	EPA 200.7	ICP
Lead	EPA 239.2	furnace
Zinc	EPA 200.7	ICP
pH	EPA 150.1	meter

TCE for SPDES, semivolatiles ?? in soils

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

Groundwater

Volatiles	SW 8240 ok

4.2.2 Level II Analyses

Level II analysis will be performed for those parameters where the rigid CLP or fix-based laboratory reporting is not necessary and field analysis is rapid and sufficient for qualitative analysis. The following analyses will receive Level II analytical treatment.

Soil Gas

1,1,1-Trichloroethane	field analysis/EPA 601
1,1,2-Trichloroethane	field analysis/EPA 601
1,1-Dichloroethane	field analysis/EPA 601
1,1-Dichloroethene	field analysis/EPA 601
1,2-Dichloroethane	field analysis/EPA 601
Trichloroethene	field analysis/EPA 601
Methylene chloride	field analysis/EPA 601
cis-1,2-Dichloroethene	field analysis/EPA 601
trans-1,2-Dichloroethene	field analysis/EPA 601

The soil gas samples will be analyzed either by a portable gas chromatograph or by a fixed base direct injection gas chromatograph with an electron capture detector (GC/ECD) utilizing EPA methods specified by the soil gas dedicated analytical laboratory as shown in Appendix A - Section III.

4.3 Quality Control Parameters

The following sections define the detection limits and data precision, accuracy, and completeness that will be maintained throughout the project:

- Detection limit - The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. (Analytical methods to be utilized and their associated detection limits are listed on Table 2-1).

- Precision - A measure of the mutual agreement among individual measurements of the same property under prescribed similar conditions. Precision is determined based on the relative percent difference (RPD) of duplicate spikes as appropriate. (See Section 12.1 for method of calculation).

- Accuracy - The degree of agreement of a measurement with an accepted reference or true value. Accuracy is determined by calculating the percent recovery of spiked samples. (See Section 12.2 for method of calculation).

- Representativeness - The sampling program is designed to ensure the analytical data obtained during the investigation represent conditions found at the site. Sample locations were selected to ensure soil, groundwater, and underground sewer leak test rinse water analytical data are suitable for the intended use and adequately characterize the site. A sufficient number of samples will be obtained to ensure site conditions are appropriately assessed. (A sample summary is presented on Table 2-1).

- Completeness - A measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. (See Section 12.3 for method of calculation). The following rationale were used for developing the completeness objectives:

  - Level III analyses being used as general indicators for characterization that are specific for site assessment will have a minimum completeness of 100% as required by the NYSDEC RCRA Guidance Document.

  - Level II analyses (soil gas field test) being used as general indicators for assessment of the potential extent of volatile constituents will have a minimum completeness of 80%.

- o Comparability - One of the objectives of the investigation is to ensure analytical data are of comparable quality. The data collection mechanisms proposed are designed to produce comparable data. To ensure comparable data, standard recognized analytical methodologies will be followed.

  To ensure comparability between samples over time, consideration will be given to seasonal conditions, flow or other environmental factors that may influence the analytical results.

Table 4-1 gives the target limits for all analyses in terms of precision, accuracy and completeness.

For compounds analyzed by GC, precision and accuracy criteria are given only for selected analytes to be used in spiking for method control purposes. Any parameter that does not have method specified precision and accuracy criteria are not included. All technical and analytical criteria are presented in the Technical Specifications Statement for Soil Gas Survey (Appendix A) for the soil gas samples.

TABLE 4-1

QUALITY ASSURANCE CRITERIA

Completeness Parameter	Method	Matrix	Matrix Spiking Level (ppb)	Precision (RPD)	Accuracy (%)	(%)
Benzene	SW 8020	soil	100	21	69-108	100
Toluene	SW 8020	soil	100	21	56-115	100
Trichloroethene	SW 8010	soil	100	24	62-137	100
1,1-Dichloroethene	SW 8010	soil	100	22	59-172	100
Cadmium	SW 6010	soil	50	20	75-125	100
Chromium	SW 6010	soil	200	20	75-125	100
Lead	SW 7421	soil	20	20	75-125	100
Zinc	SW 6010	soil	500	20	75-125	100
pH	SW 9045	soil	-	-	-	100
Cadmium	EPA 200.7	rinse water	50	20	75-125	100
Chromium	EPA 200.7	rinse water	200	20	75-175	100
Lead	EPA 239.2	rinse water	20	20	75-125	100
Zinc	EPA 200.7	rinse water	500	20	75-125	100
pH	EPA 150.1	rinse water	-	0.2 units	-	100
1,1-Dichloroethene	SW 8240	groundwater	50	14	61-145	100
Trichloroethene	SW 8240	groundwater	50	14	71-120	100
Chlorobenzene	SW 8240	groundwater	50	13	75-130	100
Toluene	SW 8240	groundwater	50	13	74-109.6	100
Benzene	SW 8240	groundwater	50	11	79.2-107.7	100

ok

some better than 8240 limits

5.0 SAMPLING EQUIPMENT AND PROCEDURES

In order to achieve the objectives of the RCRA Facility Closure work and obtain site specific information as outlined in Section 4.0 of the SVWP, Vol. II, the following matrices will be investigated at the Seneca Falls, NY site:

- soil sampling
- underground sewer leak test water sampling
- soil gas sampling (as part of the RFI)
- groundwater sampling (as part of the RFI)

The number and location of the samples from each matrix are presented below as described in SVWP, Vol. II, Section 4.0 and the RFIWP.

Area	Number of Samples	Matrix
SVWP		
Primary Storage Areas - SO1A and SO1B	8	Soil
Interim Storage Area - S01D	4	Soil
Open Burning Area	24 *	Soil
PCB Capacitor Storage Area	8	Soil
Fuel Oil Loading Dock	6	Soil
Underground Fuel Oil Tank	6	Soil
Sumps and Drains in Buildings 7A, 7B, 8, 9, 11, and 13	30	Soil
Underground Sewer Leak Test Water in Buildings 13, 13A, to Outside Lift Station and Two 6" WTP Effluent Lines	6	Rinse Water
RFIWP		
Soil Gas Investigation near MW-1	96 *	Soil gas
Groundwater Investigation near MW-1	62 *	Groundwater
Soil Investigation of Shallow MW-1 Monitoring Wells	36 *	Soil

ok

* Represents the maximum number of samples possible for this area and media.

The Primary and Interim Storage Areas, Open Burning Area, PCB Capacitor Storage Area, Fuel Oil Loading Area, Underground Fuel Oil Tank and Sewer Leak Test Water Areas are all being evaluated during the RCRA Facility Assessment. The Soil Gas Survey and subsequent Groundwater Sampling around the area of MW-1 are being evaluated during the RCRA Facility Investigation. This document serves as the Quality Assurance Project Plan for both of these investigations.

5.1 Sample Identification System

Each sample collected at the Philips site will be assigned a unique sample tracking number. The sample tracking number will consist of a three-segment alphanumeric code, which identifies the site, the sample matrix, the sampling location, the sampling event, and the specific sample type. Any other pertinent information regarding sample identification will be recorded in field sampling logbooks.

The alphanumeric code used in the sample identification system is explained in the following diagrams and subsequent designations.

(First Segment)		(Second Segment)		(Third Segment)	
AAA(A)	-	AAN	-	NN	A
Specific Location		Sample Matrix or Boring (if applicable)		sample event	sample qualifier (optional)

A - Alpha designation
N - Numeric designation

Specific Location:

The location of a given sample will be a unique abbreviation based on the name of the area sampled (i.e, OBA - Open Burning Area, etc.).

Sample Matrix:

SB - Soil boring
GW - Groundwater
SR - Sewer rinse test water
RB - Rinseate blank
TB - Trip blank
FB - Field blank

The numeric designation for sample matrix will apply to groundwater samples to designate the appropriate quarterly sampling round.

Sampling Event:

Sampling events will be numbered in sequence beginning with "01".

Sample Qualifier:

A sample may also have a qualifier "D" to distinguish a field duplicate sample from the original sample taken at a specific location.

An example of a sample identification number for a subsurface soil sample collected at area SO1D for the first time at the first boring is as follows:

SO1D-SB1-01

It's duplicate sample would be:

SO1D-SB1-O1D

A first sample from the same area but different boring would be identified as:

SO1D-SB2-01

Labeling a sample in this fashion allows for identification and sorting by data manipulating computer programs and easy identification by the end user.

5.1.1 Sample Labeling

Each sample container will be marked with a color coded label identifying the specific parameters of interest. The label will record the date of sample collection, alphanumeric identification, parameters to be analyzed, and preservatives, if applicable. Sample bottles will be prelabelled by the laboratory to avoid unnecessary delays.

5.2 Sample Container and Equipment Preparation

The following procedures for the sample container and equipment preparation (and decontamination) will be performed during all phases of each investigation. Quality assurance measures will be employed to ensure the cleanliness of the containers and equipment.

Demonstrated Analyte-Free Water

Water that will be used for the preparation of blanks and for decontaminating sampling equipment and containers must be ASTM II deionized water demonstrated to be analyte-free. The criteria for analyte-free water are the Method Detection Limits as stipulated in SW-846 for the most sensitive method to detect the analytes. Specifically for the common laboratory contaminants (Methylene Chloride, Acetone, Toluene, 2-Butanone, and Phthalate esters), the limits are set at three times the respective MDLs determined by the most sensitive analytical method. This preparation and demonstration of analyte-free water will be performed by Keystone's Analytical Laboratory prior to the field team's departure for the site sampling visit.

Sample Container Preparation

All sample containers required for this project will be new and precleaned by the bottle vendor according to NYSDEC protocol (as outlined in Table 5-1), and will not be reused. Certification for appropriate cleaning procedures is presented in Appendix D. Trip blanks will be prepared and analyzed to verify the cleanliness of the sample container.

Equipment Cleaning Procedures

Equipment prepared in Keystone's laboratory will be cleaned following the procedures outlined below. Cleaning and/or decontamination performed in the field will comply with NYSDEC protocol. The field decontamination procedures will be outlined in the specific sub-sections of this section.

Stainless Steel Bailer and Funnel Preparation

1. All dedicated stainless steel bailers and porcelain buchner funnels are cleaned and prepared after each use by following the procedures below:

   A) Wash with tap water and non-phosphate detergent.
   B) Tap water rinsed, 3 times with hot water.
   C) Rinse with a 10% nitric acid solution.
   D) Rinse with tap water four times.
   E) Rinse with pesticide grade methanol, acetone, and finally methanol again.
   F) Rinse with demonstrated analyte-free water.
   G) Heat for one hour at 800 degrees Fahrenheit.
   H) Wrap in aluminum foil.

2. All miscellaneous equipment such as shovels, soil trowels, and stainless steel parts of other pieces of equipment are cleaned using the procedures A) through F) outlined above, air dried and wrapped with aluminum foil and polyethylene.

TABLE 5-1

SAMPLE CONTAINER CLEANING PROCEDURES AND SAMPLE PRESERVATION METHODS (OR PROCEDURES)

Parameter	Matrix	Preservative	Sample Container	Cleaning Procedure
Metals	water	HNO_3 to pH <2 and cool to 4°C	1 liter plastic	1
Volatile Organics	water	cool to 4 °C	40 ml glass vial with teflon septum	2
Fluoride	water	cool to 4 °C	500 ml plastic	3
TPH / PCBs	water	cool to 4 °C	1 liter amber glass	4
Metals	soil	none required	8 oz. glass container	1
Volatile Organics	soil	cool to 4 °C	40 ml glass vial with teflon septum	2
Fluoride	soil	cool to 4 °C	8 oz. glass container	3
TPH / PCBs	soil	cool to 4 °C	8 oz. glass container	4
Volatile Organics	soil gas	5	glass vial	3

1. Use new bottle; wash container and closure with hot water using non-phosphate detergent; rinse 3 times with hot tap water; rinse with 1:1 nitric acid and drain; rinse with demonstrated analyte-free water and drain thoroughly; air dry; and cap.

2. Use new bottle; wash containers and closure with hot tap water using non-phosphate detergent; rinse, three times with hot tap water; rinse three times again with demonstrated analyte-free water; oven dry containers, septa and liners at 105 °C for one hour; air dry caps; and cap while hot.

3. No cleaning required. Use new bottle or vial depending on quantities required by the laboratory for analysis.

4. Use new 1 liter amber glass or 80 oz. jar for water and 8 oz jar for soils; wash container and closure with hot tap water using non-phosphate detergent; hot tap water rinse three times; rinse jar and teflon lined closure with pesticide grade acetone followed by a hexane rinse; rinse three times with demonstrated analyte-free water; oven dry for one hour at 105 °C (containers); air dry caps, and cap when dry.

5. No additive as preservative. Glass vial is pre-evacuated, self-sealed, and encapsulated at two atmospheres (15 psi) pressure. The sampling system is entirely "closed" from the probe tip to the glass vial to prevent the loss of volatiles (Soil Gas Technical Specifications. - Appendix A).

NYSDEC. RCRA Quality Assurance Project Plan Guidance Document. January 19, 1990.

Federal Register, Vol. 49, No. 29, 1984, p. 43260.

U.S. EPA. 1982. Test Methods for Evaluating Solid Waste. 3rd ed.SW-846.

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To verify that no contaminants are introduced from sampling equipment, a field (equipment) blank is collected by filling or pumping distilled water demonstrated to be analyte-free through the sampling device and analyzing the water for the compounds of interest. One field (equipment) blank is collected each day sampling is performed on one piece of equipment per batch of equipment type cleaned.

5.3 Underground Sewer Leak Test Water Sampling

The underground sewers in buildings 13 and 13A and the 75 foot long and 300 foot long sections of 6" RCP pipe form the Wastewater Treatment Plant (WTP) to the first manhole and from the first to the second manhole will be retested for static water leakage in accordance with the procedure in the Sewer Evaluation Report. After the leak tests, the water drained from the sewer to the Outside Lift Station No. 1 sump and from the two 6" RCP pipe sections to the end manhole will be representatively sampled and submitted for analysis of the parameters listed in Table 2-2. The leak test will be securely contained until the analysis of the water are available and a disposal option can be chosen. If the SPDES permit levels are not met (see Appendix C for the SPDES permit levels), the sewer section will be flushed and retested until the permit levels are met. 2-1

The sample containers for the sewer leak test rinse water will be precleaned and prepared according to the procedures outlined on Table 5-1. All samples will be handled and shipped in accordance with the sample handling and chain-of-custody procedures outlined in Sections 5.7 and 5.8.

5.4 Soil Sampling

Soil boring samples will be collected using split spoon sampling techniques following hollow-stem augering as described in Appendix I of the SVWP Vol. II and Appendix B of the RFIWP (Standard Operating Procedure EXP-3, Soil and Borings ; Standard Operating Procedure EXP-4, Soil and Rock Boring Sample Logging; or Standard Operating Procedure EXP-5, Subsurface Soil Sampling, as applicable) . There is also provisions in the prior SOP for hand drilling and sampling which may be applicable to this project. The soil samples will be collected from the following areas:

- Primary Storage Areas
- Interim Storage Area
- Satellite Storage Area
- Underground Storage Tank Area
- Sumps and Drain Area (Identified in site visit with NYSDEC)
- PCB Capacitor Storage Area
- Open Burning Area
- Shallow MW-1 Monitoring Wells During Installation

The number of samples, location and depth of sampling and analysis parameters of interest for each sample will be in accordance with the procedures outlined in the SVWP, Vol. II and the RFIWP. The soil samples from each area will be analyzed for the parameters listed in Table 2-1 and 2-2.

All soil samples collected from the Open Burning Area for the RFA and from the Shallow Monitoring Wells in MW-1 will be field screened for volatile organics detected in the head space. Samples will be split into a 40 ml vial to be sent to a fixed base laboratory for GC analysis of volatiles and into a pint-size glass jar for headspace analysis. Prior to sending samples to the fixed base laboratory, the headspace results will be examined. If the total volatile organics detected is not greater than or equal to 5 ppm over background levels, the sample will not be sent to the fixed base laboratory. Therefore, the number of samples for the soils in the Open Burning Area may range from 0 to 24 (not counting QA samples) and the number of samples for the soils in the Shallow Monitoring Wells may range from 0 to 30 (not counting QA samples) based on results detected in the headspace and the maximum number of locations determined in the SVWP and RFIWP, respectively. The exact procedure for performing the headspace analysis is described in the respective work plans.

The soil samples from the MW-1 area monitoring wells will be taken during installation of the well "nests". Each well will be sampled, as described in the RFIWP, at five intervals during construction in order to characterize soil quality and the potential horizontal and vertical extent of volatile constituents of the area around MW-1.

The containers used to collect the soil samples will be precleaned and prepared in accordance with the procedures outlined in Table 5-1. The sampling devices will be cleaned between sampling events using the following procedures if both organic and inorganic analyses will be performed for the successive sample taken:

1) Wash equipment with tap water and non-phosphate detergent.
2) Rinse with tap water.
3) Rinse with 10% nitric acid solution.
4) Rinse several times with tap water.
5) Rinse with pesticide grade methanol, acetone, then methanol again .
6) Rinse with distilled and demonstrated analyte-free water.
7) Air dry and wrap in aluminum foil.

The drilling equipment will be steam cleaned between test borings.

If soil samples to be collected are going to be analyzed for inorganics only, procedure 5) will be eliminated for decontamination. If soil samples to be collected are going to be analyzed for organics only, procedure 3) will be eliminated for decontamination.

The soils will be field classified and logged according to Standard Operating Procedure EXP-4, Soil and Rock Sample Boring Logging in Appendix I of the SVWP, Vol. II.

Soil samples will be contained in new glass containers with screw-type lids, labelled, and shipped to the appropriate analytical laboratory. Sample preservation, shipment, handling, and chain-of-custody procedures will be conducted in accordance with the methods outlined in Sections 5.7 and 5.8. If the borings are not used for monitoring well construction, they will be filled from the bottom to the surface with a neat cement grout mixture.

Excess soil generated as a result of soil boring and well installation activities will be containerized and stored on site. Upon receipt of the soil analytical results, the final disposition of the excess soil will be determined.

5.5 Soil Gas Sampling

As part of the feasibility (RFIWP) of the soil gas survey near MW-1, five soil gas samples will be collected around MW-1. Soil gas samples will be collected using a small volume stainless steel probe that will be hammered into the ground to a depth of about 4 feet. The actual sample locations will be determined in the field based on site reconnaissance. These samples will be screened in the field for volatile organic compounds as specified on Table 2-2. The analytical results will be evaluated for detectability of the contaminants, and a decision will be made to either continue the survey with a more in-depth sampling effort, or discontinue the survey based on the lack of contaminant detections.

If it is determined that the soil gas survey should proceed, fifty-one soil gas samples will be collected from sampling locations shown on the 59200 square feet grid system presented in the RFIWP. These samples will be collected in the same manner as the preliminary soil gas samples except the samples will be contained and sealed under pressure in glass vials and delivered to the fix-based laboratory for analysis of selected volatile organics. If results of the second phase of soil gas sampling indicate a plume extends beyond the current grid, an additional 40 soil gas samples will be taken on a grid with 40 foot intervals and will be sent for the same analysis. The location and shape of the grid will be dependent on the results of the second phase of the soil gas survey. The exact procedure for the soil gas survey is presented in the RFIWP.

The results of the Soil Gas Survey will assist in determining the placement of monitoring wells that will be required to determine the potential concentrations of constituents of concern in the groundwater and potential sources of the contamination. It is possible that one or more well "nests" may be required to adequately characterize the regimes beneath the Philips site.

All sampling and analysis procedures for the soil gas survey will be performed by a subcontractor, Target Environmental Services, Columbia, Maryland. The subcontractor's Technical Specifications Statement for Soil Gas Surveys is included in this document as Appendix A. All specific field and analytical procedures and quality assurance/quality control procedures for the subcontractors efforts are described in detail in Appendix A.

All sampling probes and related equipment will be decontaminated after each use by the same procedure described for soil sampling. All rinse water and solvent will be stored in designated containers for future testing, treatment, and/or disposal. Sample shipment, handling, and chain-of-custody procedures as performed by the subcontractor will be conducted in accordance with methods described in Sections 5.7 and 5.8 of this document.

5.6 Groundwater Sampling

Upon determination from the Soil Gas Survey, two or more well "nest(s)" will be installed in the area of MW-1. The results of the soil gas survey will assist in determining the exact location of the well "nest". The well "nest" will consist of several monitoring wells installed at intervals from shallow to deep wells to assist in characterizing the stratigraphy and hydrogeologic and hydrogeochemical regimes present beneath the site. Additionally, all monitoring wells currently being sampled quarterly will be included in this sampling and analysis program. The estimated number of samples and analyses to be performed is summarized in Table 2-2. All procedures for accurate, precise, and representative groundwater sampling is described in Keystone Environmental Resources, Inc., "Standard Operating Procedure", Quality Assurance / Quality Control for Groundwater Sampling.

Prior to implementing a groundwater monitoring program several tasks must be performed. Sample bottles are precleaned as described in Table 5-1 and equipment are cleaned and packaged for the required sampling according to the procedures outlined in Section 5.2. The laboratory is notified of incoming samples to prepare for holding times of specific samples. All of the sampling equipment required to collect, contain, preserve, and ship the samples is packaged and organized to allow efficient operation in the field. Field decontamination equipment is also prepared to enable this work to be performed when required. Groundwater samples will be analyzed for those parameters listed in Table 2-2. All groundwater samples will be preserved, handled, and shipped in accordance with the NYSDEC RCRA Quality Assurance Project Plan Guidance as described in Sections 5.7 and 5.8 and in Table 5-1.

Groundwater Sampling Equipment Preparation

Prior to performing a groundwater sampling project, the equipment used to collect groundwater samples will be prepared in Keystone's Monroeville, PA laboratory, in accordance with those procedures outlined above in Section 5.2.

Bladder Pump Preparation

1. Each tubing line set is dedicated for use on one well only. The sets of tubing are packaged securely and marked for future use on the corresponding dedicated wells.
2. Each pump should be disassembled according to the manufacturer's manual.
3. The stainless steel parts of each pump are cleaned using the methods outlined in Section 5.2.
4. The remaining parts of each pump are washed with non-phosphate detergent, and rinsed with distilled water.
5. Each pump is reassembled, wrapped in aluminum foil (shiny side out), covered with plastic, and stored for future use.

Water Level Measurement

There are several methods used by Keystone when measuring the water levels of wells. The following methods are listed in order of preference. Preferred methods will obtain accurate water level and depth measurements, will be easy to decontaminate, and will eliminate the chance of cross contamination.

Regardless of the method of water level measurement, the upgradient well(s) should be measured prior to the downgradient. When performed in conjunction with decontaminating the measuring device between wells, the potential for cross contamination will be further reduced.

All water level measurements are taken from surveyed points on each well casing and measured to an accuracy of .01 feet.

Interface Probe Method

Interface probes are commonly used to detect the presence of any floating or sinking immiscible layers. However, they can also be used to detect the water levels inside wells.

1. The probe should be lowered slowly inside each well. When water is detected the probe will make a beeping noise to signify the beginning of the water level. When the beeping noise is heard, observe the calibrated drop line to determine the water level.

   If a solid tone is heard, continue lowering the probe (observing the calibrated drop line) until the steady tone stops. The measurement on the drop line between when the steady tone began and when it stopped will determine the thickness of the light phase immiscible layer.

   The procedure as described above can be used to determine the presence (and thickness) of layers of dense phase (sinking) immiscible layers.

2. All measurements should be recorded to the nearest one hundredth of a foot (.01).

3. The probe is decontaminated between each well by rinsing with distilled water demonstrated to be analyte-free.

Electric Probe Method

1. Lower the weighted probe into the well casing (when the probe contacts water it will send a pulse to the above ground gauge which will be recorded by a movement of the gauge stick) and observe the calibrated drop line to determine the water level.

2. Mark the point on the cable at the surveyed point on the well, when the probe is touching the water. Measure the distance from the mark to the last foot mark and add this measurement to it to determine the water level.

3. The probe is decontaminated between each well by rinsing with distilled water demonstrated to be analyte-free.

Well Purging

All monitoring wells are purged prior to sample collection. Purging of each well will be performed from the top of the water column, using pumps or top filling stainless steel bailers. Wells will be purged until at least three casing volumes of water are removed from each well or until the pH, conductivity and temperature of the purge water has stabilized prior to sampling. The pH, conductivity and temperature field measurements will be recorded for each well included in the sampling program. The final measurement recorded during the purging process, to verify the stabilization of the water, shall be considered the record for the well. Low yielding wells should be purged to clear dryness once and allowed to recover sufficiently. Except for low yielding wells which may require additional time to recover, wells will be sampled within three hours of purging.

To calculate the amount of water to purge from each well the depth of standing water must be measured using one of the above noted procedures. In addition, the casing diameter of each well must be known. These measurements, along with the following appropriate numbers, must be inserted into formula 1.0, to determine the specific conversion factor to be used on each size well.

Gallons of H_2O per Linear Foot of Casing Diameter:

1.5" = 0.1057
2.0" = 0.1623
4.0" = 0.6613
6.0" = 1.5003

Top Filling Stainless Steel Bailer Volume (per ft of bailer)

1 1/8" = 300 mls
1 1/2" = 425 mls
3.0" = 1850 mls

Formula 1.0

$$\frac{\text{Gallons of } H_2O\text{/linear ft. of casing diameter x 3785 (mls/gal)}}{\text{volume of bailer}} \times 3$$

= conversion factor for each well being sampled

The conversion factor must be multiplied times the depth of standing water in each well to determine the number of bails which must be purged from each well. The following conversion factors are listed for the well diameters listed below:

Well Diameter	3 Casing Volumes Conversion
1.5"	4.007
2.0"	4.3363
4.0"	4.0589
6.0"	9.2086

Purging and Sampling Methods

Wells are purged and sampled by either hand bailing or pumping. The determination to purge a well using pumps or bailers is influenced by the amount of water to be removed from each well.

When possible, all samples are collected using bailers. Hand bailing for sample collection is preferred because bailers can be decontaminated much more carefully than pumps. Also since pumping rates are difficult to control and since most pumps operate through a pulsating action, the potential degassing of volatile organic concentrations may occur. Normally, pumps are used as sampling devices when bailers can not be used as a result of well obstruction or the installation of submersible pumps. When a number of sampling rounds will take place the same type of sampling equipment will be used to eliminate potential variability in sample collection technique.

Bailing

The following procedures are followed when wells are purged and samples are extracted using hand bailers.

1. Place plastic sheeting (or garbage bags) around the well casing to create a clean working surface.

2. Use a separate laboratory cleaned stainless steel bailer on each well for the required purging and sampling.

3. Follow Health and Safety Plan for Personal Protective Equipment.

4. Use new teflon coated wire, stainless steel wire, polypropylene monofilament or a 10' leader of above material attached to nylon cord.

    o Make sure the knotted cord is securely tied to the bailer.

- After removing the protective foil wrapping from the bailer, lower it into the well until it touches the bottom.
- Remove an additional length of cord and tie it securely to the well head to serve as a safety line for the bailer.

5. When raising the bailer, the cord is collected by hand, over the plastic sheeting.

6. Purged groundwater will be collected and drummed and stored on-site until groundwater analysis is completed.

7. As indicated, a separate laboratory-cleaned stainless steel bailer is used to collect samples from each monitoring well.

    - Samples are collected when the well recharges after purging.

    - All samples are collected according to their order of volatilization (see Table 5-2).

    - All volatile organic samples will be collected with laboratory cleaned bottom filling stainless steel bailers in conjunction with an emptying device, whenever analyzing for volatiles.

    - When sampling, all bailers should be gently lowered into the well to prevent degassification of volatile organic constituents which may be present in the well water.

Pumping

As noted above, when possible, pumps are not used to sample wells. However, there are circumstances when pumps are more effective purging devices than bailers. Also, in some instances pumps are the only means by which samples can be extracted from monitoring wells.

TABLE 5-2

ORDER OF VOLATILIZATION

Water samples are collected according to the following order of volatilization as referenced in the September, 1986 RCRA TEGD:

- Volatile Organic Aromatics (VOAs) - No air bubbles
- Polychlorinated Biphenyls

There is not an order of preference for the collection of the remaining miscellaneous parameters.

There are several pumps which Keystone uses to perform field work.

Peristaltic Pump:

Peristaltic pumps must be operated above ground next to the well being purged and are limited to purging depths of about 20.0 feet below ground surface.

1. New nalgene suction line is used on each well being purged.

2. If a peristaltic pump is used to collect a sample, e.g., the well casing is bent preventing the passage of a bailer, new medical grade silicon pump head tubing and teflon tubing is used to collect the sample.

3. The suction line should be lowered to a depth in the water column to assure continued collection should drawdown of the water column occur.

4. To determine the proper amount of water to be purged, the pumping rate will be measured in gallons per minute by recording the time required to fill a selected volume of a calibrated bucket (see above section on Well Purging). Flow measurements should be performed three times on each well to obtain an average rate.

5. The pumping is monitored to ensure proper pump operation and assure continuous discharge. If drawdown occurs, the tubing will be lowered deeper into the water column.

6. When the required amount of water is purged from each well, allow for sufficient recovery before sampling.

7. Contain all purge water, as appropriate, in labelled containers for future testing, treatment and/or disposal. All tubing is disposed of after each use.

Bladder Pumps:

The bladder pump is a gas operated positive displacement submersible well pump that uses inert compressed gas, e.g., nitrogen, to inflate an internal bladder which pumps water up the polyethylene discharge line.

These pumps are used when large volumes of water must be purged from monitoring wells. Usually these pumps are used on wells with diameters greater than 2.0" and wells with depths up to 150 feet.

The line assembly is dedicated for use on one well only. After use, the polyethylene tubing is wrapped in a spool, marked, and stored for future use in the specific well to which it is dedicated.

The bladder pumps are primarily used to remove the required amount of water from the monitoring well prior to sampling. When this is accomplished, the well water is sampled using a laboratory cleaned stainless steel bailer.

1. Connect the line assembly to the pump by first attaching the cable and then connecting the sample and gas lines.

2. Lower the pump down the well by unrolling the line off of the spool until the pump touches bottom. Raise the pump to the desired position inside the well allowing sufficient room for drawdown of the water column.

3. Secure the cable to hold the pump at the desired depth.

4. Connect the gas line to the control box. The discharge line should be placed in a container (e.g. 55 gallon drum) to collect the purged water.

5. Connect the gas supply to the control box and adjust the pressure according to the manufacturer's manual.

6. Turn on the control box and adjust the inflate delay to obtain the best pumping cycle.

7. The pumping rate should be calculated to determine the length of time the pump should run to purge the well. Field measurements of pH and specific conductance, or the calculation of three casing volumes (see formula 1.0), may be used to determine when a sufficient amount of water has been purged.

8. When the required amount of water has been purged, the well should be sampled using a laboratory cleaned stainless steel bailer.

9. As noted, the tubing is used on one well only and after each sampling it is packed, sealed, and stored for future use on that well.

Submersible Pumps:

When wells are encountered with depths greater than 150 feet, stainless steel submersible pumps are used to purge the required amount of well water. When possible the submersible pumping apparatus is pulled to allow for sampling with a laboratory cleaned stainless steel bailer. If this is not feasible the submersible pump will remain intact and will be used to collect the sample.

When economically feasible, the submersible pumps will be dedicated to each well. However, in some cases this is not economically feasible and the same pump must be used in several wells. Every effort will be made to ensure that these pumps are used in wells containing similar concentrations of constituents of concern. A pump will not knowingly be used in a dirty well prior to use on a clean well.

When the pumps must be reused, they will be steam cleaned between wells. If possible, the pumps will also be taken apart and cleaned. The stainless steel parts will be cleaned following procedures outlined above in Section 5.2. The remaining parts will be washed with non-phosphate detergent and rinsed with distilled water. The pumps will be reassembled and covered until the next use.

1. The submersible pump and discharge line should be lowered to a depth in each well between the middle to bottom screened portion of each monitoring well. The nylon safety line should be secured to the well casing.

2. Connect the power cord to the power source (generator) and turn on the pump.

3. Continue to monitor the pumping rate and lower the line if drawdown of the water column occurs.

4. If the well is pumped to dryness allow sufficient time for the well to recover. This time will vary depending on the characteristics of each well and the time required for recharging the well.

5. After this period the pump should be re-started and the total discharge volume should be measured to determine the rate of recharge.

6. Collect and contain all purged water, as appropriate, in labelled containers for future testing, treatment, and/or disposal.

5.7 Sample Preservation and Holding Times

All samples will be preserved and handled according to procedures described in Tables 5-1 and 5-3 in order to preserve accurate representativeness of the environmental samples. Sample preservation will be performed immediately after sample is placed in the appropriate container before it is sealed. Documentation of preservation will be entered in the field log book.

5.8 Shipment Documentation

The following sections describe appropriate procedures and/or uses of the chain-of-custody form, the chain-of-custody tag, and sample shipment.

TABLE 5-3

HOLDING TIMES

Parameter	Holding Time*
Volatile Organics	Within 7 days of collection for soils, **
	Within 7 days of collection for waters,
TPH / PCBs	Within 7 days of collection (for extraction) of water
	Within 40 days of extraction (for analysis) of water
	Within 7 days of collection (for extraction) of soils
	Within 40 days of collection (for analysis) of soils
Metals	Within 180 days of collection
Fluoride	Within 28 days of collection
pH, Specific Conductance	Immediately after sample collection

* (Federal Register, Vol. 49, No. 29, 1984, p. 43260)

** Soil gas samples will be analyzed within 24-48 hours of sampling, as stated in the subcontractor's Technical Specifications Statement (Appendix A) as no specific technical holding time is documented.

U.S. Environmental Protection Agency. 1986. Test Methods for Evaluating Solid Waste. 3rd ed. SW-846.

U.S. Environmental Protection Agency. September, 1986. RCRA Technical Enforcement Guidance Document.

NYSDEC. January 19, 1990. RCRA Quality Assurance Project Plan Guidance.

5.8.1 Chain-of-Custody Form

A chain-of-custody form will be prepared for each ice chest containing samples. The chain-of-custody form will record all of the necessary information pertaining to the specific samples in that individual ice chest. This information includes: date and time of sample collection, sample location, parameters to be analyzed, and notes specific to the laboratory. When complete, the chain-of-custody forms will be signed and relinquished by the designated field team leader. The original copy will be sealed in a plastic envelope and taped to the inside of the lid of the specific ice chest and will be sent to the laboratory performing the analyses and a copy of the chain-of-custody will be maintained by the field team. See Figure 5-2 for a copy of the chain-of-custody form used by Keystone Environmental Resources, Inc.

5.8.2 Chain-of-Custody Tag

After each ice chest containing samples is properly sealed, a metal chain-of-custody tag shall be fastened to the cooler opening to prevent potential sample tampering. The metal tag is numbered, and this number and the ice chest number will be written on the chain-of-custody form to document the sealing of the cooler. Evidence tape will be used to seal the opening of ice chests that are not equipped with straps to hold the metal chain-of-custody tags. These procedures shall be performed to document and ensure the integrity of the samples as they are shipped from the project site to the laboratory performing the analyses. Upon receipt at the lab, the integrity of each cooler will be examined and the chain-of-custody forms will be reviewed. A copy of the chain-of-custody will be maintained by the field team and the original will always accompany the current custodial designee.

5.8.3 Sample Shipment

The samples will be packaged and shipped according to procedures described in Keystone Environmental Resources, Inc., "Standard Operating Procedure", Packaging and Shipping of Samples via a commercial carrier if the laboratory performing the analyses is not in the vicinity of the project site. The shipping carrier and the determination to ship air freight (overnight or 2-day air) versus shipment via ground transportation is made by the field team designee. The decision will be based on the holding times of the samples, project deadlines, and efforts to reduce project costs.

5.9 Field Quality Assurance

One field rinsate blank will be collected for the project specific parameters during the collection of the surface soil samples, the sewer leak test rinse water samples and the groundwater samples. The field rinsate blank will be collected to determine whether any sampling device influenced the analytical results. The field rinsate blank for the surface soil sample will be collected by pouring demonstrated analyte-free water over a laboratory cleaned hand trowel into the designated sampling containers. The field rinsate blank for the sewer leak test rinse water will be collected by running demonstrated analyte-free water through new teflon tubing and into project specific sampling containers. The field rinsate blank for the groundwater sampling event will be collected by pouring demonstrated analyte-free water into a laboratory cleaned stainless steel bailer and transferring the water into the designated sampling containers. The blank samples will be collected in the appropriate containers prepared according to specifications outlined in Table 5-1. Each blank will be analyzed for the parameters specific to the sampling event. Sample handling, preservation, and shipping will be identical to the procedures for their associated environmental samples as outlined in Sections 5.7 and 5.8.

One field rinsate blank per day will be collected on one piece of equipment per batch of equipment type cleaned. The number of field rinsate blanks shown on Tables 2-1 and 2-2 are only estimates. The actual number of field rinsate blanks will be dependent on the type and number of samples collected per day.

One trip blank will accompany each shipment of vials to the laboratory for analysis for the two groundwater sampling rounds. If additional shipments of samples to be analyzed for volatile organics is required, a trip blank will accompany each shipment. The trip blank will be analyzed for the same parameters as the sample containers which they are accompanying. The trip blank containers will be prepared according to the procedures outlined in Table 5-1. The containers will be filled with demonstrated analyte-free water at Keystone's laboratory. The containers will be taken to the field where they will remain sealed. The trip blank samples will be placed first in the ice chest, then the project samples, and then delivered to the laboratory for analysis. This blank will determine whether proper container preparation and handling of the samples to be analyzed for Volatile Organic Compounds have occurred.

In addition, as required by the NYSDEC RCRA QAPjP Guidance Document, evacuated sample containers for soil gas sampling will be prepared by the subcontractor's analytical laboratory to be used as trip blanks. These also will be placed in the coolers prior to sample collection.

Trip blanks will be collected at a rate of 1 trip blank in 20 environmental samples or one per shipment or cooler, whichever is greater. The number of trip blanks shown on Table 2-2 are estimates based on the tentative number of samples to be taken for the soil gas sampling and on the number of groundwater sampling rounds scheduled.

Field blanks will be collected for the soil gas sampling to determine if contamination is introduced by the sampling environment. As specified in the Soil Gas Survey Technical Specifications (Appendix A, Section IV) and as required by the NYSDEC RCRA QAPjP Guidance Document, sample containers will be evacuated using pre-purified grade nitrogen or ambient air and analyzed along with the environmental samples for the same parameters. These blanks will be collected and handled using the same processes as for the other samples. The number of field blanks shown on Table 2-2 represents the required amount to suffice the 1 in 20 ratio of field blanks to environmental samples.

5.10 Safety Precautions

Site and media specific sampling health and safety requirements are outlined in detail in SVWP, Vol. III - Health and Safety Plan, May 1990. These requirements should be strictly adhered, whenever applicable.

Whenever sampling conditions are not specifically addressed in the Health and Safety Plan, all personnel performing field sampling work will comply with the EPA established minimum level D safety precautions, unless advised by the site's Health and Safety Officer. Level D protection includes wearing long sleeve shirts, long pants, goggles or safety glasses, hardhats, steel toe boots, and safety gloves. In addition, Keystone's Health and Safety officer will determine in advance, if additional safety equipment is required, for example tyvek suits and/or respirators.

5.11 Documentation

A number of documents must be completed before, during, and after each sampling project. These documents include analytical request forms, chain of custody sheets, any project notes pertaining to the sampling work, and sampling equipment checklists/pre-field punch list (when applicable). Additional documented information are used as reference during each phase of a project and they include sample holding times and sample preservation and containment records.

Analytical Request Form:

The analytical request forms (See Figure 5-1) are completed by the Team Leader and submitted to the sampling team when requesting sampling work. These sheets contain the specific parameters of interest for which the collected samples will be analyzed. The field team coordinator sends the request forms directly to the sample control department to notify the laboratory of the incoming samples. If the field team is not used to collect the samples, then the Team Leader requesting the work is responsible for providing this information to the laboratory.

Chain of Custody Sheets:

When the field team sends samples to Keystone's analytical laboratories, each ice chest containing samples must be accompanied by a chain of custody form (see Figure 5-2). The appropriate procedure for information contained on and use of chain-of-custody sheets is described in Section 5.8.

Project Notes:

Information specific to each project is typed on computer generated printouts (See Figure 5-3). These sheets are used by the field team members to prepare for and to perform the work required to successfully complete the sampling projects. Field data is collected in the field in log books, and transferred onto field data sheets (Figure 5-4) for groundwater samples upon return to the office. These sheets are filed in bound log books for future reference.

Any documentation taken by non-Keystone personnel (i.e. subcontractor for soil gas survey) will be remanded to the project manager upon completion of the designee's work assignment in order to accurately document, evaluate, and assess the results and performance of this effort.

Sampling Equipment Checklist / Pre-Field Punch List

Prior to entering the field, the Team Leader is responsible to obtain the required equipment and supplies to perform the work. The Sampling Equipment Checklist prepared for this project is presented in Figure 5-5. This will be completed to verify the receipt of all required equipment. The Pre-Field Punch List (Figure 5-6) will be used by the Team Leader to document appropriate review of all activities to be done before field activities are to begin including notification of the laboratory for future receipt of samples, receipt of necessary equipment, forms, and sample containers, and review site specific sampling schedules, activities, and procedures.

Additional Documents:

Tables 5-3 and 5-1 contain the holding times and protocol for proper preservation and containment of water and soil samples, respectively (Reference January 19, 1990, NYSDEC Division of Hazardous Substances Regulation - RCRA Quality Assurance Project Plan Guidance and EPA SW-846 2nd Edition 1982). All laboratory procedures and test methods will be consistent with and incorporate all of the requirements which are set forth in EPA SW-846 methods, as corresponding methods apply. All sample collection and handling procedures will be consistent with those outlined in the SVWP, Vol. II and Section 5.0 of this document.

This information enables the field team to properly preserve samples and it provides the field team with a time table of when samples must be received by the laboratory for analysis within the recommended EPA holding times.

FIGURE 5-1

ANALYTICAL REQUEST FORM

Request Taken By: ____________________

Request Date: ______________

Client: ____________________

Client Contact: ____________________

Address: ____________________

____

____

____

Telephone: ____________________

Project Manager: ______________

Telephone: ______________

Start Date: ______________

NO. OF SAMPLES	MATRIX	ANALYTICAL PARAMETERS	TURNAROUND TIME, DAYS

APPLICATION : ☐ NPDES ☐ SDWA ☐ RCRA ☐ Superfund ☐ Other

Special Instructions: ____

____

____

____

____

____

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KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

CHAIN OF CUSTODY RECORD

PLANT CODE	PROJECT NAME
SAMPLERS *(Signature)*	

STA. NO.	DATE	TIME	COMP	GRAB	WELL	STATION LOCATION	NUMBER OF CONTAINERS									CONDUCTIVITY	PH	REMARKS OR OBSERVATIONS

Relinquished by: *(Signature)*	Date	Time	Received by: *(Signature)*	Reliquished by: *(Signature)*	Date	Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date	Time	Received by: *(Signature)*	Reliquished by: *(Signature)*	Date	Time	Received by: *(Signature)*
Reliquished by: *(Signature)*	Date	Time	Received for Laboratory by: *(Signature)*	Date	Time	Ice Chest Temp °C	Ice Chest #

Chain of Custody
Tag #

*DISTRIBUTION: Original accompanies shipment; Copy to Coordinator Field Files.

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FIGURE 5-2

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

FIGURE 5-3

Revised: EXAMPLE
Plant Name: ABCDE
Charge #: 111111-11-11
Wells: R-1, R-7, R-8, R-8B, R-9, R-9C, R-9D, R-10, SF-1, SF-2, SF-3, SF-4
Copy Reports To: X. Smith, Y. Smith, Z. Smith
Turnaround: Normal
Sampling Dates: Quarterly

The following is a list of parameters for which samples are analyzed:

<u>Field Meas.</u>	<u>Other</u>
pH(4X)	EPA 8310
Cond.(4X)	EPA 8040
	Tox(4X)

<u>NaHSO4</u>

TOC(4X)

NOTES: TOC, TOX, pH, and Cond. get replicated 4x for all wells.
* prepare an additional TOX bottle for all wells being replicated 4x.

DO NOT FILTER ANY PARAMETERS.

THIS IS AN EXAMPLE COPY OF A COMPUTER GENERATED PRINTOUT.

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

FIELD DATA SHEET FOR GROUNDWATER SAMPLING

PLANT:

PROJECT:

DATE OF WATER LEVELS:

DATE OF SAMPLING:

SAMPLING METHOD:

SAMPLED BY:

WEATHER:

Site No.	Time	Well Dia. (in.)	Depth of Well (ft) (including stickup)	Depth to H_2O in Well (ft)	Depth of H_2O in Well (ft)	Number of Bails Removed	Dry at Number of Bails Removed	In-situ Measurements								
								pH (units)				Conductivity (umhos/cm)				Temp. (C°)

SITE NO.	OBSERVATIONS

Page____of____

FIGURE 5-4

Figure 5-5

SAMPLING VISIT - SAMPLING EQUIPMENT CHECKLIST

PHILIPS DISPLAY COMPONENTS CORPORATION
SENECA FALLS, NEW YORK

SAMPLING AND TESTING EQUIPMENT

Out In

___ ___ Water level meter with spare batteries (1)

___ ___ pH meter with spare batteries and spare electrode, buffers (1)

___ ___ Conductivity meter with spare batteries (1), standard solution

___ ___ Hnu meter, fully charged and calibrated

___ ___ Camera (35mm) wth film

___ ___ Field thermometers (2)

___ ___ Six foot folding rule

___ ___ Squeeze bottles (2)

___ ___ Plastic bucket, calibrated -(2)

___ ___ Containers (wide mouth) for pH, specific conductance (8)

___ ___ Plastic Sheets

___ ___ Soil Sampling Knife

___ ___ Spare bailer with rope (200 feet) (Note: Philips has Dedicated Bailers)

STATIONERY SUPPLIES

___ ___ Field log book

___ ___ Field Log Forms (12)

___ ___ Field Punch List (1)

___ ___ Chain of Custody Forms

___ ___ Analyses Request Sheets

___ ___ Project Site Maps

___ ___ Plastic Leakproof Bags

MISCELLANEOUS

___ ___ Tyvek Coveralls (30 Pair)

___ ___ Gloves (latex)

___ ___ Gloves (nitrile)

___ ___ Custody Seals (10)

___ ___ Permanent Ink Markers (3)

___ ___ Calculator

___ ___ Rain Gear

___ ___ Rubber Boots

___ ___ Tools

___ ___ Flashlight

___ ___ Watch

___ ___ Well Keys

___ ___ Ice (obtain near site)

___ ___ Distilled Water (Demonstrated to be analyte-free by analytical laboratory)

___ ___ Methanol and Acetone Rinses (2 bottles each)

___ ___ Nitric Acid (10%) Rinse (2 botles)

___ ___ Paper towels

___ ___ Personnel protective equipment (including hard hat, steel toed boots, safety glasses, respirator, etc.)

SUBCONTRACTOR SUPPLIED EQUIPMENT

Drilling equipment

Soil gas survey equipment

Team Leader ______________________ Date

Figure 5-6

PRE-FIELD/OFFICE PUNCH LIST

SAMPLING DATES: ______________________________

Task	Initials	Date
1. Notify Analytical Laboratory	________	____
2. Assemble Sampling Equipment and Completed Equipment Checklist	________	____
3. Perform Laboratory Calibrations and Precision of Field Meters	________	____
a. pH Meter	________	____
b. Conductivity Meter	________	____
c. Field Calibration Solutions	________	____
4. Check Operating Condition and Maintenance Records of Field Equipment	________	____
5. Assemble Necessary Forms	________	____
a. Field Log Book	________	____
b. Field Punch List	________	____
c. Chain of Custody	________	____
d. Analyses Request Sheet	________	____
6. Receive Sample Bottles and Shipping Containers from Analytical Laboratory	________	____
7. Review Site Specific Field Sampling Manual	________	____
8. Review Sampling Procedures with Project Team	________	____
9. Identify Quality Assurance Samples and Locations	________	____

____________________ ______________________________

Project Geologist Date

6.0 SAMPLE CUSTODY

The primary objective of sample custody is to create an accurate written verified record, which can be used to trace the possession and handling of the samples from the collection through data analysis and reporting. A sample is under a person's custody if:

a. it is in the person's possession, or
b. it is in the person's view, after being in the person's possession, or
c. it was in person's possession and the person locked it up, or
d. it is in the a designated secure area.

6.1 Field Sample Documentation

The Team Leader will be personally responsible for the care and custody of the samples until they are properly transferred or dispatched. Samples will be accompanied by the Chain-of-Custody Record. When transferring possession of the samples, the individuals relinquishing and receiving will sign, date, and note the time on the Record, with a separate Chain-of-Custody Record accompanying each shipping container.

In cases where samples leave the originator's immediate control, such as shipment to the laboratory by a common carrier (e.g., Federal Express) a seal is provided on the shipping container to document the integrity of the samples during transportation. Any shipping containers that do not arrive at the laboratory with the seal intact will not be considered to have been in valid custody. Before each container is sealed for shipment, it is packed with ice or coolant so that the temperature inside the container is 4^{O}C. The temperature is checked in the field and is recorded on the Chain-of-Custody Record.

6.2 Laboratory Sample Documentation

Upon arrival at the laboratory, samples will be checked in by the Sample/Analysis Coordinator or his designate utilizing Keystone's Sample Shipment Checklist (Figure 6-1). The following procedures will be followed:

a) The Sample/Analysis coordinator will first examine whether the shipping container seals are intact or broken. Containers with broken seals will not be accepted for analysis.

b) Coolers will be opened and it shall be determined if proper temperature has been maintained during shipment. The temperature is recorded on the Chain-of-Custody Record upon receipt.

c) If samples have been damaged during shipment, the remaining samples shall be carefully examined to determine whether they were affected. Any affected samples also shall be considered damaged. It will be noted on the Chain-of-Custody record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be resampled, or the testing program changed.

d) The identity of the samples received will be compared against those listed on the Chain-of-Custody Record. Verification of sample holding times will be done and samples will be checked to assure that holding times have not been exceeded. Individual parameter's holding times are presented in Table 5-3. Results from analyses performed after the appropriate holding times should be considered suspect.

e) The Sample/Analysis Coordinator will sign and date the Chain-of-Custody Record and attach any waybill to the Chain-of-Custody Record.

Keystone's Analytical Division's LIMS (Laboratory Information Management System) computer is an integral part of the sample custody procedure. Upon verification of sample receipt at the laboratory, the Sample/Analysis Coordinator will assign a unique nine character laboratory ID number to the sample for entry into the LIMS computer.

The first character, an alphanumeric, designates either the Keystone Monroeville (M) or Houston (H) analytical laboratory.

The next two characters reference the year, the next two the month, the next the sequential work order (by cooler) received by the laboratory in that month, and the last three the actual number of samples received from that site in the individual cooler. For example:

M	90	-	05	■	1	001
lab designation	year		month		work order sequence	sample number

Once samples have been logged-in and transferred to the proper storage areas, the laboratory department manager is responsible for their proper storage and condition.

Each department manager shall be given Laboratory Sample Chronicles (see Figures 6-2 and 6-3 for examples of inorganic chronicles used by the Keystone-Monroeville Laboratory) which lists the laboratory sample identification, matrix, parameters for analysis, and required completion date. These forms will be used to document sample custody while the samples are in-house. All Chain-of-Custody Records and Sample Chronicles will be kept on file by the Manager of Quality Assurance.

Whenever data are transferred to the data user, along with the analytical data is a log indicating the laboratory tracking identification number and the corresponding field identification number for each sample (as described in Section 5.1).

FIGURE 6-1

KEYSTONE

☐ Houston ☐ Monroeville ☐ Ontario

sample shipment checklist

CLIENT: DATE SHIPPED:
CLIENT CONTACT: DATE RECEIVED:
TELEPHONE NO.: SHIPPED VIA:
CHECKED BY:

NUMBER OF SHIPPING CONTAINERS (COOLERS, BOXES, ETC.):

CONTAINER ID	CUSTODY TAPE		TEMPERATURE C	NO. OF SAMPLE CONTAINERS	AGREE WITH COC? (Y/N)
	PRESENT? (Y/N)	INTACT? (Y/N)			

IRREGULARITIES

SAMPLE ID	SUB SAMPLE ID	IRREGULARITY

CHECKER SIGNATURE: DATE:

RESOLUTION OF IRREGULARITIES WITH CLIENT

CLIENT REPRESENTATIVE: KEYSTONE REPRESENTATIVE:
TELEPHONE NO.: DATE TIME
WRITTEN FOLLOWUP (Y/N) DATE
DECISION:

SIGNATURE

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FIGURE 6-2

ICP ANALYSES

CLIENT______________________ SAMPLE NUMBER______________________

WORK ORDER______________ MATRIX______________ WT/VOL DIGESTED______________

Analyses Requested		Due Dates	Samples Analyzed (X if all) Initials, Date	Rechecks, Comments
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Mercury				
Nickel				
Potassium				
Selenium				
Silver				
Sodium				
Thallium				
Vanadium				
Zinc				
<u>Other</u>				

Comments:____

____

____

FIGURE 6-3

GRAPHITE FURNACE ANALYSIS

CLIENT____________________ SAMPLE NUMBERS________________

WORK ORDER_______________ MATRIX________________________

ANALYSES	DUE DATE	DATE OF ANALYSES, RECHECKS, DILUTIONS, MSA's,etc.
ARSENIC		
LEAD		
SELENIUM		
THALLIUM		
OTHER:		

COMMENTS:

7.0 ANALYTICAL PROCEDURES

All analyses will be performed using analytical procedures from either "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (SW-846), Third Edition, 1986, incorporating any applicable latest available updates or "Methods for Chemical Analysis of Water and Wastes", March, 1983 except for the fluoride extraction procedure for soils. The fluoride analysis will be performed by using a shake extraction method described in Keystone Environmental Resources, Inc., "Standard Operating Procedures", 10/85, Laboratory Standard Operating Procedures followed by analysis using EPA method 340.2. The exact analytical procedures to be used are presented by media and analysis in Tables 2-1 and 2-2.

The analytical procedures specified and detection limits from Keystone's Analytical Laboratory meet all requirements specified in the NYSDEC Quality Assurance Project Plan. As requested in comments by NYSDEC from Mr. Paul R. Counterman, P.E., Director of Bureau of Hazardous Waste Facility Management, dated December 22, 1989, soil sample instrument detection limits were evaluated for capability of comparison with U.S. EPA health based standards for carcinogens and systemic toxicants. All instrument detection limits were below standards except for Aroclor-1254 and Aroclor-1260, both of which were 100 ug/kg compared to the 91 ug/kg carcinogenic standard for soil ingestion, as submitted by NYSDEC. However, these are the lowest instrument detection limits available from Keystone Laboratory. In conversation with Mr. Victor Valaitis (NYSDEC) of May 4, 1990, Mr. Valaitis stated these will be reviewed and should be acceptable. All procedures for environmental sample analysis, handling, storage, preparation, and documentation while in the laboratory's custody and deliverable requirements upon delivery of the data to the user will be followed by Keystone personnel as stated in Keystone Environmental Resources, Inc., "Standard Operating Procedures", 10/85, Laboratory Standard Operating Procedures.

8.0 CALIBRATION CONTROLS AND FREQUENCY

All field and laboratory equipment is calibrated before use to ensure proper operating conditions. The following procedures are utilized for this purpose.

8.1 Field Instrumentation

The soil gas samples to be analyzed by the subcontractor in the field will be performed using a portable gas chromatograph for analysis of halogenated volatiles. Associated calibration controls and frequency are outlined in the Technical Specifications Statement (Appendix A) Section IV for the soil gas survey.

For the headspace analysis of volatiles in soil samples collected in the Open Burning Area, a HNU Photoionization Analyzer will be used to screen the samples. Associated calibration controls and frequency are described in the Keystone Environmental Resources Standard Operating Procedure "Operation/Calibration HNU Photoionization Analyzer" (Appendix B).

pH Meter

The initial calibration is performed with three standard buffer solutions reading pH 4.0, 7.0, and 9.0. The calibration is checked after every ten samples. In addition, the meter is checked with an outside calibration reference standard, and a post calibration is performed at the end of each day. If the check sample is out of range, the instrument is recalibrated and the frequency of checks is increased.

Conductivity Meter

The conductivity meter used does not have a designated calibration knob. The meter is checked prior to use with an outside calibration standard. If the standard is not within 10% of the true value, the instrument is not in calibration and a backup unit must be employed. The backup meter is also checked prior to use with an outside calibration standard.

All field instrument calibrations are recorded on a field instrument calibration sheet (Figure 8-1).

8.2 Laboratory Instrumentation - Inorganics

Atomic Absorption Spectrophotometer

The instrument is calibrated before each use with a reagent blank and three calibration standards. The first standard must be at the method detection limit. In order to verify the linearity of the curve, the regression coefficient must be at least 0.995. The calibration is next checked by the analysis of an ICV. The results must be within 10% of the true value for the initial calibration to be verified. After every 10 analytical samples, and at the end of the run, a CCV and CCB are analyzed. If the CCB shows a result greater than the method detection limit, or if the reference standard differs from the true value by more than 10%, the previous samples are invalidated and must be reanalyzed. If an undiluted sample gives a response greater than the highest standard, the sample must be diluted and reanalyzed. If the diluted sample gives a response less than twice the method detection limit, the sample must be reanalyzed at a lesser dilution.

Inductively Coupled Plasma Spectrophotometer

The entrance slit to the photomultiplier tubes is aligned by a monochrometer on a mercury line. The instrument is calibrated before each use with a reagent blank and a calibration standard containing all of the desired elements. The initial calibration is checked by the analysis of an ICV. The results must be within 10% of the true value for the initial calibration to be verified. In order to verify linearity near the detection limit, a standard containing the elements of interest at twice the method detection limit is analyzed at the beginning and end of each run. After every 10 analytical samples, and at the end of the run, the CCV and a CCB are analyzed. If the CCB shows a response greater than the method detection limit, or if the CCV differs from the true value by more than 10%, the previous samples are invalidated and must be reanalyzed. In order to verify the absence of interelement and background interferences, an interference check sample is analyzed at the beginning and end of each run. A list of the elements present in the interference check sample is given in Table 8-1.

8.3 Laboratory Instrumentation - Organics

Gas and Liquid Chromatographs

These instruments are calibrated for the components of interest with a solvent blank and 3 or 5 calibration standards. The first standard must be at the method detection limit. In order to verify the linearity of the curve, the regression coefficient must be at least 0.995. The calibration is next checked by the analysis of an outside reference standard. If a supplied standard (NBS or EPA) is not available, an in-house solution containing a concentration different than those used to prepare the curve is used. The results obtained on the check standard must be within 20% of the true value for the initial calibration to be verified. After every eight samples, and at the end of the run, the mid-point standard is analyzed.

If the mid-point standard differs from the true value by more than 15%, the previous samples are invalidated and must be reanalyzed. If an undiluted sample gives a response greater than the highest standard, the sample must be diluted and reanalyzed. If the diluted sample gives a response less than twice the method detection limit, the sample must be reanalyzed at a lesser dilution.

TABLE 8-1

INTERFERENT AND ANALYTE ELEMENTAL CONCENTRATIONS USED FOR ICP INTERFERENCE CHECK SAMPLE

Analytes	(mg/l)	Interferents	(mg/l)
Ag	1.0	Al	500
Ba	0.5	Ca	500
Cd	1.0	Fe	200
Co	0.5	Mg	500
Cr	0.5		
Cu	0.5		
Mn	0.5		
Ni	1.0		
Pb	1.0		
V	0.5		
Zn	1.0		

FIGURE 8-1

CALIBRATION SHEET

pH METER

Project: ______________________________ Date: ______

Meter: ______________________________

	Meter Reading	Buffer Solutions				Operator Initials
		4	7	9	Standard 6.5	
Initial Calibration	unadjusted					
	adjusted					
Calibration Check	unadjusted	■		■		
	adjusted	■		■		
	unadjusted	■		■		
	adjusted	■		■		
	unadjusted	■		■		
	adjusted	■		■		
Final Calibration	unadjusted					
	adjusted					

Calibration checks should be made after every 10 readings using the pH 7 buffer solution (unadjusted reading). If readings are within .1 unit of the solution no calibration adjustment is made, if greater than .1 a complete calibration is necessary (adjusted reading), if greater than .2 do a complete calibration and increase the frequency of calibration checks.

Operator Signature: ____________________

9.0 DATA REDUCTION, VALIDATION AND REPORTING

Data transfer and support are essential functions in summarizing information to support conclusions. It is essential that these processes are performed accurately and, in the case of data reduction, accepted statistical techniques are used.

9.1 Data Reduction

For most analyses, data reduction involves the comparison of samples to a standard reference curve. Samples (or extracts) are diluted within the concentration range of the curve. To verify the linearity of the curve, the linear regression coefficient is calculated according to the following equation:

$$r = \frac{N\,\Sigma\, x_i y_i - (\Sigma\, x_i)\,(\Sigma\, y_i)}{([N\Sigma x_i^2 - (\Sigma\, x_i)^2]\,[N\,\Sigma\, y_i^2 - (\Sigma\, y_i)^2])^{1/2}}$$

The acceptable values for the regression coefficient were given in Section 8. The sample results are calculated according to the following formula:

$y = mx + b$

where y is the ordinate, x is the abcissa, m is the slope, and b is the y intercept.

Results from analyses that do not make use of a standard curve are calculated by the appropriate formula given in the method, taking the number of significant figures into account.

The digits in a number that are "significant" are comprised of those that are known with certainty, <u>plus</u> the first digit whose value is in doubt. For example, if three successive weighings of a sample yield the values 0.656, 0.658, and 0.662, the calculated average weight would be 0.658666. Obviously the weighings are not reliable in the third decimal place, so that the measurement contains three significant figures (two certain digits and one about which there is some doubt). The average, therefore, should contain the same number of significant figures and should be rounded off to 0.659. This rounding off is done according to the following rule: if the digit following the last significant figure is greater than 5, the significant figure is raised by 1; if less than 5, no change is made; if equal to 5, the last significant figure should be left even. For example, 0.66050 would be 0.660 (three significant figures). Zeros following a number after the decimal are counted as significant figures (4.250 has four significant figures). Zeros preceding a number, or following a number before the decimal, are not counted. Thus, both 0.066 and 66,000 have only two significant figures, but 1660, and 660.0 have four.

When making calculations involving measured values, results must be expressed so that they contain only the number of significant figures justified by the certainty of the original measurement. For example, addition or subtraction results are rounded off to the position of the number containing the least accurately known value: 13.4 + 1478.224 = 1491.624, rounded off to 1491.6. Multiplication or division results are expressed with the same number of significant figures as the least certain original value used in the calculation: 31 x 350.1 = 10,853.1, rounded off to 11,000.

All concentrations for analytical measurements, except for pH and conductivity, will be reported in appropriate units of part per billion for solids (ug/kg) and liquids (ug/l) depending on the individual analytical instrument detection limits.

All groundwater analyses will be performed using mass spectroscopic methods. The laboratory will utilize a library mass spectrum matching for verification of the accurate identification of individual analytes. If the data validator has the appropriate mass spectroscopic experience and can identify inaccurate library identifications, then action will be taken to accurately identify unknown or misidentified analytes.

Another potential problem for reduction of results pertains to the case of outlier values (reported outside the "expected" range of concentrations). Since many factors could potentially cause an outlier, including an actual real extreme result, any attempt to correct or remove outlier data values must be accompanied by validated documentation to prove that the data is not correct as presented.

9.2 Data Validation

All data obtained will be validated in three steps. First, during the field operations, field measures will be validated at the time of collection by the Team Leader by following standard procedures and using QC checks. Second, all laboratory analytical results will be validated by the laboratory designee who is the specific analytical task leader. Third, a laboratory designee, other than the analyst, who is independent of the analysis and the project will validate the data.

Field Data Validation

Validation of field obtained data as well as ongoing QA/QC checks of environmental samples being taken is performed on two levels. First, all data is reviewed during the time of collection and second, all data is reviewed by secondary field personnel. If the Team Leader is performing the initial review, a designee will do the secondary review. Otherwise, the Team Leader will perform the secondary review. In review of the field data, care will be taken to ensure correct codes, units, sample locations, as well as other pertinent information is included and correct. Any inconsistencies discovered will be resolved immediately, if possible.

Additionally, the Team Leader will be responsible for ensuring that accurate and correct data and representative samples are obtained by following field objectives as they are described in the SVWP, Vol II and the RFIWP. It is important that the Team Leader makes sure the field team adheres to the approved work plans and follows QA/QC measures as outlined in this document including the proper calibration of instruments, sampling according to standard operating procedures, and taking of sufficient sample volume.

Laboratory Data Validation

The respective Laboratory Department Manager will validate all laboratory data prior to reporting. The following QA/QC measures are reviewed or procedures are used:

1) Standard curve is prepared prior to sample analysis
2) Standard regression coefficient is within the acceptable range

3) Standard reference materials are analyzed at proper frequency with acceptable results
4) Reagent blanks are analyzed at the proper frequency
5) Precision requirements of this plan are met
6) Accuracy requirements of this plan are met
7) Completeness requirements of this plan are met
8) Samples are analyzed within the proper holding time
9) All calculations are verified as correct
10) Proper units are reported
11) Proper methodology was used

Besides this review of analytical results and project specific precision, accuracy, and completeness requirements, the Laboratory Department Manager will perform unannounced audits of report forms and other data sheets as well as daily reviews of instrument logs, performance test results, and analyst performance. Any review of analytical results or internal QA/QC checks that indicate problems, immediate corrective actions will be taken and all data collected since the previous approved QC audits will be reviewed for validity.

Independent Data Validation

All raw data is validated by the Quality Assurance Department Manager or his designee, who is independent of the analyst and the project, before reporting. The QA Department Manager can be shown to be independent of the project as the data the QA Manager reviews is only identified to laboratory personnel, except those who assemble data for reporting, by the laboratory's sample identification numbers. Thus, the QA Manager or his designee will not know the identity of the site and could not knowingly influence what was reported.

The QA Manager must be independent of the analyst to preserve the integrity of the quality assurance review. However, additional steps are taken to ensure this integrity by the use of performance and system audits which are documented and reviewed by the QA Manager and occasionally by the Laboratory Department Manager.

The validation performed by the independent data validator will be based on QA/QC and analytical results which are dependent on the analysis performed. Generally, these QA/QC checks include criteria such as holding times, instrument performance, calibrations, blanks, surrogate recoveries, and matrix spike/matrix spike duplicate recoveries to determine if problems exist with interferences or instrument problems which could affect accuracy and precision of the reported data.

9.3 Data Reporting

Once the data have been validated, the results are entered into the LIMS system where they are stored prior to reporting. When all analyses are completed, the laboratory will issue a final report including the results of the validation reviews. The QA Officer will check the final report to ensure that no errors have been made in transcription from the raw data. He will then issue the report to the Laboratory Manager for distribution. All applicable QC data (as shown in Section 10) is included with the final report.

10.0 QUALITY CONTROL PROCEDURES

To check the quality of data from field sampling efforts, blanks and duplicate samples will be collected for analysis. These samples will be treated as separate samples for identification, logging, and shipping. Analytical results on blanks and duplicates will be reported with the appropriate field sample data.

Field, Rinsate, and Trip Blanks

Field, rinsate, and trip blanks are used to detect contamination problems from equipment preparation or sampling and handling procedures. Their use was described in Section 5.9.

Duplicate (Split) Sample Collection and Analysis

A minimum of one of every 20 samples will be collected and analyzed in duplicate to evaluate the precision of both the collection and analytical procedures as described in the NYSDEC QAPjP Guidance. Duplicate samples (splits) will be collected by field personnel and submitted to the laboratory for analysis. The relative percent difference will be calculated from the duplicate analysis for the particular compounds of interest. Should the relative percent difference be excessive for the material analyzed and method used, other quality control parameters will be evaluated to determine whether the duplicates need to be reanalyzed or whether the entire set needs to be reanalyzed.

10.1 Internal QC Checks

The following general internal QC checks are performed for most analyses to ensure the measurement systems are under control:

a) Initial and continuing calibration
b) Calibration check compounds and reagent blanks
c) Field blanks

d) Preparation blanks
e) Matrix spike and matrix spike duplicate analysis
f) Quality control charts
g) Surrogate spike standard performance evaluation

Initial and Continuing Calibration

Each measurement system must be calibrated immediately prior to use and be shown to maintain the calibration throughout the course of the analysis. Calibration procedures were discussed in Section 8.

Calibration Check Compounds and Reagent Blank

These compounds are analyzed periodically throughout the course of the analysis. The exact frequencies and methods of use were discussed in Section 8.

Field Blanks

All field blanks (trip, rinsate, and field) are used to check for constituent contamination introduced by the bottle (trip), by the sampling equipment (rinsate), or by the sampling environment (field). These QC checks are used to verify the validity of the field sampling effort.

Preparation Blanks

A preparation blank is run with each batch of samples received for analysis. Compound responses observed in the blank at levels above the reportable detection limit are reviewed for possible laboratory contamination. If high blank values are observed, laboratory glassware and reagents will be checked for contamination and the analysis of future samples halted until the system can be brought under control. A high blank value is defined as a value sufficient to result in a difference in the sample values, if not corrected, greater than or equal to the smallest significant digit known to be true.

Matrix Spike and Matrix Spike Duplicate Analysis

For all analyses, 10% of all samples are analyzed as matrix spikes and matrix spike duplicates. The percent recovery for spiked samples is calculated using the equations given in Section 12 and compared to the accuracy criteria specified in Section 4. The relative percent difference of replicate spikes is calculated using the equations given in Section 12 and compared to the precision criteria specified in Section 4.

Quality Control Charts

Quality control charts are plots of multiple data points from the same or similar samples of processes versus time. Quality control charts are established for precision and accuracy of quality control measures of each analysis after every 20 determinations. A detailed description of the use and construction of quality control charts is given in Section 12.

Surrogate Spike Standard Performance Evaluation

Surrogate standards are defined as nonpriority pollutant compounds used to monitor the percent recovery efficiencies of the analytical procedures on a sample-by-sample basis. Surrogate standard determinations are performed on all samples and blanks. All samples (including matrix spike and matrix spike duplicates) and blanks are fortified with surrogate spiking compounds before purging or extraction in order to monitor preparation and analysis of samples.

Surrogate compounds and recovery levels are given in the method. When the surrogate recovery level is outside of the control limits, the laboratory must take the following actions:

o Check calculations to assure there are no errors, check internal standard and surrogate spiking solutions for degradation, contamination, etc.; also, check instrument performance.

- Recalculate or reinject/repurge the sample or extract.

- Re-extract and reanalyze the sample.

If any or all of these measures listed above fails to correct the problem, the analytical system will be considered out of control. The problem will be corrected before continuing. This may mean recalibrating the instrument.

10.2 Organic Analyses - GC

This section outlines the minimum quality control operations necessary to satisfy the analytical requirements associated with the determination of organic parameters using gas or liquid chromatographic techniques.

Initial Calibration Verification

In order to verify the linearity of the initial five point calibration curve (Section 8.3), the % RSD between calibration factors must not differ by more than 20%. Alternatively, the linear regression coefficient must be at least 0.995.

Continuing Calibration Verification

The working calibration curve or calibration factor must be verified after every eight samples by the analysis of a continuing calibration verification solution (CCV). If the response for any analyte varies from the predicted response by more than ±15%, a new calibration curve must be prepared and all samples after the last good CCV reanalyzed.

Surrogate Spike Standard Performance Evaluation

Surrogate standards will be used for gas and liquid chromatographic procedures as described previously in Section 10.1. Surrogate compounds and recovery levels are given in the applicable methods.

Reagent Blank

Each batch of samples will be accompanied by a reagent blank. The reagent blank will be carried throughout the entire analytical procedure including sample preparation or extraction, as applicable, to check contamination introduced by exposure to the laboratory environment.

Matrix Spike/Matrix Spike Duplicate Analysis

These parameters will be run at the frequency as stated previously in Section 10.1 and will follow the procedure as shown in the applicable methods.

10.3 Metals by Inductively Coupled Plasma (ICP)

This section outlines the minimum quality assurance operations necessary to satisfy the analytical requirements associated with the determination of metals by ICP. At all times, the most current revisions of the applicable protocol will be implemented by the laboratory.

Initial Calibration and Continuing Calibration Verification

At the start of instrumental operation, the ICP will be calibrated according to the manufacturers instructions and current protocol. Immediately after the ICP system has been calibrated, the accuracy of the initial calibration shall be verified and documented for every analyte by the analysis of EPA Initial Calibration Verification (ICV) Solution(s) at each wavelength used for analysis. When measurements exceed the control limits for inorganic analyses, the analysis must be terminated, the problem corrected, the instrument recalibrated, and the initial calibration reverified.

During continued analysis of metals by ICP a Continuing Calibration Verification (CCV) Solution(s) will be analyzed at each wavelength after every tenth sample. Each CCV analyzed must reflect the conditions of analysis of all associated analytical samples (the preceding 10 analytical samples or the preceding analytical samples up to the previous CCV).

If the deviation of the continuing calibration verification is greater than the control limits specified, the analysis must be stopped, the problem corrected, the instrument must be recalibrated, the continuing calibration verified and the reanalysis of the preceding 10 analytical samples or all analytical samples analyzed since the last good calibration verification must be performed for the analytes affected.

Preparation Blank Analysis

At least one preparation (or reagent) blank consisting of deionized distilled water processed through each sample preparation procedure (i.e., water, solids) will be analyzed with every 20 samples, or with each group of samples digested, whichever is more frequent. Specific procedures are detailed in the current protocol.

ICP Interference Check Sample Analysis

To verify inter-element and background correction factors, an ICP Interference Check Sample, Quality Control Sample and Linear Range Verification Sample, will be analyzed at least twice per eight hours of operation, or once during and again at the end of analysis. If these monitoring checks fall outside the allowable criteria, appropriate corrective action will be taken according to current protocol.

Matrix Spike Sample Analysis

Matrix spiked sample analysis is designed to provide information about the effect of sample matrix on the digestion and measurement methodology. The spike is added before the digestion and prior to any distillation steps. At least one spiked sample analysis will be performed on each group of samples of a similar matrix type (i.e., water, soil) and concentration (i.e., low, medium) for every 20 samples. Samples identified as field blanks cannot be used for spike sample analysis. Spike recovery limits range from 75-125 percent for metals as defined in the current protocol. If these limits are not obtained, appropriate action will be taken.

Duplicate Sample Analysis

At least one duplicate sample will be analyzed from each group of samples of a similar matrix type (i.e., water, soil) and concentration (i.e., low, medium) for every 20 samples. Samples identified as field blanks cannot be used for duplicate sample analysis. A control limit of 20% Relative Percent Difference shall be used for original and duplicate values greater than or equal to five times the detection limit. A control limit of (+/-) the detection limit must be used for sample values less than five times the detection limit.

10.4 Metals by Furnace Atomic Absorption

Furnace Atomic Absorption (AA) analysis will be performed on metals not amenable to analysis by ICP. These metals include arsenic, lead, selenium and thallium. The analysis of these metals by Furnace (AA) will be in accordance to current protocol.

All furnace analyses, except during Full Methods of Standard Addition (MSA), will require duplicate injections for which the average absorbance or "concentration" will be reported. All analyses will fall within the calibration range. The raw data package will contain both absorbance or "concentration" values, the average value and the relative standard deviation (RSD) or coefficient of variance (CV). For concentrations greater than the CRDL, duplicate injection readings will agree within 20 percent RSD or CV, or the sample will be rerun once, as specified in current protocol.

All furnace analyses for each sample will require at least a single analytical spike to determine if the MSA will be required for quantification. The spike will be analyzed and prepared in accordance to current protocol. The quality assurance/quality control (QA/QC) procedures defined by the current protocol will be followed when performing the specified analysis.

An initial calibration curve will be established using a blank and a minimum of four standards of different concentrations. The calibration curve will be confirmed with a standard and reagent blank before sample analysis.

To assure instrumental stability a calibration check will be run every 10 samples. If these instrument calibration checks should fall outside allowable criteria, the instrument will be recalibrated and all preceding samples, to a prior good calibration, will be reanalyzed.

The AA analysis will include at least one reagent blank, before the digestion sample spike and sample duplicate, for every 20 samples of similar matrices.

10.5 General Chemistry Parameters

Matrix spikes, duplicates and reagent blanks will be run at the same frequency as described in the current protocol or as described previously in general terms in Section 10.1.

11.0 PERFORMANCE AND SYSTEM AUDITS

Two types of audit procedures are conducted during this project; performance and system audits. These audits will be performed on the laboratory as well as field activities.

11.1 Performance Audits

Laboratory Performance Audits

Laboratory performance audits are conducted by the Manager of Quality Assurance on a monthly basis. Each laboratory analyst is given a performance evaluation sample containing analytes for the parameters which he/she usually performs. These audit samples are used to identify problems in technique or methodologies which could lead to future analytical problems.

Additionally, the laboratory performance audits should include verification of each analyst's record keeping, proper use and understanding of procedures, and documentation. Corrective action will be taken for any deficiencies noted during the audit.

Field Performance Audits

Field performance audits are performed directly by the Team Leader and indirectly by the performance of field QC samples. All field obtained data will be reviewed on an ongoing basis as they are generated by the Team Leader for accuracy and clarity in order to ensure their reproducibility after completion of field activities. The analytical results of the field blank and replicate samples are indirect audits of the level of performance of field activities.

11.2 System Audits

Laboratory System Audits

Laboratory system audits are conducted by the Manager of Quality Assurance on a quarterly basis. These audits are used to ensure that all aspects of this quality control manual are operative. This involves a thorough review of all laboratory methods performed and documentation to confirm that work is performed according to project specifications.

In some cases, outside certification agencies conduct performance and system audits to verify contract compliance or the laboratories ability to meet certification requirements on methods of analysis and documentation.

Field System Audits

Field system audits will be performed by the Team Leader by inspection of all field site activities. All ongoing activities will be monitored by the Team Leader to verify work is being performed according to the approved work plans (SVWP and RFIWP) and all procedures and analyses are conducted according to procedures outlined in this QAPjP. Any time a deficiency is noted during this ongoing system audit, the Team Leader will inform the field staff immediately so corrective actions may be implemented.

12.0 ASSESSMENT PROCEDURES FOR LABORATORY DATA ACCEPTABILITY

The following discussion describes the procedures that will be employed to evaluate the precision, accuracy, completeness, representativeness, and comparability of the generated data.

12.1 Precision

Precision is a measure of agreement among individual measurements of the same property under prescribed similar conditions. Precision is assessed by calculating the relative percent difference (RPD) of replicate spike samples or replicate sample analyses according to the following equation:

$$RPD = \frac{R1 - R2}{(R1 + R2)/2} \times 100 \qquad \text{where } R1 = \text{result 1}, \; R2 = \text{result 2}$$

12.2 Accuracy

Accuracy is a measure of the closeness of an individual measurement to the true value. Accuracy is measured by calculating the percent recovery (R) of known levels of spike compounds as follows:

$$R = \frac{\text{determined value of spiked sample}}{\text{theoretical value of spiked sample}} \times 100$$

12.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system, expressed as a percentage of the number of valid measurements that should have been collected. It is calculated as follows:

$$\text{Completeness (\%)} = \frac{\text{number of valid samples reported}}{\text{total number of samples analyzed}} \times 100$$

12.4 Representativeness

Representativeness is the degree to which data accurately and precisely represents a characteristic population, a process control, or an environmental condition. Appropriate sampling procedures will be implemented so that the samples are representative of the environmental matrices from which they were obtained. The sampling procedures are described in the respective work plans.

12.5 Comparability

Comparability refers to the degree to which one data set can be compared to another. Appropriate sampling and analytical processes will be implemented so that the samples of similar matrices may be compared.

12.6 Quality Control Charts

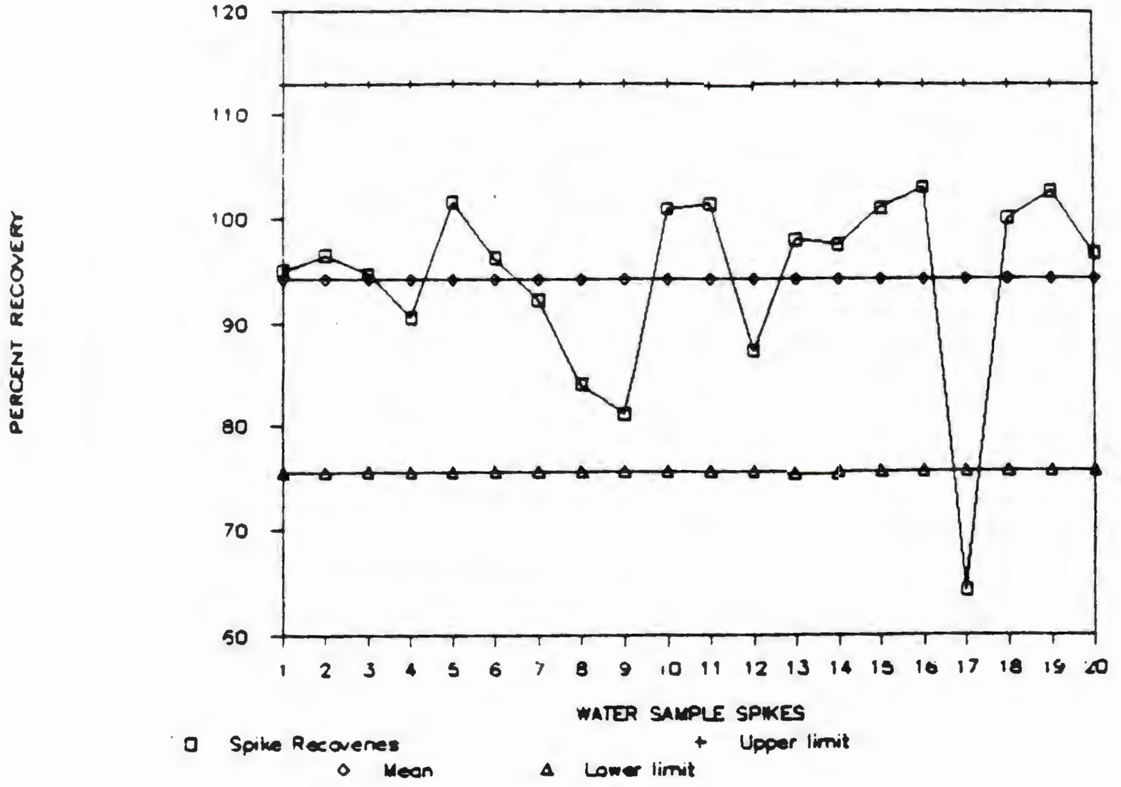
Quality control charts are prepared after every 20 determinations of precision and accuracy. The charts are prepared by determining the mean value of the determinations and setting control limits at ± 2 standard deviations from that mean. The following equations are used:

$$\text{mean} = \sum_{n=1}^{\eta} \chi/\eta$$

$$\text{standarddeviation}=\sqrt{\frac{1}{n-1}\sum_{n=1}^{n}(x-\bar{x})^{2}}$$

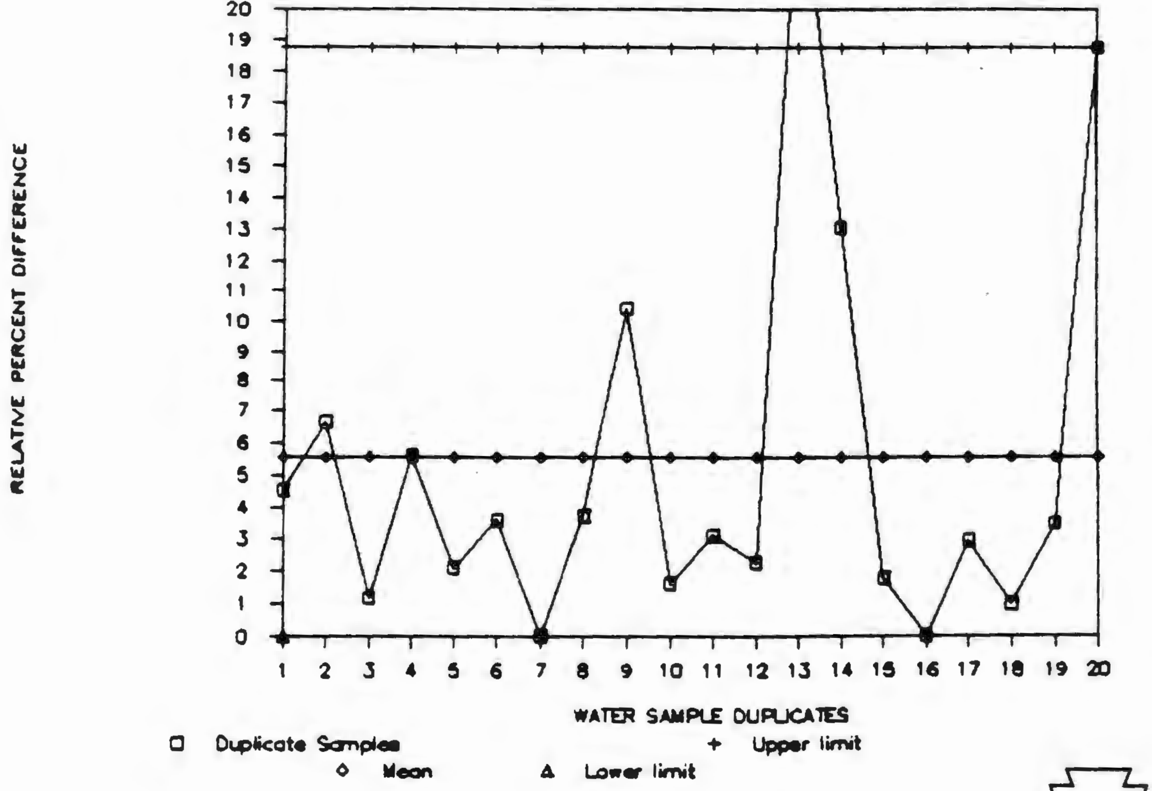
The control limits should approximate the values given in Table 4-1. If the limits are found to be outside these values, the measurement system is examined to determine if possible problems exist. Example control charts are shown in Figure 12-1.

FIGURE 12-1



MATRIX SPIKE ACCURACY PLOT

ZINC 01/19/89-06/04/89



DUPLICATE SAMPLE PRECISION PLOT

ZINC 6/13/89-11/10/89

13.0 PREVENTIVE MAINTENANCE

Periodic preventive maintenance is required for equipment whose performance can affect results. Instrument manuals are kept on file for reference if equipment needs repair. Troubleshooting sections of manuals are often useful in assisting personnel in performing maintenance tasks.

All major laboratory instruments are under service contract so that trained professionals are available on call to minimize instrument downtime.

13.1 Glassware Preparation

Glassware used for analysis is thoroughly cleaned by laboratory personnel immediately after each use. Special cleaning procedures are described in detail based on analysis in Table 5-1 as required by the NYSDEC RCRA QAPjP Guidance Document.

13.2 Routine Preventive Maintenance (Field and Laboratory Equipment)

Routine preventive maintenance for laboratory equipment shown in this section are as described in Keystone Environmental Resources, Inc., "Laboratory Standard Operating Procedures".

Inductively Coupled Plasma Spectrophotometers

1) Change pump tubing every 4 days of operation or as needed
2) Clean nebulizer daily as needed
3) Periodically clean and replace torch and chimney extension

Atomic Absorption Spectrophotometers

1) Clean contact cylinders daily
2) Check pyrolytic tube and platform daily
3) Replace contact cylinders every 3 months or as needed.

Analytical Balance

1) Check daily with class S weights
2) Clean and calibrate once per year

Mass Spectrometers

1) Periodically dismantle and clean the ionizing source

pH Meters

1) Store electrodes in pH 7 buffer when not in use
2) Keep hole for filling solution plugged to prevent evaporation of filling solution when not in use
3) Replace filling solution as needed

Conductivity Meter

1) Keep battery fully charged
2) Replatinize cell when response becomes erratic or platinum back has flaked off the cell

Gas Chromatographs

1) Change septa daily
2) Periodically clean detectors
3) Replace columns when instrument response deteriorates

14.0 CORRECTIVE ACTION

Corrective action procedures are divided into two subgroups, notably, methods corrective action and systems corrective action. These corrective actions are implemented whenever system or performance audits note deficiencies or when QC procedures indicate a potential analytical problem.

14.1 Methods Corrective Action

Methods corrective action is initiated by the Analyst and Department Section Manager at the time of analysis. Recoveries that fall outside the acceptable window limits established by the laboratory or the supplier of the control sample is an example of a reason to initiate methods corrective action. Poor response or poor sensitivity check response are other causes that require methods corrective action.

The analyst is required to terminate analysis when any of the above is noted, locate the problem and correct it. This may take the form of recalibration of standards, reanalyzing a sample or in extreme cases, general maintenance of the instrument hardware. Documentation of the latter is done in the instruments log book. Satisfactory methods corrective action will be the proper response that corrects the problem for which the action was taken.

14.2 System Corrective Action

The Manager of Quality Assurance initiates the system corrective action. A memo is generated which is addressed to the Section Manager responsible. A copy of the memo is filed in a folder designated for such. The Section Manager then assigns the responsibility to the appropriate analyst. Systems corrective action is initiated as a result of any of the following: 1) Poor result in a performance audit (internal or external) and 2) Poor result in an interlaboratory performance test program.

When satisfactory progress has been achieved on each requested action, the analyst describes the nature of the problem and the action that was taken to resolve it on the Invalid Data Notification Form (See Figure 14-1). Action here may involve extensive study of extraction solvents, digestion acids, standards from more than one source, etc. The Section Manager reviews the process to verify the corrective action has resolved the problem, signs and dates it. This form is given to the Manager of Quality Assurance. The Manager of Quality Assurance evaluates the corrective steps taken, and if satisfied that no further action is required, signs the Invalid Data Notification Form and files it in a folder designated as such. If more corrective steps should be taken, the Manager of Quality Assurance sends the form back to the Section Manager with comments, suggestions, etc. and the corrective process starts again.

FIGURE 14-1

INVALID DATA NOTIFICATION

Laboratory Group:
☐ GC
☐ GC/MS
☐ HPLC
☐ Metals
☐ Wet Chemistry
☐ Miscellaneous

Date of Notification: ________

Parameter: ________________

QC Batch No. ______________

Data for the following samples, which have been submitted on ______________ are not valid.

TRAVELLER NUMBER	SAMPLE IDENTIFICATION

Reason: ____
____
____

Submitted by ________________________

15.0 QA REPORTS TO MANAGEMENT

This QAPjP provides a documentable mechanism for the assurance of quality work performed for the Seneca Falls site. Audit reports (Section 11.0) will be provided to management by the Laboratory Manager as a means of tracking program performance. Additionally, periodic assessments of measurement data accuracy, precision, and completeness and significant QA/QC problems will be provided to management by the Laboratory QA Officer and independent validator.

Field QA reports will be submitted periodically during field activities to report the daily field progress, compiled field data sets, and corrective action documentation. Any situations requiring immediate corrective action measures will be brought to the attention of the Project Manager.

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APPENDIX A

SOIL GAS SURVEY
TECHNICAL SPECIFICATIONS
STATEMENT

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

TECHNICAL SPECIFICATIONS STATEMENT

FOR

SOIL GAS SURVEYS

TARGET ENVIRONMENTAL SERVICES, INC.

9180 Rumsey Road
Columbia, Maryland 21045

Phone: 301/992-6622

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INTRODUCTION

TARGET Environmental Services, Inc., a wholly-owned subsidiary of the TARGET Companies, Inc. of Columbia, Maryland, specializes in conducting soil gas surveys. TARGET has developed and maintains a full range of soil gas sampling and analytical capabilities which have been used successfully on over 600 soil gas survey assignments throughout the U.S. TARGET's approach to soil gas investigations is distinctly different from that practiced by other environmental and soil gas service companies. This difference is a result of TARGET's routine practice of:

- selecting the most appropriate sampling and analytical procedures for meeting the objectives of each project;
- utilizing high quality, lab-grade gas chromatographs in a climate-controlled environment to obtain high resolution results on all analyzed soil gas samples;
- analyzing for a full range of VOCs; and
- producing a comprehensive, interpretive report usually within one week of sampling.

The development and refinement of the sampling, analytical, and reporting methodologies described in this technical specifications statement have evolved from the efforts and experience of the company's field and technical staff. This staff is comprised of qualified professionals with backgrounds in geology, chemical engineering, hydrogeology, soil science and environmental science.

FIELD PROCEDURES

Scheduling

TARGET normally dispatches a field crew to any North American site within 2-3 days after receiving client authorization, and following markout of underground utilities and receipt of Health and Safety information, if applicable. The company also maintains an emergency response capability. Field personnel and equipment, from both the Columbia, Maryland and Huntington Beach, California offices, are mobilized to project locations by company-owned vehicle or, where appropriate, by commercial air carrier and rental vehicle. Weather conditions are rarely an obstacle to fulfilling scheduled survey times and requirements.

The field sampling phase is expedited to limit the effects of changing atmospheric and soil conditions; to limit interference with site activities or business operations; to minimize daily costs; and to prevent delay of the client's other investigation or remedial operations. On a typical survey, a sample collection rate of 40-80 samples per day is the norm for a two-man field crew. For larger projects with accelerated or short-fused deadlines, TARGET dispatches multiple field teams.

Survey Design and Layout

Upon arrival on a project site, TARGET field personnel examine the location to verify that all underground utilities and other buried structures have been properly marked and identified (crews are equipped with line detectors as an added precaution). A general Health and Safety reconnaissance of the site is performed using appropriate air monitoring equipment. The accuracy of any pre-existing site map is verified at this time as well.

Following the site reconnaissance, an accurate site map, which includes all sampling points as well as important physical features and landmarks reflecting actual site conditions, is carefully constructed (or validated) using tape and compass survey procedures. The sampling points (each marked with a wire pin-flag or paint) are typically spaced 30-100 feet apart and are laid out over the property in accordance with the pre-survey design as approved by the client. Each sampling pattern, however, is site-specific and designed to address the particular questions pertinent to each site. A regular rectilinear grid is often the best pattern of coverage, with particular attention to the areas around any suspected contamination sources.

Sampling Methodology

Depending on the site conditions and the survey objectives, TARGET can offer three levels of sampling depth capability. Samples of soil gas are most commonly obtained from a depth of about 4 feet. For most projects of this type, TARGET uses hand-held equipment, such as a heavy-duty manual plunger bar or an electric rotary hammer drill equipped with a special drive rod, to produce each 1/2" diameter sampling hole. In the event asphalt or cement pavement, gravel fill, or other hard surfaces are encountered, an electrical rotary drill is used to make a 1" diameter perforation through the hard layer. The remaining depth of the sampling hole is completed with the plunger bar or the rotary drive rod. Once the sampling operations are completed, these holes are filled and restored with like material.

Samples of the soil gas are extracted immediately after each hole is made using an active sampling technique with a custom designed soil gas sampling system. This portable system consists of a stainless steel probe which is connected to a stainless steel sampling box by special tubing of inert material. The probe is inserted to the full depth of the hole boring. The hole is then sealed off at the ground surface to isolate the probe from the atmosphere. The sampling box mechanism pulls a small volume of the in-situ gas vapors from the ground through the probe and tubing, enough to displace or purge the air from the sampling system. This first sample of soil gas is then vented to the atmosphere. A second sample of soil gas is extracted and pulled through the sampling system into a pre-evacuated, self-sealing, glass vial where it is encapsulated at two atmospheres (15 psi) pressure. The system is entirely "closed" from the probe tip to the glass vial to prevent the loss of volatiles.

If samples are to be obtained from depths greater than 4 feet, a truck-mounted hydraulic probe (approximately 1" O.D.)or drill (approximately 3" in diameter) is used to penetrate up to 30 feet of soil layer. Samples from even greater depths (up to 100 feet) can be obtained using a custom designed packer probe which is inserted down into hollow-stem augers, opening borings, or monitoring wells.

TARGET obtains true in-situ and representative soil gas samples and removes only small volumes of soil gas from the ground to minimize disruption to the in-situ vadose zone environment. Continuous purging or pumping of soil gas to reach a so-called "equilibrium" or "steady state" condition is avoided as this destroys the truly representative soil gas condition of that particular location in the subsurface.

Following each sample extraction, the sample vial is packaged in an airtight bag, labeled, and logged in preparation for transport to the field or main laboratory facilities for analysis.

During the course of the soil gas sampling phase, a strict QA/QC protocol is followed. These procedures are described in a later section of this document.

ANALYTICAL PROCEDURES

On routine projects, once field operations and sampling have been completed each day, the samples are immediately transported by the field crew or shipped by overnight courier to the main laboratory for analysis. Where appropriate, however, samples may be analyzed during the course of field sampling by TARGET's mobile laboratory facilities or by a portable GC.

TARGET's dedicated laboratory facilities are equipped with Hewlett Packard 5890 gas chromatographs interfaced with an HP Series 9000 computer and Series 300 chemstation. The lab uses contaminant-specific detectors, following strict QA/QC procedures and standard EPA 601 and 602 methodologies. For the analysis of petroleum products, a flame-ionization detector (FID) is used. The analysis of chlorinated hydrocarbons is performed with an electron capture detector (ECD). A mass spectrometer (GC/MS) is available for the confirmation of unusual or "unknown" contaminants which appear on the chromatograms. The lab is equipped to analyze 300 soil gas samples per day.

The company's mobile laboratory is climate controlled and contains high-grade analytical equipment identical to that in the main laboratory. The mobile laboratory is equipped to analyze 50 soil gas samples per day and may be used when same-day results and quality "real time" data are required.

TARGET's laboratory quality analytical facilities are capable of detecting, discriminating, and measuring concentrations of many volatile organic compounds. A listing by analysis in TARGET's lab of some of the more common compounds and their detection limits are presented in Tables 1-3.

Concentrations for each compound detected are calculated based on the peak areas on the chromatograms. TARGET's technical staff examines in detail the individual sample chromatograms to decipher the signatures or peak areas characteristic of the specific hydrocarbon analytes detected.

As an example of its analytical capabilities, TARGET is not limited to reporting only standard hydrocarbon compounds such as benzene, toluene and xylenes, but can also detect the paraffins and cyclo-paraffins which comprise a substantial volume of fresh gasoline in the vapor phase. The GC/FID is typically standardized and calibrated to quantitatively detect MTBE (a gasoline additive), benzene, toluene, ethylbenzene and ortho-, meta-, and para-xylene. Each of these compounds behaves differently in the subsurface due to differences in their volatility, water solubility, and octanol-water partition coefficients. As a result of these different chemical and physical properties, each compound can offer significant insight into what has occurred in the subsurface of a contaminated site - e.g. source of the contamination, presence of multiple sources, relative age of the product (weathering effects), migration patterns, etc.

TARGET also maintains portable GC equipment to conduct in-field analysis for projects requiring on-site data to reach the desired goals of the investigation. The in-field portable GC, while not as informative as the laboratory GC, is capable of providing limited on-site data to guide field activities such as emergency responses, remedial clean-up, and possible groundwater plume tracking where sampling approaches may need to be modified by the on-site data. Upon reviewing specific site information, TARGET would evaluate the appropriateness of using the portable GC in the field.

Tables 1 and 2 list the minimum concentrations (the detection limits) of selected compounds detectable using TARGET's soil gas analyses. The compounds in bold letters are those routinely used as standards for GC/ECD or GC/FID analyses; however, those not in bold letters can be added to the list of standards upon request.

ANALYSIS BY GC/ECD

VOLATILE ORGANIC COMPOUNDS	DETECTION LIMITS (ug/1)
Carbon Tetrachloride (CT)	0.05
Chloroform (CF)	0.10
Dichlorodifluoromethane	0.05
1,1-Dichloroethane (1,1-DCA)	1.0
1,2-Dichloroethane (1, 2-DCA)	1.0
1,1-Dichloroethylene (1,1-DCE)	1.0
cis-1,2-Dichloroethylene (c-1,2-DCE)	1.0
trans-1,2-Dichloroethylene (t-1,2-DCE)	1.0
Dichloromethane (Methylene Chloride, MC)	1.0
1,1,2,2-Tetrachloroethane (TECA)	0.05
Tetrachloroethylene (PCE)	0.05
1,1,1-Trichloroethane (1,1,1-TCA)	0.10
1,1,2-Trichloroethane (1,1,2-TCA)	0.10
Trichloroethylene (TCE)	0.10
Trichlorofluoromethane (TCFM)	0.05
1,1,2-Trichloro-1,2,2-trifluoroethane	0.05

TABLE 1

ANALYSIS BY GC/FID

VOLATILE ORGANIC COMPOUNDS	DETECTION LIMITS (ug/l)
Acetone	1.0
Benzene	1.0
1-Butanol	1.0
2-Butanol	1.0
Chlorobenzene	1.0
Ethylbenzene	1.0
Isopropyl Ether (IPE)	1.0
Methyl Ethyl Ketone (MEK)	1.0
Methyl Isobutyl Ketone (MIBK)	1.0
4-Methyl-2-Pentanone	1.0
Methyl-Tert-Butyl Ether (MTBE)	1.0
1-Propanol	1.0
2-Propanol	1.0
Toluene	1.0
Meta- & Para-Xylene	1.0
Ortho-Xylene	1.0

The following compounds are also analyzed using GC/FID; however, a different column is used for the analysis.

VOLATILE ORGANIC COMPOUNDS	DETECTION LIMITS (ppb)
i-Butane	1.0
n-Butane	1.0
Ethane	1.0
Ethylene	1.0
Methane	1.0
Propane	1.0
Propylene	1.0

TABLE 2

ANALYSIS BY GC/MS
(EPA 8240)

VOLATILE ORGANIC COMPOUNDS	DETECTION LIMITS (ug/l)
Acrolein	1.0
Acrylonitrile	1.0
Bromodichloromethane	1.0
Bromoform	1.0
Bromomethane	1.0
Chloroethane	1.0
1-Chloroethyl Vinyl Ether	1.0
Chloromethane	1.0
Dibromochloromethane	1.0
1,2-Dichlorobenzene	1.0
1,3-Dichlorobenzene	1.0
1,4-Dichlorobenzene	1.0
1,2-Dichloropropane	1.0
cis-1,2-Dichloropropene	1.0
trans-1,2-Dichloropropene	1.0
2-Hexanone	1.0
Vinyl Acetate	1.0
Vinyl Chloride	0.2

TABLE 3

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Field Operations

The following list outlines the minimum required QA/QC guidelines which have been established by TARGET to ensure accurate and reliable results from the soil gas samples collected during the field phase of the survey.

- Special precautions are taken in the selection and design of sampling equipment and supplies to avoid any material that could potentially contaminate or react with the soil gas chemical constituents.

- Sampling apparatus are decontaminated internally and externally prior to and after each day's field activities, and whenever deemed appropriate during the sampling process.

- The entire sampling system is purged between each sampling point. The sampling probe and apparatus, including tubing, valves and injection needle, are purged with a volume of filtered ambient air or pre-purified grade nitrogen approximately 70 times the void space capacity prior to each sample extraction.

- Each field tech is trained by TARGET for a six month period to conduct soil gas surveys and to collect representative soil gas samples.

- Just prior to taking an actual soil gas sample, the sampling apparatus is purged with one (1) sampling system volume of in-situ soil gas. This in-situ soil gas, which is pulled into the system through the probe, is used to purge the atmospheric or nitrogen air from the sampling equipment, preventing dilution of the actual soil gas sample. The gas is then vented into the atmosphere.

- To confirm quality, field control blanks of pre-purified grade nitrogen or ambient air filtered through a dust and organic vapor filter cartridge are obtained at the beginning of each day's sampling activities, after every twentieth (20) sample, and at the conclusion of each survey phase. These field control samples are labeled and analyzed in the same manner as and are visually indistinguishable from the actual field samples.

- Sample inventories are counted and checked prior to leaving the field site. They are also checked and verified prior to and after transport to the analytical laboratory. A Chain of Custody form, on which there is an itemized log of all samples, is used to track each point of custody exchange.

- When transporting the soil gas samples to the analytical facility, whether by the field crew members or overnight courier service, the sample vials are securely packaged in a protective container to prevent damage.

Laboratory Analysis

Quality Assurance/Quality Control procedures are strictly followed throughout the analysis phase to prevent and test for erroneous results.

- Calibration of the analytical equipment is performed on a regular basis using an instrument-response curve.
- The retention time of the standard compounds are used to identify the unknown compounds in the field samples. To ensure the validity of the compound identifications, periodic injections of key qualitative standards are performed daily prior to sample batch analysis and at additional intervals during analysis as necessary
- Duplicate analyses are run for every tenth (10) field sample.
- Laboratory syringe blanks of carrier gas are analyzed prior to sample batch analysis and after every tenth (10) field sample.
- All chromatograms are interpreted by qualified professionals.
- Following the project or job analysis phase, all samples are archived for a period of at least ten (10) days to allow for further analysis.

INTERPRETATION AND REPORTING

The field notes, data, and sample chromatograms for each project are examined and interpreted by TARGET's technical staff of geologists, chemical engineers, soil scientists and hydrogeologists. All soil gas data require interpretation in order to clarify the meaning of the variations in compound concentrations and material compositions across a site. TARGET's technical staff has extensive experience in the analysis and interpretation of this data and has the capability to identify for the client those important features or results of the soil gas survey which will impact other phases of the site assessment project.

Following this review and interpretation, the data and results are fully integrated into a formal comprehensive written report. Three (3) copies of this report are distributed to the client by overnight courier within 7 to 10 days following the completion of field sampling. If desired, verbal reports are also available within 3-4 days of sample collection. The written report prepared by TARGET provides:

- an executive summary
- an introduction (site background, purpose of survey)
- documentation of field and laboratory procedures as well as QA/QC procedures
- tables of all analytical and QA/QC results
- details of the survey and site conditions
- discussion and interpretation of results, including (if applicable):
    - description of individual analyte occurrences
    - likely on- or off-site sources
    - relative aging of the contaminant(s) based on degree of weathering
    - migration patterns
    - characterization of different products or source events
- a series of two-color, compound-specific isoconcentration maps of total volatiles and each key analyte, revealing the differences in occurrence and behaviors of the various compounds in the subsurface.
- other illustrations, as appropriate, to clarify interpretations and conclusions

The reports are written, compiled and published at TARGET's corporate headquarters in Columbia, Maryland. The report writing and preparation efforts are supported by a computer-aided drafting department which is responsible for generating the report maps.

SUMMARY OF SCHEDULED DELIVERABILITIES

FOR TYPICAL FOUR FOOT SURVEYS

- Mobilization of field crew(s) within 2-3 days after receiving client authorization, utility clearance, and Health and Safety information.
- Daily sample collection rate of 40-80 samples per 2-man crew; multiple field crews dispatched for large projects with accelerated schedules.
- Samples transported or shipped to laboratory daily.
- Laboratory analysis completed within 24-48 hours of sampling.
- Written report completed within 7-10 days of field sampling; verbal report available within 3-4 days.

SUMMARY OF HEALTH AND SAFETY PROGRAM

All of TARGET's field personnel and several members of its management staff (18 total) have completed 40-hours of Health and Safety Training as required by OSHA 29 CFR 1910.120. Several members of the staff (including the Health and Safety Officer) have completed supervisory level training and are certified to teach the 40-hour OSHA Health and Safety course. Annual 8-hour updates are completed as appropriate. Each one of these employees is also participating in a medical monitoring program.

The company's Health and Safety Officer has developed a safety plan specific to the type of work TARGET conducts and designs safety plans specific to each project or job situation. Normal field operations also include a Health and Safety pre-survey reconnaissance using air monitoring equipment and line detectors for locating buried structures and utilities. Equipment is also maintained for operations under OSHA Health and Safety Levels C and B, including respirators, protective clothing and SCBAs.

APPENDIX B

KEYSTONE ENVIRONMENTAL RESOURCES
STANDARD OPERATING PROCEDURES

OPERATION/CALIBRATION OF HNU PHOTOIONIZATION ANALYZER

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

KEYSTONE ENVIRONMENTAL RESOURCES
STANDARD OPERATING PROCEDURE

Page:	1 of 6
Date:	04/86
Number:	405
Revision:	0

TITLE: OPERATION/CALIBRATION OF HNu PHOTOIONIZATION ANALYZER

1.0 PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) describes the operation and calibration techniques used for the Model PI 101 Photoionization Analyzer. This instrument is designed to measure organic vapor levels. There are three direct reading ranges: 0-20 ppm, 0-200 ppm and 0-2000 ppm at a minimum gain. The detection limit is 0.1 ppm. The linear range is 0-600 ppm. The response time is less than 5 seconds to 90% of full scale. (All specifications are benzene referred.)

The PI 101 is capable of operating either from a rechargeable battery for more than 10 hours or continuously from the AC battery charger. The recorder output is 0-100 mv FSD (full scale deflection).

2.0 RELATED DOCUMENTS

- HNu Systems, Inc. 1975. Instruction Manual for model PI 101 photoionization analyzer.

3.0 RESPONSIBILITIES

The field team leader or his designee is responsible for ensuring that the analyzer is in proper operating condition prior to leaving the laboratory. A laboratory check-out form must be completed and accompany the analyzer to the field. The field team leader is also responsible for ensuring that the analyzer is calibrated and operated according to the methods outlined in this SOP.

4.0 REQUIRED MATERIALS

- NBS - Traceable span gas cyliners:

  1. 10 ppm Isobutylene or other appropriate gas in hydrocarbon free air.

2. 150 ppm Isobutylene or other appropriate gas in hydrocarbon free air.

NOTE: If NBS traceable gas standards are not available, substitute manufacturer's certified standard.

- Appropriate gas regulator
- Tedlar bags, 4-5 liters
- Tubing used for gas transfer from cylinder to bag (if necessary)
- AC battery charger
- "Magic marker"
- Field notebook
- Calibration data sheets
- Activated charcoal

5.0 SAFETY PRECAUTIONS

Do not look directly into the UV light source of analyzer. Be careful with the standard gas cylinder when standardizing the instrument.

6.0 PROCEDURE

6.1 Standard Procedure

1. Operation and calibration of the instrument should be performed in a controlled environment, (i.e., in the field office, interior of vehicle, etc). This is done in order to control working temperature, protect from vehicle exhuasts, etc.

2. The probe nozzle, electrode casing handle, and cable are stored within the instrument cover. To assemble, the handle must be screwed to the electrode casing. The probe nozzle must be screwed to the opposite end of the electrode casing. The 12-pin connector at the end of the cable must then be attached to the rest of the unit by twisting it downwards until a distinct snap and lock is felt. The unit is now ready to be used.

3. Prior to calibration or use of the instrument the unit should be allowed to warm up for approximately one-half hour. During this time, check to see if the UV light source is working. Do not look directly at the light source. Also check to see if the intake fan is working properly. It is located in the electrode casing and will give off a distinct hum when the unit is turned on.

4. Check to make sure the level of charge is high enough to ensure accurate readings. When the instrument is switched to the BATTERY CHECK position, the needle should deflect upscale to well within the green area (battery level) on the face of the meter. If not, the unit should be charged using the AC charger. A 3-hour charge will bring the unit up to 90% full charge. With continuous use, (e.g., unit left on for a full day), the unit should be recharged overnight for 8-10 hours.

6.2 Calibration and Maintenance

1. To ensure accurate readings over the full range of scale that is to be needed, calibration should be done at the beginning of each day the instrument is used. Two cylinders containing isobutylene or another appropriate gas, of two different, known concentrations are to be used as calibration gases. If only one cylinder is available, it should be of high enough concentration to be within the expected range under normal use.

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2. The instrument should be given the dynamic zero check by connecting the activated charcoal cannister to the inlet probe, using flexible tubing, while operating the instrument in the sampling mode. Wait for a stable response, and then adjust the zero potentiometer until a zero reading is obtained. This zero check should be performed before and after each calibration. The charcoal in the cannister should be replaced at least once every 5 sampling days.

3. Actual calibration is done by first filling an evacuated Tedlar bag with gas from the calibration gas cylinder containing the highest gas concentration. Use the available tubing and any other hookup materials that are provided. Be absolutely sure that the Tedlar bag has been evacuated before filling it with gas, otherwise the calibration gas will be diluted and its concentration will not be known.

4. The appropriate analyzer scale should be chosen depending on the known concentration of the calibration gas. Attach the probe nozzle to the Tedlar bag and allow it to sample the gas until a stable, unchanging reading is reported by the analyzer. Adjust the span potentiometer so that the instrument reading agrees exactly with the concentration of the calibration gas. Whenever the span setting is changed the zeroing procedure should be repeated.

5. The calibration procedure should be repeated for the other calibration gas provided to ensure that the instrument is calibrated properly over a wide range of scale.

6.3 Standard Operation

1. After the instrument is fully calibrated, it is ready to be used. To obtain the most accurate reading, the lowest possible scale should be selected prior to sampling. To analyze a sample, the probe nozzle should be placed in close proximity to the sample, taking care not to contaminate the probe with any materials (soil, water).

2. A "magic marker" is provided to check meter response periodically. When the probe is inserted into the marker cap or next to the marker tip a reading of about 5 ppm should be obtained. Shelter the probe and marker from any wind when performing this test.

3. Meter calibration should be checked at the end of the day with any appropriate changes made and documented.

7.0 QUALITY CONTROL

Prior to the HNu photoionization analyzer's use in the field, the analyzer should be tested and checked in the laboratory to ensure good working condition. A laboratory check-out form will accompany the analyzer to the field. The analyzer will be calibrated in the field prior to its use and at the end of the use period.

8.0 DOCUMENTATION

Record all calibration information on the calibration form. Record all sample readings and sample information in the field notebook. A copy of the field notebook and calibration forms will be placed in the project file.

HNu PI 101 CALIBRATION FORM

Project Name/No.________________ Calibration Date ____/____/____

Time________________________

By Whom________________(Init)

Calibration Gases: Cylinder ID Number Concentration

1. ______________________________ ppm

2. ______________________________ ppm

Where calibrated: ______________ (office, field lab)

Battery Check: (Y, N)__________ Recharge Time: ______hrs

Zero Adjust: (Y, N)__________

First Calibration: Designated Reading ________ppm

(use higher standard gas)

Observed Reading __________ppm

Span Setting: Initial__________

Final__________

Post Span Observed Reading _____ppm

Post Calibration Zero Adjust: (Y, N) ________________

Second Calibration Designated Reading __________ppm

(use lower standard)

Observed Reading ______________ppm

Final Zero Adjust: (Y, N)_____ Second Recalibration Needed (Y, N)______

Calibrated by:__________________________ Date: _____________

APPENDIX C

SPDES PERMIT
PHILIPS DISPLAY COMPONENTS COMPANY
SENECA FALLS, NEW YORK

91-20-2 (7/84)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)
DISCHARGE PERMIT
Special Conditions (Part 1)

Industrial Code 3672
Discharge Class (CL) 03
Toxic Class (TX) 02
Major D.B. 07
Sub D.B. 05

Facility IDNumber: NY- 0001228
UPA Tracking Number:
Effective Date (EDP): June 1, 1985
Expiration Date (ExDP): June 1, 1990
Modification Date(s):
Attachment(s): *General Conditions (Part II,* 2/85)

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et. seq.) (hereinafter referred to as "the Act").

Attn: Mr. A. R. Covell

Permittee Name: Philips ECG, Inc.
Street: 50 Johnson St.
City: Seneca Falls State: NY Zip Code: 13148

is authorized to discharge from the facility described below:

Facility Name:
Location (C,T,[✓ V]) Seneca Falls County: Seneca
Mailing Address (Street): Johnson Street
Mailing Address (City) Seneca Falls State: New York Zip Code: 13148

from Outfall No. 001 at: Latitude 76° 46' 51" & Longitude 42° 54' 59"
into receiving waters known as: Seneca River/Barge Canal, Class C
and: (list other Outfalls, Receiving Waters & Water Classification)

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal as prescribed by Sections 17-0803 and 17-0804 of the Environmental Conservation Law and Parts 621, 752, and 755 of the Departments' rules and regulations.

PERMIT ADMINISTRATOR Albert W. Butkas	DATE ISSUED 5/2/85	ADDRESS 6274 E. Avon-Lima Road Avon, NY 14414

Distribution: Region 8 Water Division
Mr. Hannaford, BWFD
Seneca County Health Department
Baker, USEPA/Region II

Albert W. Butkas

.-20-2a (7/84)

Facility ID # NY 0001228

Part 1, Page 2 of 4

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the Period Beginning June 1, 1985,

and lasting until June 1, 1990,

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations		Units	Minimum Monitoring Requirements	
	Daily Avg.	Daily Max.		Measurement Frequency	Sample Type
001 (Process Wastewater)					
Flow	Monitoring requirement only		MGD	Continuous	Recorder
Temperature		90*	°F	2/Month	Grab
pH (Range)	6.0 - 9.0		SU	Continuous	Recorder
Solids, Suspended		404	#/Day	2/Month	24-Hour Composite
BOD_5	270	404	#/Day	2/Month	24-Hour Composite
Fluoride, Total		52	#/Day	2/Month	24-Hour Composite
Cadmium, Total		1.1	#/Day	2/Month	24-Hour Composite
Chromium, Total		4.2	#/Day	2/Month	24-Hour Composite
Zinc, Total		6.7	#/Day	2/Month	24-Hour Composite
Trichloroethylene		4.2	#/Day	2/Month	Grab

* If the influent temperature from Vancleef Lake is greater than 90°F, no net increase is permitted.

001 B (Process Wastewater, 2 March - 31 Dec.)					
Lead, Total		3.4	#/Day	2/Month	24-Hour Composite
001 C (Process Wastewater, 1 Jan. - 1 March)					
Lead, Total		2.3	#/Day	2/Month	24-Hour Composite

91-20-2e (7/84)

Facility ID # NY 0001228

Part 1, Page 3 of 4

Definition of Daily Average and Daily Maximum

The daily average discharge is the total discharge by weight or in other appropriate units as specified herein, during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges in appropriate units as specified herein divided by the number of days during the calendar month when the measurements were made.

The daily maximum discharge means the total discharge by weight or in other appropriate units as specified herein, during any calendar day.

Monitoring Locations

Permittee shall take samples and measurements to meet the monitoring requirements at the location(s) indicated below: (Show locations of outfalls with sketch or flow diagram as appropriate). Normally samples should be taken from effluent flow prior to discharge to the Barge Canal.

At flows greater than 700 GPM, samples shall also be taken from the holding lagoon influent i.e. the fluoride and heavy metals waste treatment effluent.

Facility ID # NY 0001228

Part 1. Page 4 of 4

MONITORING. RECORDING AND REPORTING

a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be:

☐ Summarized. signed and retained for a period of three years from the date of sampling for subsequent inspection by the Department or its designated agent.

☒ Summarized and reported by submitting completed and signed Discharge Monitoring Report forms once every 3 month(s) to the locations specified below. Blank forms available at department offices listed below. The first report will be due no later than September 28, 1985.

Thereafter, reports shall be submitted no later than the 28th of the following month(s): December, March, June, September.

Department of Environmental Conservation
Regional Water Enginer - Region 8
6274 E. Avon-Lima Road
Avon, New York 14414

Department of Environmental Conservation
Water Division
50 Wolf Road,
Albany, New York 12233

☒ (applicable only if checked)
Dr. Richard Baker, Chief
Permit Administration Branch
Planning & Management Division
USEPA Region II, 26 Federal Plaza
New York, New York 10278

c) If so directed, Monthly Wastewater Treatment Plant Operator's Reports should be submitted to the Regional Engineer and County Health Department or County Environmental Control Agency specified above.

d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

e) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculations and recording of the data on the Discharge Monitoring Reports.

f) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

g) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

h) On or after April 1, 1984, any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquires regarding laboratory certification should be sent to the Laboratory Certification/Quality Assurance Group, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences. The Nelson A. Rockefeller

APPENDIX D

CERTIFICATION FOR DOCUMENTATION OF USE OF APPROPRIATE BOTTLE PRECLEANING REQUIREMENTS FROM SAMPLE BOTTLE VENDOR

All-Pak

All-Pak Inc. 2260 Roswell Drive
Chartiers Valley Industrial Park
Pittsburgh, Pennsylvania 15205

412/922-7525

June 11, 1990

Keystone Environmental
3000 Tech Center Drive
Monroeville, PA 15146

Attn: Keith Stang
Subject: Bottle Pre-cleaning requirements
NY State Dept. of Environmental Conservation

Dear Keith,

Pursuant to our meeting of June 1, 1990, in regard to the above subject, listed below please find a summary of our cleaning procedures as compared to the Jan. 17, 1990 NYSDEC QAPJP Guidance document.

A. Demonstrated Analyte - Free Water
We are in total compiance.

B. Pre-cleaning for Metals, Cyanide, and Sulfide Analyses
Item 3 - We will use reagent grade nitric acid.
All other points remain the same.

C. Pre-cleaning for Purgeable Organic Analyses
We are in total compliance.

D. Pre-cleaning for Extractable Organic Analyses
Item 3 - We rinse with either nitric or sulfuric acid
vs. acetone or methanol.
All other items are in compliance.

We will certify that our bottles have been cleaned to certification Level 3 and a certificate of analysis will be sent with each case. Each case will have a lot number assigned for quality control purposes.

If I can be of any further service to you, please do not hesitate to contact me.

Yours Truly,

Karen L. Brooks

Karen L. Brooks
Manager
Pre-Cleaned Bottle Sales

KLB/tlm

CC: R. Tamborino - All-Pak