Work Plan — Revision 2

Pre-Design Sampling and Remedial Design/Remedial Action

Canonie Environmental

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WORK PLAN

1.0 INTRODUCTION

This document presents Canonie Environmental Services Corp.'s (Canonie) Work Plan for Pre-Design Sampling and Remedial Design for the Pollution Abatement Services (PAS) Clothier Disposal site in Granby, New York. The general site location is shown on Figure 1. The plan identifies the activities which will be performed consistent with Appendix 2 - Scope of Work of the Consent Decree between the United States Environmental Protection Agency (EPA) and the site's Potentially Responsible Parties.

The primary components of the remedy include:

1. Placing a 1-foot clean soil cover over contaminated areas determined by sampling and analyzing soil samples;

2. Regrading and revegetating the site to prevent soil erosion and control surface water runoff;

3. Installing riprap as needed in selected areas to prevent soil erosion;

4. Performing long-term soil, sediment, and ground/surface water monitoring; and

5. Performing construction and post-construction air monitoring.

This Work Plan describes the manner in which pre-design sampling will be performed and the remedial design will be completed.

2.0 PRE-DESIGN SAMPLING PLAN

Prior to preparation of the design plans, sampling of the site soils will be necessary to delineate the contaminated area which will be covered with 1 foot of clean soils. In addition, air samples will be obtained to provide air quality information for site health and safety protocol during remedial construction.

Field work associated with these objectives will consist of the following:

1. Site surveying;
2. Surface soil/sediment sampling and analyses;
3. Air sampling and analyses;
4. Borrow-soil sampling; and
5. Monitoring well inspection and evaluation.

Details of these proposed field activities are discussed in the following sections. (Proposed on-site sampling locations are shown on Figure 2.)

2.1 Site Surveying

Site surveying will be performed to:

1. Locate the five areas identified in the Remedial Investigation (RI) and the Record of Decision (ROD) which contain contaminant concentrations above ROD-specified remediation levels;
2. Locate 20 soil-sampling locations to delineate the areal extent of elevated contaminant levels;

3. Set a bench-mark near the center of the site for use in sampling and later remedial construction; and

4. Provide detailed topographic mapping (contour interval 1 foot, scale 1 inch = 25 feet) of the contaminated area of the site and adjacent areas for use in the design plan and remedial construction. The New York State Division of Fish and Wildlife will be contacted and asked for assistance in delineating the wetlands boundary adjacent to the site.

Figure 2 shows the five previously identified contaminant areas, the centers of which will be located in the field by land-surveying methods. The approximate boundary of the contaminant cluster area will be used to establish initial surface soil-sampling locations, also shown on Figure 2.

Ten sample locations will be established by land survey methods approximately 20 feet outside of the five-point contaminant area boundary. An additional ten sample locations will be established 50 feet from the boundary area. The proposed sampling points will provide a representative evaluation of the extent of surface soil contamination. These locations will be surveyed and staked in the field prior to sampling. The survey will provide actual location coordinates and surface elevations for the 20 points shown on Figure 2. If conditions warrant sampling in other locations, the new locations will also be surveyed upon completion of the field exploration program.

A bench-mark will be established on-site near the location shown on Figure 2. The bench-mark will be established near the center of the site in an area that will not be disturbed by remedial construction activities and will consist of a steel pin set in concrete. The bench-mark will be used to determine pre- and post-remediation ground surface elevations to assist in verifying that 1 foot of soil cover was placed over contaminated areas as part of the remedy.

Finally, in addition to establishing the proposed sampling locations, site survey data will be collected to allow preparation of a detailed topographic map for use in the design plans, during remedial construction, and to serve as the basis for as-built drawings which will illustrate pre- and post-closure site contours. (The map will be generated with a contour interval of 1 foot and at a scale of 1 inch = 25 feet.)

2.2 Surface Soil/Sediment Sampling and Analyses

Following the site survey, soil or sediment samples will be collected at the 20 approximate locations shown on Figure 2. The soil or sediment samples will be collected and analyzed for polychlorinated biphenyls (PCBs) and carcinogenic polynuclear aromatic hydrocarbons (CPAHs) concentrations to determine which samples exceed ROD-specified cleanup levels.

Samples will be collected with a decontaminated stainless steel spade and scoop and mixed in a stainless steel bowl with a stainless steel spatula. Decontamination of sample collection and mixing equipment will consist of the following procedure:

1. Wash with nonphosphate detergent and potable water;
2. Rinse with potable water;
3. Rinse with acetone or methanol followed by hexane (solvents will be pesticide grade or better);
4. Rinse with demonstrated analyte-free deionized water;
5. Air dry; and
6. Wrap in aluminum foil until use.

Field rinse blanks (demonstrated analyte-free deionized water) will be taken at the rate of one per sampling day. The field blank will be analyzed for the same parameters as the soil samples. Field blanks will be analyzed as water samples.

The deionized water used as the final rinse will be demonstrated analyte-free for all parameters and at the detection limits required for this project (see Table 1). The deionized water to be used for final rinse will be analyzed before sampling operations commence. The results of the analysis will be sent at least two weeks before field sampling commences to:

U.S. Environmental Protection Agency
Monitoring and Management Branch
Attention: Laura Scalise
Building 209
Edison, New Jersey 08837

Sampling procedures are as follows:

1. Remove the top 6 inches of soil or sediment with a precleaned spade and scoop. The soil or sediment will be placed in a bowl and mixed with a spatula. The spade, scoop, bowl, and spatula will be made of stainless steel. The soil will be thoroughly mixed in the bowl and any sticks or stones will be removed.

2. Completely fill an 8-ounce prepared glass jar with soil or sediment for extractable organics and PCB analyses.

3. Secure the cap tightly and store the sample at 4 degrees Celsius (°C) until shipped to the laboratory via overnight courier for analyses.

4. Label the sample with the following information:

- o Sample location
- o Depth
- o Date
- o Project number

5. Clean the sampling equipment according to the previously described procedure after sampling at each location.

Sample bottles for field blanks and soil or sediment samples will be verified as clean in accordance with the Contract Laboratory Program Sample Bottle Repository Statement of Work. Container and cleaning specifications from this Statement of Work are included in Appendix A for reference. Proof of bottle cleanliness will be provided with verification documentation sent to the EPA monitoring and management branch at the address presented above.

All 20 samples (and one duplicate sample per 10 samples for quality control purposes) will be analyzed by Canonie's in-house laboratory. Canonie's laboratory is certified by the State of New York Department of Health for organic and inorganic analyses of potable and nonpotable water and environmental analyses of solid and hazardous wastes and soils. In addition to routine performance evaluations by the state of New York to maintain Canonie's certification, Canonie also participates in the EPA's Water Pollution and Water Supply performance evaluations every six months through the Environmental Monitoring Systems Laboratory in Cincinnati, Ohio. A copy of the results of the most recent evaluation are included in Appendix B.

Testing will be performed in accordance with the Contract Laboratory Program (CLP) Statement of Work (SOW) for Organics Analysis, revision February 1988. The soil samples will be tested for the specific analytes

indicated in Table 1. An additional 10 percent of the samples taken (ie, two duplicate samples) will also be obtained and analyzed according to these test methods for quality control purposes. The detection limits for these tests will be 330 micrograms per kilogram (ug/kg) for the polynuclear aromatic hydrocarbons and 80 ug/kg for the PCBs. The EPA Region II Standard Operating Procedures (SOP) for QA/QC reports for the analyses will be included with reported results. (A copy of the SOP is included in Appendix D.) Table 2 provides an overview of the sampling activities.

2.3 Air Quality Sampling and Analyses

Air sampling will be performed to provide air quality information for predesign sampling activities and to establish site health and safety protocols for remedial construction at the site. Air sampling will consist of perimeter sampling and personal sampling using both direct reading instrumentation and laboratory analyses of sorbent test media.

2.3.1 Perimeter Monitoring and Sampling

Perimeter air monitoring will be performed for air particulates and volatile organic compounds (VOCs). Action levels which will dictate the type, frequency, and location of air sampling and site personnel safety protection requirements are as follows:

1. Particulates - Continuous air monitoring using a Real-Time Aerosol Monitor (RAM) for particulate air sampling at a downwind location.

    - Action Level - 150 micrograms per cubic meter (ug/m^3).

    - Required Action - Measure the upwind location with the RAM. If the particulate measurement is greater than 100 ug/m^3 above the background level, implement additional dust suppression techniques such as reducing vehicle travel on-site.

2. Total VOCs - Continuous air monitoring using an organic vapor analyzer and HNu.

   - o Action Level 1 - Sustained readings of 2.5 parts per million (ppm) above background.

   - o Required Action - Increase monitoring frequency to include continuous upwind monitoring with the OVA and HNu to substantiate that the sampling location is the source of the emissions.

   - o Action Level 2 - Sustained readings of 5.0 ppm above background.

   - o Required Action - Upgrade site personnel to Level C personnel protective equipment. Attempt to locate source of emissions and either containerize or provide temporary cover over source.

   - o Action Level 3 - Sustained readings of 10.0 ppm above background.

   - o Required Action - Conduct specific VOC analyses. Complete analyses within one working day.

For VOC Action Levels 1 and 2 above, air monitoring will be performed on a continuous basis using both an organic vapor analyzer and a HNu. The instruments will be located at a downwind location from sampling activities. It is assumed that the downwind sampling point will be at or near the location identified on Figure 2. The actual sample location(s) will be established during field activities based on wind conditions.

In addition to the real-time monitoring described above, perimeter monitoring will also be performed by sample collection and analyses of sorbent

test media. One set of analytical ambient air samples will be obtained at the downwind and upwind site perimeter at the approximate locations shown on Figure 2 for both VOCs and particulates. At a minimum, this sampling will be performed if action Level 3 above is exceeded. Even if action Level 3 is not exceeded, an analytical sample will be obtained to verify continuous direct reading air monitoring results. Sampling will consist of one eight-hour continuous sample obtained in charcoal tube media for VOCs and polyvinyl chloride filter for particulates, and one duplicate sample and one blank sample for quality control purposes at the downwind location. Climatological data, including wind speed and direction, will be obtained on a minimum hourly basis during the eight-hour sampling period. (Sample collection and analyses will be performed by Galson Technical Services, Inc.'s laboratory located in East Syracuse, New York.)

2.3.2 Personal Monitoring

Personal monitoring will consist of one 8-hour sample collected each day that field activities are in progress. One worker, subject to the greatest potential exposure, will be outfitted with a calibrated air sample pump. The personal monitoring samples will be analyzed for VOCs listed in Table 3 to verify direct reading air monitoring results in the immediate work area.

2.3.3 Sample Collection and Analyses

Air samples for VOC analyses will be collected on solid sorbent carbon cartridges. Air samples for particulates will be collected on polyvinyl chloride filters. A Gilian pump or equivalent will be used for air sample collection. The pump will be calibrated to draw a volume of 100 cubic centimeters per minute (cc/min) for VOCs and 2,000 cc/min for particulates. Personal monitors will be calibrated to draw 1,000 cc/min. The collection tube for VOCs will include a backup section to detect breakthrough or excessive vapor migration. Calibration of the pump will be accomplished using a primary standard of volume displacement. Acceptable accuracy of the flow rate shall be within $\pm$ 10 percent.

A "blank" from the same lot as the sample tubes and the duplicate sample will be submitted to the laboratory for quality control. The samples will be capped, labeled, and chilled (4°C) at the site. The chilled samples will then be submitted to the analytical laboratory for testing immediately following the 8-hour sampling period. The air samples will be analyzed in accordance with NIOSH Methods 1003, 1500 and 1501 for the VOCs and NIOSH Method 0500 for particulates in Table 3. Table 2 provides an overview of the sampling activities.

Air quality analyses will be used to establish the time-weighted, average contaminant concentrations for the site. Such monitoring will be used to establish appropriate health and safety protocol for the site during remedial construction. Sample results will be compared to applicable Occupational Safety and Health Administration permissible exposure limit for detected VOCs to confirm that concentrations are below levels at which extraordinary protective measures may be required.

2.4 Soil Borrow

Off-site, clean soil borrow sources will be located and sampled during predesign sampling for nutrient analyses. The samples will be analyzed for pH, total nitrogen, potassium, total phosphorous, iron, manganese, and bicarbonate/carbonate. The analyses will be performed to determine the suitability of the borrow for use as plant growth medium and fertilizer requirements, if needed. Based on this information and discussions with local U.S. Department of Agriculture personnel, a revegetation seeding program will be specified.

In addition, a representative sample of the proposed borrow will be analyzed for the parameters specified in the Superfund Target Compound List. This testing will be performed to verify that the borrow material does not contain undesirable constituents.

2.5 Existing Monitoring Well Evaluation

Each of the nine existing monitoring wells at the PAS Clothier site shown in plan on Figure 3 will be evaluated to determine its condition for post-closure monitoring. The wells will first be visually examined for any damage near the surface. The depth to the bottom of the well and depth to the water surface will be measured. The depth to the bottom of the well will be compared to the well completion details presented in the RI to determine if silt or debris has filled the bottom of the well casing within the screened section. Water level data will be used to verify the ground water gradient at the site and determine if wells are located in appropriate upgradient and downgradient areas for post-closure ground water quality monitoring. If the well is damaged, filled with silt, or foreign materials are observed within the well casing, appropriate corrective measures, such as well repair or replacement, will be included as part of the design plan.

3.0 REMEDIAL DESIGN PLAN

Following completion of the pre-design sampling and analyses, a design plan will be prepared summarizing results of the pre-design sampling. The document will include the results of the soil and air sampling, identification of affected soils within the Ox Creek floodplain (Figure 2) which will be excavated, delineation of the area requiring soil cover, and an evaluation of the current ground water monitoring wells. This information will then be used to develop the plan drawings, specifications, and schedule for implementation of the remedy.

3.1 Design Plan

The design plan will be based on information contained in the RI/Feasibility Study, the requirements set forth in the ROD and additional data collected during pre-design sampling. The basic approach to site remediation is presented in the ROD and will only be refined based on data collected during pre-design sampling. The design plan will provide the plans and specifications needed to implement the remedy.

The design plan will include:

1. A drawing depicting the areal extent of the soil cover and location(s) of riprap placement for erosion control;
2. A site grading plan (1-foot contours, 1 inch = 25 feet);
3. Monitoring well locations;
4. Construction details;
5. Technical specifications; and
6. Implementation schedule.

The drawing(s) will depict the areal extent of contamination and the limits of the soil cover. The minimum limit of surface soils will be established by lines connecting the sampling point locations which show CPAH and PCB concentrations above ROD-specified cleanup levels. This delineation of contamination will be integrated with topographic considerations to maintain surface water control in developing the site grading plan.

The design plan drawings will indicate the limits of contaminated soils within the Ox Creek 100-year floodplain, the excavation requirements for these soils, and placement of those materials in the upland area. Finally, the drawings will indicate the limits of the proposed soil cover. The soil cover limits will coincide with the limits of contamination with the exception of the Ox Creek floodplain area. In this area, the soil cover limits will extend only to the upland edge of the floodplain excavation.

The grading plan will indicate the limits of clearing and grubbing, existing and final ground contours, and the location of erosion-protection materials. The grading plan will illustrate construction of the 1-foot soil cover over contaminated areas while maintaining appropriate site drainage. Erosion protection (ie, riprap) will be sized based on runoff created by the 100-year, 24-hour storm event to preclude gully erosion. The grading plan will also delineate areas to be revegetated as part of erosion protection.

Drawings showing the location and construction details of new monitoring wells will be included if the pre-design evaluation indicates their current condition needs repair or replacement. The drawings will identify construction/installation details necessary for the modifications or replacement of wells to be used for post-closure monitoring.

Technical specifications will be prepared which specify the soil cover characteristics (ie, thickness and placement tolerances), erosion protection (ie, riprap), size and durability requirements, excavation and grading tolerances, revegetation seed types and placement methods, and post-closure

monitoring requirements for existing wells (or new wells, if required). Air monitoring requirements during remedial construction, along with modifications to the health and safety plan contained herein, if appropriate, will be included.

Specific requirements regarding sampling protocols for post-closure monitoring of ground water, Ox Creek sediments and Ox Creek surface water, will be included as part of the technical specifications of the design plan. The monitoring will include annual sampling of water samples from up to eight wells for a period of five years after initiation of the remedial action at which point an evaluation regarding the necessity for continued monitoring will be made. If the evaluation confirms that the chemical constituents of concern identified in the ROD do not exceed ROD-specified acceptance levels, then sampling will be terminated.

Each water sample, one duplicate, and one blank (up to 10 samples total) will be analyzed for purgeable halocarbons in accordance with EPA Test Method 601, CPAHs in accordance with EPA Test Method 610, and PCBs in accordance with EPA Test Method 608. Specific test methods and analytes are presented in Table 4. The specific analytes will include those identified in the ROD as chemicals of concern (see Table 4) including PCBs and CPAHs. One sample of Ox Creek surface water obtained immediately downgradient and west of the site will be included with the ground water samples and analyzed for the same constituents employing the test methods identified above.

Finally, one sample of Ox Creek sediments, similarly obtained downgradient and west of the site, will be analyzed for purgeable halocarbons in accordance with EPA Test Method 8010, CPAHs in accordance with EPA Test Method 8100, and PCBs in accordance with EPA Test Method 8080 for the analytes identified above and in Table 4. Appropriate blank and duplicate samples are discussed in the Project Quality Assurance Plan, Appendix C. Table 2 summarizes the sampling requirements.

EPA CLP-SOW will not be required for these analyses. The results of this testing will be used to verify trends in water quality and to detect degradation or improvement of water quality at the site with time. Since this data will not be used for verification of limits of contamination, such as is needed for site soils, the detailed QA/QC and data packages required by the CLP-SOW are not necessary. Should trends in the water quality data indicate water quality degradation, then the CLP-SOW procedures would be implemented, as stringent QA/QC and analytical procedures are warranted.

An implementation schedule will be prepared which identifies the various tasks and time required to implement the remedy. The schedule will illustrate the estimated time required to complete each task and the total time required to complete construction. The schedule will be used to track the progress of construction and will indicate the projected date at which construction will be initiated and then be completed.

Drawings will be developed using Canonie's in-house Computer Aided Drafting (CAD) system. The CAD system produces quality drawings which can be reproduced in various sizes (for either report use or construction sets), have high resolution for detail, and can be easily revised to illustrate as-built conditions.

4.0 SCHEDULE

Activities will initiate following the EPA's approval of the pre-design work plan and once the soils have thawed at the site to permit sampling. It is expected that soil sampling will be performed in the spring of 1990. Testing will be expedited to obtain analytical results within two weeks of sampling. As indicated by the schedule, the design plan will be submitted within 30 days of completion of soil sample analyses. Figure 4 illustrates the proposed schedule of pre-design sampling activities.

TABLES

TABLE 1

SOIL SAMPLE ANALYSES

Analyte	Number of Analyses	Method	Contract Required Quantitation Limits (ug/kg)
PCB-Aroclor 1242	20	EPA 8080	80.0
Benzo (a) Anthracene	20	EPA 8270	330
Benzo (b) Fluoranthene	20	EPA 8270	330
Benzo (k) Fluoranthene	20	EPA 8270	330
Benzo (a) Pyrene	20	EPA 8270	330
Chrysene	20	EPA 8270	330

Notes:

1. Analytical methods in accordance with the "Contract Laboratory Program Statement of Work for Organic Analyses," revision February 1988.

2. For a summary of the number of QA/QC samples, preservatives, sample containers, sample volumes, and sample holding times, see Table 2.

TABLE 2

OVERVIEW OF SAMPLING ACTIVITIES

	Analyses	Matrix	Number of Repre-sentative Samples	Number of Duplicates	Number of Rinseate Blanks	Number of Trip Blanks	Number of Field Blanks	Preservatives	Sample Container Volume	Sample Holding Time
Pre-design Soil/ Sediment Sampling	EPA 8270	Soil	20	2	-	-	-	Cool, 4°C	1-8 oz. glass jar	10 days
	EPA 625	Water	-	-	1/day	-	-	Cool, 4°C	1-4 l amber glass bottle	5 days
	EPA 8080	Soil	20	2	-	-	-	Cool, 4°C	1-8 oz. glass jar	10 days
	EPA 608	Water	-	-	1/day	-	-	Cool, 4°C	1-4 l amber glass bottle	5 days
Pre-design Borrow Soil Sampling	EPA 8270	Soil	1	1	-	-	-	Cool, 4°C	1-8 oz. glass jar	10 days
	EPA 8080	Soil	1	1	-	-	-	Cool, 4°C	1-8 oz. glass jar	10 days
Pre-design Air Sampling	NIOSH 0500	Air	2	1	-	-	1	Cool, 4°C	PVC filter	28 days
	NIOSH 1003 NIOSH 1500 NIOSH 1501	Air	3	1	-	-	1	Cool, 4°C	Carbon Molecular sieve cartridge	28 days
Post-closure Sediment Sampling	EPA 8240	Soil	1	1	-	1/day	-	Cool, 4°C	2-120 ml glass vials	14 days
	EPA 624	Water	-	-	1/day	-	-	Cool, 4°C, Hydrochloric Acid	2-40 ml glass vials	7 days
	EPA 8270	Soil	1	1	-	-	-	Cool, 4°C	1-8 oz. glass jar	14 days
	EPA 625	Water	-	-	1/day	-	-	Cool, 4°C	1-4 l amber glass bottle	7 days
	EPA 6010	Soil	1	1	-	-	-	Cool, 4°C	1-8 oz. glass jar	14 days

TABLE 2

OVERVIEW OF SAMPLING ACTIVITIES
(Continued)

	Analyses	Matrix	Number of Repre-sentative Samples	Number of Duplicates	Number of Rinseate Blanks	Number of Trip Blanks	Number of Field Blanks	Preservatives	Sample Container Volume	Sample Holding Time
	EPA 200.7	Water	-	-	1/day	-	-	Cool, 4°C, Hydrochloric Acid	1-500 ml polyethylene bottle	7 days
	EPA 8010	Soil	1	1	-	1/day	-	Cool, 4°C	2-120 ml glass vials	14 days
	EPA 601	Water	-	-	1/day	-	-	Cool, 4°C, Hydrochloric Acid	3-40 ml glass vials	7 days
Post-closure Ground Water and Surface Water Sampling	EPA 601	Water	9	1	1/day	1/day	1/day	Cool, 4°C, Hydrochloric Acid	3-40 ml glass vials	14 days
	EPA 2500	Water	9	1	1/day	-	1/day	Cool, 4°C	3-40 ml glass vials	14 days
	EPA 608	Water	9	1	1/day	-	1/day	Cool, 4°C	3-1 l amber glass bottles	7 days
	EPA 610	Water	9	1	1/day	-	1/day	Cool, 4°C	3-1 l amber glass bottles	14 days
	EPA 200.7	Water	9	1	1/day	-	1/day	Cool, 4°C, Hydrochloric Acid	1-500 ml polyethylene bottles	40 days

TABLE 3

AIR SAMPLE ANALYSES

Analyte	Number of Analyses	Method
Nuisance Dusts	2	NIOSH 0500
Calcium Carbonate	2	NIOSH 0500
Cellulose	2	NIOSH 0500
Glycerin Mist	2	NIOSH 0500
Limestone	2	NIOSH 0500
Benzyl chloride	3	NIOSH 1003
Bromoform	3	NIOSH 1003
Carbon tetrachloride	3	NIOSH 1003
Chlorobenzene	3	NIOSH 1003
Chlorobromomethane	3	NIOSH 1003
Chloroform	3	NIOSH 1003
o-dichlorobenzene	3	NIOSH 1003
p-dichlorobenzene	3	NIOSH 1003
1,1-dichloroethane	3	NIOSH 1003
1,2-dichloroethylene	3	NIOSH 1003
Ethylene dichloride	3	NIOSH 1003
Hexachloroethane	3	NIOSH 1003
Methylchloroform probylene dichloride	3	NIOSH 1003
Tetrachloroethylene	3	NIOSH 1003
1,1,2-trichloroethane	3	NIOSH 1003
1,2,3-trichloropropane	3	NIOSH 1003
Cyclohexane	3	NIOSH 1500
Cyclohexene	3	NIOSH 1500
n-heptane	3	NIOSH 1500
n-hexane	3	NIOSH 1500
Methylcyclohexane	3	NIOSH 1500
n-octane	3	NIOSH 1500
n-pentane	3	NIOSH 1500
Benzene	3	NIOSH 1501
P-tert-butyltoluene	3	NIOSH 1501
Cumene	3	NIOSH 1501

TABLE 3

AIR SAMPLE ANALYSES
(Continued)

Analyte	Number of Analyses	Method
Ethylbenzene	3	NIOSH 1501
Methyl styrene	3	NIOSH 1501
Napthalene	3	NIOSH 1501
Styrene	3	NIOSH 1501

Notes:

1. Analyses for Methods NIOSH 1003, 1500, and 1501 include two perimeter air samples and one personal air sample. Analyses for Method NIOSH 0500 include two perimeter air samples.

2. For a summary of the number of QA/QC samples, preservatives, sample containers, sample volumes, and sample holding times, see Table 2.

TABLE 4

POST-CLOSURE MONITORING
SEDIMENT, GROUND WATER, AND SURFACE WATER ANALYSES

Analyte	Method	Quantitation Limits (mg/kg)
Soils - Ox Creek Sediment		
Acetone	EPA 8240	0.125
Bis(2-ethylhexyl)phthalate	EPA 8270	0.330
2-butanone	EPA 8240	0.125
Carcinogenic PAHs	EPA 8270	0.330
4-chloro-3-methylphenol	EPA 8270	0.330
2,4-dimethylphenol	EPA 8270	0.330
Di-n-butylphthalate	EPA 8270	0.330
Di-n-octylphthalate	EPA 8270	0.330
Methylphenols	EPA 8270	1.65
N-nitrosodiphenylamine	EPA 8270	0.330
Non-carcinogenic PAHs	EPA 8270	0.330
PCB Aroclor 1242	EPA 8080	0.05
Phenol	EPA 8270	0.330
Tetrachloroethene	EPA 8010	0.02
Toluene	EPA 8240	0.125
Xylenes	EPA 8240	0.125
Cadmium	EPA 6010	1.0
Selenium	EPA 6010	1.0
Silver	EPA 6010	5.0
Thallium	EPA 6010	5.0
1,2-dichloroethene (trans)	EPA 8010	0.02
Methylene chloride	EPA 8010	0.02
1,1,1-trichloroethane	EPA 8010	0.02

TABLE 4

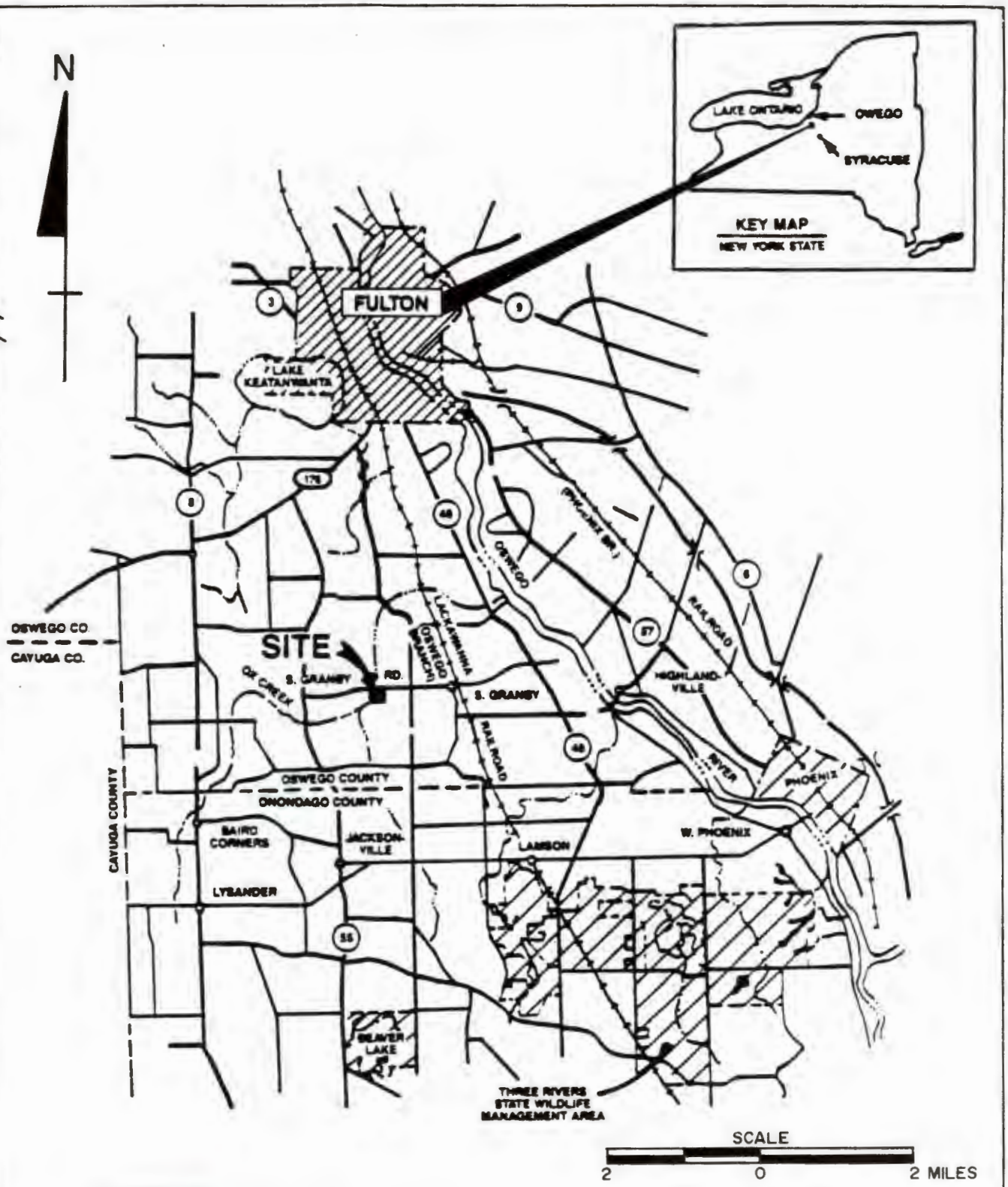
POST-CLOSURE MONITORING
SEDIMENT, GROUND WATER, AND SURFACE WATER ANALYSES
(Continued)

Analyte	Method	Quantitation Limits (mg/l)
Ground Water and Ox Creek Surface Water		
Bis(2-ethylhexyl)phthalate	EPA 610	0.01
1,2-dichloroethene (trans)	EPA 601	0.0005
1,1,1-trichloroethane	EPA 601	0.0005
Trichloroethene	EPA 601	0.0005
Tetrachloroethene	EPA 601	0.0005
Xylenes	EPA 2500	0.005
Cadmium	EPA 200.7	0.005
Chromium	EPA 200.7	0.005
Manganese	EPA 200.7	0.05
Carcinogenic PAHs	EPA 610	0.01
PCB Aroclor 1242	EPA 608	0.50

Note: For a summary of the number of QA/QC samples, preservatives, sample containers, sample volumes, and sample holding times, See Table 2.

FIGURES

DRAWN BY	M.T.H.	CHECKED BY	DRAWING NUMBER 88-209-A6
	7-21-89	APPROVED BY	



LEGEND:

■ PAS CLOTHIER DISPOSAL SITE

SITE LOCATION MAP

PREPARED FOR...

PAS CLOTHIER SITE
GRANBY, NEW YORK

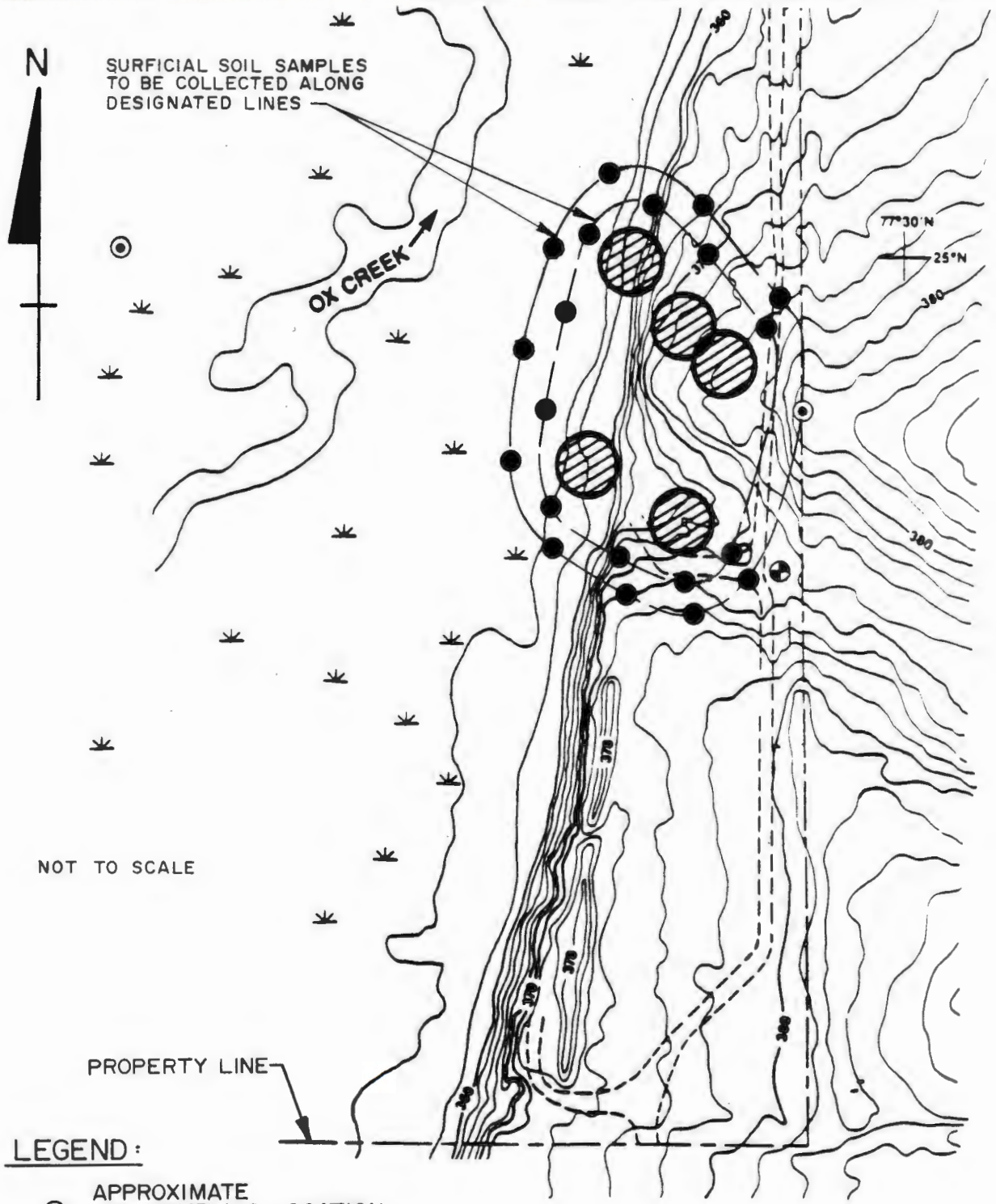
REFERENCE:

-DRAWING PROVIDED BY EBASCO, TITLED: "SITE LOCATION MAP."

Canonie Environmental

DATE: 7-21-89	FIGURE 1	DRAWING NUMBER 88-209-A6
SCALE: AS SHOWN		

102340



DRAWN BY	CHECKED BY	DRAWING NUMBER
R.H. 6-2-89	APPROVED BY	88-209-A7

SAMPLING AND BENCHMARK LOCATIONS

PREPARED FOR

PAS CLOTHIER SITE
GRANBY, NEW YORK

REFERENCE:

-DRAWING PROVIDED BY EBASCO, TITLED: "ALT. 3 - OFFSITE RCRA LANDFILL AREAS TO BE EXCAVATED".

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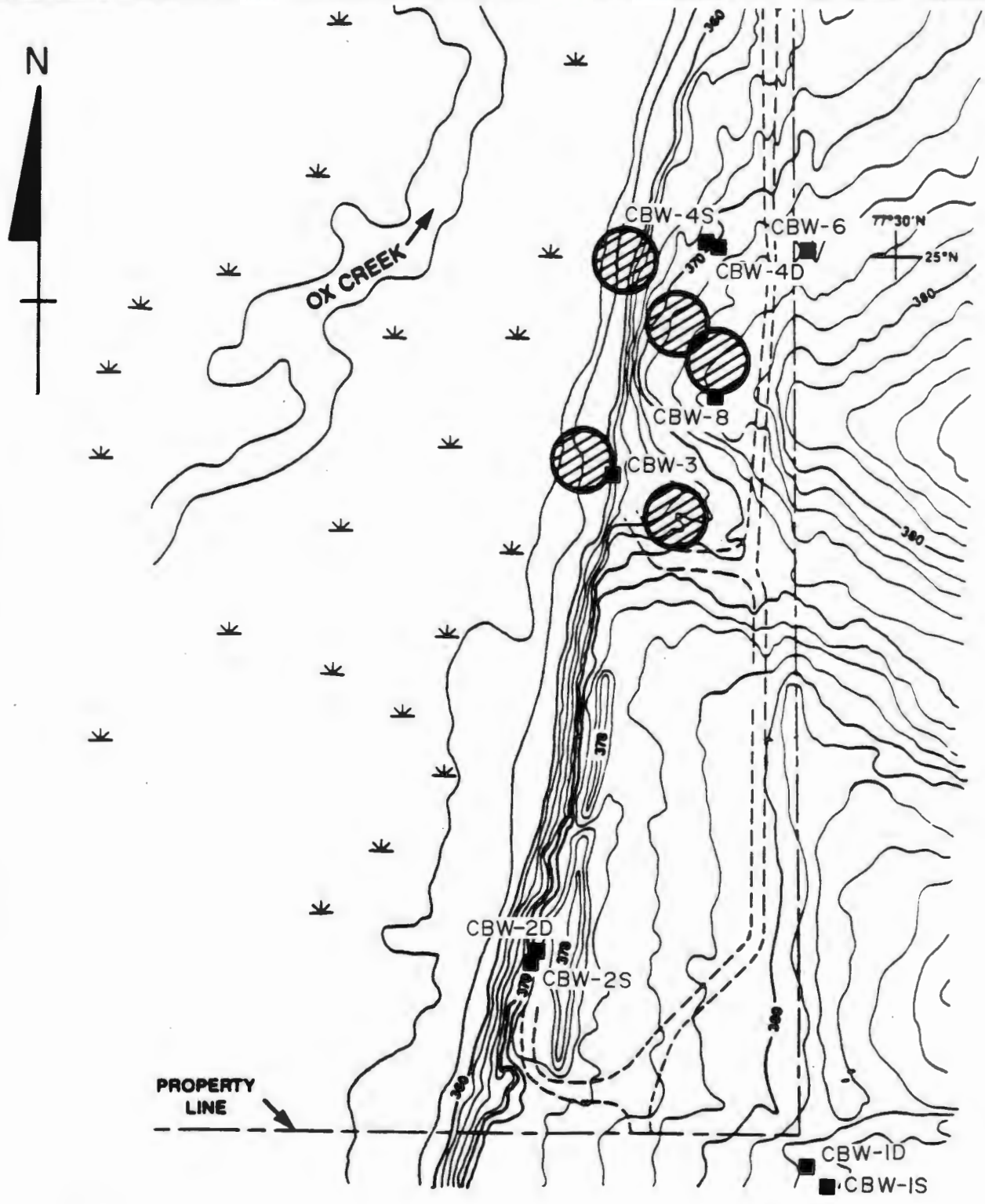
DATE: 6-2-89	FIGURE 2	DRAWING NUMBER 88-209-A7
SCALE: N.T.S.		

102340

DRAWN BY	CHECKED BY	DRAWING NUMBER
R.H. 7-21-89	DHG 8/25/89	88-209-A5
	APPROVED BY OPW 8/25/89	



LEGEND:

CBW-3 ■ EXISTING MONITORING WELL LOCATION

AREAS ABOVE CLEANUP LEVELS

EXISTING MONITORING WELL LOCATIONS

PREPARED FOR

PAS CLOTHIER SITE
GRANBY, NEW YORK

Canonie Environmental

REFERENCE:

-DRAWING PROVIDED BY EBASCO, TITLED: "ALT. 3 - OFFSITE RCRA LANDFILL AREAS TO BE EXCAVATED".

DATE: 7-21-89	FIGURE 3	DRAWING NUMBER 88-209-A5
SCALE: N.T.S.		

DRAWN BY	M.T.H.	CHECKED BY	CPW	8/3/89	DRAWING NUMBER 88-209-A8
	8-2-89	APPROVED BY	SPW	8/3/89	

ACTIVITY(1)	WEEKS 1	2	3	4
SITE SURVEYING				
SITE SOIL SAMPLING				
BORROW SOIL SAMPLING				
AIR SAMPLING				
WELL INSPECTION				
SOIL SAMPLE ANALYSES				
AIR SAMPLE ANALYSES				
DESIGN PLAN				

(1) ACTIVITIES COMMENCE UPON EPA APPROVAL OF PRE-DESIGN SAMPLING WORK PLAN AND FOLLOWING THAWING OF THE SITE SOILS.

PRE-DESIGN SAMPLING SCHEDULE

PREPARED FOR

PAS CLOTHIER SITE
GRANBY, NEW YORK

CanonieEnvironmental

DATE: 8-2-89	FIGURE 4	DRAWING NUMBER 88-209-A8
SCALE: AS SHOWN		

APPENDIX A

SUPERFUND CONTAINER SPECIFICATIONS

SAMPLE BOTTLE REPOSITORY
SUPERFUND CONTAINER SPECIFICATIONS

Container Type	Specifications	Recommended No. Per Case	Recommended No. Per Case Lot
A	Container: 80 ounce amber glass, ring handle bottle/jug, 38 mm neck finish. Closure: black phenolic, baked polyethylene cap, 38-430 size, .015 mm teflon liner. Total Weight: 2.45 lbs.	6	16
B	Container: 40 ml glass vial, 24 mm neck finish. Closure: black phenolic, open-top, screw cap, 15 cm opening, 24-400 size. Septum: 22 mm disc of .005 inch teflon bonded to .120 inch silicon for total thickness of .125 inch. Total Weight: .72 oz.	72	1
C	Container: 1 liter natural high-density polyethylene, cylinder-round bottle, 28 mm neck finish. Closure: white polyethylene, white ribbed, 28-410 size; F217 polyethylene liner. Total Weight: 1.89 oz.	42	2
D	Container: 120 ml, wide mouth, glass vial, 48 mm neck finish. Closure: white polypropylene cap, 48-400 size; .015 mm teflon liner. Total Weight: 4.41 oz.	72	1
E	Container: 16 ounce tall, wide mouth, straight-sided, flint glass jar, 63 mm neck finish. Closure: black phenolic, baked polyethylene cap, 63-400 size, .015 mm teflon liner. Total Weight: 9.95 oz.	48	2
F	Container: 8 ounce short, wide mouth, straight-sided, flint glass jar, 70 mm neck finish. Closure: black phenolic, baked polyethylene cap, 58-400 size, .030 mm teflon liner. Total Weight: 7.55 oz.	96	1

Figure 9-1 — Container/Component Material Specifications

Container Type	Specifications	Recommended No. Per Case	Recommended No. Per Case Lot
G	Container: 4 ounce tall, wide mouth, straight-sided, flint glass jar, 48 mm neck finish. Closure: black phenolic, baked polyethylene cap, 48-400 size, .015 mm teflon liner. Total Weight: 4.70 oz.	120	1
H	Container: 1 liter amber, Boston round, glass bottle, 33 mm pour-out neck finish. Closure: black phenolic, baked polyethylene cap, 33-430 size, .015 mm teflon liner. Total Weight: 1.11 lb.	30	3
J	Container: 32 ounce tall, wide mouth, straight-sided paragon, flint glass jar, 89 mm neck finish. Closure: black phenolic, baked polyethylene cap, 89-400 size, .015 mm teflon liner. Total Weight: 1.06 lb.	36	3
K	Container: 4 liter amber glass, ring handle bottle/jug, 38 mm neck finish. Closure: black phenolic, baked polyethylene cap, 38-430 size, .015 mm teflon liner. Total Weight: 2.88 lb.	4	25
L	Container: 500 ml high density polyethylene, cylinder-round bottle, 28 mm neck finish. Closure: white polypropylene cap, 28-410 size; F217 polyethylene liner. Total Weight: 1.20 oz.	48	2

Figure 9-1 (cont'd) — Container/Component Material Specifications

II. SUPERFUND AND NON-SUPERFUND CONTAINER CLEANING

The Contractor shall clean and prepare containers and component materials according to the following procedures specified by container type.

A. Superfund Containers

CONTAINER TYPE A: 80 ounce amber glass bottle

CONTAINER TYPE E: 16 ounce wide-mouth glass jar

CONTAINER TYPE F: 8 ounce wide-mouth glass jar

CONTAINER TYPE G: 4 ounce wide-mouth glass jar

CONTAINER TYPE H: 1 liter amber glass bottle

CONTAINER TYPE J: 32 ounce wide-mouth glass jar

CONTAINER TYPE K: 4 liter amber glass bottle

SAMPLE TYPE: Extractable Organics (Types A, E, F, G H, J and K); and Metals (Types E, F, G and J) in Soils and Medium/High Concentration Water

CLEANING PROCEDURE:

- Wash glass bottles, teflon liners, and caps in hot tap water with laboratory grade non-phosphate detergent.
- Rinse three times with tap water.
- Rinse with 1:1 nitric acid (metals-grade HNO_3, ASTM Type I deionized water).
- Rinse three times with American Society for Testing and Materials (ASTM) Type I organic-free water.
- Oven dry at 125°C for one hour.
- Rinse with pesticide grade hexane using: 20 mL for 1/2 gallon container; 10 mL for 32-oz and 16-oz containers; and 5 mL for 8-oz and 4-oz containers.
- Oven dry at 125°C for one hour. Allow to cool to room temperature in an enclosed contaminant-free environment.
- Place liners in lids and cap containers.
- Label each container with Lot Number and pack in case.
- Label exterior of each case in Lot with Lot Number.
- Store in contaminant-free area. (Amber glass containers shall not be exposed to sunlight.)

CONTAINER TYPE B: 40 mL glass vial

CONTAINER TYPE D: 120 mL glass vial

SAMPLE TYPE: Purgeable (Volatile) Organics

CLEANING PROCEDURE:

- o Wash glass vials, teflon-backed septa, teflon liners, and caps in hot tap water using laboratory grade non-phosphate detergent.
- o Rinse three times with tap water.
- o Rinse three times with ASTM Type I organic-free water.
- o Oven dry vials, caps, septa, and liners at 105°C for one hour.
- o Allow vials, caps, septa, and liners to cool to room temperature in an enclosed contaminant-free environment.
- o Seal 40 mL vials with septa (teflon side down) and cap.
- o Place liners in lids and cap 120 mL vials.
- o Label each vial with Lot Number and pack in case.
- o Label exterior of each case with Lot Number.
- o Store in contaminant-free area.

CONTAINER TYPE C: 1 L polyethylene bottle

CONTAINER TYPE L: 500 ml polyethylene bottle

SAMPLE TYPE: Metals, Cyanide, Sulfide

CLEANING PROCEDURE:

- o Wash polyethylene bottles and caps in hot tap water with laboratory-grade non-phosphate detergent.
- o Rinse with 1:1 nitric acid (metals-grade HNO_3, ASTM deionized water).
- o Rinse three times with ASTM Type I deionized water.
- o Invert and air dry in contaminant-free environment.
- o Cap bottles.
- o Label each container with Lot Number and pack in case.
- o Label exterior of each case with Lot Number.
- o Store in contaminant-free area.

I. SUPERFUND AND NON-SUPERFUND QUALITY ASSURANCE CHECKPOINTS

The key quality assurance/quality control (QA/QC) activities of the Contractor shall be: incoming materials inspection and QC testing of cleaned Lots of containers, including monitoring of QC container storage area. Written records of results of all QC inspections (signifying acceptance or rejection) shall be maintained as part of the permanent Repository files. All QA/QC records (i.e., preparation/QC logbook, analytical data, data tapes, storage log) shall be kept in the Repository in a central location.

Following is a description of the two primary QC checkpoints.

A. Incoming Materials Inspection

The Contractor shall inspect a representative item from each case/carton of containers and component materials received from a vendor, to check for conformance with contract specifications. Any deviation shall be considered unacceptable, and materials shall immediately be returned to the vendor for replacement. The Contractor shall maintain a log of incoming shipments (see Figure 17, Incoming Materials Inspection Log), in which cases/cartons shall be identified by material type, vendor purchase order number and delivery date. The Contractor shall indicate on this log the date of incoming inspection and acceptance or rejection of the material.

B. Quality Control Inspection of Cleaned Lots of Containers

1. Superfund Containers

Following container cleaning and labeling, the Contractor shall randomly select two containers from each container Lot to be used for quality control purposes. A notice, as shown in Figure 11, shall be placed in each case from which QC containers have been removed. The two categories of QC containers are: Analysis QC Containers and Storage QC Containers.

a. Analysis QC Containers

One selected QC container per Lot shall be designated as the Analysis QC Container. The Analysis QC Container(s) shall be analyzed by the Contractor to check for contamination, prior to releasing the container Lot for shipment. The QC analyses procedures to be used by the Contractor for determination of extractable organics, pesticides, volatiles, metals, and cyanide are specified in Part II of this section. This series of analyses shall constitute the QC check for Superfund Analysis QC Containers.

1. QC Clearance

If the representative Analysis QC Container(s) passes the QC check, the related Lot of containers shall be assigned the appropriate QC number (see 2., b., following) and released from Inventory Control Point No. 3 - Prepared and Awaiting QC Clearance. The Contractor shall label one face (excluding top and bottom faces) of each case of the Lot with the QC Clearance number and move the Lot to Inventory Control Point No. 4 - Cleared for Shipment. The appropriate QC number shall then be entered in the preparation/QC logbook (see Figure 20) to indicate clearance or rejection of the Lot for shipment.

2. QC Clearance/Rejection Number

The QC number shall be a six-digit number sequentially assigned to Lots that have undergone QC analysis. The first alphabetical character shall be the container type letter (from Figure 9), the next four digits shall be assigned sequentially in numerical order (starting with "0001" for the first Lot to undergo QC analyses), and the last character shall be either a "C" to indicate clearance, or an "R" to indicate rejection (see c., below).

3. QC Rejection

If the Analysis QC Container is found to be contaminated per the specified QC analysis procedures, the appropriate QC Rejection Number shall be assigned and entered in the preparation/QC Log (see Figure 20). The Contractor shall then reclean/reprepare and rerun QC on the entire Lot of containers from which the contaminated container originated, at no additional cost to the government. Container labels shall be either removed or obscured and the entire Lot returned to Inventory Control Point No. 1 for reprocessing under a new Lot Number. In this event, the Storage QC Container for that Lot shall be removed from the storage area and returned with the Lot for reprocessing.

A laboratory standard and a blank shall be run with each QC analysis. All QC analysis results shall be kept in chronological order by QC report numbers in a central QC file. As specified, the QC numbers assigned shall be documented in the preparation logbook, indicating acceptance or rejection, and date of analysis, as shown in Figure 20.

The Contractor shall not, under any circumstances, release a container Lot for shipment prior to QC analysis and clearance. Once the containers have cleared QC, the Contractor shall store the containers in a contaminant-free area until packaging and shipment.

b. Storage QC Containers

One selected QC container per Lot shall be designated as the Storage QC Container. The Storage QC Container shall be separated from the Lot after cleaning and labeling and stored by the Contractor in a designated contaminant-free storage area, which shall be continuously monitored for volatile contaminants. The date the storage container is placed in the storage area shall be entered into the Storage QC Container logbook (see Figure 19).

Upon EPA Project Officer request, the Contractor shall remove the Storage QC container from the storage area and analyze the container using the QC analysis procedures specified for that container type. Such analysis shall be completed and data reported to the Project Officer within ten (10) days following the analysis request. Analysis of the Storage QC Container will be indicated if contamination of the particular container Lot comes into question at any time pursuant to Contractor shipment. Upon removal, containers shall be logged out of the storage area.

NOTE: QC Storage Container analyses are considered part of the contract QA/QC requirements and shall be performed by the Contractor as required at no additional cost to the government.

The designated storage area for the Storage QC Containers shall be monitored continuously. A pre-cleaned, QC cleared 40 mL vial filled with ASTM Type I organic-free water shall be placed in the storage area. These vials shall be changed at one-week intervals. The removed vial shall be subjected to the volatile organics QC check procedure described in Part II of this Section. Any peaks shall indicate contamination. Contaminants, if present, shall then be identified and the results included in the monthly report. In the event that contaminants are detected, the Contractor shall notify the EPA Project Officer immediately.

II. SUPERFUND AND NON-SUPERFUND QUALITY CONTROL TESTING PROCEDURES

The type(s) of QC tests applied correlates with the type of container being tested and its future use in sample collection. The required QC tests are for determination of: extractable organics, pesticides, volatile organics, metals, cyanide, and conductivity. Quality control tests shall be run according to the container type and related sample type utilizing the specified Method(s), as described following.

A. Determination of Extractable Organics/Pesticides - Quality Control Procedure for Superfund Container Types A, E, F, G, H, J, and K.

1. Sample Preparation

- Add sixty (60) mL of pesticide-grade methylene chloride to the container and shake for two minutes.
- Transfer the solvent to a Kuderna-Danish (KD) apparatus equipped with a three-ball Snyder column. Concentrate to less than 10 mL on a steam bath.
- Add 50 mL of pesticide-grade hexane to the KD apparatus by slowly pouring down through the Snyder column. Concentrate to less than 10 mL to effect solvent replacement of hexane for methylene chloride.

- o Concentrate the solvent to 1 mL using a micro-Snyder column.
- o Prepare a solvent blank by adding 60 mL of pesticide-grade hexane directly to a KD apparatus and proceed as above.

2. Extractable Organics QC Check

- o Inject 3 uL of solvent into a gas chromatograph mass spectrometer (GC/MS).
- o GC/MS operating conditions are listed in Figure 13. NOTE: As an alternative to the column specified in Figure 13, the following column may be used.

  Column - 30 m x 0.25 mm ID (or 0.32 mm) bonded-phase silicone-coated fused silica capillary column (J&W Scientific DB-5 or equivalent). A film thickness of 0.25 micron may be used.
- o Any peaks found in the container solvent that are not found in the solvent blank or with peak heights or areas not within ± 50% of the blank peak height or area shall be cause for rejection.
- o Perform tentative identification and tentative quantitation of any contaminant(s) that cause rejection of a container Lot.
- o A standard mixture of the 10 semivolatile organic compounds listed in Figure 12 with concentrations in the 20-50 ppb range must be analyzed to ensure that the required sensitivities are achieved.
- o A blank shall be run with each analysis.

3. Pesticides QC Check

- o Inject 1 uL of solvent into a gas chromatograph (GC) equipped with an electron capture detector (ECD).
- o GC/ECD operating conditions are listed in Figure 14.
- o Any peaks found in the container solvent that are not found in the solvent blank or with peak heights or areas not within ± 50% of the blank peak height or area shall be cause for rejection.
- o A standard mixture of the 5 pesticide organic compounds listed in Figure 12 with concentrations in the 0.10 to 1 ppb range must be analyzed to ensure that the required sensitivities are achieved.
- o A blank shall be run with each analysis.

B. Determination of Volatile Organics - Quality Control Procedure for Superfund Container Type B (including 40-mL QC storage monitoring vials) and Container Type D.

- o Fill the container with ASTM Type I organic-free water.
- o Analyze for volatile organics by EPA Method 624 (44 FR 69464, December 3, 1979) using GC/MS with the operating conditions specified in Figure 15.
- o Any peaks not found in the blank, or with peak heights or areas not within ± 50% of the blank peak height or area shall be cause for rejection.
- o Perform tentative identification and tentative quantitation of any contaminant(s) that cause rejection of a container Lot.
- o A standard mixture of the 5 volatile organics listed in Figure 12 with concentrations in the 20-50 ppb range shall be analyzed to ensure that the required sensitivities are achieved.
- o A blank shall be run with each analysis.

C. Determination of Metals - Quality Control Procedures for Superfund Container Types C, E, F, G, J, and L.

- o Add 50 ml of ASTM Type I deionized water to the container and acidify with 0.5 ml metals-grade HNO_3. Cap and shake well.
- o Treat the sample as a dissolved metals sample. Analyze the undigested water by applying the EPA method specified in Figure 16. The detection limits must not exceed the detection limits shown in Figure 16.
- o Concentration at or above the detection limit for each parameter (listed in Figure 16) will be cause for rejection of the Lot of containers.
- o A set of standards in the expected working range and a blank must be analyzed with each analytic run. The acid matrix of the standards and blank must match that of the samples.

D. Determination of Cyanide - Quality Control Procedures for Superfund Container Types C and L

- o Cyanide is to be determined by EPA Method 335.1, 335.2, or 335.3[1] by placing 250 ml of ASTM Type I deionized water in the container. Add 1.25 ml of 6N NaOH. Cap the container and shake vigorously for two minutes. Analyze an aliquot by the EPA method selected. The detection limit must be 10 ppb or lower.

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[1] U.S. EPA, 1979, Methods for Chemical Analysis of Water and Wastes EPA-600/4-79-020, Washington, D.C.

- A blank must be run by analyzing an aliquot of the ASTM Type I water used above.
- A set of standards in the expected working range must be analyzed with each run along with the blank.
- The detection of contaminants of 10 ppb cyanide will be cause for rejection of the Lot of containers. (Note: Contamination could be due to the container, the cap, or the NaOH).

Compounds Analyzed To Demonstrate Sensitivity

Volatile -

- Methylene Chloride
- Acetone
- Toluene
- 2-Butanone
- Trichloroethene

Semivolatiles -

- Benzoic Acid
- Pentachlorophenol
- Bis(2-ethylhexyl) phthalate
- Di-n-butyl phthalate
- Nitrobenzene
- Diethyl phthalate
- Hexachlorobenzene
- 2,6-Dinitrotoluene
- 4-Bromophenyl phenyl ether
- 4-Chloroaniline

Pesticides -

- Endrin
- 4-4'DDT
- Heptachlor
- Dieldrin
- Aldrin

Figure 12

OPERATOR _____ DATE _____

JOB NUMBER _____ SAMPLE IDENTIFICATION Container lot number

SOLVENT Hexane _____ ANALYTICAL METHOD 625, 44 Fr 69464, 12/3/79

Extractable Organics Fraction

COLUMN
- Type Glass
- Length 6'
- Diameter 2 mm ID
- Liquid Phase (% wt) 3% SP 2250
- Support Supelcoport
- Mesh 100/120

CARRIER GAS Helium
- Rotameter 60
- Inlet Pressure, psig 15
- Flow Rate, mL/min 30

SCAVENGER GAS _____

SPLIT _____

FID GAS
- Hydrogen, mL/min _____
- Air, mL/min _____

CHART SPEED, cm/min _____

DETECTOR Mass Spectrometer
- Range 50-350 a.m.u.
- Attenuation _____

TEMPERATURE, °C
- Detector _____
- Injection Port 225
- Column
  - Initial 70°/3 min
  - Program 10°/min
  - Final 270°C

INSTRUMENT HP 5993B GC/MS

Figure 13
GC/MS Operating Conditions for Extractable Organics QC Analysis

OPERATOR _____ DATE _____

JOB NUMBER _____ SAMPLE IDENTIFICATION Container lot number

SOLVENT Hexane _____ ANALYTICAL METHOD 608, 44 FR69464, 12/3/79 Pesticide Fraction

COLUMN
- Type Glass
- Length 6'
- Diameter 4mm ID
- Liquid Phase (% wt) 1.5% SP2250/1.95% SP2401
- Support Supelcoport
- Mesh 100/120

CARRIER GAS Nitrogen
- Rotameter _____
- Inlet Pressure, psig _____
- Flow Rate, mL/min _____

SCAVENGER GAS _____

SPLIT _____

FID GAS
- Hydrogen, mL/min _____
- Air, mL/min _____

CHART SPEED, cm/min 1 cm/min

DETECTOR Electron Capture
- Range 10^{-12}
- Attenuation 16

TEMPERATURE, °C
- Detector 350
- Injection Port 250
- Column
  - Initial 200 isothermal
  - Program _____
  - Final _____

INSTRUMENT Varian 3700 GC

Figure 14

GC/ECD Operating Conditions for Pesticides QC Analysis

OPERATOR _____ DATE _____

JOB NUMBER _____ SAMPLE IDENTIFICATION Container Lot No.

SOLVENT ASTM Type I Water ANALYTICAL METHOD 624, 44 FR 69464, 12/3/79 Volatile Organics Fraction

COLUMN
- Type Stainless Steel
- Length 8'
- Diameter 2mm ID
- Liquid Phase (% wt) 1% SP-1000
- Support Chromosorb W
- Mesh 60/80

CARRIER GAS Helium
- Rotameter 60
- Inlet Pressure, psig 15
- Flow Rate, mL/min 30

SCAVENGER GAS _____

SPLIT _____

FID GAS
- Hydrogen, mL/min _____
- Air, mL/min _____

CHART SPEED, cm/min _____

DETECTOR Mass Spectrometer
- Range 40-300 a.m.u.
- Attenuation _____

TEMPERATURE, °C
- Detector _____
- Injection Port 150
- Column
  - Initial 70/15 min
  - Program 10/min
  - Final 220

INSTRUMENT HP 5993 B GC/MS

Figure 15
GC/MS Operating Conditions for Volatiles QC Analysis

ANALYTICAL METHODS FOR METAL ANALYSIS

Element	Methods[1]	Detection Limit. ug/L
Aluminum	200.7	80
Antimony	204.2	5
Arsenic	206.2	5
Barium	200.7	50
Beryllium	200.7 or 210.2	1
Cadmium	213.2	1
Calcium	200.7 or 215.1	500
Chromium	200.7 or 218.2	10
Cobalt	200.7	20
Copper	200.7	10
Iron	200.7	50
Lead	239.2	4
Magnesium	200.7 or 242.1	100
Manganese	200.7	10
Mercury	245.1	0.2
Nickel	200.7	20
Potassium	200.7 or 258.1	1000
Selenium	270.2	2
Silver	200.7 or 272.2	5
Sodium	200.7 or 273.1	1000
Thallium	279.2	5
Vanadium	200.7	10
Zinc	200.7	10

Figure 16

Metals QC Analysis Requirements

[1] U.S. EPA, 1979, Methods for Chemical Analysis of Water and Wastes EPA-600/4-79-020, Washington, D.C.

APPENDIX B

CANONIE ENVIRONMENTAL SERVICES CORP.
ANALYTICAL LABORATORY
PERFORMANCE EVALUATION TEST RESULTS

CANONIE ENVIRONMENTAL SERVICES CORP.
ANALYTICAL LABORATORY
PERFORMANCE EVALUATION REPORT
ENVIRONMENTAL PROTECTION AGENCY

PERFORMANCE EVALUATION REPORT DATE: 6/ 9/89

WATER POLLUTION STUDY NUMBER WP022

B-2

LABORATORY: CR080

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	412	350	269- 439	290- 418	ACCEPTABLE
	2	1210	1150	931- 1340	982- 1290	ACCEPTABLE
ARSENIC	1	48.1	45.1	35.6- 55.5	38.0- 53.0	ACCEPTABLE
	2	214	226	171- 272	188- 259	ACCEPTABLE
BERYLLIUM	1	404	400	347- 459	360- 436	ACCEPTABLE
	2	81.0	80.1	68.8- 91.2	71.3- 88.3	ACCEPTABLE
CADMIUM	1	91.5	85.1	74.1- 100	77.8- 97.8	ACCEPTABLE
	2	330	320	277- 375	289- 363	ACCEPTABLE
COBALT	1	202	200	171- 229	179- 222	ACCEPTABLE
	2	910	900	787- 1010	816- 983	ACCEPTABLE
CHROMIUM	1	619	600	485- 703	512- 676	ACCEPTABLE
	2	155	150	110- 179	125- 171	ACCEPTABLE
COPPER	1	827	920	753- 893	778- 876	ACCEPTABLE
	2	73.8	76.2	65.4- 86.0	67.9- 83.4	ACCEPTABLE
IRON	1	1840	1827	1650- 2030	1690- 1980	ACCEPTABLE
	2	753	749	652- 859	678- 833	ACCEPTABLE
MERCURY	1	0.86	0.69	6.80- 11.1	6.99- 10.5	ACCEPTABLE
	2	0.877	0.853	.857- 1.23	.550- 1.13	ACCEPTABLE
MANGANESE	1	298	292	263- 318	270- 311	ACCEPTABLE
	2	973	970	886- 1050	906- 1030	ACCEPTABLE
NICKEL	1	372	370	319- 419	331- 407	ACCEPTABLE
	2	619	622	547- 691	565- 673	ACCEPTABLE
LEAD	1	431	415	361- 479	376- 464	ACCEPTABLE
	2	93.1	91.9	71.5- 115	77.8- 110	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/ 9/89

WATER POLLUTION STUDY NUMBER WP022

B-3

LABORATORY: CA049

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	41.0	40.0	33.0- 50.5	36.2- 55.3	ACCEPTABLE
	2	13.0	12.0	6.24- 16.7	7.56- 15.8	ACCEPTABLE
VANADIUM	1	1550	1497	1270- 1710	1330- 1650	ACCEPTABLE
	2	492	479	420- 553	437- 536	ACCEPTABLE
ZINC	1	408	401	347- 446	359- 434	ACCEPTABLE
	2	215	210	181- 237	188- 230	ACCEPTABLE
ANTIMONY	3	52.4	55.2	37.2- 76.2	42.8- 71.0	ACCEPTABLE
	4	19.9	20.7	11.1- 31.8	13.9- 29.1	ACCEPTABLE
SILVER	3	6.53	7.30	5.44- 9.15	5.91- 8.68	ACCEPTABLE
	4	1.43	0.73	.395- 1.12	.486- 1.03	NOT ACCEPTABLE
THALLIUM	3	13.5	12.8	8.92- 17.5	10.8- 16.4	ACCEPTABLE
	4	91.4	91.2	65.8- 119	72.9- 112	ACCEPTABLE
POLYNUCLEAR	3	6.88	7.08	2.68- 10.1	3.63- 9.13	ACCEPTABLE
	4	11.1	13.2	6.75- 19.2	8.45- 17.5	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	5.81	5.80	5.66- 5.91	5.69- 5.88	ACCEPTABLE
	4	7.81	7.80	7.55- 7.97	7.60- 7.92	ACCEPTABLE
SPEC. COND.	1	195	191	168- 208	169- 203	ACCEPTABLE
(MMHOS/CM AT 25 C)	2	747	755	665- 824	684- 804	ACCEPTABLE
TDS AT 180 C	1	106	100	73.1- 136	80.9- 128	ACCEPTABLE
	2	439	401	298- 522	326- 494	ACCEPTABLE
TOTAL HARDNESS	1	18.2	18.1	15.3- 22.0	16.1- 21.2	ACCEPTABLE
(AS CACO3)	2	171	170	154- 183	158- 179	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 6/ 9/89

WATER POLLUTION STUDY NUMBER WP022

D-4

LABORATORY: CA040

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
CALCIUM	1	4.58	4.47	3.84- 5.77	4.00- 5.53	ACCEPTABLE
	2	31.3	30.2	26.0- 34.3	27.0- 33.3	ACCEPTABLE
MAGNESIUM	1	1.65	1.70	1.48- 1.97	1.50- 1.91	ACCEPTABLE
	2	22.5	23.0	19.5- 26.2	20.3- 25.4	ACCEPTABLE
SODIUM	1	9.13	7.50	6.31- 8.92	6.64- 8.59	ACCEPTABLE
	2	72.8	72.3	63.7- 80.0	65.7- 77.9	ACCEPTABLE
POTASSIUM	1	31.8	30.1	25.4- 34.5	26.5- 33.3	ACCEPTABLE
	2	5.16	5.50	4.63- 6.61	4.88- 6.36	ACCEPTABLE
TOTAL ALKALINITY (AS CACO3)	1	10.5	8.59	5.73- 12.7	6.59- 11.8	ACCEPTABLE
	2	53.3	52.9	47.3- 57.4	48.6- 56.1	ACCEPTABLE
CHLORIDE	1	14.8	15.9	12.8- 17.3	13.8- 16.7	ACCEPTABLE
	2	183	191	177- 207	180- 203	ACCEPTABLE
FLUORIDE	1	1.58	1.60	1.39- 1.78	1.44- 1.73	ACCEPTABLE
	2	0.149	0.160	.0837- .235	.103- .216	ACCEPTABLE
SULFATE	1	36.9	38.0	30.6- 44.3	32.3- 42.6	ACCEPTABLE
	2	6.08	6.10	2.92- 8.88	3.65- 8.07	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN	1	2.80	3.00	2.31- 3.66	2.47- 3.50	ACCEPTABLE
	2	12.5	13.0	10.2- 15.5	10.9- 14.9	ACCEPTABLE
NITRATE-NITROGEN	1	0.920	0.950	.785- 1.16	.790- 1.11	ACCEPTABLE
	2	8.27	9.50	6.94- 10.1	7.32- 9.72	ACCEPTABLE
ORTHOPHOSPHATE	1	1.12	0.940	.789- 1.09	.825- 1.05	NOT ACCEPTABLE
	2	3.65	3.80	3.25- 4.36	3.39- 4.23	ACCEPTABLE

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PERFORMANCE EVALUATION REPORT DATE: 6/ 9/89

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: CA090

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
NUTRIENTS IN MILLIGRAMS PER LITER:						
TOTAL PHOSPHORUS	3	2.43	2.50	2.03- 3.01	2.15- 2.89	ACCEPTABLE
	4	6.87	7.01	5.60- 8.30	5.93- 8.05	ACCEPTABLE
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	33.0	28.5	19.7- 44.0	22.7- 40.9	ACCEPTABLE
	2	91.0	91.7	74.4- 109	78.0- 105	ACCEPTABLE
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1248	1	4.71	5.62	2.54- 7.16	3.11- 6.58	ACCEPTABLE
PCB-AROCLOR 1254	2	1.80	2.27	1.09- 2.95	1.32- 2.72	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1254	1	7.95	12.5	3.68- 18.3	5.53- 16.4	ACCEPTABLE
PCB IN OIL- 1260	2	31.4	36.3	3.69- 58.3	10.6- 51.4	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	7.52	5.86	2.80- 7.74	3.43- 7.11	CHECK FOR ERROR
	4	2.22	1.60	.750- 2.12	.932- 1.95	NOT ACCEPTABLE

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PERFORMANCE EVALUATION REPORT DATE: 6/ 9/89

WATER POLLUTION STUDY NUMBER WP022

B-6 LABORATORY: CROSS

ANALYTE	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PESTICIDES IN MICROGRAMS PER LITER:						
ALDRIN	1	0.340	0.647	.170- .873	.260- .784	ACCEPTABLE
	2	0.144	0.265	.0646- .370	.103- .331	ACCEPTABLE
DIELDRIN	1	0.348	0.596	.300- .720	.350- .666	CHECK FOR ERROR
	2	.0843	0.137	.0764- .190	.0905- .176	CHECK FOR ERROR
DDD	1	0.538	0.949	.439- 1.31	.550- 1.20	CHECK FOR ERROR
	2	0.180	0.356	.155- .529	.203- .481	CHECK FOR ERROR
DDE	1	0.414	0.656	.297- .912	.376- .833	ACCEPTABLE
	2	0.139	0.234	.110- .345	.148- .315	CHECK FOR ERROR
DDT	1	0.591	0.825	.370- 1.16	.468- 1.06	ACCEPTABLE
	2	0.132	0.206	.0789- .325	.103- .292	ACCEPTABLE
HEPTACHLOR	1	0.614	0.833	.326- 1.11	.426- 1.01	ACCEPTABLE
	2	0.118	0.146	.0531- .210	.0732- .198	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.384	0.586	.332- .777	.389- .720	CHECK FOR ERROR
	2	.0705	0.110	.0561- .152	.0684- .140	ACCEPTABLE
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	66.6	67.8	41.2- 96.1	48.1- 89.2	ACCEPTABLE
	2	13.1	15.5	9.32- 22.8	11.0- 20.7	ACCEPTABLE
CHLOROFORM	1	65.7	78.5	49.3- 96.2	55.1- 90.3	ACCEPTABLE
	2	7.93	10.6	6.40- 15.3	7.58- 14.2	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	48.8	53.1	31.9- 73.7	37.2- 68.5	ACCEPTABLE
	2	15.6	19.9	11.4- 30.5	13.9- 28.1	ACCEPTABLE
TRICHLOROETHENE	1	63.7	61.9	37.7- 85.4	43.8- 79.3	ACCEPTABLE
	2	16.5	18.7	11.1- 26.1	13.9- 24.2	ACCEPTABLE

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PERFORMANCE EVALUATION REPORT DATE: 6/ 9/89

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: CA049

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
CARBON TETRACHLORIDE	1	70.3	75.8	60.0- 109	68.6- 100	ACCEPTABLE
	2	17.0	18.4	9.64- 26.6	11.8- 24.5	ACCEPTABLE
TETRACHLOROETHENE	1	79.1	78.8	58.6- 103	52.1- 95.4	ACCEPTABLE
	2	15.7	17.1	9.39- 24.4	11.3- 22.6	ACCEPTABLE
BROMODICHLOROMETHANE	1	75.2	58.6	35.8- 73.8	48.5- 69.0	NOT ACCEPTABLE
	2	14.5	12.8	8.48- 18.3	9.74- 17.1	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	65.0	61.3	39.6- 88.8	45.9- 82.5	ACCEPTABLE
	2	10.4	11.5	6.75- 17.1	8.07- 15.8	ACCEPTABLE
BROMOFORM	1	58.7	52.8	31.1- 79.4	37.3- 73.2	NOT ACCEPTABLE
	2	26.5	24.6	13.8- 37.8	16.8- 34.1	ACCEPTABLE
METHYLENE CHLORIDE	1	48.2	47.7	25.5- 67.8	30.8- 62.5	ACCEPTABLE
	2	13.8	14.9	7.50- 23.3	9.53- 21.3	ACCEPTABLE
CHLOROBENZENE	1	76.9	67.8	43.8- 90.8	49.8- 84.8	ACCEPTABLE
	2	18.3	29.9	13.6- 28.1	15.4- 26.3	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	17.8	21.6	14.2- 29.6	16.1- 27.7	ACCEPTABLE
	2	86.4	98.5	61.9- 125	69.8- 117	ACCEPTABLE
ETHYLBENZENE	1	19.8	11.3	6.53- 15.8	7.59- 14.8	ACCEPTABLE
	2	62.8	66.2	38.3- 88.2	48.5- 81.9	ACCEPTABLE
TOLUENE	1	11.4	13.4	8.75- 17.6	9.87- 16.5	ACCEPTABLE
	2	67.2	73.8	47.9- 96.4	58.8- 90.3	ACCEPTABLE
1,2-DICHLOROBENZENE	1	11.1	13.1	7.46- 18.7	8.98- 17.2	ACCEPTABLE
	2	39.3	41.8	28.1- 59.3	28.7- 58.7	ACCEPTABLE

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PERFORMANCE EVALUATION REPORT DATE: 6/ 9/87

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: C0099

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
1,3-DICHLOROBENZENE	1	11.9	13.8	7.93- 10.9	9.30- 17.4	ACCEPTABLE
	2	60.1	72.7	45.9- 92.7	51.8- 86.8	ACCEPTABLE
1,4-DICHLOROBENZENE	1	10.9	12.1	6.69- 18.0	8.20- 16.5	ACCEPTABLE
	2	51.2	51.7	31.2- 78.9	37.1- 69.0	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE	1	0.740	0.990	.562- 1.14	.635- 1.07	ACCEPTABLE
(IN MG/L)	2	0.063	0.070	.0388-.0998	.0388-.0910	ACCEPTABLE
NON-FILTRABLE RESIDUE	1	26.9	29.7	24.2- 33.3	25.3- 32.2	ACCEPTABLE
(IN MG/L)	2	40.8	41.9	33.3- 46.6	34.9- 45.0	ACCEPTABLE
OIL AND GREASE	1	13.3	12.0	6.32- 16.4	7.57- 15.1	ACCEPTABLE
(IN MG/L)	2	10.4	19.8	10.7- 24.8	12.5- 23.0	NOT ACCEPTABLE

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CANONIE ENVIRONMENTAL SERVICES CORP.
ANALYTICAL LABORATORY
ANALYTICAL LABORATORY PROFICIENCY TEST REPORT
NEW YORK STATE DEPARTMENT OF HEALTH

STATE DEPARTMENT OF HEALTH
ENVIRONMENTAL LABORATORY APPROVAL PROGRAM

NON-POTABLE WATER CHEMISTRY PROFICIENCY TEST REPORT

LAB ID : 10798 LAB NAME : Canonie Engineers

TEST NUMBER: 31
TEST DATE: 9-Jan-1989

Analyte	Ampul	Mean	Result	Satisfactory Limits	Marginal Limits	Score
Demand Ampul						
Chemical Oxygen Demand	1300	80.201	83.4000	67.240 - 93.162	63.173 - 97.229	4
Chemical Oxygen Demand	1301	140.038	154.0000	122.719 - 157.357	117.285 - 162.791	4
Residue Ampul						
Solids, Total	1297	226.685	202.0000	201.230 - 252.140	193.243 - 260.127	4
Solids, Total	1299	535.111	496.0000	496.162 - 574.060	483.941 - 586.281	3
Solids, Total Dissolved	1297	200.892	173.0000	171.394 - 230.390	162.138 - 239.646	4
Solids, Total Dissolved	1299	466.336	423.0000	432.459 - 500.213	421.830 - 510.842	3
Waste Water Hydrogen Ion Ampul						
Hydrogen Ion (pH)	1292	9.146	9.1500	9.028 - 9.264	8.992 - 9.301	4
Hydrogen Ion (pH)	1293	4.511	4.5000	4.437 - 4.585	4.413 - 4.609	4
Total Alkalinity Ampul						
Alkalinity	1320	496.084	503.0000	469.742 - 522.426	461.476 - 530.692	4
Alkalinity	1321	321.122	325.0000	303.016 - 339.228	297.334 - 344.910	4
Total Hardness Ampul						
Hardness, Total	1322	67.863	70.5000	61.371 - 74.355	59.335 - 76.391	4
Hardness, Total	1324	113.958	120.0000	105.671 - 122.245	103.071 - 124.845	4
Inorganic Nutrient Ampul						
Orthophosphate (as P)	1327	4.998	4.8800	4.557 - 5.439	4.419 - 5.577	4
Orthophosphate (as P)	1328	1.687	1.6500	1.505 - 1.869	1.448 - 1.926	4
Waste Water Mineral Ampul						
Chloride	3306	273.073	262.0000	257.805 - 288.341	253.014 - 293.132	4
Chloride	4306	128.162	122.0000	119.603 - 136.721	116.917 - 139.407	4

WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
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ENVIRONMENTAL LABORATORY APPROVAL PROGRAM

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Fluoride, Total	3306	2.449	2.4700	2.112 - 2.786	2.006 - 2.892	4
Fluoride, Total	4306	5.155	5.2500	4.442 - 5.868	4.218 - 6.092	4
Potassium, Total	3306	133.186	131.0000	117.298 - 149.074	112.313 - 154.059	4
Potassium, Total	4306	500.193	438.0000	436.140 - 564.246	416.042 - 584.344	4
Sodium, Total	3306	179.958	180.0000	161.857 - 198.059	156.178 - 203.738	4
Sodium, Total	4306	89.382	87.6000	79.782 - 98.982	76.770 - 101.994	4
Sulfate (as SO4)	3306	163.118	161.0000	145.674 - 180.562	140.201 - 186.036	4
Sulfate (as SO4)	4306	626.086	562.0000	548.423 - 703.749	524.054 - 728.118	4
Metals Mixture #1 Ampul						
Cadmium, Total	1319	49.915	47.6000	43.020 - 56.810	40.856 - 58.974	4
Cadmium, Total	2319	84.508	80.8000	76.935 - 92.081	74.558 - 94.458	4
Copper, Total	1319	135.093	136.0000	123.339 - 146.847	119.651 - 150.535	4
Copper, Total	2319	284.914	287.0000	264.804 - 305.024	258.495 - 311.334	4
Lead, Total	1319	165.478	171.0000	144.045 - 186.911	137.320 - 193.636	4
Lead, Total	2319	349.866	362.0000	320.231 - 379.501	310.932 - 388.800	4
Manganese, Total	1319	149.932	147.0000	137.431 - 162.433	133.509 - 166.355	4
Manganese, Total	2319	415.926	410.0000	381.077 - 450.775	370.143 - 461.710	4
Nickel, Total	1319	235.777	233.0000	212.428 - 259.126	205.101 - 266.453	4
Nickel, Total	2319	340.372	337.0000	316.899 - 363.845	309.534 - 371.210	4
Zinc, Total	1319	795.853	780.0000	732.582 - 859.124	712.729 - 878.977	4
Zinc, Total	2319	1660.084	1640.0000	1512.037 - 1808.131	1465.584 - 1854.584	4

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Analyte	Ampul	Mean	Result	Satisfactory Limits	Marginal Limits	Score
WW Metals Mixture #2 Ampul						
Aluminum, Total	1312	203.941	193.0000	169.547 - 238.335	158.755 - 249.127	4
Aluminum, Total	2312	470.698	453.0000	402.041 - 539.355	380.498 - 560.898	4
Arsenic, Total	1312	178.174	180.0000	149.593 - 206.755	140.625 - 215.723	4
Arsenic, Total	2312	441.049	456.0000	366.706 - 515.392	343.379 - 538.719	4
Chromium, Total	1312	215.407	209.0000	191.101 - 239.713	183.474 - 247.340	4
Chromium, Total	2312	385.024	372.0000	345.414 - 424.634	332.986 - 437.062	4
Iron, Total	1312	517.182	499.0000	472.937 - 561.427	459.054 - 575.310	4
Iron, Total	2312	236.621	237.0000	212.225 - 261.017	204.570 - 268.672	4
Mercury, Total	1312	6.326	6.3800	4.758 - 7.894	4.266 - 8.386	4
Mercury, Total	2312	4.164	4.2200	3.006 - 5.322	2.642 - 5.686	4
Selenium, Total	1312	165.755	172.0000	133.911 - 197.599	123.919 - 207.591	4
Selenium, Total	2312	116.800	118.0000	91.867 - 141.733	84.043 - 149.557	4
WW Metals Mixture #3 Ampul						
Antimony, Total	2327	388.617	376.0000	320.338 - 456.896	298.914 - 478.320	4
Antimony, Total	2328	618.011	607.0000	520.801 - 715.221	490.299 - 745.723	4
Beryllium, Total	2327	15.137	17.5000	11.913 - 18.361	10.901 - 19.373	4
Beryllium, Total	2328	49.323	50.4000	43.908 - 54.738	42.208 - 56.438	4
Cobalt, Total	2327	554.251	525.0000	506.274 - 602.228	491.220 - 617.282	4
Cobalt, Total	2328	202.577	190.0000	183.381 - 221.773	177.357 - 227.797	4
Molybdenum, Total	2327	739.288	737.0000	659.202 - 819.374	634.074 - 844.503	4
Molybdenum, Total	2328	299.541	293.0000	270.637 - 328.445	261.567 - 337.515	4

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Vanadium, Total	2327	856.803	855.0000	766.857 - 946.749	738.634 - 974.972	4
Vanadium, Total	2328	219.086	216.0000	189.384 - 248.788	180.064 - 258.108	4
Purgeable Aromatics						
1,3-Dichlorobenzene	1336	19.458	20.0000	14.048 - 24.868	12.351 - 26.565	4
1,3-Dichlorobenzene	2336	64.745	70.0000	46.084 - 83.406	40.228 - 89.262	4
1,4-Dichlorobenzene	1336	24.019	25.4000	18.182 - 29.856	16.351 - 31.687	4
1,4-Dichlorobenzene	2336	49.127	53.6000	36.601 - 61.653	32.670 - 65.584	4
Toluene	1336	16.761	18.3000	13.249 - 20.273	12.147 - 21.375	4
Toluene	2336	41.296	47.0000	32.280 - 50.312	29.451 - 53.141	4
m-Xylene	1336	20.466	24.8000	14.729 - 26.203	12.929 - 28.003	4
m-Xylene	2336	32.837	41.4000	24.048 - 41.606	21.294 - 44.360	4
Purgeable Halocarbons						
Bromoform	1341	20.351	23.6000	14.665 - 26.037	12.881 - 27.821	4
Bromoform	2341	57.689	67.4000	40.312 - 75.066	34.859 - 80.519	4
Dibromochloromethane	1341	11.819	19.6000	7.783 - 15.855	6.517 - 17.121	0
Dibromochloromethane	2341	37.536	57.0000	26.405 - 48.667	22.913 - 52.159	0
1,1-Dichloroethene	1341	24.228	23.4000	16.606 - 31.850	14.214 - 34.242	4
1,1-Dichloroethene	2341	47.678	42.0000	32.157 - 63.199	27.287 - 68.069	4
cis-1,3-Dichloropropene	1341	blank	0.9970	LT 5.000	LT 10.000	0
cis-1,3-Dichloropropene	2341	blank	0.8340	LT 5.000	LT 10.000	0
Trichloroethene	1341	28.957	30.3000	20.783 - 35.331	18.501 - 37.613	4
Trichloroethene	2341	62.524	61.2000	45.151 - 79.897	39.699 - 85.349	4

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TEST DATE: 9-Jan-

Analyte	Ampul	Mean	Result	Satisfactory Limits	Marginal Limits	S
Trichlorofluoroethane	1241	27.891	22.8000	16.386 - 39.396	12.776 - 43.006	
Trichlorofluoroethane	2341	38.977	28.8000	24.387 - 53.567	19.809 - 58.145	
Chlorinated Hydrocarbons						
2-Chloronaphthalene	1306	23.505	30.5000	11.659 - 35.351	7.942 - 39.068	
2-Chloronaphthalene	2306	58.427	81.3000	29.974 - 86.880	21.046 - 95.808	
Hexachlorobenzene	1306	20.748	28.4000	10.668 - 30.828	7.505 - 33.991	
Hexachlorobenzene	2306	79.592	113.0000	45.937 - 113.247	35.377 - 123.807	
Hexachloroethane	1306	19.380	27.6000	6.473 - 35.036	2.423 - 39.949	
Hexachloroethane	2306	40.357	56.7000	13.478 - 71.315	5.045 - 81.029	
1,2,4-Trichlorobenzene	1306	19.864	34.8000	7.932 - 31.796	4.187 - 35.541	
1,2,4-Trichlorobenzene	2306	50.794	81.4000	21.602 - 79.986	12.442 - 89.146	
Polynuclear Aromatic Hydrocarbons						
Acenaphthene	2300	17.169	16.0000	9.002 - 25.336	6.439 - 27.899	
Acenaphthene	3300	60.742	59.5000	33.431 - 88.053	24.862 - 96.622	
Benzo(k)fluoranthene	2300	26.000	58.4000	8.683 - 44.177	3.250 - 49.881	
Benzo(k)fluoranthene	3300	36.619	56.6000	12.230 - 62.158	4.577 - 70.171	
Benzo(ghi)perylene	2300	21.984	20.0000	7.342 - 37.948	2.748 - 42.957	
Benzo(ghi)perylene	3300	47.013	27.4000	15.701 - 80.049	5.877 - 90.415	
Fluorene	2300	41.962	40.4000	22.464 - 61.460	16.346 - 67.578	
Fluorene	3300	25.051	22.6000	11.915 - 38.187	7.793 - 42.309	
Priority Pollutant Phenols						
4-Chloro-3-methylphenol	2322	43.967	22.8000	20.523 - 67.411	13.167 - 74.767	
4-Chloro-3-methylphenol	3322	78.495	34.4000	33.899 - 123.091	19.906 - 137.084	

WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
NEW YORK STATE DEPARTMENT OF HEALTH
ENVIRONMENTAL LABORATORY APPROVAL PROGRAM

NON-POTABLE WATER CHEMISTRY PROFICIENCY TEST REPORT

LABID : 10798 LAB NAME : Canonie Engineers TEST NUMBER:
TEST DATE: 9-Jan-1

Analyte	Ampul	Mean	Result	Satisfactory Limits	Marginal Limits	Sc
2-Chlorophenol	2322	51.446	40.4000	27.632 - 75.260	20.160 - 82.732	
2-Chlorophenol	3322	72.557	53.1000	37.887 - 107.227	27.008 - 118.106	
2,4-Dichlorophenol	2322	53.607	36.9000	27.388 - 79.826	19.161 - 88.053	
2,4-Dichlorophenol	3322	87.068	56.5000	45.336 - 128.800	32.241 - 141.895	
2-Nitrophenol	2322	58.409	94.7000	25.614 - 91.204	15.324 - 101.494	
2-Nitrophenol	3322	83.598	144.0000	33.398 - 133.798	17.647 - 149.549	
Polychlorinated Biphenyls						
PCB-1016	2297	4.327	4.8600	2.749 - 5.905	2.254 - 6.400	
PCB-1254	2297	3.402	3.1300	1.746 - 5.058	1.226 - 5.578	
Chlorinated Hydrocarbon Pesticides						
Aldrin	1308	44.259	52.2000	24.945 - 63.573	18.885 - 69.633	
Aldrin	2308	25.878	30.6000	15.766 - 35.990	12.594 - 39.162	
delta-BHC	1308	70.930	84.0000	35.374 - 106.486	24.217 - 117.643	
delta-BHC	2308	33.200	39.5000	18.690 - 47.710	14.137 - 52.263	
4,4'-DDT	1308	53.243	48.0000	21.424 - 85.062	11.440 - 95.046	
4,4'-DDT	2308	31.452	32.2000	16.193 - 46.711	11.406 - 51.498	
Dieldrin	1308	80.724	87.4000	38.929 - 122.519	25.815 - 135.633	
Dieldrin	2308	26.613	28.8000	14.512 - 38.714	10.715 - 42.511	
Chlordane Ampul						
Chlordane	1294	7.749	9.7900	4.454 - 11.044	3.420 - 12.078	
Chlordane	2294	17.571	20.9000	9.780 - 25.362	7.335 - 27.807	

LAB ID : 10798 LAB NAME : Canonie Engineers

Unreported Analytes in Non-potable Water Chemistry PT
Conducted on 9-Jan-1989 (Test Number 31)

Ampul Type	Analyte
Inorganic Nutrient Ampul	Nitrate (as N)
Polychlorinated Biphenyls	PCB-1016
Polychlorinated Biphenyls	PCB-1254
Surfactant	Surfactants

APPENDIX C

PROJECT QUALITY ASSURANCE PLAN
PAS CLOTHIER SITE
GRANBY, NEW YORK

APPENDIX C

PROJECT QUALITY ASSURANCE PLAN
PAS CLOTHIER SITE
GRANBY, NEW YORK

1.0 INTRODUCTION

The purpose of the Quality Assurance Plan (QAP) is to specify Quality Assurance (QA) and Quality Control (QC) procedures to ensure that technical data generated during the site investigation are accurate, precise, and representative of actual field conditions. QA is defined as an integrated program designed for assuring reliability of monitoring and measuring data. QC is defined as the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measuring process. The QAP is based on, and is consistent with, the following Environmental Protection Agency (EPA) regulations:

1. EPA, National Contingency Plan, 40 Code of Federal Regulations (CFR) 300, 50 Federal Register 47912 (November 20, 1985);

2. EPA guidance documents, as follows: "Test Methods for Evaluating Solid Wastes, Section 10, SW-846" dated July 1982; "Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring," EPA, May 1984; "User's Guide to the Contract Laboratory Program," EPA, December 1986; "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAMS-005/80," dated December 29, 1980; and "Draft Supplement to: Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80," dated January, 1986.

2.0 PROJECT DESCRIPTION

The QAP will govern the activities specified in Pollution Abatement Services (PAS) Clothier design sampling and Remedial Action/Remedial Design (RA/RD) Work Plan. (Analytic Laboratory QA/QC protocol is provided under separate cover.) The purpose of this QAP is to ensure that the data generated as a result of work outlined in the Work Plan are precise, accurate, comparable, complete, and representative of actual conditions existing on- and off-site.

The general scope of work will include the following:

1. Collection of near-surface soil samples for physical characterization; and

2. Collection of ambient air samples.

Installation of new ground water monitoring wells will not be required as a part of pre-design sampling work. Existing wells will be evaluated and a determination made as to whether replacement of any wells will be required. Since it is possible that new well(s) may have to be installed as a part of remedial action activities, this QAP presents well installation and ground water sampling procedures. In addition, ground water sampling procedures are presented for use during post-closure monitoring.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project team for QA aspects of this Work Plan will consist of Canonie Environmental Services Corp.'s (Canonie) project manager, QA director, health and safety director, field engineer, and analytical laboratory director (see Laboratory Quality Assurance/Quality Control Plan). The responsibilities of key individuals are as follows:

1. Project Manager: Responsible for coordinating the overall project between the Potentially Responsible Parties (PRPs), the EPA and its representatives, and providing technical guidance for the project. He has direct overview of QA issues brought to his attention by the QA director;

2. Quality Assurance Director (QAD): Responsible for reviewing, monitoring, auditing, and evaluating the performance of the QA/QC program, relating to both field and laboratory QA/QC procedures and the application of field protocols;

3. Health and Safety Director: Responsible for reviewing performance of the work to ensure that it complies with the health and safety program developed for the Work Plan. The health and safety director will not be present on the site during site activities and will vest the coordinator with the authority to enforce compliance with health and safety requirements;

4. Field Engineer: Responsible for all of the field activities related to soil and air sampling, monitoring well installation and sampling, field testing, and preparing the field report. The field manager will report directly to the project manager.

5. Analytical Laboratory Director: Responsible for performance of all laboratory analyses and ensuring that testing is performed in accordance with industry standard protocol and QC procedures.

3.1 QA/QC Implementation

The QAD will report results of the QA activities directly to the project manager. The QAD is responsible for ongoing surveillance of project activities to ensure conformance with QC protocol and this plan and to evaluate the effectiveness of its requirements. He will have access to any Canonie personnel, PAS Clothier PRP personnel, or project consultants as necessary to resolve QA/QC problems. He has authority to recommend to the project manager that work be stopped when the manner in which the work is being conducted appears to jeopardize project quality. As part of this responsibility, he will:

1. Monitor the correction of QC problems and alert other task leaders where similar problems may exist or might occur;

2. Report to the project manager concerning the quality of the work, the procedures utilized, and the services provided, according to the stated objectives of the project;

3. Provide for retention of QA/QC records;

4. Participate in QA/QC audits;

5. Recommend changes where appropriate to improve the effectiveness of project procedures or the procedures identified in this QAP; and

6. Review proposed additions and/or changes to this plan.

The QAD is also responsible for evaluating and approving this plan, scheduling and conducting QA/QC audits, providing QA/QC reports to the project manager on the results of audits, advising preventive or corrective actions where necessary, and developing and initiating preventive and corrective actions as required in conjunction with the project manager.

4.0 QUALITY ASSURANCE OBJECTIVES

4.1 General

The quality of measurements made and data acquired during the pre-design process will be determined by the following characteristics: accuracy, precision, representativeness, completeness, and comparability. Specific objectives for each characteristic are established to develop sampling protocols and identify applicable documentation, sample handling procedures, and measurement system procedures. These objectives are established based on site conditions, objectives of the project, and knowledge of available measurement systems. The subsequent use of these measurements in calculations and evaluations is also subject to aspects of this Work Plan as described in the following sections.

Canonie will collect all samples and direct all field measurements in completing the work presented in this Work Plan. Sample collection and field handling will be in accordance with the sampling and sample handling protocols established in this Work Plan. All soil and water samples will be analyzed through Canonie's environmental laboratory, located at 212 Frank West Circle, Suite A, Stockton, California. Analytical laboratory QA/QC information is specified for all anticipated analyses in Appendix E. Recent analysis of EPA QC check samples containing the parameters of interest to this project, using reagent grade water as the sample matrix, and completed by Canonie's laboratory are presented in Appendix B. Galson's laboratory in East Syracuse, New York will analyze all air samples.

4.2 Representativeness

Measurements will be made so that analytical results are as representative of the actual field conditions as possible. Sampling protocols will be utilized to assure that samples collected are representative of the media present in the field. Sample handling protocols, including such tasks as storage, transportation, and preservation, will be used to protect the representativeness of

the sample gathered during the project. Proper documentation in the field and the laboratory will establish that protocols have been followed and that sample identification as well as integrity have been preserved.

The sampling plan, presented in this Work Plan, describes the samples which are currently planned for collection, the location of the sampling stations, the types of samples to be collected, and the types and number of analyses to be performed on the samples. The execution of the sampling plan should result in the collection of sufficient samples to determine the nature and extent of chemical constituents in the soils and the potential for release of contaminants to the air.

4.3 Precision and Accuracy

Precision is the characteristic which reflects the ability to replicate a previously obtained value using identical testing procedures, while accuracy is the characteristic which reflects the ability to obtain a value which equals, or approaches within certain predetermined limits, the true value of a certain phenomenon. Each of these two characteristics is addressed in all data gathering and reporting conducted by Canonie. Data quality objectives for precision and accuracy are established for each major parameter to be measured during the project. These objectives are based upon prior experience in executing remedial investigations or remedial activities for wastes similar to those present or anticipated at this site, on prior knowledge of the capabilities of the measurement system to be employed during activity at the site, and on the limitations which are presented in execution of the task. The precision and accuracy requirements for certain data gathering and reporting activities may vary based upon the anticipated use of the information. For example, the precision and accuracy requirements of data gathered during surveying to locate ground water monitoring wells will not be as strict as the requirements imposed on analytical data, which is used to establish the lateral extent of impacted soils. To illustrate, it is unlikely that an inaccuracy or a lack of precision in acquiring horizontal distances or angles will materially alter the ultimate decisions on remediation. However, an inaccuracy or

imprecision in soil quality could change the scope of the Work Plan and remediation.

In general, the precision and accuracy requirements for the pre-design program will be met by assuring that at least 10 percent of the samples gathered for analytical evaluation in each matrix type (ie, soil and air) during each sampling episode are duplicates, so that field precision may be evaluated. Since standard sampling procedures are stipulated for all sampling episodes, no additional duplicates are required due to changes in sampling team composition. In the laboratory, 10 percent of the samples of each matrix will be analyzed as replicates to evaluate laboratory precision. Duplicate and replicate samples will be chosen at random, unless the criticalness of the sampling would suggest duplicate sampling or replicate sampling to be appropriate. Appendix E discusses the use of approved methodologies, and Tables 1 and 4 within the text identify detection limits typically achievable in the analysis of samples with low concentrations of chemical constituents. The analysis of data toward establishment of accuracy and precision levels obtained in the analytical work is discussed in Appendix E.

Calculations performed with the data gathered or generated during the project are also checked for accuracy by the task leader or his designee, and precision, ie, the comparabilty of calculation techniques between various tasks, is assured through review by the QA team.

Portable field instruments, such as the organic vapor analyzers (OVAs), will be calibrated daily with standardized methane [standardization concentration to be within the range of 5 to 10 parts per million (ppm)] to establish the accuracy of the data collected.

Accuracy of field measured pH, if evaluated, will be evaluated through comparison of instrument readings taken on standard buffer solutions. Accuracy will be established by obtaining readings which do not vary from the standardized solution value by $\pm$ 0.05 pH units. Field measurements will be recorded to the nearest 0.05 pH units.

Accuracy of the conductivity meter, if used, will be assured by daily calibration verification with a standardized solution of potassium chloride, purchased from the manufacturer of the meter or from a laboratory chemical supply house. If instrument readings vary from the standardized value by more than 5 percent, the conductivity meter will be recalibrated or replaced.

Instruments which are factory calibrated will be considered accurate if the most recent calibration occurred within the previous 12-month period and the instrument readings do not appear to be in obvious error. Periodic checks, such as monthly control checks, of the instruments against samples containing known concentrations will allow personnel to detect calibration drifting. Measurement precision for all field instrumentation will be estimated by periodically (1 per 10 samples) completing duplicate testing of samples in the field.

4.4 Completeness

The characteristic of completeness is a measure of the amount of valid data obtained compared to the amount that was specified to be obtained under normal conditions. The amount of valid data specified is established based on the measurements required to accomplish project objectives. The extent of completeness must be reviewed on a relative basis for sample collection activities, since the required amount of valid data anticipated prior to sampling episodes may not accurately define the amount of data necessary to render a correct decision.

4.5 Comparability

The characteristic of comparability reflects both internal consistency of data collected with regard to a single parameter and an expression of data in units which are consistent with the units in which data, gathered by other organizations measuring the same parameter, are presented. Comparability of data gathering and measuring procedures should also be addressed if data gathered is to be reliably compared. Thus, the characteristic of comparability implies

the personnel involved in data acquisition and reduction must operate measurement systems within the calibrated range of the particular instrument as well as utilize analytical methodologies which produce comparable results.

When comparison of data sets indicates certain values within one or more sets are not consistent with the totality of the data acquired, these values, known as "outliers", must be reassessed prior to utilization in the decision-making process. Utilization of statistical analysis is often required to define whether the "outliers" represent significant values which require recognition in the decision-making process. Analysis methodologies which will be considered in reviewing data will include the three approved statistical procedures presented in 40 CFR 264. Since the number of verifiable sampling data points for the soil sampling will be few, it may not be possible, however, to complete a timely statistical analysis of data for all constituents at all locations.

4.6 QA/QC Objectives

The QA/QC objectives for the pre-design activity contemplated in this Work Plan includes the following:

1. To collect sufficient field, sample blank, and trip blank samples as well as field duplicates to allow assessment of sample representativeness and sample collection protocol precision;

2. To analyze sufficient internal duplicates, blanks, reference standards, and matrix spike samples to allow an assessment of analytical precision and accuracy. Sufficiency of analytical QA/QC procedures is specified by the referenced methods in Section 10.0; and

3. To produce documented, consistent, and technically defensible data and reports which accurately and completely define the nature and extent of chemical constituents of concern at the site for use in the development of the RA/RD, and the concentration and distribution of any organic emissions which may impact adjacent property.

5.0 SAMPLING PROCEDURES

Routine sampling procedures described in this section are designed to assure that:

1. Samples are properly collected;

2. Samples are identified, preserved, and transported in a manner so that they are representative of field conditions; and

3. Sample results are reproducible.

The types, locations, and numbers of samples to be collected are specified in the Work Plan.

5.1 Soil Sample Collection

Near-surface soil samples will be collected for chemical analyses. Samples will be collected by hand excavation methods and at the locations as described in the Work Plan.

5.2 Ground Water Monitoring Well Installation and Sampling

Ground water sampling will be performed only as part of post-closure monitoring. If the pre-design evaluation indicates that new wells will need to be constructed as part of the RA, then they will be constructed and developed as indicated below during the RA. Post-closure ground water sampling will be performed as described below.

5.2.1 Cleaning of Equipment and Materials

The drill rig shall be in good condition, capable of efficiently accomplishing the designated work, and properly maintained so that chemical constituents are not introduced into the soil or the borehole during the construction of the

well. Leaking seals or leaking tanks containing fluids other than approved drilling water shall not be permitted.

All equipment to be used in the construction of wells at the site shall be cleaned within the decontamination area designated in the health and safety plan. All drill rods, augers, samplers, and any other equipment necessary for the construction of the well shall be removed from the rig and steam cleaned utilizing water from a source approved by the project manager.

In addition to the cleaning of the equipment noted above, water tanks, pumps, mud pans, hoses, and transfer vessels shall be periodically cleaned to prevent the introduction of chemical constituents which would compromise the quality, representativeness, or use of the new well. Precautions shall be taken to prevent contamination of the well with petroleum oils and greases. Lubricants shall not be used on the drilling and sampling tools and fittings.

Only new materials shall be used in the construction of wells on the site. Well casings and screens shall, prior to cleaning, bear the manufacturer's label indicating the type of material and specification to which the material element was made. Grout, cement, bentonite, or other material to be used in construction of the well shall be brought to the site in unopened bags, pails, or other containers, and shall be clearly labeled as to type, manufacturer, and specification compliance.

Only threaded casing and accessories shall be used. The factory threading operation for the casing shall be completed without the use of oils, and all burrs and shavings shall be cleaned from the casing. Casings with ink markings shall be sanded with fine sand paper until all ink has been removed from the entire casing. After steam cleaning the casings, workers shall always use clean cotton gloves when handling the casing.

All pumps to be used in development, purging, or pumping of wells shall be constructed of stainless steel with polyethylene or Teflon™ fittings. Pumps which leak or otherwise may introduce chemical constituents into the well, sampled water, or aquifer shall not be used. Electrical lines to submersible pumps shall meet all applicable code standards. Electrical lines to submersible pumps may be attached to the discharge pipe or hose of the pump by stainless steel or plastic fasteners which grip by means of a mechanical action only. No electrical tape shall be used to attach electrical lines to the discharge pipe or hose. Decontamination will be in accordance with the following procedures:

1. Wash outside and flush inside with nonphosphate detergent and potable water;

2. Rinse inside and outside with a 10 percent nitric acid rinse (when samples for metals analyses are collected);

3. Rinse inside and outside with potable water;

4. Rinse inside and outside with demonstrated analyte-free deionized water; and

5. Dispose of tubing after each use.

Compressors utilized in the development, purging, or pumping of wells at the site shall be equipped with an operable oil trap and in-line air filter. The oil trap and filter shall be checked by the supervising geologist, geotechnical engineer, or technician prior to each day's use. The oil trap and filter must be capable of removing entrained oil from the compressed air to prevent introduction of chemical constituents into the sample water or the ground water.

If bladder pumps are utilized and powered by compressed nitrogen, the nitrogen gas shall be pressure regulated at the tank and shall pass through an in-line

oil trap and filter before it enters the well or pump. The source of nitrogen gas shall be indicated in the daily log for the site activities.

5.2.2 Drilling Procedure

Hollow-stem augers will be utilized to drill and stabilize the well hole as was done during past well installation operations at the site. The inside diameter of the hollow-stem augers shall be at least 4.25 inches. Only hollow-stem augers with water-tight joints shall be utilized in constructing the well.

If heaving soils are encountered during the advancement of the borehole, the drilling crew may attempt to salvage the borehole by filling the hollow-stem augers with water from the approved source, and then cleaning out the hollow-stem auger using a clean split-spoon sampler or other tool. A roller bit shall not be used to remove the soil from within the auger, nor shall the augers be cleaned by jetting.

The borehole shall be advanced to the pre-determined depth or soil strata. Sampling of the soil formation during advancement of the borehole shall conform to the procedures set forth in Section 5.2.3 of this Appendix.

5.2.3 Sampling of the Formation

The sampling of the formation is required to establish the nature of the soils at the location of the monitoring wells. Geologic samples, retrieved through split-spoon sampling or thin-walled tube sampling, are required to determine the strata thickness and soil type present at depth, and to provide the information necessary to develop an accurate log of the well hole. All monitoring wells shall be properly logged, to provide a permanent record of the lithology encountered and the well constructed. The soils log for the well shall follow the format established in the Unified Soil Classification System (USCS). The field geologist or geotechnical engineer shall be responsible for obtaining

all required information to fully and completely detail the lithology and well construction for each monitoring well installed at the site.

Soils within the borehole shall be sampled at regular intervals, not to exceed 5 feet. At a minimum, two samples shall be retrieved from the soil strata in which a monitoring well screen is to be set. Sampling shall be performed in accordance with American Society for Testing and Materials (ASTM) D1586, split-spoon sampling, or ASTM D1587, thin-walled tube sampling. Soil samples to be analyzed off-site for physical parameters shall be placed in 8-ounce paragon jars, sealed, and labeled. Labels shall include the name of the sampler, the date and time of collection, the borehole or well designation, the site name, and the preliminary classification of the soil under the USCS. Soils examined for logging of the hole, but not retained for subsequent analysis, will be discarded with the cuttings.

5.2.4 Well Construction Materials

All materials utilized or incorporated into the construction of ground water monitoring wells shall be new, of sound condition, and free of hazardous or toxic chemical constituents which may leach into the ground water. All paint, coatings, or inks shall be removed prior to installation.

Well screens shall be continuously wound type 304 stainless steel wire screens as manufactured by Johnson Well Screen, or equivalent. The diameter of the well screen shall be two inches. Well screen shall be furnished in 5-foot-long sections, or longer. The bottom of each section shall be designed to accept a threaded bottom plug, which shall be designed to withstand all installation and well development pressures without becoming dislodged or damaged.

Slot size for the screen shall be 0.10 inches as has been used in past monitoring well installations.

Riser pipe shall consist of type 304 stainless steel pipe with flush-joint threads. Schedule 40 pipe shall be utilized. Riser pipe shall be furnished in appropriate lengths, with all riser pipe having a minimum length of 5 feet and a maximum length of 20 feet. Threads shall be cut in accordance with Drilling Contractors and Drilling Manufacturers Association standards.

Grout shall be mixed on-site, or delivered in ready-mix trucks where the volume of grout required exceeds the practical capability of portable mixing equipment or weather conditions prohibit effective mixing and temporary storage of the grout. Grout shall be composed of five to six gallons of water mixed with one bag of Portland cement. Hydrated lime may be substituted for up to 10 percent of the cement required. Bentonite shall be added to the mix at a rate of two to four pounds of bentonite powder per bag of cement.

Gravel pack is the material placed in the annular space around the well screen. The pack shall be uniformly graded sand or gravel, comprised of hard, durable particles which have been washed and screened. The sizing of the particles shall be determined by the soil type encountered in the zone to be monitored. The gravel pack shall be free of all organic matter and shall not contain detectable concentrations of any chemical constituents. The gravel pack shall be furnished in unopened bags or pails.

The seal between the filter and the borehole grout shall be constructed of sodium bentonite pellets and sand. The diameter of the bentonite pellets shall be less than one-half the width of the annular space into which they are placed. The pellets shall be furnished in unopened bags or pails and stored in a dry location prior to use.

5.2.5 Well Installation

Prior to installation of any material in a borehole, the supervising geologist or geotechnical engineer shall verify that the borehole is stable, vertical, unobstructed, and advanced to the depth indicated in the work plan. If the borehole tends to cave in or heave, the drill crew shall be instructed to take

the necessary steps, consistent with the procedures described herein, to stabilize the borehole. Well installation shall not be permitted by driving or jetting the well screen.

The installation of the components of the well shall be as follows. The well screen and riser pipe shall be assembled by inserting and tightening the components by hand. The bottom plug shall be inserted into the bottom of the last section of well screen. If more than one section of well screen is required, each section shall be joined and hand tightened. If necessary to assure a tight joint, pipe or chain wrenches may be utilized only if the wrenches have been thoroughly cleaned. To avoid possible contamination, no tape will be used to connect the riser pipe or screen sections.

The final depth of the well screen will be dependent upon the circumstances for which the monitoring well is installed. Since installation of new monitoring wells will either be based on an evaluation of the existing wells or revised monitoring needs based on post-closure evaluations, it is not possible to determine the depth of the screened intervals at this time.

Once the string has been lowered to the depth of the zone to be monitored, the string shall be suspended in place, if necessary, and the screen and riser sections positioned in the center of the borehole and vertically aligned. The riser pipe shall extend at least 2 feet above grade. The final trimming of the riser above grade shall occur after the grout is in place around the well.

After the string has been placed into the borehole, the volume of the gravel pack shall be computed and carefully measured. The gravel pack shall typically extend at least 2 feet above the uppermost row of slots in the well screen, except where relatively impermeable zones separating permeable strata of soil are thin and require that the gravel pack construction be limited to a shorter rise. The level of the gravel pack within the borehole will be confirmed by sounding with a weighted tape, and appropriate notations shall be recorded in the well log with other well construction data. When using hollow-stem augers, the gravel pack shall be placed by pouring the material

into the annulus between the auger and the riser pipe using a tremie. The auger shall be raised periodically, and an auger flight removed, to allow the gravel pack to fill the annulus between the well screen and the borehole wall.

After the gravel pack has been placed and sounded, a bentonite pellet seal shall be constructed above the gravel pack. Prior to placing the seal, the volume of pellets required to construct the seal shall be calculated and carefully measured. The seal shall be 2 feet in thickness, and the pellets shall be placed by tremie and sounded in the same manner as the gravel pack. If the bentonite seal is constructed above the water table, approximately five gallons of clean water shall be poured into the annulus between the riser pipe and borehole to wet the bentonite pellets. A seal tamper shall then be lowered down the borehole and the wetted pellets shall be tamped into a cohesive mass.

After the bentonite seal has been placed, the borehole shall be grouted. The volume of grout required to fill the borehole shall be calculated and a volume shall be added to that calculated to account for losses. Grout shall be prepared in accordance with the procedure presented in Section 5.2.4 of this Plan, and then injected into the borehole via a tremie pipe. The discharge end of the tremie pipe shall be placed initially on the top of the bentonite seal. As the borehole is filled with the grout, the tremie pipe may be raised. The grout shall be pumped through the tremie pipe into the borehole until the grout flows out of the borehole at the surface. After the grout has been placed, the temporary casing shall be removed. Additional grout shall be added to maintain a continuous column of grout within the borehole which is filled completely to the surface. After the grout has set (approximately 48 hours), the riser pipe may be trimmed. Trimming of the riser shall proceed in a manner to prevent pipe cuttings from entering the well.

A steel pipe, having an inside diameter of at least 1.33 times the outside diameter of the riser pipe, shall be set concentrically around the riser pipe and into the plastic grout. The bottom of the well protector shall be submerged at least 3 feet into the grout, and shall extend at least six inches

above the top of the riser pipe. The well protective casing shall be installed so that the bottom of the casing is terminated below the frost line, to prevent heaving of the casing and riser pipe. The grout which is forced out of the borehole due to the placement of the well protector shall be carefully removed so as to prevent "mushrooming" of the grout, which tends to promote heaving of the well casing and the well protector during frost conditions.

5.2.6 Well Development and Sampling

All new monitoring wells shall be developed, by pumping or other means of evacuating the well casing, in order to remove trapped soil fines in the gravel pack and soil formation just outside the pack and to produce a representative sample of the water in the formation. Well development shall be completed as soon as possible after the well construction has been completed and prior to sampling for any water quality characteristics.

Well development may be accomplished through the use of submersible, bladder, jet, or suction pumps. Pumps must be fully operational, be stainless steel with Teflon™ or polyethylene fittings and tubing, meet applicable electrical or other code provisions, and must be thoroughly cleaned. Pump capacity shall generally be rated at three to five gallons per minute. Pumps shall be operated to remove water from the well casing continuously for at least five minutes without pumping the well dry. Where the nature of the formation makes development of the well infeasible using pumps, bailers may be utilized.

Well development shall continue until representative formation water, free of the effects of well construction, is obtained. Representative formation water shall be defined as water which is generally free of sediment, and has stable pH, temperature, and conductivity readings when measured during a period of ten minutes. In general, well development shall proceed for at least four hours, unless prior experience suggests that a shorter well development period results in the production of formation water which is representative. Well development water will be discharged onto the ground near the well.

Initial well sampling procedures shall be as follows:

1. Check the well for proper identification and location;

2. Measure and record the height of protective casing;

3. Measure and record the ambient and well-mouth organic vapor levels using organic vapor direct reading instrumentation;

4. Using the electronic water level meter, measure and record the static water level in the well and the depth to the well bottom. Upon removing the water level wire, rinse with isopropyl alcohol followed by deionized water;

5. Using a Teflon™ bailer, retrieve enough liquid to fill a small beaker. Measure hydrogen ion activity (pH) to the nearest tenth using an Orion Model 231 meter with temperature-calibrated accuracy and repeatability of ± 0.01 pH (the Teflon™ bailer will be decontaminated prior to use and following each well sampling, in accordance with the procedure described in Section 2.2 of the Work Plan); and

6. Measure conductivity and temperature using a YSI Model 33 Conductivity/Salinity Meter with a conductivity accuracy of ± 3 percent over ranges from 0 to 500, 0 to 5,000, or 0 to 50,000 mmhos/cm and a temperature accuracy better than ± 1 degrees Celsius (°C) over a range from +2°C to + 50°C.

Following the initial monitoring as part of each sampling event, the sample will be retrieved. Sampling procedures are summarized as follows:

1. Transport the sample bottles and preservatives to the site as provided by the analytical laboratory and complete sample labels.

2. If possible, the well purging/sampling sequence will proceed from the least impacted sampling sites to the most impacted site. Decontaminate tubing, pump, and electrical and support cords, before beginning the sequence to avoid contamination. Decontamination will be in accordance with the following procedure:

   - o Wash outside and flush inside with nonphosphate detergent and potable water;
   - o Rinse inside and out with potable water;
   - o Rinse inside and out with a 10 percent nitric acid rinse;
   - o Rinse inside and out with potable water;
   - o Rinse inside and out with demonstrated analyte-free deionized water; and
   - o Dispose of tubing after each use.

3. Measure in-situ water level to the nearest 0.01 foot, using the electronic water level indicator from the reference point on top of the casing. Using either a bladder pump or a Teflon™ bailer, remove a minimum of three casing volumes from the well prior to sampling. (A casing volume is determined by subtracting the water table depth from the depth of the well, then calculating the volume within that length of casing.) If a pump is used to purge the well, it shall be constructed of stainless steel with polyethylene or Teflon™ fittings. The tubing will also consist of polyethylene or Teflon™. Record water temperatures, pH, and electrical conductivity of the water at the start of pumping or bailing and after every well volume of water has been removed. Purge at least 3 well volumes and begin sampling only when pH, temperature, and conductivity readings have stabilized.

4. Collect samples using a Teflon™ bailer. Samples shall be collected within three hours of purging. Follow sample custody procedures thoroughly (eg, type of bottle, quantity of sample, and preservative) as specified by the analytical method.

5. Fill VOA bottles first, ensuring that no air is trapped in the VOA containers. Transfer the water directly from the bailer to the sample bottle. VOA samples will be acidified to pH <2 with 1:1 hydrochloric acid (HCL). The following procedure, adapted from the drinking water methods, should be used for acidification of VOA samples with HCl to a pH less than 2:

   - Adjust the pH of the sample to <2 by carefully adding 1:1 HCl, drop by drop, to the required 2 [40 milliliter (ml)] VOA sample vials. The number of drops of 1:1 HCl required should be determined on a third portion of sample water of equal volume.

   It should be noted that if acidification of the sample causes effervescence, the sample should be submitted without preservation except for cooling to 4°C. This sample property should be appropriately noted when present.

6. Ground water samples will be analyzed for total metals. Samples intended for a total metals analysis do not require filtration. If samples for a dissolved metals analysis are obtained, they must first be filtered with a 45-micron filter as described below:

   - When filtering aqueous metals samples for a dissolved metals analysis, a device made of polyethylene, polypropylene, or borosilicate glass should be used. The apparatus should be precleaned by rinsing with a 10 percent nitric acid solution, followed by a demonstrated analyte-free deionized water rinse, and should be cleaned in the same manner between samples.

- The filter used should be a cellulose-based membrane filter of 0.45 um nominal pore size. Samples must be filtered immediately after their collection to minimize changes in the concentration of the substances of interest. Samples are only passed through the filtration apparatus once, they are not to be passed through repeatedly until they are free of turbidity.

Samples are then preserved immediately with undiluted ultrapure nitric acid to a pH less than 2.

7. Sample volumes for ground water will be as follows:

   - Volatile organics - Three 40 ml glass vials, open hole caps with Teflon™-lined septa;

   - Semivolatile organics and polychlorinated biphenyls (PCB) - Three 1-liter amber glass bottles with Teflon™-lined caps;

   - Total metals - One 500 ml polyethylene bottle with Teflon™-lined caps; and

   - Dissolved metals (optional) - One 500 ml polyethylene bottle with Teflon™-lined cap.

8. Record final temperature, pH, and conductivity. Label each sample with the information presented in Section 7.1. Samples receiving acidification will be acidified immediately following sampling. All samples will be cooled to 4°C immediately following sampling.

9. Document, in gallons per minute, the pump operating time prior to collecting the sample plus the pumping rate at the well. Alternatively, document the casing volumes evacuated from the well prior to sampling.

Duplicate samples will be included for each analysis. A minimum of one sample or 10 percent of the samples obtained (whichever is greater) will be duplicates. One equipment blank (equipment rinseate) sample will be taken per day from the pump and/or bailer, whichever is used for sample collection. Equipment blanks will be obtained for all parameters being analyzed. Appropriate sampling procedures will be followed as discussed above. When VOA samples are collected, one 40 ml analyte-free deionized water trip blank will be prepared per day for shipment with VOA samples. The sample will be acidified and sealed.

5.3 Air Monitoring Samples

Ambient air samples will be obtained at the site to evaluate ambient air quality. Samples will be obtained at the location specified within the Work Plan. In addition, some field air analyses will be performed during sampling activities using a Century OVA.

5.3.1 Gilian Constant Flow Pumps with Tenax and Carbon Molecular Sieve (CMS) Cartridges

Ambient air samples will be collected using calibrated Gilian constant flow pumps which utilize a compensating, self-correcting electronic control system to provide a constant flow (within $\pm$ 10 percent) at any preset flow rate from 1 to 5,000 cubic centimeters per minute (cc/min). Sample flow rates will be calibrated prior to and following sample collection. Samples will be collected over a continuous eight-hour period within CMS cartridges. The sample flow rate will be 100 cc/min for VOCs, 2,000 cc/min for particulates, and 1,000 cc/min for personal air samples.

A backup cartridge will be taken for each VOA sample in order to detect breakthrough. One duplicate CMS sample will be collected. One CMS field blank will also be included for analyses.

6.0 FIELD MEASUREMENTS

Field data will be collected during various sampling and monitoring activities during pre-design sampling and post-closure. This section describes routine procedures to be followed by personnel performing field measurements. The methods presented below are intended to ensure that procedures used in taking field measurements are consistent and there is no variance when performed by various individuals.

6.1 Water Level Surveys

Water levels will be measured using an electrical sounder. The following protocols will be employed when collecting water-level measurements.

Electrical Sounder

1. A battery-powered sounder will be used for water-level measurements. The sounder will have firmly affixed or permanent marks on the sounder line at regular intervals of 5 feet or less; and

2. Sounders will be maintained in a clean and functional condition.

Field personnel conducting the water level surveys will be responsible for ensuring that the electrical sounder was calibrated prior to its use. All water-level readings will be obtained within an eight-hour period to ensure comparability.

6.2 Conductivity, Temperature, and pH

Specific conductance, water temperature, and pH measurements will be obtained when a water sample is collected. A representative water sample will be placed in a container used solely for field parameter determinations. A pH meter with a combination electrode will be used for field pH measurements. A conventional conductivity meter will be used for field-specific conductance

measurements. Temperature measurements will be performed using standard thermometers or equivalent temperature meters. Combination instruments capable of measuring two, or all three, of the parameters may also be used.

All instruments will be calibrated in accordance with procedures described in Section 8.0. The values for conductivity standards and pH buffers used in calibration will be recorded daily. All probes will be thoroughly cleaned and rinsed with distilled water prior to any measurements taken and between monitoring events.

7.0 SAMPLE CUSTODY

This section describes standard operating procedures for sample custody during the site investigation. Sample custody procedures will be followed through sample collection, transfer, analysis, and ultimate disposal. The purpose of these procedures is to assure that:

1. All samples scheduled for collection, as appropriate for the data required, are uniquely identified;

2. The integrity of samples is maintained during their collection, transportation, and storage prior to analysis;

3. The correct samples are analyzed and are traceable to their records;

4. Samples are protected from loss or damage;

5. Any alteration of samples (eg, filtration, preservation) is documented; and

6. A record of sample integrity is established for legal purposes.

Sample custody is divided into field procedures and laboratory procedures, described as follows:

7.1 Field Documentation

Immediately after collection, each sample will be labeled and sealed properly. Sample tracking documents will be prepared so that identification and chain-of-custody records are maintained and sample disposition is controlled. Forms will be printed legibly with waterproof ink. The following are sample identification documents used during the site investigation:

1. Sample label;

2. Daily Activity log; and

3. Chain-of-Custody form.

Sample Labels

Sample labels are necessary to ensure proper sample identification. Each sample label will contain the following information:

1. Name of collector;

2. Date and time of collection;

3. Location of collection;

4. Site identification; and

5. Sample identification number.

Field Logs

Information pertinent to a field survey, measurements, and sampling will be recorded on the Daily Activity Log form, an example of which is presented at the end of this Plan. Entries in the log will contain the following, as appropriate:

1. Name and title of author, date and time of entry, and physical/ environmental conditions during field activity;

2. Location of sampling or measurement activity;

3. Name(s) and title(s) of field crew;

4. Type of sample or measured media (eg, soil, sediment, ground water, etc);

5. Sample collection or measurement method(s);

6. Number and volume of sample(s) taken;

7. Description of sampling point(s);

8. Date and time of collection or measurement;

9. Sample identification number(s);

10. Sample preservation;

11. Sample distribution (eg, laboratory);

12. Field observation/comments; and

13. Field measurement data (pH, etc).

Chain-of-Custody Form

Every sample will be listed on the chain-of-custody form. The form will accompany every sample and every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession. An example of the chain-of-custody form to be used is presented at the end of this Plan. The record will contain the following information:

1. Sample identification number;

2. Signature of collector;

3. Date of collection;

4. Place of collection;

5. Sample type;

6. Signatures of persons involved in chain of possession;

7. Inclusive dates of possession;

8. Name of person receiving the sample;

9. Date of sample receipt;

10. Analyses requested; and

11. Sample condition and temperature (recorded in miscellaneous remarks).

Sample Transfer and Shipment

Sample bottles will be sealed in plastic bags and packed in ice to achieve and maintain a temperature of 4°C for shipment. Sample coolers will be secured with nylon strapping tape, and custody seals placed on the coolers in such a way that if the coolers are opened, the seal will be broken. Samples will be shipped within 24 hours of collection via overnight courier.

Each cooler will always be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the chain-of-custody record. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis. The chain-of-custody record will be contained in each shipment. The method of shipment and courier name(s) will be entered in the chain-of-custody record.

7.2 Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies the information on the chain-of-custody record(s). Pertinent information as to shipment, pickup, and courier will also be noted on the chain-of-custody record(s). The custodian will then enter the appropriate data into the laboratory sample tracking system and sign the chain-of-custody form. The laboratory custodian will assign a unique laboratory number to each sample. The custodian will then transfer the sample(s) to the proper analyst(s) or store the sample(s) in the appropriate secure area.

Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted. All data sheets and laboratory records (including sample chromatograms) are retained as part of the permanent documentation.

7.3 Corrections to Documentation

Original data recorded in field logs, chain-of-custody records, and other forms will be written in waterproof ink. None of these documents should be destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual should make corrections simply by drawing a line through the error, entering the correct information, and initialing and dating the change. The erroneous information should not be discarded. Any subsequent error(s) discovered on a document should be corrected by the person who made the entry.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

Procedures described in this section pertain to the calibration of equipment and instrumentation to be used during pre-design sampling and post-closure activities. Included is a description of the procedure or reference to an applicable standard operating procedure, the calibration frequency, and the calibration standards to be used.

8.1 Field Instruments, Calibration Procedures, and Frequency

A limited amount of field equipment and instrumentation will be required as part of sampling and monitoring activities. Equipment requiring calibration is expected to be limited to an organic vapor analyzer, a Gilian pump for sampling of air, a pH meter for measuring hydrogen ion concentration, and a water level indicator for ground water elevation determination.

Field equipment will be calibrated prior to use each day. The procedures for calibrating each piece of equipment which Canonie anticipates will be used are described below. If the use of other instrumentation is required, the manufacturer's calibration procedures will be followed.

OVA

The procedure for calibration of an OVA when the instrument is used in the survey mode is:

1. Preset the "Gas Select" control to the desired dial indication prior to turning on the instrument. The instrument is factory-set to read out directly in terms of methane in the air;

2. Move the INSTRUMENT switch to ON and allow five minutes for warm-up;

3. To set the audible alarm to a predetermined level, first turn the PUMP switch to ON, then adjust the meter pointer to the desired alarm level using the CALIBRATE ADJUST (zero) knob. Turn the alarm level adjust knob on the back of the readout assembly until the alarm is just audible. Adjust the speaker volume with the VOLUME knob. If the earphone is used, plug in and readjust the volume as desired. The instrument is then preset to activate the alarm when the level exceeds that of the setting;

4. Move the CALIBRATE switch to X10 and adjust the meter reading to zero with the CALIBRATE ADJUST (zero) knob;

5. Check that the PUMP switch is ON and observe the SAMPLE FLOW RATE indicator. Indication should be approximately two units;

6. Open the H2 TANK valve one turn and observe the reading on the H2 TANK PRESSURE indicator. (Approximately 150 pounds per square inch of pressure is required for each hour of operation.);

7. Open the H2 SUPPLY valve one-half to one turn and observe the reading on the H2 SUPPLY PRESSURE indicator;

8. Confirm that the meter is still reading zero. Readjust if necessary;

9. Depress ignitor button. There will be a slight "pop" as the hydrogen ignites, and the meter pointer will move upscale of zero. Immediately after ignition, release the ignitor button. Do not depress ignitor button for more than six seconds. If burner does not ignite, let the instrument run for several minutes and try again. After ignition, the meter pointer will indicate the background level of the organic vapor to which it is calibrated. This background level is nulled out using the CALIBRATE ADJUST (zero) knob;

10. Move the instrument to an area which represents the "lowest ambient background concentration" (cleanest air) to be surveyed. Move the CALIBRATE ADJUST (zero) knob. [Adjustment to 1 part per million (ppm) rather than zero is necessary in the X1 range because of the sensitivity of the Century OVA. This permits minor downward fluctuations in the normal background level without dropping below zero, which would actuate the flame-out alarm. It is important, therefore, to remember during subsequent surveys that 1 ppm must be subtracted from all readings.];

11. If the alarm is to be set above the normal background detection level, turn the alarm level adjust knob on the back of the readout assembly until it actuates slightly above background;

12. The instrument is now ready for use in surveying organic vapors.

The procedure for calibration of the OVA based upon organic vapors other than methane (ie, the factory setting) is:

(Note: The instrument is factory-calibrated to the methane-in-air standard. However, it can be easily and rapidly calibrated to a variety of organic compounds. A GAS SELECT control is incorporated on the instrument panel which is used to set the electronic gain to a particular organic compound. However, the device may also be used to detect various hydrocarbons while leaving the factory-calibrated setting unchanged. Under this process, the relative response of the OVA to a non-methane vapor, as compared to methane, is utilized to convert the organic vapor reading to that which the instrument would indicate if the calibration had been altered. As an example, the relative response of benzene to methane is 150 percent. Thus, if the OVA is calibrated to methane and the vapor surveyed is benzene, the reading obtained must be divided by 1.5. Similarly, the relative response of trichloroethylene to methane is 70 percent. Thus, if the OVA is calibrated to methane and the vapor surveyed is trichloroethylene, the reading obtained must be divided by 0.7.)

1. Calibration of a Century OVA to other organic vapors is accomplished by adjusting the setting of the GAS SELECT CONTROL knob. Primary calibration of the instrument under this procedure is accomplished using a known mixture of a specific organic vapor compound. After the instrument is in operation and the "normal background" is "zeroed out," a sample of the calibration gas must be drawn into the instrument. The GAS SELECT knob on the panel is then used to shift the readout meter indication to correspond to the concentration of the calibration gas mixture.

2. The instrument is then calibrated for the vapor mixture being used. After this adjustment, the setting on the "digital" (the GAS SELECT knob) is read and recorded for that particular organic vapor compound. This exercise may be repeated for a large variety of compounds, and when desiring to read a particular compound, the GAS SELECT control is turned to the predetermined setting for the compound.

Gilian Pump for Organic Vapor Sampling

A Gilian pump is calibrated by attaching the pump to a thin film flowmeter via a tygon tube. A small amount of test solution is placed in the test chamber, and the pump is started. The pump draws a thin film through the flowmeter, and the flowmeter electronically determines the flow rate at which the pump is operating. The pump rate is shown on a digital readout on the face of the flowmeter, and the flow rates obtained averaged for use in calculations concerning the high volume pump. The pump rate is calibrated prior to and following sampling.

Water Level Indicator

Check electrical sounder calibration against steel surveyor's tape prior to use.

pH Meter

The pH meter will be calibrated every two hours of active use using 4.00, 7.00, and 10.00 buffer solutions. The procedure will conform to the manufacturer's specifications included with the unit. Temperature corrections will be applied during measurements.

Electrical Conductivity Meter

The meter is factory-calibrated annually.

9.0 CHEMICAL ANALYTICAL PROCEDURES

Analyses of soil samples will be performed by Canonie's Stockton, California, laboratory. (Canonie's analytical laboratory QA/QC document is included as Appendix E.) Analyses of soil and sediment for carcinogenic polynuclear aromatic hydrocarbons (CPAHs) and PCBs will be performed in accordance with the Contract Laboratory Program - Scope of Work (CLP-SOW) for semivolatiles and PCBs. Analyses of ambient air samples will be performed by Galson Technical Services, Inc. (East Syracuse, New York). Analysis of air samples will be in accordance with National Institute for Occupational Safety and Health (NIOSH) Methods 0500, 1003, 1500, and 1501.

Sampling of ground water monitoring wells will be performed as a part of post-closure monitoring and during remedial action if pre-design studies indicate the need for new wells. Water samples collected at these times will be tested for CPAHs, PCBs, metals, and purgeable halocarbons. Specific test methods are presented in Table 4 of the Work Plan.

10.0 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction is the process of converting measurement system outputs to an expression consistent with the comparability objective. Validation is a systematic process of reviewing data to provide assurance that the data are adequate for their intended use and consistent with project objectives. The quality of data will be assessed based on the precision, accuracy, consistency, and completeness of the data that is measured or generated. The validation process includes editing, screening, checking, auditing, verifying, certifying, and reviewing.

Data validation will be performed by Mr. Thomas M. Kreutz of Canonie in accordance with EPA Region II standard operating procedures. Data validation summary reports presented in Appendix D will be signed by the validator and submitted to the EPA at the address identified in Section 2.2 of the Work Plan. Flags on data restricting its usage will be observed.

Reports, report tables, and other data presentations are initially edited by comparison with original field data sheets and/or calculations. Subsequent data tabulations are checked by comparing the reports with the tabulations. Similarly, other measurement and calculation data are edited and checked by comparing tabulations with original sources.

Measurements, calculations, and work performed by other organizations will be verified and documentation placed in the file for the record. The project manager will screen, edit, and review important activities for adequacy of the methodology, obtained data, use, and presentation with respect to the project objectives.

11.0 INTERNAL QUALITY CONTROL

Canonie routinely follows QC procedures established for all field activities, such as sample blank preparation, duplicate sample preparation, and field verification of measurements. In addition, a comparison of the number of samples submitted for analysis compared to the number indicated prior to the initiation of the sampling episode is performed in order to check sampling completeness. Calculations performed as part of data collection or data reduction are independently checked by a second qualified project staff member.

QC procedures for laboratory activities are included in the Laboratory QA/QC Plan.

Field QC activities are primarily related to sampling activities associated with later chemical laboratory analyses. Special samples are routinely sent to the laboratory, including sample blanks and blind duplicates. These samples provide the quantitative basis for validating the data reported. These samples are explained in greater detail in the following subsections.

11.1 Sample Blanks

Sample blanks will be collected as follows:

Equipment blanks - One per day for soil sampling equipment, consisting of rinseate from final deionized water rinse.

One per day for ground water sampling equipment, consisting of rinseate from final deionized water rinse.

Trip blanks - One per day for VOA water samples, consisting of acidified deionized water.

Blanks will be preserved, sealed, and shipped in the same manner as other samples. Blanks will be obtained and analyzed for the same parameters as the samples being collected.

11.2 Duplicates

Duplicates of soil, ground water, and ambient air samples will be submitted for analysis of all parameters specified for those samples. Unless otherwise indicated by analytical results or other factors, a minimum of 10 percent or at least one sample per sample media per sampling event will be duplicates. The identity of the duplicate samples will not be revealed to the laboratory until completion of the analyses.

12.0 AUDITS

QA audits are performed to assure and document that QC measures are being used to provide data of acceptable quality, and that subsequent calculations, interpretation, and other project outputs are checked and validated. Field system and performance audits will be conducted by the project manager at the site during the course of the field exploration. Project audits of calculations, interpretations, and reports, which are based on the measurement system outputs, will subsequently be performed in the office. Noted discrepancies in established QC procedures are immediately corrected to the satisfaction of the project manager.

12.1 Systems Audit

A system audit may be conducted on all components of measurement systems to confirm their proper selection and utilization. The systems audit includes evaluation of field and laboratory procedures. The laboratory system audit is more thoroughly described in the Laboratory QA/QC Plan.

Organization and Personnel

The project organization is reviewed for compliance with the proposed organization and for clarity of assigned responsibility. Personnel assigned to the project are evaluated with respect to their qualifications in order to determine that assigned responsibility, skill, and training of the personnel are properly matched to the requirements of the project. The project manager maintains firsthand knowledge of the team's capabilities and efficiency.

Facilities and Equipment

The audit confirms that field tools, monitoring instruments, and investigation equipment are selected and used to meet requirements specified by the project objectives stated in the Work Plan. Equipment and facilities provided for

personnel health and safety will also be evaluated. Calibration and documentation procedures for instruments used in the field will receive special attention.

Observation of analyst technique, data reduction, and record-keeping may be performed if determined necessary. Review of the precision and accuracy of data is routinely performed.

Measurement and Data Handling

During a system audit, the QA Director will review measurement and data-handling procedures with the project manager and task leaders. Accuracy, consistency, documentation, and appropriate selection of methodologies will be discussed.

12.2 Performance Audit

Performance audits are intended primarily for analytical and data generation systems. Canonie's analytical laboratory regularly participates in and successfully completes EPA Performance Evaluations (WS and WP series). Ongoing performance evaluations include assessments of duplicates, matrix spikes, and QC check sample results.

12.3 Project Audit

Project audits encompass the aspects of both the systems audit and the performance audit. The project audit typically occurs at least once for a short-term project and more often during long-term projects. Timing is keyed to the systems involved and the project objectives.

12.4 QA Audit Report

A written report of the QA audit may be prepared to include:

1. An assessment of the task force's status in each of the major project areas;

2. Clear statements of areas requiring improvement or problems to be corrected. Recommendations and assistance will be provided regarding proposed corrective actions or system improvements. If no action is required, the report will state that the QA audit was satisfactorily completed;

3. A timetable for any corrective action required;

4. A follow-up to assure that recommendations have been implemented.

13.0 PREVENTIVE MAINTENANCE

Preventive maintenance of all field equipment proceeds routinely before each sampling event; more extensive maintenance is performed on the basis of hours in use.

Laboratory equipment is maintained on a regular, scheduled basis. This maintenance is documented in the laboratory records book for each instrument. Emergency repair or scheduled manufacturer's maintenance is provided under repair and maintenance contracts with factory representatives.

14.0 CORRECTIVE ACTION

Corrective or preventive action is required when potential or existing conditions are identified that may have an adverse impact on data quantity or quality. Corrective action could be immediate (such as in the case of field investigation observed deficiencies) or long-term. In general, any member of the program staff who identifies a condition adversely affecting quality can initiate corrective action by notifying in writing his or her supervisor and the project manager. The written communication will identify the condition and explain how it may affect data quality or quantity. Corrective action in the field is the responsibility of each member of the on-site staff, with review of procedures to be used prior to sampling episodes, and a check of the procedures implemented taking place after the sampling episode is completed.

15.0 REPORTS TO MANAGEMENT

The field sampling program will be of limited extent and duration. Accordingly, a summary report will be prepared following field work which monitors the project status. The report will include:

1. An assessment of measurement data accuracy, precision, and completeness;

2. Results of performance audits and/or systems audits;

3. Significant QA/QC problems and recommended/implemented solutions;

4. Status of solutions to any problems previously identified.

Additionally, any incidents requiring corrective action will be fully documented. Procedurally, the project manager will prepare the report to the vice president in charge of operations. The summary of findings shall be factual, concise, and complete. Any required supporting information will be appended to the report.

APPENDIX D

EPA REGION II
STANDARD OPERATING PROCEDURES
DATA VALIDATION

SOP NO. HW-2

Evaluation of Metals Data for the Contract Laboratory Program (CLP)

based on

SOW. 7/87
REV.12/87

(SOP Revision VIII)

PREPARED BY: _____ DATE: 2-14-89
Hanif Sheikh, Quality Assurance Chemist
Toxic and Hazardous Waste Section

CONCURRED BY: _____ DATE: 2/14/89
Louis Bevilacqua, Section Chief
Toxic and Hazardous Waste Section

APPROVED BY: _____ DATE: 2/15/89
Gerard F. McKenna, Chief
Monitoring Management Branch

Title: Evaluation of Metals Data for the Contract Laboratry Program

Date: Dec. 1988
Number: HW-2
Revision: 8

1.0 Scope

1.1 This procedure is applicable to inorganic data obtained from contractor laboratories working for Hazardous Waste Site Contract Laboratory Program (CLP).

1.2 The data validation is based upon analytical and quality assurance requirements specified in Statement of Work (SOW) 7/87.

2.0 Responsibilities - Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

2.1. For a total review:

2.1.1 Data Assessment - "Total Review-Inorganics" Checklist Appendix (A.1). The reviewer must answer every question on the checklist.

2.1.2 Data Assessment - Data Assessment Narrative (Appendix A.2)
The answer on the checklist must match the action in the narrative (appendix A.2) and on Form I's.

2.1.3 Contract Non-Compliance - SMO Report (Appendix A.3)
This report is to be completed only when a serious contract violation is encountered, or upon the request of the Data Review Manager or Deputy Project Officer (DPO). Forward 5 copies: one each for internal files, appropriate Regional DPO, Sample Management Office (SMO) and last two addresses of Mailing List for Data Reviewers (Appendix A.4). In other cases, all contract vioaltions should be appended to end of Data Assessment Narrative (Sec. A.2.2).

2.1.4 Data Summary Sheet - Summary of Inorganic Quality Control Data (Appendix A.5).
Enter on Data Summary Sheet all values from Forms I through IX. Circle all values out of control limits in red.

2.1.5 CLP Data Assessment Summary Forms

2.1.5.1 Appendix A.6
Fill in the total number of analytes analyzed by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in boxes where analyses were not performed, or criteria do not apply.

2.1.5.2 Appendix A.7
Data reviewer is also required to fill out Inorganic Regional Data Assessment form (Appendix A.7) provided by EPA Headquarters. Codes listed on the form will be used to describe the Data Assessment Summary.

2.1.6 Data Review Log: Each data reviewer will maintain a log of reviews completed to include:

a. date of start of case review
b. date of completion of case review
c. site
d. case number
e. contract laboratory
f. number of samples
g. matrix
h. hours worked
i. reviewer's initials

The log is kept in MMB office.

2.1.7 Telephone Record Log - the data reviewer should enter the bare facts of inquiry, before initiating any phone conversation with CLP laboratory. After the case review has been completed, mail white copy of Telephone Record Log to the laboratory and pink copy to SMO. File yellow copy in the Telephone Record Log folder, and attach a xerox copy of the Telephone Record Log to the completed Data Assessment Narrative (Appendix A.2).

2.1.8 Forwarded Paperwork

2.1.8.1 Upon completion of review, the following are to be fowarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:

a. data package
b. completed data assessment checklist (Appendix A.1,original)
c. SMO Contract Compliance Screening (CCS)
d. Data Summary Sheet (Appendix A.5) along with completed Data Assessment Narrative (Appendix A.2)
e. Record of Communication (copy)
f. CLP Reanalysis Request/Approval Record (original + 3 copies)
g. Appendix A.7 (original).

2.1.8.2 Forward 4 copies of completed Data Assessment Narrative (Appendix A.2) along with 2 copies of the Inorganic Data Assessment Form (Appendix A.7) and Telephone Record Log , if any,: one each for appropriate Regional DPO, Sample Management Office (SMO), and last two addressees of Mailing List for Data Reviewers (Appendix A.4) (the Inorganic Data Assessment form does not go to the last two addressees).

2.1.9 Filed Paperwork - Upon completion of review, the following are to be filed within MMB files:

a. completed Data Assessment Narrative (Appendix A.2)
b. Telephone Record Log (copy)
c. Data Summary Sheet - Summary of Inorganics Quality Control Data (copy) (Appendix A.5)
d. Record of Communication (original)

e. SMO Report (copy)
f. CLP Data Assessment Summary Form (Appendix A.6 and A.7).
g. CLP Reanalysis Request/Approval Record (copy)
h. checklist of Total Review (Appendix A.1).

3.0 Data Completeness

Indicate incomplete data package on the computer tracking sheet.Authorized contractor personnel may contact the laboratory contact after discovery of an incomplete data package. If a laboratory will not return phone calls or does not respond to requests, notify the DPO of the Region in which the laboratory is located.

4.0 Rejection of Data - All values determined to be unacceptable on the Inorganic Analysis Data Sheet (Form I) must be lined over with a red pencil. As soon as any review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.

5.0 Acceptance Criteria - In order that reviews be consistent among reviewers, acceptance criteria as stated in Appendix A.1 should be used. Additional guidance can be found in the National Inorganic Functional Guidelines.

6.0 SMO Contract Compliance Screening (CCS) - This is intended to aid reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from laboratory in response to CCS must be used by the reviewer.

7.0 Request for Reanalysis - Data reviewers must note all items of contract non-compliance within Data Assessment Narrative.If holding times and sample storage times have not been exceeded, DPO may request reanalysis if items of non-compliance are critical to data assessment. Requests are to be made on "CLP Re-Analysis Request/Approval Record".

8.0 Record of Communication - Provided by the Regional Sample Control Center (RSCC) to indicate which data packages have been received and are ready to be reviewed.

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.1: Data Assessment - Contract Compliance (Total Review - Inorganics)

Date: Dec. 1988
Number: HW-2
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	YES	NO	N/A
A.1.1 Contract Compliance Screening Report (CCS) - Present?	___	___	___
A.1.2 Record of Communication (from RSCC) - Present?	[___]	___	___
ACTION: If no, request from RSCC.			
A.1.3 Sample Traffic Report - Present or on file?	[___]	___	___
Legible?	[___]	___	___
ACTION: If no, request from Regional Sample Control Center (RSCC).			
A.1.4 Cover Page - Present?	[___]	___	___
Is cover page properly filled in and signed by the manager or the manager's designee?	[___]	___	___
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[___]	___	___
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	[___]	___	___
(b) Form I's?	[___]	___	___
ACTION: If no for any of the above, contact RSCC for clarification.			
A.1.5 Form I (Final Data) - Are all Form I's present and complete?	[___]	___	___
ACTION: If no, prepare telephone record log and contact laboratory for submittal.			
Are correct units (ug/l for waters and mg/kg for soils) indicated on Form I's?	[___]	___	___

	YES	NO	N/A
Are soil sample results for each parameter corrected for percent solids?	[___]	___	___
Are EPA sample # s and corresponding laboratory sample ID # s the same as on the Cover Page, Form I's and in the raw data?	[___]	___	___
Are computation/transcription errors less than 10% of reported values?	[___]	___	___
Are all "less than IDL" values properly coded with "U"?	[___]	___	___
Was a brief physical description of samples given on Form I's?	[___]	___	___
Were the result qualifiers used correctly with final data?	[___]	___	___

ACTION: If no for any of the above, prepare Telephone Record Log, and contract laboratory for corrected data.

Were any samples diluted beyond requirements of contract?	___	[___]	___
If yes, were dilutions noted on Form I's?	[___]	___	___

ACTION: If no, note under contract -problem/non-compliance of the"Data Assessment Narrative".

A.1.6 Holding Times - (aqueous samples)

(Examine sample traffic reports and digestion/distillation logs.)

Mercury (28 days). . . . . exceeded?	___	[___]	___
Cyanide (14 days). . . . . exceeded?	___	[___]	___
Other Metals (6 months). . . . . exceeded?	___	[___]	___
Soil samples			
Metals and Cyanide (6 months).....exceeded?	___	[___]	___

NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of analysis (from raw data). Attach to checklist.

		YES	NO	N/A
	ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL); flag as estimated (J) the values above IDL.			
A.1.7	Raw Data			
A.1.7.1	Digestion Log* for flameAA/ICP present?	[___]	___	___
	Digestion Log for furnace AA present?	[___]	___	___
	Digestion Log for mercury present?	[___]	___	___
	Digestion Log for cyanides present?	[___]	___	___
	Are pH values (pH<2 for all metals, pH>12 for cyanide) present in Digestion/Distillation Logs?	[___]	___	___
	*Weights, dilutions and volumes used to obtain values.			
	Percent solids calculation present for soils/sediments?	[___]	___	___
	Are preparation dates present on Digestion Log?	[___]	___	___
A.1.7.2	Measurement read out record present? ICP	[___]	___	___
	Flame AA	[___]	___	___
	Furnace AA	[___]	___	___
	Mercury	[___]	___	___
	Cyanides	[___]	___	___
A.1.7.3	Are all raw data to support all sample analyses and QC operations present?	[___]	___	___
	Legible?	[___]	___	___
	Properly Labeled?	[___]	___	___
	ACTION: If no for any of the above, write Telephone Record Log and contact laboratory.			

		YES	NO	N/A
A.1.8	**Data Validation and Verification**			
A.1.8.1	**Calibration**			
A.1.8.1.1	Is record of at least 2 point calibration present for ICP analysis?	[___]	___	___
	Is record of 5 point calibration present for Hg analysis?	[___]	___	___
	ACTION: If no for any of the above, write in the contract problem/non-compliance section of the "Data Assessment Narrative".			
A.1.8.1.2	Is record of 4 point calibration present for: Flame AA?	[___]	___	___
	Furnace AA?	[___]	___	___
	Cyanides?	[___]	___	___
	NOTE: 1. If less than 4, other standards must be run immediately after calibration and be ± 5% of true value. 2. For all AA and Cyanide analyses one calibration standard is at CRDL level.			
	ACTION: Flag associated data as estimated if standards are not within ±5% of true values (except CRDL calibration standard).			
A.1.8.1.3	Is correlation coefficient less than 0.995 for: Mercury Analysis?	___	[___]	___
	Cyanide Analysis?	___	[___]	___
	Atomic Absorption Analysis?	___	[___]	___
	ACTION: If yes, flag the associated data as estimated.			
A.1.8.2	**Form II A (Initial and Continuing Calibration Verification)**-			
A.1.8.2.1	Present and complete for every metal and cyanide?	[___]	___	___

	YES	NO	N/A
Present and complete for AA and ICP when both are used for same analyte?	[___]	___	___

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

A.1.8.2.2 Circle all values on data summary sheet that are outside of contract windows. Are all calibration standards (initial and continuing) within control limits?

Metals 90-110%	[___]	___	___
Hg - 80-120%	[___]	___	___
Cyanides 85-115%	[___]	___	___
Are all calibration standards (initial and continuing) within 50-150%?	[___]	___	___

ACTION: Flag as estimated (J) all positive data (not flagged with a "U") analyzed between a calibration standard of 75-89% (65-79% for Hg; 70-84% for CN) or 111-125% (121-135% for Hg; 116-130% for CN) recovery and nearest good calibration standard. Qualify results <IDL as estimated (UJ), if the ICV or CCV %R is 75-89%(CN, 70-84% ; HG, 65-79%). Reject (red-line) as unacceptable data if recovery of the ICV or CCV %R is outside the range 75-125% (CN, 70-130%; Hg, 65-135%).

Was continuing calibration performed every 10 samples or every 2 hours?	[___]	___	___

ACTION: If no, flag the excess samples (eleventh and up) data as estimated (J).

A.1.8.3 Form II B (CRDL Standards for AA and ICP) -

A.1.8.3.1 Was a CRDL standard (CRA) analyzed for all AA metals (except Hg)?	[___]	___	___
* Was a mid-range calib. verification standard distilled and analyzed for cyanide analysis?	[___]	___	___
Was a 2xCRDL or 2xIDL (when IDL>CRDL) analyzed (CRI) for each ICP run? (Note: CRI for AL,Ba,Ca,Fe,Mg,Na,or K is not required.)	[___]	___	___

* Find the results of mid-range standard in the raw data.

		YES	NO	N/A
	ACTION: If no for any of the above, flag as estimated positive data falling within the range *(true value ± CRDL). For CN, the range is *(true value ± 0.5 x true value).			
A.1.8.3.2	Was CRI analyzed after ICV/ICB and before the final CCV/CCB, or every four hours of ICP run?	[___]	___	___
	ACTION: If no, write in Contract Problem/Non-Compliance Section of the "Data Assessment Narrative".			
A.1.8.3.3	Are CRA and CRI standards within control limits:			
	Metals 90 - 110?	[___]	___	___
	Is mid-range standard within control limits:			
	Cyanide 85 - 115?	[___]	___	___
	ACTION: Flag the affected data within the range *(true value ± CRDL) as estimated (J) if recovery is less than 90% (for CN <85%); flag the positive data within the range (true value ± CRDL), if recovery is greater than 110% (for CN >115%). The range for CN is *(true value ± 0.5 x true value).			
A.1.8.4	Form III (Initial and Continuing Calibration Blanks)			
A.1.8.4.1	Present and complete?	[___]	___	___
	For both AA and ICP when both are used for same analyte?	[___]	___	___
	ACTION: If no, prepare Telephone Record Log and contact laboratory.			
A.1.8.4.2	Circle all calibration blank values on Data Summary Sheet that are above IDL. Are all calibration blanks (when IDL≤CRDL) less than or equal to Contract Required Detection Limits (CRDL)?	[___]	___	___
	Are all calibration blanks less than two times Instrument Detection Limit (when IDL>CRDL)?	[___]	___	___
	ACTION: If no for any of the above, flag as estimated (J) on form I's all data <5xIDL between calibration blank with value over CRDL or IDL and nearest good calibration blank. Flag five samples on either side of the calibration blank.			

* -True value of CRA, CRI or mid-range CN standard.
-Substitute IDL for CRDL when IDL > CRDL.

		YES	NO	N/A
A.1.8.4.3	Was an initial calibration blank analyzed?	[___]	___	___
	Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (whichever is more frequent)?	[___]	___	___

ACTION: If no, flag as estimated (J) all values <5xIDL not analyzed within 5 samples of calibration blank.

A.1.8.5 FORM III (Preparation Blank) --

(Note: The preparation blank for mercury is the same as the calibration blank.)

A.1.8.5.1	Was one prep. blank analyzed for: each 20 samples?	[___]	___	___
	each batch?	[___]	___	___
	each matrix type?	[___]	___	___
	both AA and ICP when both are used for same analyte?	[___]	___	___

ACTION: If no for any of the above, flag as estimated (J) all associated positive data <10 x IDLs for which prep.blank was not analyzed.

NOTE: If only one blank was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).

A.1.8.5.2	Do concentrations of prep. blank fall below two times IDL when IDL is greater than CRDL?	[___]	___	___

ACTION: If no, reject (red-line) all data that has a concentration less than 10 times the prep. blank value, but not flagged with a "U" (less than).

A.1.8.5.3	Is concentration of prep. blank greater than CRDL when IDL is less than or equal to CRDL?	___	[___]	___
	If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep. blank value?	___	[___]	___

		YES	NO	N/A
	ACTION: If yes, reject (red-line) all associated data that has a concentration less than ten times the prep. blank value, but not flagged with a "U" (less than).			
A.1.8.5.4	Is concentration of prep. blank below the negative CRDL?	___	[___]	___
	ACTION: If yes, reject (red-line) all associated data that has a concentration less than 10xCRDL.			
A.1.8.6	Form IV (ICP Interference Check Sample)			
A.1.8.6.1	Present and complete?	[___]	___	___
	(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
A.1.8.6.2	Circle all values on Data Summary Sheet that are more than ± 20% of true or established mean value. Are all Interference Check Sample results inside of control limits (± 20%)?	[___]	___	___
	If no, is concentration of Al, Ca, Fe, or Mg lower in sample than in ICS?	[___]	___	___
	ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150% ; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			
A.1.8.6.3	Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	[___]	___	___
	ACTION: If no, flag as estimated (J) all samples for which AL, Ca, Fe, or Mg is higher than in ICS.			
A.1.8.7	Form V A (Spiked sample Recovery - Pre-Digestion/Pre-Distallation)- (Note: Not required for Ca, Mg, K, and Na (both matrices), Al, and Fe (soil only.)			

		YES	NO	N/A
A.1.8.7.1	Present and complete for: each 20 samples?	[___]	___	___
	each matrix type?	[___]	___	___
	each conc. range (i.e. low, med., high)?	[___]	___	___
	For both AA and ICP when both are used for same analyte?	[___]	___	___

ACTION: If no for any of the above, flag as estimated (J) all positive data less than four times spiking level for which spiked sample was not analyzed.

NOTE: If one spiked sample was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).

A.1.8.7.2	Was field blank used for spiked sample?	___	[___]	___
	If yes, was field blank described as such on Traffic Report?	___	[___]	___

ACTION: If yes, flag all positive data less than 4 x spike added as estimated (J) for which field blank was used as spiked sample.

A.1.8.7.3	Circle all values on Data Summary Sheet that are outside of control limits (75% to 125%). Are all recoveries within control limits?	[___]	___	___
	If no, is sample concentration greater than or equal to four times spike concentration?	[___]	___	___

ACTION: If yes, disregard spike recoveries for analytes whose concentrations are greater than or equal to four times spike added. If no, circle those analytes on Form V for which sample concentration is less than four times the spike concentration.

	Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	[___]	___	___

ACTION: If no, write in the contract problem/non compliance section of "Data Assessment Narrative".

		YES	NO	N/A
A.1.8.7.4	Aqueous			
	Are any spike recoveries:			
	(a) less than 30%?	___	[___]	___
	(b) between 30-74%?	___	[___]	___
	(c) between 126-150%?	___	[___]	___
	(d) greater than 150%?	___	[___]	___

ACTION: If less than 30%, reject all associated aqueous data; if between 30-74%, flag all associated aqueous data as estimated (J); if between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U"; if greater than 150%, reject (red-line) all associated aqueous data not flagged with a "U".

NOTE: If pre- digestion spike result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria , disregard spike recovery on Form V. Flag the associated data as estimated(J).

A.1.8.7.5	Soil/Sediment			
	Are any spike recoveries:			
	(a) less than 10%?	___	[___]	___
	(b) between 10-74%?	___	[___]	___
	(c) between 126-200%?	___	[___]	___
	(d) greater than 200%?	___	[___]	___

ACTION: If less than 10%, reject all associated data; if between 10-74%, flag all associated data as estimated; if between 126-200%, flag as estimated all associated data was not flagged with a "U"; if greater than 200%, reject all associated data not flagged with a "U".

A.1.8.8	Form VI (Lab Duplicates)			
A.1.8.8.1	Present and complete for: each 20 samples?	[___]	___	___
	each matrix type?	[___]	___	___
	each concentration range (i.e. low, med., high)?	[___]	___	___

		YES	NO	N/A
	both AA and ICP when both are used for same analyte?	[___]	___	___
	ACTION: If no for any the above, flag as estimated (J) all data >CRDL* for which duplicate sample was not analyzed. Note: If one duplicate sample was analyzed for more than 20 samples, then first 20 samples do not have to be flagged as estimated.			
A.1.8.8.2	Was field blank used for duplicate analysis?	___	[___]	___
	If yes, was field blank identified as such on Traffic Report?	___	[___]	___
	ACTION: If yes, flag all data >CRDL* as estimated (J) for which field blank was used as duplicate.			
A.1.8.8.3	Circle all values on Data Summary Sheet that are outside control limits: Aqueous Samples (a) 20% RPD or *(b)± CRDL Soil Samples (a) 35% RPD or *(b)± CRDL			
	Are all values within control limits?	[___]	___	___
	If no, are all results outside the control limits flagged with an * on Form I's and VI?	[___]	___	___
	ACTION: If no, write in the contract problems/non-compliance section of "Data Assessment Narrative".			
	NOTE: 1. RPD is not calculable for an analyte of the sample - duplicate pair when both values are less than IDL. 2. If lab duplicate result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria. Flag the associated data as estimated.			
A.1.8.8.4	Is any value for sample duplicate pair less than CRDL* and other value greater than or equal to 10 x *CRDL?	___	[___]	___
	ACTION: If yes, flag the associated data.			

* Substitute IDL for CRDL when IDL > CRDL.

Title: Evaluati n f Metals Data for the Contract Laboratory Program
Appendix A.1: Data Assessment - Contract Compliance (Total Review - Inorganics)

Date: Dec. 1988
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	YES	NO	N/A
A.1.8.8.5 Aqueous			
Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[___]	___
Is any difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	___	[___]	___
ACTION: If yes, flag the associated data as estimated.			
A.1.8.8.6 Soil/Sediment			
Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) :			
≥ 100%?	___	[___]	___
Is any difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) :			
>2x*CRDL?	___	[___]	___
ACTION: If yes, flag the associated data as estimated.			
A.1.8.9 Field Duplicates			
A.1.8.9.1 Were field duplicates analyzed?	[___]	___	___

ACTION: If yes, prepare a Form VI for each field duplicate pair, report concentrations of soils in ug/l on wet weight basis and calculate RPDs.

NOTE: 1. Do not calculate RPD when both values are less than IDL.
2. Flag all associated data only for field duplicate.

A.1.8.9.2 Circle all values on Form VI for field duplicates that are outside control limits:

Aqueous Samples (a) 20% RPD or
*(b) ± CRDL

Soil Samples (a) 35% RPD or
*(b) ± CRDL

* Substitute IDL for CRDL when IDL > CRDL.

		YES	NO	N/A
	Are all values within control limits?	[___]	___	___
A.1.8.9.3	Is any value for sample duplicate pair less than *CRDL and other value greater than or equal to 10 x *CRDL?	___	[___]	___
	ACTION: If yes, flag the associated data as estimated.			
A.1.8.9.4	Aqueous			
	Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[___]	___
	Is any difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	___	[___]	___
	ACTION: If yes, flag the associated data as estimated.			
A.1.8.9.5	Soil/Sediment			
	Is any RPD (where sample and duplicate are both greater than 5 times *CRDL) :			
	≥100%?	___	[___]	___
	Is any difference between sample and duplicate (where sample and/or duplicate is less than 5x *CRDL):			
	>2x *CRDL?	___	[___]	___
	ACTION: If yes, flag the associated data as estimated.			
A.1.8.10	Form VII (Laboratory Control Sample) (Note: LCS - not required for aqueous Hg and cyanide analyses.)			
A.1.8.10.1	Was one LCS prepared and analyzed for: every 20 water samples?	[___]	___	___
	every 20 solid samples?	[___]	___	___
	both AA and ICP when both are used for same analyte?	[___]	___	___

* Substitute IDL for CRDL when IDL > CRDL.

	YES	NO	N/A

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory for submittal of results of solid LCS. Flag as estimated(J) all data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20 samples, then first 20 samples close to LCS do not have to be flagged as estimated.

A.1.8.10.2 Aqueous

Circle all LCS values outside of control limits(80 - 120%- except aqueous Ag and Sb).

Is any LCS recovery: less than 50%?	___	[___]	___
between 50% and 79%?	___	[___]	___
between 121% and 150%?	___	[___]	___
greater than 150%?	___	[___]	___

ACTION: Less than 50%, reject (red-line) all data; between 50% and 79%, flag all associated data as estimated (J); between 121% and 150%, flag all positive (not flagged with a "U") results as estimated; greater than 150%, reject all positive results.

A.1.8.10.3 Solid LCS

NOTE: 1. If IDL of an analyte is equal to or greater than True Value of LCS, disregard the following criteria.
2. If"Found"value of LCS is rejectable due to duplicate injections or analytical spike recovery criteria, disregard LCS recovery; flag the associated data as estimated(J).

a. If the Solid LCS recovery for any analyte falls outside EPA control limits, qualify all sample results >IDL as estimated (J).

b. If the LCS results are higher than the control limits and the sample results < IDL, the data are acceptable.

c. If the LCS results are lower than the control limits,qualify all sample results < IDL as estimated(UJ).

		Yes	NO	N/A
A.1.8.11	Form IX (ICP Serial Dilution) -			
A.1.8.11.1	Was Serial Dilution analysis performed for: each 20 samples?	[___]	___	___
	each matrix type?	[___]	___	___
	each concentration range (i.e. low, med.)?	[___]	___	___
	ACTION: If no for any of the above, flag all positive data greater than or equal to 10xIDLs as estimated (J) for which Serial Dilution Analysis was not performed, and summarize the deficiency on the DPO report.			
A.1.8.11.2	Was field blank(s) used for Serial Dilution Analysis?	___	[___]	___
	If yes, was field blank described as such on Traffic Report?	___	[___]	___
	ACTION: If yes, flag all associated data $\geq$ 10 x IDL as estimated (J).			
A.1.8.11.3	Circle all values on Data Summary Sheet that are ouside of control limit ($\pm$10 %). Are all values within $\pm$ 10 % ?	[___]	___	___
	Are results outside control limit flagged with an "E" on Form I's and Form IX?	[___]	___	___
	ACTION: If no, write in the contract problem/non-compliance section of the"Data Assessment Narrative".			
A.1.8.11.4	Are any % Diff. values : > 10% ?	___	[___]	___
	$\geq$ 100% ?	___	[___]	___
	ACTION: Flag as estimated (J) all associated sample results equal to or greater than 10xIDLs for which percent difference is greater than 10% but less than 100%. Reject (red-line) all associated sample results equal to or greater than 10xIDLs for which PD is greater than or equal to 100%.			

		YES	NO	N/A
A.1.8.12	Furnace Atomic Absorbtion (AA) QC Analysis			
A.1.8.12.1	Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed by GFAA?	[___]	___	___
	ACTION: If no, reject the data on Form I's for which duplicate injections were not performed.			
A.1.8.12.2	Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or Coefficient of Variation (CV) for concentration greater than CRDL?	[___]	___	___
	Was a dilution analyzed for sample with post digestion spike recovery less than 40%?	[___]	___	___
	ACTION: If no for any of the above, flag all the associated data as estimated (J).			
A.1.8.12.3	Is *post digestion spike recovery less than 10% or greater than 150% for any result?	___	[___]	___
	ACTION: If yes, reject (red-line) the affected data if recovery is <10%; reject data not flagged with "U" if spike recovery is >150%.			
	NOTE : Reject the data only if the affected sample was not subsequently analyzed by Method of Standard Addition.			
A.1.8.13	Form VIII (Method of Standard Addition Results)			
A.1.8.13.1	Present?	[___]	___	___
	If no, is any Form I result coded with "S" or a "+"?	___	[___]	___
	ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.8.13.2	Is coefficient of correlation for MSA less than 0.990 for any sample?	___	[___]	___
	ACTION: If yes, reject (red-line) affected data.			

* Post digestion spike is not required on the pre-digestion spiked sample when pre-digestion spike recovery is within control limits of 75-125% or when SR≥4xSA.

	YES	NO	N/A
A.1.8.13.3 Was *MSA required for any sample but not performed?	___	[___]	___
Is coefficient of correlation for MSA less than 0.995?	___	[___]	___
Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	___	[___]	___

ACTION: If yes for any of the above, flag all the associated data as estimated (J).

A.1.8.13.4 Was proper quantitation procedure followed correctly as outlined in the SOW on page E-16 through E-17?	[___]	___	___

ACTION: If no, note exception under contract problem/non-compliance of data assessment narrative, or prepare a seperate list.

A.1.8.14 Dissolved/Total or Inorganic/Total Analytes -

A.1.8.14.1 Were any analyses performed for dissolved as well as total analytes on the same sample(s).	___	[___]	___
Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	___	[___]	___

If yes, apply the following questions only if inorganic (or dissolved) results are (i) above CRDL, and (ii) greater than total constituents.

A.1.8.14.2 Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 10%?	___	[___]	___
A.1.8.14.3 Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 50%?	___	[___]	___

NOTE : Prepare a list comparing differences between all dissolved (or inorganic) and total analytes.Compute the differences as a percent of the total analyte only when both are above CRDL.

* MSA is not required on LCS and prep. blank.

	YES	NO	N/A

ACTION: If more than 10%, flag both dissolved (or inorganic) and total values as estimated (J); if more than 50%, reject (red-line) the data for both valuse.

A.1.8.15 Form I to IX

A.1.8.15.1 Are all the Form I through Form IX labeled with:

Laboratory name?	[___]	___	___
Case number?	[___]	___	___
EPA sample No.?	[___]	___	___
SDG No.?	[___]	___	___
Contract No.?	[___]	___	___
Correct units?	[___]	___	___
Matrix?	[___]	___	___

ACTION: If no for any of the above,note under contract problem/non-compliance section of narrative. of the"Data Assessment Narrative".

A.1.8.15.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:

(NOTE: Check all forms against raw data.)

(a) all analytes analyzed by ICP?	___	[___]	___
(b) all analytes analyzed by GFAA?	___	[___]	___
(c) all analytes analyzed by AA Flame?	___	[___]	___
(d) Mercury?	___	[___]	___
(e) Cyanide?	___	[___]	___

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

	YES	NO	N/A

A.1.8.16 Form I (Field Blank) -

Circle all field blank values on Data Summary Sheet that are greater than 2xIDL.
Do concentrations of field blank(s) fall below two times IDLs for all parameters of associated aqueous and soil samples? [___] ___ ___

If no, was field blank value already rejected due to other QC criteria? [___] ___ ___

ACTION: If no, reject (red line) all associated aqueous and soil/sediment data (except field blank) that has a concentration less than five times the field blank value not flagged with a "U" (less than).

A.1.8.17 Form XI, XII, XIII (Quarterly Verification of Instrumental Parameters).

A.1.8.17.1 Is quarterly verification report present for:

Instrument Detection Limits? [___] ___ ___

ICP Interelement Correction Factors? [___] ___ ___

ICP Linear Ranges? [___] ___ ___

ACTION: If no, contact DPO of the lab.

A.1.8.17.2 Form XI (Instrument Detection Limits) - (Note: IDL is not required for Cyanide.)

Are IDLs present for: all the analytes? [___] ___ ___

all the instruments used? [___] ___ ___

For both AA and ICP when both are used for same analyte? [___] ___ ___

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

	YES	NO	N/A
Is IDL greater than CRDL for any analyte?	___	[___]	___
If yes, is the concentration of the sample analyzed on the instrument whose IDL exceeds CRDL, greater than 5 x IDL?	[___]	___	___

MMB ACTION: If no, reject (red-line) all values less than five times IDL of the instrument whose IDL exceeds CRDL.

A.1.8.17.3 Form XII (Linear Ranges)

	YES	NO	N/A
Was any sample result higher than high linear range of ICP by more than 10%?	___	[___]	___
Was any sample result higher than the highest calibration standard for non-ICP parameters?	___	[___]	___
If yes for any of the above, was dilution performed on the sample to bring raw data in linear range or below the highest standard.	[___]	___	___

MMB ACTION: If no, flag the result reported on Form I as estimated(J).

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.2: Data Assessment Narrative

Date: Dec. 1988
Number: HW-2
Revision: 8

Case# _____ Site _____ Matrix: Soil _____

Reviewer _____ Lab _____ Water _____

Contractor _____ Other _____

A.2.1 All data are of acceptable quality? Yes _____ No _____

If no, exceptions are noted below with reason(s) for rejection or qualification as estimated value (J).

_____

_____

_____

_____

_____

_____

_____

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_____

_____

_____

_____

_____

_____

_____

_____

_____

A.2.1 (continuation)

A.2.2 Contract Problems/Non-compliance

MMB Reviewer: _____ Date: _____
Signature

Contractor Reviewer: _____ Date: _____
Signature

Verified by: _____ Date: _____

CONTRACT NON-COMPLIANCE
(SMO REPORT)

Regional Review of Uncontrolled Hazardous Waste
Site Contract Laboratory Data Package

CASE NO._____

The hardcopied (laboratory name)_____
Inorganic data package received at Region II has been reviewed and the quality assurance and performance data summarized. The data reviewed included:

SMO Sample No.:_____

Conc. & Matrix:_____

Contract No. WA87-K025,K026,K027(SOW787) requires that specific analytical work be done and that associated reports be provided by the contractor to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Matrix Spike Results
- Calibration Standards Results
- Duplicate Analysis Results
- Blank Analysis Results
- MSA Results

Items of non-compliance with the above contract are described below.

Comments:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

Reviewer's Initial Date

DPO/MAILING LIST FOR DATA REVIEWERS

1. USEPA Region I (ESD)
60 Westview Street
Lexington, MA 02173
Deb Szaro
(617) 861-4312
CT, ME, MA, NH, RI, VT

2. USEPA Region II (ESD)
Woodbridge Avenue
Edison, New Jersey 08837
Lisa Gatton Vidulich
(201) 321-6676
NJ, NY, PR, VI

3. USEPA Region III (CRL)
839 Bestgate Road
Annapolis, MD 21401
Chuck Sands
(301) 266-9180
DE, MD, PA, VA, WV, DC

4. USEPA Region IV (ESD)
Analytical Support Branch
College Station Road
Athens, GA 30613
Tom Bennett, Jr.
(404) 546-3112
AL, FL, GA, KY, MS, NC, SC, TN

5. USEPA Region V (ESD)
536 South Clark Street
Tenth Floor, CRL
Chicago, IL 60605
Pat Churilla
312-353-9087
IL, IN, MI, MN, OH, WI

6. USEPA Region VI (ESD)
Monterey Park Plaza, Bldg. C
6608 Hornwood Drive
Houston, TX 77074
David Stockton
(713) 953-3425
AL, LA, NM, TX, OK

7. USEPA Region VII Laboratory
25 Funston Road
Kansas City, KS 66115
Debra Morey
(913) 236-3881
IO, KS, NB, MO

8. USEPA Region VIII Laboratory
BOX 25366
Denver Federal Center
Lakewood, CO 80225
Eva Hoffman
(303) 236-7371
CO, ND, SD, UT, WY, MT

9. USEPA Region IX (ESD)
QA Management Section
215 Fremont Street
San Francisco, CA 94105
Kent Kitchingman
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AZ, CA, HI, NV, American Samoa, Guam Trust Territories of Pacific Islands, Wake Island

10. USEPA Region X Laboratory
P.O. BOX 549
Manchester, WA 98353
Gerald Muth
(206) 442-0370
AK, ID, OR, WA

11. Sample Management Office
Viar and Company
P.O. BOX 818
Alexandria, VA 22313

12. Edward Kantor
USEPA
EMSL-LV
944 E. Harmon Avenue
BOX 93478
Las Vegas, NV 89119

13. Duane Geuder - (OS-230)
USEPA
401 "M" Street, S.W.
Washington, DC 20460

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.5: Summary of Inorganics Quality Control Data

Date: Dec. 1988
Number: HW-2
Revision: 8

SUMMARY OF INORGANICS QUALITY CONTROL DATA

LABORATORY:_____ CASE NO._____ SOW NO._____ SAMPLE TYPE:_____

SITE/STUDY DESCRIPTION:_____ SAMPLE NOS:_____

_____ Field Blank _____

FIELD DUP. #'S:_____ LAB DUP. #'S:_____ MATRIX SPIKE #:_____

SERIAL DILUTION SAMPLE NO._____ COMPLETION DATE:_____ REVIEWERS INITIALS:_____

	XI		I	IIA				IIB		III				IV		V	VI	VII	IX		
Parameter	Detection Limits UG/L		Field Blank	Calib. Ver. %R				CRDL Std Ver. %R		Calibration Blanks				PB EA PN	RL EA PN	ICP %R	ICS %R	Mtrix	Spik	Lab Dup	LCS	Ser Dil	Meth
				Continued						Continued													
	CRDL	IDL		Init	1	2	3	Init	Fin	Init	1	2	3			Init	Fin			RPD	%R	%D	
Al	200																						
Sb	60																						
As	10																						
Ba	200																						
Be	5																						
Cd	5																						
Ca	5000																						
Cr	10																						
Co	50																						
Cu	25																						
Fe	100																						
Pb	5																						
Mg	5000																						
Mn	15																						
Hg	0.2																						
Ni	40																						
K	5000																						
Se	5																						
Ag	10																						
Na	5000																						
Tl	10																						
V	50																						
Zn	20																						
CN	10																						

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.6: CLP Data Assessment Summary Form (Inorganics)

Date: Dec. 1988
Number: HW-2
Revision: 8

CLP DATA ASSESSMENT SUMMARY FORM (INORGANICS)

ype of Review:_____ Date:_____ Case #:_____

ite:_____ Lab Name:_____

eviewer's Initials:_____ Number of Samples:_____

Analytes Rejected Due to Exceeding Review Criteria:*

	Holding Times	Calibration	Prep Blank	Field Blank	Inter-ferences	Spike Recovery	Duplicates Lab	Duplicates Field	Detection Limits	LCS	Serial Dilution	MSA	Total Analytes	Rejection
ICP														
Flame AA														
Furnace AA														
Mercury														
Total														
Other														

Analytes Flagged as Estimated (J) Due to Exceeding Criteria For:*

ICP														
Flame AA														
Furnace AA														
Mercury														
Total														
Other														

Note:
Asterisk (*) Indicates additional exceedances of review criteria.

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.7: CLP Data Assessment Checklist
Inorganic Analysis

Date: Dec. 1988
Number: HW-2
Revision: 8

INORGANIC REGIONAL DATA ASSESSMENT Region_____

CASE NO._____ SITE_____

LABORATORY_____ NO. OF SAMPLES/ MATRIX_____

SDG#_____ REVIEWER (IF NOT ESD)_____

SOW#_____ REVIEWER'S NAME_____

DPO: ACTION_____ FYI_____ COMPLETION DATE_____

DATA ASSESSMENT SUMMARY

		ICP	AA	Hg	CYANIDE
1.	HOLDING TIMES				
2.	CALIBRATIONS				
3.	BLANKS				
4.	ICS				
5.	LCS				
6.	DUPLICATE ANALYSIS				
7.	MATRIX SPIKE				
8.	MSA				
9.	SERIAL DILUTION				
10.	SAMPLE VERIFICATION				
11.	OTHER QC				
12.	OVERALL ASSESSMENT				

O = Data has no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS:_____

AREAS OF CONCERN:_____

NOTABLE PERFORMANCE:_____

SOP NO. HW-6
Revision #6

CLP ORGANICS DATA REVIEW AND PRELIMINARY REVIEW

CURRED BY: _____ Date: 4/6/89
Louis Bevilacqua
Monitoring Management Branch

ROVED BY: _____ Date: 4/14/89
Gerard F. McKenna, Chief
Monitoring Management Branch

INTRODUCTION TO DATA VALIDATION

) Scope

..1 This procedure is applicable to organic data obtained from contractor laboratories working for the Contract Laboratory Program (CLP).

..2 The data validation is based upon analytical and quality assurance requirements specified in the Statement of Work (SOW).

) Responsibilities

)ata reviewers will complete the following tasks as assigned by the Data Review Coordinator:

2.1 Data Assessment - The reviewer must answer every question on the checklist. All response shall be in ink.

2.2 Data Assessment Narrative (Attachment 1) - Data reviewer is required to use these forms and must match the action in the narrative with the action taken on the Form I(s).

2.3 Rejection Summary Form (Attachment 2) - Fill in the total number of analytes measured by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in the boxes where analyses were not performed or criteria do not apply.

2.4 Organic Regional Data Assessment - Data reviewer is also required to fill out Organic Regional Data Assessment Form (Attachment 3).

2.5 Telephone Record Log - The data reviewer should enter the bare facts of inquiry before initiating any authorized telephone conversation with a CLP laboratory. After the case review has been completed, mail the white copy of the Telephone Record Log to the laboratory and the pink copy to SMO. File the yellow copy in the Telephone Record Log folder and attach a photocopy of the Telephone Record Log to the completed Data Assessment Narrative.

2.6 Forwarded Paperwork - Upon completion of the review, the following are to be forwarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:

a. data package
b. completed assessment checklist
c. SMO Contract Compliance Screening (CCS)

Forward four (4) copies of the completed Data Assessment Narrative along with four (4) copies of the Organic Data Assessment Form: one each for the appropriate Regional DPO, the Sample Management Office (SMO), and to the last two addresses of the Data Reviewers Mailing List.

2.7 Filed Paperwork - Upon completion of the review, the following are to be filed within the Monitoring and Management Branch (MMB) files:

a. Telephone record Log (copy)
b. Record of Communication (original)
c. Rejection Summary Form

Rejection of Data - All values determined to be unacceptable on the Organic Analysis Data Sheet (Form I) must be flagged with an "R". As soon as review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.

Acceptance Criteria - In order that the reviews be consistent among reviewers, this Standard Operating Procedure (SOP) should be used. Additional guidance can be found in the Functional Guidelines.

SMO Contract Compliance Screening (CCS) - This is intended to aid the reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from the laboratory in response to CCS must be used by the reviewer.

AGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____

LAB: _____

SITE: _____

Data Completeness and Deliverables	YES	NO	N/A
1.1 Have any missing deliverables been received and added to the data package.	[___]	___	___
ACTION: Call lab for explanation / resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-compliance" section of reviewer narrative.			
1.2 Was SMO CCS checklist included with package?	[___]	___	___
Cover Letter/Case Narrative			
2.1 Is the Narrative or Cover Letter present?	[___]	___	___
2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?	[___]	___	___

Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any BNA analyses and Part C for Pesticide/PCBs.

Does this package contain:

VOA data?	___	___
BNA data?	___	___
Pesticide/PCB data?	___	___

ACTION: Complete corresponding parts of checklist.

	YES	NO	N/A

PART A: VOA ANALYSES

..0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [___] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [___] ___

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be rejected.

ACTION: If both VOA vials for a sample have air bubbles, flag all positive results "J" and all non -detects "R".

2.0 Holding Times

2.1 Have any VOA holding times, determined from date of collection to date of analysis, been exceeded? ___ [___] ___

If unpreserved, aqueous aromatic volatiles must be analyzed within 7 days of collection and non-aromatic volatiles must be analyzed within 14 days. If preserved with hydrochloric acid and stored at 4°C, then both aromatic and non-aromatic volatiles must be analyzed within 14 days. If uncertain about preservation, contact the sampler to determine whether the samples were preserved.

A ten-day holding time for soil samples is recommended.

Table of Holding Time Violations

			(See Traffic Report)		
Sample	Sample Matrix	Preserved ?	Date Sampled	Date Lab Received	Date Analyzed
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water	[___]	___	___
b. Med Water	[___]	___	___
c. Low Soil	[___]	___	___
d. Med Soil	[___]	___	___

3.2 Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water	[___]	___	___
b. Med Water	[___]	___	___
c. Low Soil	[___]	___	___
d. Med Soil	[___]	___	___

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	[___]	___	___

ACTION: Circle all outliers in red.

3.4 Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?	___	[___]	___
If yes, were samples reanalyzed?	[___]	___	___
Were method blanks reanalyzed?	[___]	___	___

ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

	YES	NO	N/A

If any surrogate has a recovery of <10% :

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as unusable ("R").

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [___] ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present? [___] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [___] ___ ___

b. Med Water [___] ___ ___

c. Low Soil [___] ___ ___

d. Med Soil [___] ___ ___

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many VOA spike recoveries are outside QC limits?

Water	Soils
_____ out of 10	_____ out of 10

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 5	_____ out of 5

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package

	YES	NO	N/A
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[___]	___	___
5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[___]	___	___
5.3 Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?	[___]	___	___
ACTION: If any method blank data are missing, call lab for explanation / resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[___]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are <u>not</u> used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[___]	___
6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	___	[___]	___
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Methylene chloride Acetone Toluene 2-butanone	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [___] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Bromofluorobenzene (BFB)? [___] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [___] ___ ___

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [___] ___ ___

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

	YES	NO	N/A

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? [___] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [___] ___

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.) ___ [___] ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? [___] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [___] ___ ___

b. Matrix spikes and matrix spike duplicates [___] ___ ___

c. Blanks [___] ___ ___

	YES	NO	N/A
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[___]	___	___
c. Blanks	[___]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[___]	___	___
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability	[___]	___	___
Resolution	[___]	___	___
Peak shape	[___]	___	___
Full-scale graph (attenuation)	[___]	___	___
Other:_____	[___]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[___]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[___]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[___]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[___]	___	___
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[___]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Blanks	[___]	___	___
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene--a VOA TCL--and should not be reported as a TIC)?	___	[___]	___
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[___]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[___]	___	___
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[___]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	___	[___]	___

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [___] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction? [___] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)? [___] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05? ___ [___] ___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[___]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	[___]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[___]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[___]	___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[___]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [___] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [___] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [___] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
15.0 Field Duplicates			
15.1 Were any field duplicates submitted for VOA analysis?	[___]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

	YES	NO	N/A

PART B: BNA ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [___] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [___] ___

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be rejected.

2.0 Holding Times

2.1 Have any BNA holding times, determined from date of collection to date of extraction, been exceeded? ___ [___] ___

Samples for BNA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

			(See Traffic Report)		
Sample	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water	[___]	___	___
b. Med Water	[___]	___	___
c. Low Soil	[___]	___	___
d. Med Soil	[___]	___	___

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water	[___]	___	___
b. Med Water	[___]	___	___
c. Low Soil	[___]	___	___
d. Med Soil	[___]	___	___

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	[___]	___	___

ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?	___	[___]	___
If yes, were samples reanalyzed?	[___]	___	___
Were method blanks reanalyzed?	[___]	___	___

ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. base-neutral OR acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

YES NO N/A

If any base-neutral or acid surrogate has a recovery of <10% :
1. Flag all positive results for that fraction (i.e. all acid or base-neutral compounds) "J".
2. Flag all non-detects for that fraction "R".

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [___] ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present? [___] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [___] ___ ___

b. Med Water [___] ___ ___

c. Low Soil [___] ___ ___

d. Med Soil [___] ___ ___

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BNA spike recoveries are outside QC limits?

Water	Soils
_____ out of 22	_____ out of 22

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 11	_____ out of 11

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples

	YES	NO	N/A
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[___]	___	___
5.2 Frequency of Analysis: for the analysis of BNA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[___]	___	___
5.3 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[___]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for BNAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[___]	___
6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?	___	[___]	___
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Common Phthalate Esters	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [___] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? [___] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [___] ___ ___

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [___] ___ ___

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

				YES	NO	N/A
DATE	TIME	INSTRUMENT	SAMPLE NUMBERS			

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? [___] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [___] ___

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.) ___ [___] ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? [___] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I BNA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [___] ___ ___

b. Matrix spikes and matrix spike duplicates [___] ___ ___

c. Blanks [___] ___ ___

	YES	NO	N/A
8.2 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[___]	___	___
c. Blanks	[___]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[___]	___	___
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability	[___]	___	___
Resolution	[___]	___	___
Peak shape	[___]	___	___
Full-scale graph (attenuation)	[___]	___	___
Other:_____	[___]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified BNA compounds present for each sample?	[___]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[___]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[___]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[___]	___	___
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[___]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[___]	___	___
b. Blanks	[___]	___	___
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene--a VOA TCL--and should not be reported as a TIC)?	___	[___]	___
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[___]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[___]	___	___
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[___]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	___	[___]	___

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [___] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction? [___] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for BNAs over the concentration range of the calibration (RSD <30%)? [___] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05? ___ [___] ___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[___]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction?	[___]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[___]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[___]	___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[___]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [___] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [___] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [___] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
15.0 Field Duplicates			
15.1 Were any field duplicates submitted for BNA analysis?	[___]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

	YES	NO	N/A
PART C: PESTICIDE/PCB ANALYSES			
1.0 Traffic Reports and Laboratory Narrative			
1.1 Are the Traffic Report Forms present for all samples?	[___]	___	___
ACTION: If no, contact lab for replacement of missing or illegible copies.			
1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?	___	[___]	___
ACTION: Use professional judgement to evaluate the effect on the quality of the data.			
ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be rejected.			
2.0 Holding Times			
2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?	___	[___]	___
Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.			
3.0 Surrogate Recovery (Form II)			
3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water	[___]	___	___
b. Med Water	[___]	___	___
c. Low Soil	[___]	___	___
d. Med Soil	[___]	___	___
3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water	[___]	___	___
b. Med Water	[___]	___	___
c. Low Soil	[___]	___	___
d. Med Soil	[___]	___	___

	YES	NO	N/A

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk? [___] ___ ___

ACTION: Circle all outliers in red.

3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank? ___ [___] ___

ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [___] ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present? [___] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [___] ___ ___

b. Med Water [___] ___ ___

c. Low Soil [___] ___ ___

d. Med Soil [___] ___ ___

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water	Soils
_____ out of 12	_____ out of 12

	YES	NO	N/A

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 6	_____ out of 6

ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [___] ___ ___

5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent? [___] ___ ___

5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs? [___] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor. ___ [___] ___

6.2 Do any field/rinse blanks have positive PEST/PCB results? ___ [___] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

YES NO N/A

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U"; cross out "B" flag	Reject sample result and report CRQL; cross out "B" flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample? [___] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards not required if there are no positive results above CRQL) column present:

a. Evaluation Standard Mix A [___] ___ ___

b. Evaluation Standard Mix B [___] ___ ___

c. Evaluation Standard Mix C [___] ___ ___

d. Individual Standard Mix A [___] ___ ___

e. Individual Standard Mix B [___] ___ ___

f. Multi-component Pesticides Toxaphene & Chlordane [___] ___ ___

g. Aroclors 1016/1260 [___] ___ ___

h. Aroclors 1221, 1232, 1242, 1248, and 1254 [___] ___ ___

ACTION: If no, take action specified in 3.2 above

	YES	NO	N/A
7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?	[___]	___	___
ACTION: If no, take action specified in 3.2 above.			
7.3 Are there any transcription/calculation errors between raw data and Form VIII?	___	[___]	___
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?	___	[___]	___
- for Endrin?	___	[___]	___
or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?	___	[___]	___

ACTION:

a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:

1. Flag all positive DDT results "J".
2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
3. Flag positive DDD and DDE results "JN".
4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").

b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:

1. Flag all positive Endrin results "J".
2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
3. Flag Endrin Ketone positive results "JN".
4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").

c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is >20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

	YES	NO	N/A
7.5 Is the linearity check RSD of all four calibration factors <10% for the quantitation column?	[___]	___	___
ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.			
7.6 Is the % difference between the EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < I.D. < 2 mm]) ?	[___]	___	___
ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.			
7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW).	[___]	___	___
ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.			
8.0 Pesticide/PCB Standards Summary			
8.1 Is Form IX present and complete for each GC column and 72 hr sequence of analyses?	[___]	___	___
ACTION: If no, take action specified in 3.2 above.			
8.2 Are there any transcription/calculation errors between raw data and Form IX?	___	[___]	___
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)?	[___]	___	___
ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".			
8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses?	[___]	___	___

	YES	NO	N/A
ACTION: Beginning with the samples following the last <u>in control</u> standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and, DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".			
8.5 Are the continuing calibration standard calibration factors within 15% (for quantitation column) or 20% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors?	[___]	___	___
ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.			
9.0 <u>Pesticide/PCB Identification</u>			
9.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[___]	___	___
ACTION: If no, take action specified in 3.2 above.			
9.2 Are there any transcription errors between raw data and Form X?	___	[___]	___
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
9.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses?	[___]	___	___
Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)?	[___]	___	___
ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).			
9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?	___	[___]	___
ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis, flag the appropriate data with an "R".			

	YES	NO	N/A
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Were any errors found?	___	[___]	___
NOTE: Simple peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicates the presence of an interfering compound. If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an estimated quantity ("JN"). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has obscured the attempt at a second column confirmation.			
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	___	[___]	___
ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.			
11.0 Chromatogram Quality			
11.1 Were baselines stable?	[___]	___	___
11.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[___]	___
11.3 Were early eluting peaks (for early eluting analytes) resolved to baseline?	[___]	___	___
ACTION: For 11.1 and 11.2, comment only. For 11.3, reject ("R") those analytes that are not sufficiently resolved.			

	YES	NO	N/A

12.0 Field Duplicates

12.1 Were any field duplicates submitted for PEST/PCB analysis? [___] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

ATTACHMENT 1
SOP NO. HW-6

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

Case No._____SDG No._____LABORATORY_____SITE_____

DATA ASSESSMENT:

The current functional guidelines (1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable),or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Reviewer's
Signature:_____Date:___/____/19___

Verified By:_____Date:___/_____/19___

DATA ASSESSMENT:

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

2. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip field, rinse and water blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field blanks measure cross- contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for the common contaminants), the analytes are qualified as non- detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method blank contamination

B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

C) Trip blank contamination

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

3. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl- phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable, "R".

DATA ASSESSMENT:

4. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) RESPONSE FACTOR:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be $\geq$ 0.05 in both the initial and continuing calibrations. A value < 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected ("R").

DATA ASSESSMENT:

5. CALIBRATION:

A) PERCENT RELATIVE STANDARD DEVIATION (%RSD) AND PERCENT DIFFERENCE (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be <30% and %D must be <25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ" (if %D or RSD >50%). If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R").

For the PCB/PESTICIDE fraction, %RSD for aldrin, endrin, DDT, and dibutylchlorendate must not exceed 10%. Percent D must be within 15% on the quantitation column and 20% on the confirmation column.

DATA ASSESSMENT:

6. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

DATA ASSESSMENT:

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

DATA ASSESSMENT:

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

B) PESTICIDE FRACTION:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 ng/ml in the final sample extract.

DATA ASSESSMENT:

9. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for some additional qualification of the data.

DATA ASSESSMENT:

10. OTHER QC DATA OUT OF SPECIFICATION:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued on next page if necessary):

12. CONTRACT PROBLEMS____NON-COMPLIANCE:

13. This package contains re-extraction, re-analysis or dilution. Upon reviewing the QA results, the following form I(s) are identified to be used.

DATA ASSESSMENT:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued):

APPENDIX E

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PLAN
PAS CLOTHIER SITE
GRANBY, NEW YORK

APPENDIX E

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL
PAS CLOTHIER SITE
GRANBY, NEW YORK

1.0 INTRODUCTION

The purpose of the laboratory Quality Assurance/Quality Control (QA/QC) Plan is to ensure that data generated are accurate and precise. The QA/QC Plan utilized by Canonie is based on Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) criteria.

Canonie Environmental Services Corp.'s (Canonie) laboratory and any laboratories with which Canonie proposes to subcontract during the work are accessible by EPA personnel or the EPA's authorized representatives to ensure the accuracy of laboratory results related to the site. All testing is performed in accordance with EPA-accepted methods. All laboratories proposed for use in this project participate in EPA and EPA-equivalent QA programs.

The QA program identified herein is designed to ensure reliability in the data. The QC program is designed to obtain prescribed standards of performance in the identification and measurement of data. The above areas are discussed in detail along with sampling, collection and preservation, sample control (log-in and storage), instrument calibration and maintenance, and analytical methodology in the following sections of this plan.

2.0 SAMPLES AND SAMPLE CUSTODY

Laboratory results coinciding with time requirements for the project require careful coordination of the various activities of the laboratory. The main factors to be considered are: sample tracking from collection to the final report, sample preparation, and sample analysis time.

Site personnel notify the laboratory prior to sampling to confirm that:

1. By giving the laboratory prior notification of the number of samples and the sample matrix, the laboratory can schedule the work load accordingly.

2. Sufficient quantity of the sample is taken to complete all testing.

3. The appropriate sample containers are used.

2.1 Notification of Analysis

The following steps are followed in notifying the laboratory of forthcoming testing by site personnel:

1. A laboratory project number is assigned to the work requested. The number of samples are indicated on a project form along with the sample matrix and the tests to be performed. Any other pertinent information that may assist in the handling of the samples is also noted.

2. The bottle request section indicating the number, type of container and where and when to send the requested containers is completed.

3. Along with the sample containers, a chain-of-custody form and sample labels are included as a complete package.

2.2 Sampling

Upon receipt of the sampling container package, field personnel follow procedures described as follows:

1. Collection and preservation of the sample, in accordance with analysis protocol, is maintained.

2. All information on the sample label is completed.

3. Sample origin information is noted to eliminate questions regarding sample origin.

4. The chain-of-custody reflects the identification of the sample to appear on the final report. This identification may be up to 20 characters per sample identification (ID).

5. Any unusual observations noted or problems encountered during sampling are noted on the chain-of-custody form.

2.3 Sample Receipt

When samples arrive at the laboratory, the chain-of-custody form and the samples are removed from the shipping container. At this time, the sample custodian checks to ensure that all the samples listed on the chain-of-custody are present and in good condition. The condition of the samples is recorded on the custody form. If improper preservation of the sample has been observed by the laboratory, the sampler is contacted by the laboratory sample control department and notified which samples have been rejected and that resampling is required. A notation is placed on the chain-of-custody form to indicate which samples have been rejected.

Each sample container is given a unique six-digit laboratory ID number. The first number of the ID indicates the year in which the sample was received, ie, samples received in 1986 begin with the number 6. The sample custodian will then check to see that a laboratory project number has been assigned and that the initial work request matches the chain-of-custody analysis request. The samples are logged in via computer, and the sample tracking sheets and the accession page are generated.

After completing all of the above, the appropriate section chief receives the complete project folder which includes:

1. A copy of the laboratory project work request form;

2. The chain-of-custody form; and

3. The sample tracking sheets.

The samples are then placed in a refrigerator and maintained at 4 degrees Celsius (°C), unless immediate analysis or preservation is required. Should the samples require any special preservation, the custodian contacts the appropriate chemist in order to properly preserve the samples. The preservation techniques performed on the samples are noted on the chain-of-custody form. The sample custodian is responsible for the removal of all samples from storage and for noting the date they were removed in the sample control book.

The chemist supervisor reviews the paperwork for accuracy and completeness, then divides the work according to analysis type. Each chemist is responsible for ensuring that samples are extracted according to analysis protocol and in a timely fashion in order to complete the work by the project due date.

2.3.1 Sample Rejection

If improper preservation of a sample is observed by the laboratory upon receipt of a sample, the following actions are taken. The sampler is contacted by the laboratory sample control department and notified that the sample has been rejected and that resampling is required. A notation is placed on the chain-of-custody form to indicate which sample has been rejected.

3.0 STANDARDS AND REAGENTS

All chemicals, solvents, and gases used are of a consistent purity. For general inorganic analyses, Analytical Reagent (AR) grade reagents are used. Metal analyses performed via Atomic Absorption Spectrophotometry use reagents and solvents of spectroquality. The minimum purity used for organic analysis is AR grade. For High Pressure Liquid Chromatography (HPLC), HPLC grade solvents are used. The standards used are traceable to the National Bureau of Standards (NBS) and certified by the manufacturer.

3.1 Receipt of Standards, Reagents, and Solvents

All standards, reagents, solvents, and chemicals received into the laboratory are logged in and given a unique code number. Depending on the chemical received, a prefix code is assigned to ease tracking. Volatile Organic Analyzer (VOA) standards are given a prefix code of 1; pesticide standards, a prefix code of 2; inorganic standards, a prefix code of 3; dry chemicals are given a prefix code of 4; and solvents or liquid reagents (ie, acids) are given a prefix code of 5. Deionized water is given a code of 5-000. The date received, manufacturer, lot number, and expiration date are recorded in the log book.

Recorded on the labels of the reagent and solvent bottles are the initials of the person opening the bottles and the date that the bottles are opened. For all analyses performed, the code number of the standards and reagents used are recorded. Solvents are prescreened for contamination prior to usage by taking 200 milliliter (ml) of the solvent and concentrating it to 1 ml and testing by the various analytical techniques. If a reagent is found to contain contaminants above an acceptable level, then all reagents of that lot number can be pulled from usage to eliminate any further problems. Volatile standards are purchased by lots of 100. When a new lot number arrives, a QC check is performed.

3.2 Preparation of Parent Solutions

When making up the parent solutions, a log book is maintained to record all the necessary information. A code number (prefixed with a "P") is assigned to the parent solution, the date it was made, analyst, code numbers of the standard and reagent used, and all weights and volumes used are recorded on the Parent Solution Preparation Log. A balance check is also performed at the same time. All parent solution bottles are labeled with the code number, exact contents, date made, solvent, analyst, expiration date, and a mark on the side of the label to indicate the solvent line. Each time a significant aliquot is removed, a new mark is placed on the label. This is done in order to determine if evaporation has occurred.

3.3 Preparation of Stock Standards and QC Stock

All compounds used in the preparation of stock standards or QC stock by the laboratory are of a certified purity by the manufacturer. A log book is maintained when preparing a stock solution. The date prepared, analyst, code numbers of all standards or parent solutions used, amounts added, final volume, solvent code number, etc, are entered into the log book. Commercially-certified stock mixtures are also utilized. These stock mixtures are checked by analyzing QA test samples obtained from the EPA.

3.4 General Storage

Proper storage of reference standards is an essential part of the analytical process. When a container is removed from storage, it is allowed to come to room temperature before opening. The bottle cap remains off only long enough to withdraw the amount needed. After use, the bottle is returned to storage immediately.

3.4.1 Purified Undiluted Standards

Purified standards are placed in a container, preferably with desiccant, and stored in an explosion-proof refrigerator.

3.4.2 Concentrated "Stock" Solutions

Concentrated "stock" solutions are stored at approximately 4°C). Stable compounds such as organochlorines and triazines are replaced after six months or when degradation is apparent. Replacement of compounds that degrade only at ambient temperatures occurs after six months or sooner if degradation is apparent. Unstable compounds, such as butylate, CDED, and disulfoton, are replaced monthly. Degradation studies are performed on brand names of herbicide, insecticide, and Endrin according to CLP protocol.

3.4.3 Dilute "Working" Solutions

Stable compounds are stored in a refrigerator if not in daily use and re-prepared by dilution of "stock" solution periodically. Replacement is sooner if solvent evaporation is evident.

Stable solutions kept on lab benches are replaced with fresh dilutions of "stock" after three months or with unopened standards from refrigerator storage. Replacement is sooner if solvent loss is evident.

Compounds known to be unstable at ambient temperatures are stored in a refrigerator between uses and replaced with fresh "stock" dilutions every two months. Replacement is sooner if solvent loss is evident.

Unstable compounds are stored in a refrigerator between uses and replaced with fresh "stock" dilutions every week.

3.5 Deionized Water

Deionized water is produced on the premises. The resistivity is checked and recorded each time water is produced. Every three months, the following tests are performed on the deionized water: pH, conductivity, silica content, total solids, and total organic carbon. The results from these tests are kept in a log book.

4.0 CALIBRATION AND MAINTENANCE PROCEDURES

To assure the performance of the instruments used, records are kept on any maintenance done, both preventative and necessary, to assure the performance of the instruments. The record contains the date, identity of the worker, problems (if any), maintenance performed, and the results.

4.1 Gas and Liquid Chromatographs

The chromatographs are calibrated daily for each analysis to be performed. Calibration is done upon initial startup and is rechecked periodically during the day, depending on the number of samples run through the instrument. Calibration is done using a standard in the middle of the linear range for the instrument. As a general rule, after ten samples are analyzed, the calibration curve is checked. Between calibrations, a QC sample is also monitored.

Initial calibration of the instrument is based on a five-point curve. Once linearity has been demonstrated, a three-point curve is routinely analyzed. From the initial calibration, an average response factor (concentration/area) is determined from the five points. This response factor is compared to the response factor generated from the daily calibration. The daily response factor should be within $\pm$ 10 percent of the average response factor; if it lies outside these limits, a three-point curve is performed. If linearity is not achieved, then actions are taken to rectify the situation. Depending on the particular instrument and detector, a variety of routine maintenance is required.

4.2 Atomic Absorption Spectrophotometer

The atomic absorption spectrophotometer is calibrated using a minimum of three standards and a blank for each parameter to be analyzed. After ten samples have been tested, the intermediate standard is rechecked. As long as the value for the intermediate standard is within $\pm$ 10 percent of the

known value, analysis continues. If the instrument has drifted, it is recalibrated using three standards, and the samples previously analyzed are checked against the new calibration curve.

For each analyte tested by atomic absorption spectrophotometer, the response factor (concentration/absorbance) for high and low levels are monitored. If the response factors deviate from the typical factors recorded, a fresh standard is used. The physical adjustments are also checked, along with the lamp, and in the case of graphite work, a new tube is put into operation. If this does not bring the response factor in line with those previously recorded, maintenance is required.

4.3 Analytical Balances

A single class S-weight, near the typical weighing range, is weighed and recorded in a bound notebook on a daily basis or with each use, whichever is less frequent. Should the weight deviate from the true value by 0.5 percent, the balance is inspected and checked to see that the pan is clear of any obstructions. The weight is checked on a different balance to verify if the S-weight is in error. If the weight passes the check, the balance must be inspected by a certified technician. Annually, the balances are inspected and certified as to their accuracy.

4.4 Refrigerators

Since most of the samples received by the laboratory have required temperatures for preservation, it is imperative that the true operating temperature is known. Therefore, the daily temperatures of the refrigerators are recorded in bound notebooks. Should the refrigerators not meet the required temperatures, corrective measures are taken.

4.5 Ovens

A daily temperature check is performed on ovens used for total suspended solids and total dissolved solids analyses. Ovens not used for analysis purposes are monitored every six months to ensure that the temperature range is accurate.

4.6 Thermometers

All thermometers are calibrated against an NBS certified thermometer. Each thermometer has a unique identification tag in order to monitor its performance. Annually, the thermometers are checked for their accuracy by submerging them in three different temperature baths. Thermometers found to deviate more than 1°C for a given range are used for noncritical work or discarded.

4.7 pH Meters

Before using the pH meter, the probe is carefully examined for any physical damage. The pH meter is calibrated on a pH 7.0 buffer solution and a pH 4.0 or pH 10.0, depending on the range to be monitored. A log book is maintained for the pH meter.

4.8 Conductivity Meter

Before using the conductivity meter, the condition of the electrode is closely inspected for any physical wear or damage. If the coating appears damaged, the electrode is replationized according to the manufacturer's guidelines.

Periodically, the conductivity cell is checked over a range of at least five concentrations of potassium chloride listed in Table 205.1, 16th edition of Standard Methods.

4.9 Turbidimeter

Daily or with each use, whichever is less frequent, a 4 Nephelametric Turbiditry Unit (NTU) and a 40 NTU formazin standards are measured and recorded. Periodically, the turbidimeter is calibrated according to the method described in Standard Methods (16th ed., 1985), Section 214a.

4.10 Repeating Pipettes

Before delivering precise volumes, the pipettes are checked for their accuracy by weighing water dispensed by five fill-and-dispense cycles. Based on the weight of the pure water, the mean dispensed volume can be determined for the pipette.

4.11 Glassware

Glassware is checked for damage, such as stars, cracks, or scratches. Before using, laboratory glassware is kept scrupulously clean to assure that there will be no contamination of samples or sample extracts. Depending on the eventual use of the glassware, several different cleaning methods are incorporated.

1. VOA - Glassware used in VOA analysis is soaked in a tub of a cleaning solution containing no chlorines (ie, Palmolive soap). The glassware is then washed in a sink using a fresh portion of the same detergent, rinsed first with tap water and then with organic pure water. The glassware is then transferred into an oven and baked to ensure all volatile compounds are removed.

2. Organic Analysis - The glassware is first soaked in a diluted solution of Palmolive soap, rinsed, and then washed in a fresh soap solution. Next, it is rinsed with tap water, then with deionized water. The glassware is placed on a drying rack until dry. It is then rinsed with acetone and allowed to dry. The

exposed ends are then wrapped with tin foil and put away for future use.

3. Inorganic Analysis - The glassware is first rinsed with a 1 percent solution of nitric acid. Next, it is washed using a phosphorous-free detergent (Alconox) and rinsed once using tap water. The glassware is then rinsed using deionized water, followed by a rinsing with 1 percent solution of nitric acid, and again rinsed with deionized water. It is then inverted on a rack until dry and stored in its proper storage area.

4.12 All Other Equipment

All other equipment is examined quarterly to determine its general condition and for any physical damage. If any problems are noted, corrective actions are taken.

4.13 Instrument Log Book

All major instrumentation has an analysis log book. For every day that analysis is performed on the instrument, the log book is filled in with the sample analysis list. This includes blanks, calibration standard, QC work, and the sample IDs.

5.0 ANALYTICAL PROCEDURES

Only analytical methods and procedures that are approved by the EPA or other appropriate agencies are employed in the analytical laboratory. Most procedures utilized come directly from EPA 600 4-79-020 "Methods for Chemical Analysis of Water and Wastewater," EPA SW-846 "Test Methods for Evaluating Solid Waste" (3rd ed. 1986), Standard Methods for the Examination of Water and Wastewater" (16th ed., 1985), "Contract Laboratory Program Statement of Work for Organic Analysis," revision February 1988 and "Contract Laboratory Statement of Work for Inorganics Analysis," revision July 1988.

6.0 DATA REVIEW AND REPORTING

All data generated is reviewed by at least two chemists from each of the various areas. If a second chemist is unavailable to review the work, the QA Officer will perform the second review. The QA officer randomly reviews work from each section to verify the documentation and reported results.

Areas checked when reviewing the work are:

1. That the calculations, identification, and reported units are correct;

2. That all the results obtained for the samples were within the working calibration range or the samples are diluted into the working calibration range; and

3. The QC results meet acceptance criteria.

If the data and QC results are unacceptable, then the cause for the results being unacceptable must be determined before the analysis can continue and results can be released. In the event that the QC results fall outside of the control limits, an out-of-control notice is issued that is signed by both the section head and the QA officer.

If the data and the QC results are acceptable, the chemist initials the tracking sheets, bench sheets, and/or other generated data and gives the entire data package to a second chemist for review and approval.

Once all of the various areas of analysis are completed, the entire report is reviewed by the laboratory supervisor to ensure that all information, data, and resulting conclusions for a particular project are properly documented, statistically valid, and meet the requirements of the client.

After approving the entire project, a typed report is generated, proofread by an administrator, signed by each analyst and each chemist who reviewed the work, and then sent to the client and to any county, state, or federal regulatory agencies, if required.

The original report is submitted to the accounting department for posting and is subsequently filed in the project files.

7.0 QUALITY CONTROL

The QC program is the most essential element to determining the performance of the analytical measurements. The QC program involves the analysis of a blank, duplicate, and spiked samples with every set of ten samples or with each matrix type.

7.1 Analyses of Blanks

Three types of blanks that can be prepared and analyzed are reagent blank, travel blank, or field blank.

A reagent blank is prepared using deionized water, purified soil, solvents, acids, or other reagents used in the preparation and analysis of the samples. All analyses are run using a reagent blank in order to verify that any positive results are not due to contamination from the laboratory. Blanks showing contamination above minimal detectable levels indicates process contamination that must be corrected.

A travel blank is prepared by and transported to the field along with the sample containers. The travel blank undergoes all of the same handling as a sample, ie, placed in the same cooler at the time of sampling, thus showing if any contamination was picked up during transportation. Travel blanks are used to assess the environment in which the bottles and samples are exposed during transportation. The results from the travel blank are used to assess contamination encountered during transportation. Should contamination occur, corrective measures must be taken (ie, monitoring, resampling).

A field blank is prepared at the sampling site and returned to the laboratory with the sample. The field blank is exposed to the same environmental factors as the samples and provides a good test of whether contamination is picked up at the time of sampling. Field blanks are used to monitor sampling techniques and are usually analyzed as a blind QC sample.

7.2 Analysis of Duplicates

The preferred method of duplication is the analysis of a duplicate spike sample. A sample is chosen randomly, divided into equal aliquots, spiked with a known amount of the analyte, and prepared for analysis. Duplicate samples are analyzed to determine the precision of the preparation and analytical techniques. The relative percent difference (RPD) between the spike and duplicate spike are plotted daily. The RPD is calculated as:

$$RPD = \frac{\text{Amount in Spike 1 - Amount in Spike 2}}{\frac{\text{Spike 1 + Spike 2}}{2}} \times 100$$

7.3 Analyses of Spiked Samples

In order to assure the accuracy of the analytical procedure, a sample is randomly chosen and spiked with a known amount of the analyte to be tested. The increased value for a spiked sample resulting from the addition of the analyte at a known concentration compared to the value obtained for that same analyte in the unspiked sample determines the percent recovery.

Daily control charts are plotted and kept by instrument specific, matrix specific, and analyte specific. The percent recovery for a spiked sample is calculated as follows:

$$\text{Percent Rec.} = \frac{\text{Amt. Found in Spiked Sample - Amt. Found in Sample}}{\text{Known Amount Added}} \times 100$$

7.4 Measurement of Method Detection Limits (MDL)

Periodically, MDLs are reevaluated for each matrix type and for each method.

To determine the MDL, the methods prescribed by the EPA are employed. The MDL is defined as the minimum concentration of a substance that can be identified, measured, and reported with 99 percent confidence.

The procedure is as follows:

1. If the MDL is determined in water, a laboratory standard at a concentration one to five times that of the estimated MDL is analyzed.

2. For other matrices, a standard five to ten times that of the estimated MDL is analyzed.

3. The standard is analyzed seven times.

4. The MDL is calculated by finding the standard deviation of the results for all seven analyses and multiplying the standard deviation by a factor of 3.143.

8.0 ESTABLISHMENT OF ACCEPTABLE LIMITS

A control chart is constructed on data produced in the laboratory for a specific analysis and instrument. It is a method of showing the precision of an analysis, based on common, simple statistical methods.

When a QC sample of known concentration is analyzed a number of times, a series of analytical results are received which should bracket the known concentration in a Gaussian or normal distribution. The average ($\bar{X}$) is the sum of the results divided by the number (n) of results.

$$\bar{X} = \frac{X}{n}$$

The estimated standard deviation (s) is an indication of the spread of the results from the mean, or the precision of the analysis. This is defined as the square root of the sum of the differences between the average and each result, squared, divided by one less than the number of analysis.

$$s = \frac{(xi - \bar{x})^2}{(N - 1)}$$

The proportion of results lying within any given range is related to the standard deviation. That is, 68 percent of the observations lie within $\bar{X} \pm 1s$, 95 percent between $\bar{X} \pm 2s$, and 99 percent between $\bar{X} \pm 3s$, for large numbers of samples. This relationship becomes more precise as n increases, but is suitable for smaller populations (approximately 20).

Once a QC sample has been analyzed at least 20 times and the mean and standard deviation established, it is possible to predict the limits into which any further analysis of the sample will fall, if the analysis is performed under identical conditions. For example, if a known QC sample is 10.0 parts per billion, the analysis may produce an $\bar{X}$ of 9.9 and an s of 1.0 for 20 results. Then 95 percent of the results of re-analysis will fall within 9.9 ± 2.0 or from 7.9 to 11.9. In like manner, 99 percent of

the results of re-analysis will fall within 9.9 $\pm$ 3.0, or from 6.9 to 12.9. These ranges are known as limits. The upper warning limits (UWL) and lower warning limits (LWL) are $\bar{X} \pm 2s$, and the upper control limits (UCL), and lower control limits (LCL) are $\bar{X} \pm 3s$.

These limits can be used to construct a chart defining when an analysis is "in control."

The following steps are necessary in order to construct a control chart:

1. Analyze the QC sample at least 20 times;

2. Collate the results, finding the average ($\bar{X}$) and the standard deviation (s);

3. Set the UWL at $\bar{X} + 2s$, the LWL at $\bar{X} - 2s$;

4. Set the UCL at $\bar{X} + 3s$ and the lower control limit LCL at $\bar{X} - 3s$.

5. Draw a control chart which delineates the average and the four limits; and

6. Plot each subsequent QC result on the chart to demonstrate the precision of that analysis.

9.0 ACCEPTANCE CRITERIA AND PROBLEMS

When an analysis is being performed, the analyst immediately verifies that the results generated for the QC samples fall within the acceptance limits for that analysis.

The QC sample indicates acceptable analysis values when it falls between the LWL and the UWL. As long as the QC sample falls within these limits, the analysis will continue and results will be released. If the QC sample value falls between the control limit and warning limit (UCL and UWL or LCL and LWL), the analysis is scrutinized as being possibly out of control. The sample results are still acceptable at this point; however, if the control sample value remains between the control limit and warning limit for five consecutive days, the analysis is stopped, and no data is released until the problem is solved.

If the QC sample value falls outside the control limits (UCL or LCL), this indicates an out-of-control situation. The analysis is stopped, and no data is released until the reason for the problem has been identified and solved. When an out-of-control situation occurs, the analyst is required to fill out a QA/QC comment sheet and submit it to both the immediate supervisor and the QA officer. After the problem has been corrected and shown that acceptable results are once again produced, samples are again analyzed and data released. Depending on the type of problem encountered, the problem and its solution will be documented.

Not only are the control charts used to monitor the performance of the laboratory, the QA officer also monitors the laboratory performance by releasing blind QA samples and by randomly reviewing a particular analysis. In the event that the QA officer spots unacceptable practices, a formal notice is issued to the laboratory manager and the section supervisor in which the corrective actions must be implemented. The section supervisor must respond to the formal notice and correct any deficiencies.

10.0 ANALYSIS OF EXTERNAL REFERENCE SAMPLES

An outside control, or "referee" control sample is run at least every three months to independently verify the accuracy of the methods. Outside controls may be supplied by some state laboratories, the EPA, or commercial QA suppliers. If necessary, the QA officer can provide a control which has been prepared as a "blind" control when no suitable referee controls exist. If the QA officer provides the "referee" control, it must be prepared from the analytes directly and not from prepared house standards.

11.0 REVIEW OF ANALYTICAL RESULTS BY THE QA OFFICER

The function of the QA officer is to assure that the quality of the service meets the highest possible standard of quality through the control of handling and analytical procedures performed on the samples. Should the acquired data be of suspect quality, it is the duty of the QA officer to halt its release.

Outlined are the functions to be performed by the QA officer:

1. Coordinate proficiency testing for laboratory approval programs;

2. Coordinate any on-site QA/QC inspections;

3. Establish QC procedures;

4. Inspect warning and action limits for all test parameters to verify that QC sample results fall between the LWL and the UWL. If samples fall between the action limit and warning limit, then the quality of the test parameter is held suspect and evaluated as described in Section 9.0;

5. Prepare and update QA/QC plans;

6. Assist the various sections in developing and implementing a QC program;

7. Assist in developing new analytical methods and cleanup procedures;

8. Assist engineers in planning QC document for various projects; and

9. Monitor the various sections for compliance to the QA/QC plan. This involves:

   - o Daily review of instrument calibration and chromatographic procedures,
   - o Daily review of QA/QC data for each section,
   - o Review QC charts for timely completion,
   - o Review QC documentation for completeness,
   - o Ensure that the proper number of blanks, duplicates, and spikes are analyzed with each procedure,
   - o Review standard preparation,
   - o Review sample storage, and
   - o Review instrument log books and monitoring books.

10. Analyze data generated from in-house QC check samples;

11. Advise personnel on laboratory procedures;

12. Advise personnel when problems are encountered with an analysis; and

13. Respond to inquiries made regarding laboratory QA/QC-related activities.

11.1 QA Officer's Responsibility

1. Identify any instances in which QC objectives are not being met and refer them to the section heads and laboratory manager for Remedial Action (RA);

2. Assure that suspect data are excluded in laboratory reports;

3. Follow up on the RA undertaken in response to the above referrals to assure that QC objectives are once again being met;

4. Inspect corrective action reports for out-of-control events; and

5. Prepare a monthly QA report summarizing any warning sheets issued, corrective actions taken, unresolved problems, and overall QC activities of the laboratory.

A monthly report is then submitted to the organic and inorganic managers. They review the progress of the laboratory, make their recommendations and goals for the next month. The managers also review all finished reports before they are released to verify that the data are technically sound and the requirements of the client are met. A QA report is submitted semi-annually to the executive vice president.

APPENDIX F

HEALTH AND SAFETY PLAN
PAS CLOTHIER SITE
GRANBY, NEW YORK

APPENDIX F

HEALTH AND SAFETY PLAN
PAS CLOTHIER SITE
GRANBY, NEW YORK

1.0 INTRODUCTION

This section outlines the Health and Safety (H&S) procedures which will be instituted for the field activities associated with the pre-design field activities at the Pollution Abatement Services (PAS) Clothier site. The plan is based on existing information regarding the site and upon past experience at other sites.

Site conditions are expected to vary. Specific provisions of this plan will be upgraded/downgraded, as appropriate, depending upon actual field conditions. All changes in the plan must be approved by the site H&S officer prior to implementation. Such changes will be conveyed to all on-site personnel.

All visitors and regulatory personnel are expected to know and comply with all aspects of the H&S Plan. Anyone failing to comply with on-site protection requirements or other provisions of the plan will be excluded from all active work/exclusion areas, as deemed appropriate by the H&S officer or other designated on-site Canonie Environmental Services Corp. (Canonie) representative.

Canonie will provide all protective equipment necessary for Canonie on-site personnel. Other personnel and visitors brought on-site by regulatory personnel are expected to provide their own protective equipment which meets or exceeds protective equipment standards required by this plan.

2.0 RESPONSIBLE PERSONNEL

The key Canonie personnel and their respective responsibilities for the project are listed below:

1. Project Manager: The project manager is responsible for overseeing all aspects of the project, including H&S and all on-site activities.

2. Site Engineer: The site engineer is responsible for on-site engineering activities including sampling, Quality Assurance, and other on-site activities. The site engineer also functions as the on-site safety officer and reports directly to the project manager.

3. H&S Officer: The H&S officer is responsible for implementing this plan and overseeing the air monitoring program. All changes in this plan will be approved by the H&S officer.

3.0 JOB HAZARD ANALYSIS

The potential hazards associated with the site activities include exposure to both chemical and physical hazards. The chemical hazards include potential contact with contaminated soils and ground water. The physical hazards include exposure to noise, heat, and possible injury from working around heavy machinery such as drill rigs and backhoes.

3.1 Chemical Hazards

The primary contaminants of concern identified at the PAS site include polychlorinated biphenyls (PCB), carcinogenic polynuclear aromatic hydrocarbons (CPAH), volatile organics, and metals.

The CPAHs consist of benzo (a) anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (a) pyrene and chrysene. For chemical hazard evaluation purposes, these particular CPAHs can be grouped into the class of compounds falling under coal tar pitch volatiles. The volatile organics consist primarily of acetone, 2-butanone, methylene chloride, 1-2 dichloroethene, 1,1,1-trichloroethane, toluene, and xylene. The metals primarily consist of cadmium, selenium, silver, thallium, chromium, and manganese.

Description of the health hazards associated with the above chemicals are as follows:

PCB - This compound is a potential carcinogen and affects the eyes, ears, and skin. Routes of exposure include inhalation, ingestion, and skin contact. Symptoms include acne form eruptions, eye discharge, swelling of upper eyelids, hyperpigmentation, fever, hearing difficulties, limb spasms, headache, vomiting, and diarrhea. The National Institute for Occupational Safety and Health (NIOSH) TLV-TWA is 0.5 mg/m^3.

Coal Tar Pitch Volatiles - These compounds are potential carcinogens and affect the lungs and kidneys. Routes of exposure include inhalation and skin contact. Symptoms include dermatitis and bronchitis. The NIOSH occupational exposure standard (TLV-TWA) is 0.2 mg/m^3.

Acetone - This compound is a colorless, volatile liquid moderately toxic by ingestion and inhalation, and flammable. The NIOSH TLV is 740 parts per million (ppm) in air.

2-butanone - This compound is flammable and toxic by inhalation. The NIOSH TLV is 200 ppm in air.

Methylene chloride - This compound is a colorless, volatile liquid that is a carcinogen. The NIOSH TLV is 100 ppm in air.

1,2-dichloroethene - This compound is a colorless liquid that is flammable and toxic by ingestion, inhalation, and skin contact. The NIOSH TLV is 200 ppm in air.

1,1,1-trichloroethane - This compound is a colorless liquid that is an irritant to eyes and tissue. The NIOSH TLV is 350 ppm in air.

Toluene - This compound is a colorless liquid that is flammable and is toxic by ingestion, inhalation, and skin absorption. The NIOSH TLV is 100 ppm in air.

Xylene - This compound is a clear liquid that is flammable and toxic by ingestion and inhalation. The NIOSH TLV is 100 ppm in air.

Cadmium - This compound is a carcinogen toxic by inhalation of dust or fume. The NIOSH TLV for dust and soluble compounds is 0.05 mg/m^3 of air.

Chromium - This compound is a carcinogen and corrosive on tissue resulting in ulcers and dermatitis on prolonged contact. The NIOSH TLV for dust and fume is 0.5 mg/m^3 of air.

Manganese - This compound is flammable as a dust or powder and toxic by inhalation. The NIOSH TLV as fume is 1 mg/m^3 of air.

Selenium - This compound is toxic by ingestion. The NIOSH TLV is 0.2 mg/m^3 of air.

Silver - This compound is toxic. The NIOSH TLV of the metal is 0.1 mg/m^3 of air and 0.01 mg/m^3 of air for soluble compounds as silver.

Thallium - This compound forms toxic compounds on contact with moisture. The NIOSH TLV is 0.1 mg/m^3 of air.

3.2 Physical Hazards

The anticipated physical hazards are due to the hazardous nature of the work involved as well as exposure to routine site activities and standard conditions.

Heat stress is a possible consequence from work scheduled during summer months, the heavy physical workload associated with construction activities, and the use of personal protective clothing. When ambient temperatures reach 70 degrees Fahrenheit and workers are wearing impervious clothing, work/rest cycles will be scheduled on a regular basis and liquids with electrolytes (such as Gatorade) will be available to replenish body fluids. Because heat stress results from a variety of factors, all workers, even those not wearing protective equipment, will be observed and encouraged to report any symptoms of heat stress. In addition, all personnel are instructed to take breaks as they see necessary.

4.0 RISK ASSESSMENT SUMMARY

The risks associated with the field activities are a consequence of potential hazards present and degree of control. Chemical risk is based on exposure to the body from inhalation or direct skin contact. Precautions against risks associated with on-site chemicals and occupational safety risks will be provided.

4.1 Health Risks Associated With Inhalation

Some of the chemicals identified as potential health hazards have the potential to volatilize from the soil samples. Of the chemicals previously identified, the reported soil contamination levels are less than 10 ppm. Therefore, minimal volatilization is expected. Air monitoring and the use of personal protective equipment will be provided to control and minimize the potential of injury from chemical inhalation.

4.2 Health Risks Associated With Skin Contact

All the chemicals identified as potential health hazards present a risk associated with skin contact. The contaminants identified are not readily absorbed through the skin, but can cause dermatitis. Handling chemical samples presents the greatest potential for skin contact.

Using personal protective equipment provides the greatest protection against skin contact. Chemical-resistant gloves will be provided for obtaining chemical samples.

4.3 Safety Risks Associated With Chemicals

Although small, the only foreseen safety risk related to the chemicals on-site is the potential fire hazard. Air monitoring will be used to control

this potential hazard. Due to the reported soil contamination concentrations of less than 10 ppm, and by monitoring and maintaining concentrations in the air below 100 ppm, the potential fire hazard will be minimal.

4.4 Safety Risks Associated With Physical Conditions

Potential physical hazards from working with heavy machinery, heat, and noise are routine with any standard construction or industrial operations. Risks will be minimized by training and employing experienced personnel, using personal protective equipment, and scheduling frequent work/rest cycles.

5.0 AIR MONITORING

Direct reading instrumentation for ambient air monitoring will be conducted during the initial site entry and as appropriate, based on the judgment of the H&S officer. Either an Organic Vapor Analyzer photo ionization detector, or flame ionization detector will be used for evaluating the airborne concentration of the chemical constituents. In addition, one worker, subject to the greatest potential exposure, will be outfitted with a calibrated, personal air sampling pump. One 8-hour sample will be collected each day that field activities are in progress during pre-design sampling. Samples will be collected on solid sorbent carbon cartridges. A Gilian pump or equivalent will be used for air sample collection. The pump will be calibrated to draw 1,000 cubic centimeters per minute. The collection tube will include a backup section to detect breakthrough or excessive vapor migration. Samples will be analyzed for the constituents listed in Table 3 of the Work Plan.

Monitoring equipment will be maintained according to the manufacturer's recommendations. Battery-operated equipment will be kept fully charged. Monitoring equipment will be calibrated according to the manufacturer's specifications prior to each use, or more often as necessary.

5.1 Work Area Action Levels

The H&S officer will determine appropriate levels of protection, according to direct reading instrumentation. The action levels presented below are based on those levels being measured for a period of 15 minutes.

Level D protection is appropriate for ambient conditions in which the sustained organic vapor readings obtained in the breathing zone are less than 5 ppm above background.

Level C protection with a full-face air purifying respirator and organic vapor HEPA cartridges is appropriate when the sustained organic vapor

readings exceed 5 ppm above background or are less than 10 ppm above background.

Deterioration of operating conditions above the 10 ppm limit specified above will result in the temporary cessation of activities and a re-evaluation of the work practices. At such time, the H&S officer may decide to implement additional control measures, and when and under what conditions operations can be resumed.

6.0 PERSONAL PROTECTION

Canonie has extensive experience in the area of waste site investigation. This experience demonstrates that drilling usually results in minimal levels of airborne volatile organics.

The soil sampling will be carried out under a modified Level D protection. Protection equipment includes:

1. Hardhats;
2. Safety boots with optional dust booties or chemical-resistant boots with safety toes;
3. Latex gloves for personnel handling soil and/or water samples;
4. Cotton or leather work gloves for operators and laborers;
5. Safety glasses or goggles; and
6. Optional tyvek coveralls.

If air monitoring results require increased protection, Level C equipment includes:

1. Hardhat;
2. Safety boots with dust booties or chemical-resistant boots with safety toe;
3. Nitrile polyvinyl chloride or other chemical-resistant outer gloves;
4. Latex inner gloves;

5. Cotton or leather outer work gloves for operators and laborers.

6. Safety glasses or goggles;

7. Tyvek or polytyvek coveralls; and

8. Full-face respirators with organic vapor HEPA cartridges.

All respirators used will meet criteria established by the NIOSH/Mine Safety and Health Act.

All personnel entering the active work area will be required to wear equipment satisfying the designated levels of protection for that area.

All EPA personnel, EPA contractors and other visitors will be required to wear modified Level D protection as described above when entering the site during work activities. If monitoring results require increased protection, EPA personnel and contractors will be required to upgrade to Level C protection when entering the active work areas.

7.0 WORK ZONES

Only authorized personnel will be allowed in active working areas. An area of 50 feet will be maintained as designated active work areas around the soil-sampling activities and will be delineated with barricade tape.

A decontamination area will be established adjacent to the active working areas. All employees leaving the designated active working location will comply with decontamination procedures. The decontamination area will also be delineated with barricade tape.

The H&S officer or his designated representative will be responsible for ensuring that all personnel entering an active work area comply with the medical and training requirements for the site and have the required level of protective equipment. It is also the responsibility of the H&S officer to ensure that all personnel comply with decontamination procedures upon leaving an active work area.

8.0 DECONTAMINATION

All sampling equipment as well as nondisposable protective equipment coming in contact with potentially contaminated soils or ground water at the site will be decontaminated prior to being removed from the site or being reused.

The sampling equipment, hardhat, and chemical-resistant boots will be washed in soapy water and rinsed in clear water. Respirators will be cleaned with sanitizing wipes. If necessary, respirators will be washed and rinsed before sanitizing. The wastewater will be disposed of on the ground.

All disposable protective clothing will be collected on-site for subsequent disposal.

9.0 GENERAL SITE HEALTH AND SAFETY AND WORK RULES

1. No drinking, gambling, or illegal drugs will be allowed on-site. Anyone reporting to work under the influence of alcohol and/or illegal drugs shall be subject to disciplinary action. Any site personnel under a physician's care and/or taking prescribed narcotics must notify the designated site H&S officer.

2. Personal protective equipment is required in designated areas. Such equipment may include, but is not limited to, respiratory protection, earplugs, hardhat, rainsuits, boots, gloves, and safety glasses.

3. Eating, drinking, smoking, and chewing gum or tobacco are allowed only outside the active work area.

4. Changes in work practices or work rules shall be implemented only after approval by the project manager and the designated site H&S officer.

5. Construction equipment always has the right-of-way over regular vehicles.

6. All site personnel must clean up at the end of their shift before leaving the site.

7. All protective clothing required will be supplied by the designated site H&S officer. None of this equipment will be permitted to leave the site until the project is completed.

8. Site personnel are responsible for cleaning and maintaining the protective equipment issued to them. Any defects noted in the equipment shall be reported immediately to the designated site H&S officer.

9. Site personnel shall listen and respond to warning signals on construction equipment and shall yield the right-of-way to construction equipment.

10. All equipment operators shall deliberately watch for and avoid workers on the ground who may be in their path and provide warnings to these people before moving their equipment.

11. All workers shall follow emergency procedures explicitly.

12. Site personnel must report all injuries and/or illnesses to their supervisors. This includes minor or slight injuries.

9.1 Conditions of Employment

1. Although medical requirements for work at this site are minimal, all site personnel must have completed medical monitoring in accordance with 29 Code of Federal Regulations (CFR) 1910.120 (f) as outlined in Section 13.0 of Appendix F.

2. All site personnel must participate in the air quality exposure monitoring program by wearing the personal monitors or sampling devices, if required and specified by the site H&S officer. Any site personnel who refuses to participate in the program or who tampers with a sample will be subject to disciplinary action.

3. No beards or long sideburns shall be allowed since they interfere with respiratory protection. Trimmed sideburns and mustaches are acceptable. All site personnel must report to work clean-shaven when there is a potential need for the use of respiratory protection.

4. All site personnel must complete a required training program prior to starting work.

5. All site personnel are required to use the personal protection specified for their work. This may include, but is not limited to, a cartridge respirator, rainsuit, gloves, boots, hardhat, hearing protection, and safety glasses.

6. All site personnel must abide by all safety rules and procedures as described in the work rules and/or developed throughout the project.

7. All site personnel will perform their job assignments according to the "buddy" system with a line of sight with co-workers being maintained at all times.

10.0 CONTINGENCY PLAN

If the organic vapor readings of the total volatile levels exceed 20 ppm in the breathing zone for five minutes, field activities will be stopped, and appropriate contingency measures implemented. If the reduction in activity does not decrease the detectable levels, additional measures will be considered. These measures include changing to an increased level of protection, or identification and control of the source creating the change in conditions.

Emergency information in the event of injury is provided in Section 11.0. Injuries requiring minor first aid will be treated on-site by site personnel trained in first aid and cardiopulmonary resuscitation (CPR). Injuries requiring medical treatment beyond first aid will be treated at A. L. Lee Memorial Hospital.

In the event emergency personnel have to enter the active work area, all work activity will cease. Appropriate measures to limit any potential emission of contaminated materials will be instituted. The supervisory personnel and the designated site H&S officer will coordinate the emergency measures and provide any information or assistance that the emergency personnel may require.

A list of emergency numbers (police, ambulance, etc) and emergency routes will be posted at the jobsite and are included in Section 11.0.

11.0 EMERGENCY RESPONSE

The on-site H&S officer will be responsible for coordinating emergency responses. Prior to the initiation of field activities, the H&S officer will notify any local services which may reasonably be expected to respond to emergency situations and review anticipated hazards and/or potential emergency situations. The local services to be contacted include the fire and police departments, ambulance service, and the local hospital.

On-site emergencies are expected to be within the response capabilities of on-site personnel. In the event of a fire, accident, or injury, work activities in the active area will cease until the emergency is brought under control.

The following list of emergency phone numbers and contacts will be posted at the job site.

Local Services	Phone Numbers
Fire Department	(315) 592-9575
Ambulance Service	(315) 592-4145
Police Department	(315) 598-2111
Hospital	(315) 592-2224

Canonie Contact

Doug Graves	(303) 790-1747
Tamara Renkoski	(219) 926-8651

Route to A. L. Lee Memorial Hospital

Follow South Grandby Road east to State Road 48. Go north on State Road 48 to Broadway. Go east on Broadway for approximately four blocks to Park

Street. Turn right (south) and go approximately four blocks. The hospital is on the left.

12.0 TRAINING

All personnel on-site will have training and/or prior experience which meets the requirements of 29 CFR 1910.120. The Canonie Corporate H&S Training Program includes a 40-hour course and annual eight-hour update training. All technical field personnel are included in the training program. The corporate program includes training in the following areas:

1. Chemical hazards;
2. Physical hazards (heat stress, noise, radiation, material handling, etc);
3. Hazard recognition;
4. Toxicology;
5. Permissible exposure limits;
6. Personal protective equipment and protection levels;
7. Respiratory protection (20 CFR 1910.134);
8. Air monitoring;
9. Confined space entry;
10. Corporate policies and site management;
11. Supervision of H&S;
12. Site control;
13. H&S Plans;

14. Medical monitoring;

15. OSHA compliance;

16. Personnel training;

17. Decontamination;

18. Drum handling;

19. Hazardous material sampling;

20. Practical exercises;

21. Case histories; and

22. First Aid/CPR.

All subcontractor personnel on-site must demonstrate compliance with the 40-hour training provision specified in 29 CFR 1910.120.

In addition, all on-site personnel must receive site-specific training which includes:

1. Site chemical hazards (including acute and chronic effects);

2. Site control and decontamination procedures;

3. Contingency Plan;

4. Protection levels and equipment;

5. Proper use and maintenance of protective equipment; and

6. Review of H&S Plan.

Periodic on-site safety meetings will be held to inform site personnel of changes in the H&S Plan, air monitoring results, and other related information. Scheduling of these meetings will be at the discretion of the site H&S officer.

All regulatory personnel and visitors requiring access to an active work area will be expected to demonstrate compliance with the applicable training requirements.

13.0 MEDICAL SURVEILLANCE

All on-site technical personnel are included in the Canonie corporate medical program and receive annual physical examinations which include:

1. Medical history;
2. Physical examination;
3. Urinalysis (microscopic, morphology, and dipstick);
4. Blood chemistry (SMAC18 or equivalent);
5. Complete blood count, including platelets and differential;
6. Pulmonary function test;
7. Resting electrocardiogram; and
8. Audiogram.

All subcontractor personnel with the potential for chemical exposures are required to have medical monitoring which equals or exceeds requirements of the Canonie program.

All personnel hired specifically for work on-site receive a pre-employment examination which includes a chest x-ray and back x-rays in addition to the examination described above. End-of-employment physicals will be conducted at the discretion of the H&S officer.

All visitors and regulatory personnel who enter the active work areas are expected to demonstrate participation in a medical program which is equivalent to or exceeds requirements of the Canonie program.