August 1991 90-128

PROPOSED FIELD INVESTIGATION PROGRAM IN W-26 AREA FAIRCHILD SEMICONDUCTOR CORPORATION WAPPINGERS FALLS, NEW YORK FACILITY

CanonieEnvironmental

CanonieEnvironmental

Canonie Environmental Services Corp.
500 North Gulph Road - Third Floor
King of Prussia, Pennsylvania 19406
Phone: 215-337-2551
Fax: 215-337-0560

August 30, 1991

90-128

Mr. Keith Browne
New York Department of Environmental Conservation
21 South Putt Corners Road
New Paltz, NY 12561

Proposed Field Investigation Program in W-26 Area
Fairchild Semiconductor Corporation
Wappingers Falls, New York Facility

Dear Mr. Browne:

As discussed during our August 20, 1991 meeting, Canonie Environmental Services Corp. (Canonie) presents the following proposed field investigation program at the Fairchild Semiconductor Corporation (Fairchild) Wappingers Falls facility for your review. The objectives of this field program are to:

1. Define the vertical and horizontal extent of trichloroethene (TCE) near well W-26.

2. Determine the depth of bedrock.

Canonie's proposed approach is described below. Please refer to Appendix A for detailed field procedures for soil borings, well installation, soil and ground water sampling, and quality assurance/quality control.

1. Approximately 12 soil borings will be drilled as shown on Figure 1. Drilling will be performed using either hollow stem augers or air rotary procedures;

2. Drilling will begin with borings closest to W-26 and work radially outward;

3. Split spoon samples will be collected at a minimum of every five feet;

4. Soil cuttings will be screened for organic vapors using a photoionization detector in the field. Soil samples at selected intervals will be collected and analyzed for halogenated organic compounds using United States Environmental Protection Agency (EPA) Method 8010. At least two soil samples will also be analyzed for Total Organic Carbon by EPA Method 9060.

5. All borings not converted to monitoring wells will be backfilled with soil cuttings and grouted to surface as necessary.

6. Canonie will also collect ground water samples from 5 of the 12 borings (SB-2, SB-4, SB-7, SB-9 and W-36) as shown on Figure 1 using the HydroPunch® procedures. The ground water samples will be analyzed for halogenated organic compounds using EPA Method 601.

7. Two soil borings W-26A and W-26B will be converted to a well cluster and will be installed within 10 feet of existing well W-26. Well W-26A will be completed and screened in the surficial aquifer (silt layer) with an expected depth of 15 feet and a screen interval from 5 to 15 feet. Well W-26B will be completed in the top of bedrock with an expected depth of 20 feet and a screen interval from 15 to 20 feet. W-26B will be sealed from the surficial aquifer with a one-foot thick bentonite seal.

8. A third soil boring will be converted to downgradient monitoring well W-36. This well is expected to be screened from 5 to 20 feet and will be completed in the surficial aquifer (silt layer).

9. All monitoring wells will be constructed of four-inch diameter polyvinyl chloride (PVC) casing and 0.020-inch well screen. A sand gravel pack will be placed to one foot above the slotted well screen section and then a one-foot bentonite seal will be installed. The remainder of the boring annulus will be grouted and a eight-inch steel protective casing will be provided.

10. The actual depth of screen will be determined in the field by Canonie's field geologist/engineer.

11. Canonie proposes to use CAMO Laboratories (CAMO), in Poughkeepsie, New York, for all analytical work. CAMO is a New York State Department of Health (NYSDOH) approved laboratory.

12. Canonie proposes to use Boyd Artesian Well Company, Carmel, New York, for all drilling and well installation.

Canonie also proposes to use quick turnaround time for analytical samples so that the number and final location of the field borings may be optimized in achieving all program objectives. Canonie expects that the soils borings and well installation as proposed can be completed within two weeks.

Upon completion of the field boring program, Canonie will prepare a summary report that will include the following:

1. Description of field procedures;
2. Field logs, analytical data, well details;
3. Description of the regional geology;
4. Assessment of the impacted area including a TCE-concentration contour map;
5. Preliminary screening of potential remedial action alternatives.

Canonie will submit this summary report to the New York State Department of Environmental Conservation (NYSDEC) within six weeks of completion of the field work.

Canonie requests your approval of this proposed plan by September 6, 1991 so that we may schedule our subcontractors. If you have any questions, please call me at (215) 337-2551.

Very truly yours,

Joseph T. Clifford, P.E.
Project Engineer

JTC/bam

cc: Thomas Jones, Schlumberger Technology Corporation
Ram Pergadia, NYSDEC
Thomas Trapp, Landels, Ripley & Diamond
Dennis Curran, Canonie
Joseph Mihm, Canonie

TABLE OF CONTENTS

TABLE OF CONTENTS

(Continued)

TABLE OF CONTENTS

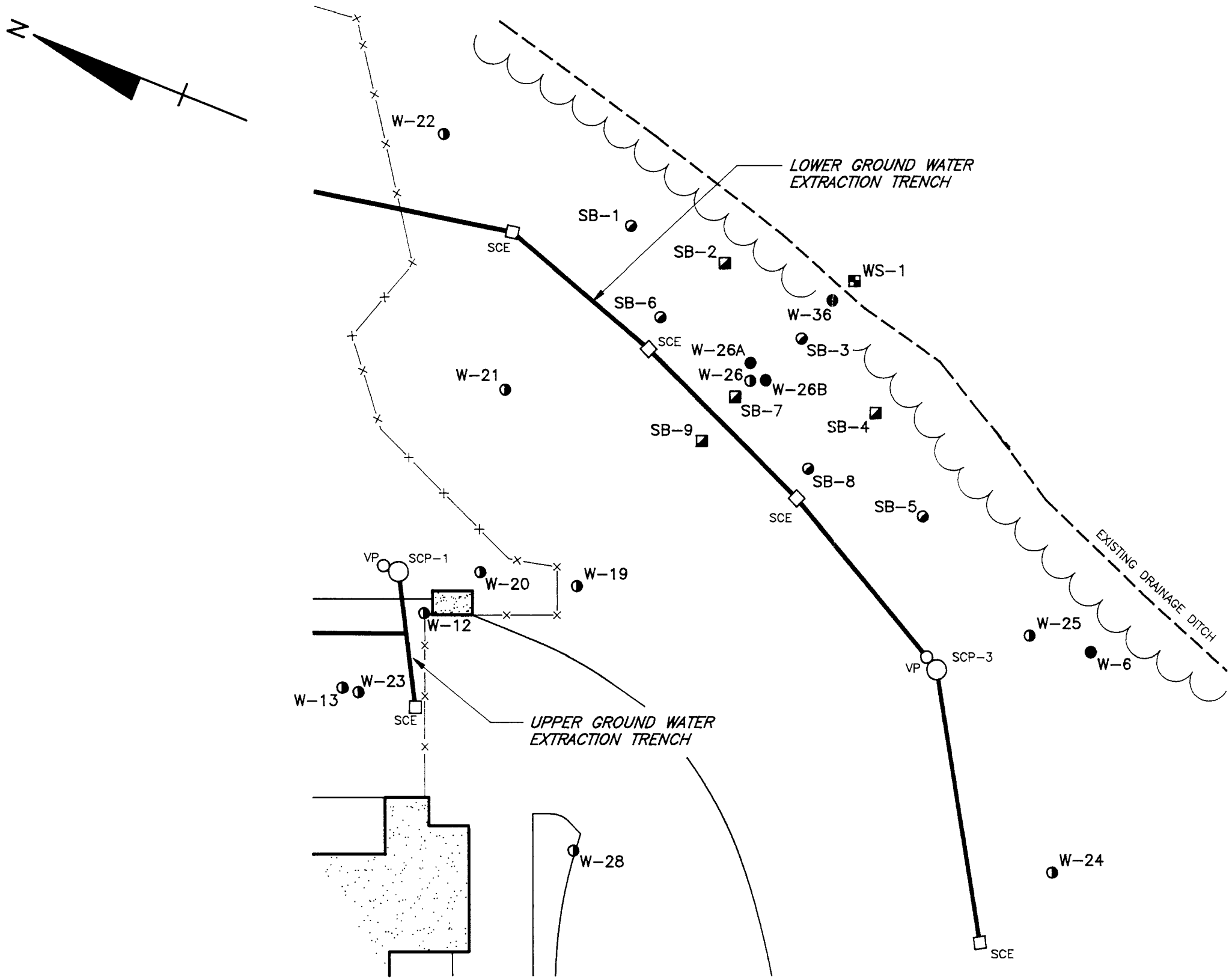
(Continued)

LIST OF FIGURES

FIGURE NUMBER	DRAWING NUMBER	TITLE
1	90-128-B34	Proposed Field Investigation Boring Program
2	90-128-A37	Monitoring Well Specifications
3	--	Daily Field Activity Log
4	--	Chain-of-Custody Form
5	--	Field Sample Data Form

Figures

DRAWING NUMBER 90-128-B36



LEGEND:

- W-26 — HYDROCARBON INVESTIGATION BORING AND MONITORING WELL INSTALLED BY CANONIE ENVIRONMENTAL SERVICES CORP.
- WS-1 — WETLAND SAMPLE
- W-36 — PROPOSED BORING AND MONITORING WELL LOCATION
- SB-4 — PROPOSED BORING AND GROUND WATER SAMPLE LOCATION
- SB-1 — PROPOSED BORING LOCATION

NOTE:

1. INVESTIGATION WILL BEGIN NEAR W-26 AND THEN PROGRESS RADIALLY OUTWARD. FIELD ADJUSTMENTS TO BORING LOCATIONS TO BE MADE AS DATA IS OBTAINED IN THE FIELD.

SCALE
25 0 25 50 FEET

PROPOSED FIELD INVESTIGATION BORING PROGRAM FAIRCHILD FACILITY WAPPINGERS FALLS, NEW YORK

PREPARED FOR

FAIRCHILD SEMICONDUCTOR CORP.

Canonie Environmental

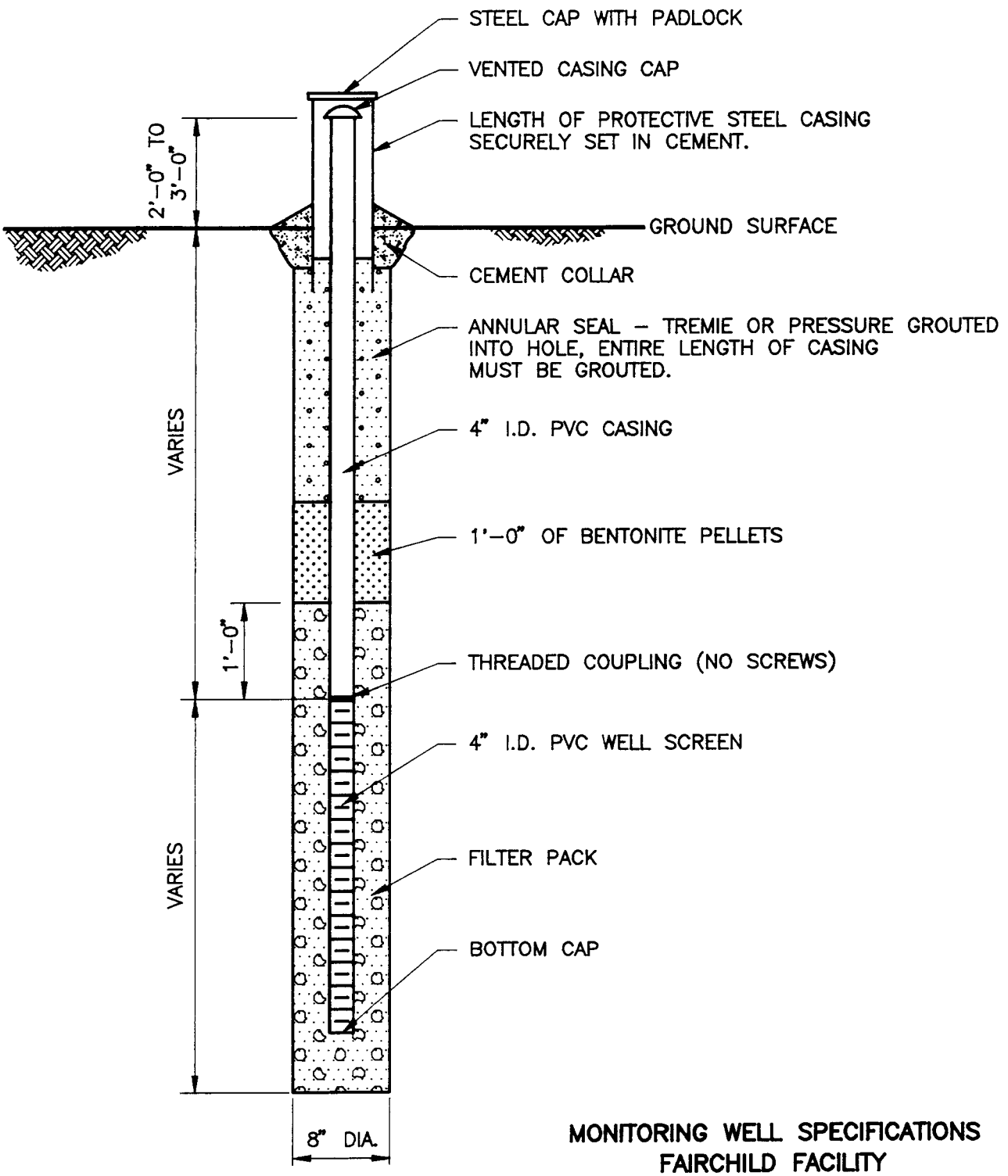
No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	8-30-91	ISSUED FOR AGENCY REVIEW	WLH	JJC	

REFERENCE:

-HAYWARD AND PAKAN ASSOCIATES, FIELD SURVEY No. 7937, 8-25-86.

DATE: 8-22-91	FIGURE 1	DRAWING NUMBER 90-128-B36
SCALE: AS SHOWN		

DRAWING NUMBER 90-128-A37



MONITORING WELL SPECIFICATIONS
FAIRCHILD FACILITY
WAPPINGERS FALLS, NEW YORK

PREPARED FOR

FAIRCHILD SEMICONDUCTOR CORPORATION

CanonieEnvironmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	8-30-91	ISSUED FOR AGENCY REVIEW	WLH	JPC	

DATE: 8-30-91
SCALE: N.T.S.

FIGURE 2

DRAWING NUMBER 90-128-A37

1

FIGURE 3

Canonie Environmental

Daily Field Activity Log

PROJECT No. _____

DATE _____

PAGE _____ OF _____

COMPLETED BY _____

PROJECT NAME _____ LOCATION _____

FIELD ACTIVITY SUBJECT _____

WEATHER _____

DAILY ACTIVITIES AND EVENTS

FIGURE 4

CAMO LABORATORIES

POUGHKEEPSIE AREA FACILITY:
CAMO LABORATORY
367 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12601
(914) 473-9200

CHAIN OF CUSTODY

CLIENT

SAMPLER

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP	GRAB	No. of CONT.:	ANALYSIS REQUIRED

Relinquished by:

Received by: Date Time

Relinquished:

Received by: Date Time

Dispatched by: Date Time

Received for Laboratory by: Date Time

Method of Shipment:

Comments:

CAMO Containers ☐

FIGURE 5

Canonie Engineers

Field Sample Data

PROJECT No. _____

PAGE _____ OF _____

PROJECT NAME _____ SAMPLED BY _____

STATION No./LOCATION _____ DATE _____

SKETCH ON BACK YES ☐ NO ☐ PHOTOGRAPHS YES ☐ NO ☐ ROLL No./EXPOSURE No. _____

FIELD DATA

TIME _____ AIR TEMP °F _____ WEATHER _____

WELL DEPTH _____ WATER DEPTH _____ SAMPLE DEPTH _____ SAMPLE METHOD _____

VOL. PURGED _____ SAMPLE TEMP. _____ °C

☐ IN SITU ☐ IN BOTTLE SP. COND. _____ / _____ AT 25°C ☐ IN SITU ☐ IN BOTTLE

pH _____ ☐ IN SITU ☐ IN BOTTLE Eh _____ ☐ IN SITU ☐ IN BOTTLE DISSOLVED O_2 _____ ppm ☐ IN SITU ☐ IN BOTTLE

VOA LEVEL (ppm) AMBIENT _____ SAMPLE LOCATION _____ HEADSPACE _____

BOTTLE ID	LAB ID	VOL	MATERIAL	FILTERED	PRES./VOL.	ANALYSIS REQUESTED

REMARKS: _____

FIELD EQUIPMENT QUALITY ASSURANCE CHECKLIST

pH METER BUFFER CHECK pH 4 _____ pH 7 _____ pH 10 _____

SP. COND. METER STANDARDS CHECK _____ Eh PROBE _____

PUMP TUBING RINSED _____ CHANGED _____ SAMPLER BLANK _____

FILTRATION BLANK WITH PRES. _____ FILTERS ACID WASHED _____

APPENDIX A

DETAILED FIELD PROCEDURES

APPENDIX A

DETAILED FIELD PROCEDURES

1.0 SOIL BORING AND WELL INSTALLATION PROCEDURES

Soil boring procedures and the quality control program controlling well construction are critical to the collection of data which accurately reflects the conditions existing in the subsurface soils and in the ground water. The following procedures will govern the boring and well installation during this program. Examples of forms which will be used for quality control during the field activities are provided on Figures 2 through 5.

1.1 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 boring and well installation at the site shall be cleaned within the decontamination area designated and then checked by the field engineer. All drill rods, augers, samplers (used for geotechnical samples), and any other equipment necessary for the construction of the well shall be steam cleaned utilizing potable water. Drill rods, augers, casings, samplers, pipe wrenches, and other down-hole materials and tools shall be cleaned until all visible signs of grease, oil, mud, or other material are removed. Brushes shall be used as necessary to assist in the removal of extraneous materials or soil. New equipment shall be cleaned of all paint before utilization in well construction. Drillers shall utilize new surgical or other protective gloves in handling drill rig equipments.

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.

All wells will be constructed of 4-inch polyvinyl chloride (PVC) casing which shall be cured and free of plasticizers. 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. After steam cleaning the casings, workers shall always use clean gloves when handling the casing.

All pumps to be used in development, purging, or pumping of wells at the site shall be steam cleaned and all wetted parts, hoses, and valves flushed thoroughly with potable water. The electrical and support cords will be cleaned in this manner also. Evacuation tubes will be cleaned before use and disposed of after use. Pumps which leak or otherwise may introduce chemical constituents into the well, sampled water, or aquifer will 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.

In order to prevent cross-contamination between sampling depths and borings, all equipment utilized to collect analytical samples will be decontaminated according to the following procedure:

a. Wash and scrub with low phosphate detergent;

b. Tap water rinse;

c. An acetone rinse or a methanol followed by hexane rinse, solvents pesticide grade or better;

d. Deionized water rinse;

e. Air dry;

f. Wrap in aluminum foil until use.

1.2 Drilling Procedures

Wells shall be constructed using drilling procedures which do not require the introduction of water or drilling fluids into the well hole. In general, drilling will be performed with hollow-stem augers or air rotary procedures as described below.

1.2.1 Hollow-Stem Auger Drilling Procedure

Where a well screen is to be constructed in a saturated, permeable zone of soil under low or no artesian pressure, hollow-stem augers may be utilized to drill and stablize the well hole. The inside diameter of the hollow-stem augers shall be at least 1.33 times the outside diameter of the well screen and riser scheduled to be placed in the borehole. Only hollow-stem augers with water-tight joints shall be utilized in constructing the well.

The borehole is created by rotating the hollow-stem augers and advancing the augers into the soil. The borehole is created as the soils are brought to the surface by the action of the augers. When the augers have advanced to the designated depth, the augers are withdrawn. Soils which have not been pushed to the surface by the rotation of the auger are extracted when the augers are retrieved.

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. If the head of water created inside the augers is not enough to maintain stability of the formation, bentonite base drilling mud will be added to the auger instead.

The borehole shall be advanced to the pre-determined depth or soil strata, as determined by the field engineer. Sampling of the soil formation during advancement of the borehole shall conform to the procedures set forth in Section 1.3.

1.2.2 Air Rotary Drilling Procedures

The air rotary procedure utilizes compressed air to remove the cuttings from the hole. Air rotary drilling is not amenable to situations where artesian conditions are present. However, air rotary drilling is appropriate in situations where hydrogeologic conditions are such that the loss of water through the borehole would affect the immediate ground water quality or could cause a ground water plume to be enlarged beyond its existing boundary.

1.3 Sampling of the Formation

1.3.1 General

The sampling of the formation is required to establish the nature of the soils at the location of the 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. Where sampling is required for chemical characterization of the soils, sampling shall follow the procedures set forth in Section 2.2. All 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 engineer shall be responsible for obtaining all required information to fully and completely detail the lithology and well construction for each well installed at the site.

1.3.2 Sampling Interval and Type

Soils within the borehole shall be sampled at regular intervals, not to exceed five feet. At a minimum, two samples shall be retrieved from the soil strata in which a well screen is to be set. Sampling shall be performed in accordance with American Society for Testing and Materials (ASTM) D1586, split-spoon sampling. Disturbed soil samples to be analyzed off-site for physical parameters shall be placed in appropriate containers, 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 field classification of the soil under the USCS.

1.4 Well Construction Materials

All materials utilized or incorporated into the construction of wells shall be certified by the manufacturer and the supplier to 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. PVC well construction material will be used for all wells to be installed in this program.

1.4.1 Well Screens

Well screens shall be 4-inch diameter schedule 40, 0.020-inch slotted PVC plastic well screen as manufactured by Johnson Well Screen, or equivalent. Well screen shall be furnished in five-foot-long sections, or longer. The bottom of each section shall be

designed to accept a threaded bottom plug, which plug shall be designed to withstand all installation and well development pressures without becoming dislodged or damaged.

1.4.2 Riser Pipe

Riser pipe shall consist of PVC plastic pipe meeting ASTM D1785, with flush-joint threads. Schedule 40 pipe of 4-inch diameter 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.

1.4.3 Protective Outer Casing

Permanent or temporary steel casing for cased wells shall have a minimum inside diameter which is 1.33 times the outside diameter of the well screen and riser pipe. The steel casing shall have a minimum wall thickness of 0.125 inches, and the ends of each casing section shall be threaded, or bevelled for welding. All casing shall be new black pipe which is free of interior coatings.

1.4.4 Grout Mix

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. Bentonite shall be added to the mix at a rate of two to four pounds of bentonite powder per 94-pound bag of cement.

The grout shall be thoroughly mixed and free of lumps. Cement used shall be Portland cement Type I, meeting ASTM C150, furnished in unopened bags. Bentonite shall be powdered sodium bentonite, supplied in full, unopened bags.

1.4.5 Gravel Pack

Gravel pack is the granular 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 screened. The particle size of the pack shall be at least 4 times the D15 size (15 percent of the soil is finer than this dimension) of the soil in the screened zone and shall be no more than 4 times the D85 size (85 percent of the soil is finer than this dimension) of the soil in the screened zone. The gravel pack shall be certified by the supplier to be free of all organic matter and detectable concentrations of chemical constituents. The gravel pack shall be furnished in unopened bags, pails, or other appropriate containers.

1.4.6 Bentonite Pellets for Seals

The seal between the filter and the borehole grout shall be constructed of sodium bentonite pellets. 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, pails, or other appropriate containers, and shall be stored in a dry location prior to use.

1.5 Well Installation

Prior to installation of any material in a borehole, the supervising field engineer shall verify that the borehole is stable, vertical, unobstructed, and advanced to the appropriate depth. 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.

1.5.1 Well Component Assembly

The installation of the components of the well shall be per the specifications as shown on Figure 2. All materials shall be cleaned in accordance with the procedures set forth in Section 1.1 of this Plan prior to assembly. The wells screen and riser pipe shall be assembled by inserting and tightening the threaded 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.

As the screen and riser pipes are assembled, the assembled sections (string) may be positioned into the borehole and held in place with a slip plate and ropes or wire cables attached to the boom of the drill rig. Precautions must be taken to prevent oil or greases on the ropes or cables from contacting the riser pipe. If oils or greases do contaminate the riser pipe through contact, the riser pipe must be removed and cleaned properly.

Once the string has been lowered to the depth of the zone to be screened, 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 two feet above grade. The final trimming of the riser above grade shall occur after the grout is in place around the well.

1.6 Well Development

All new 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 pumps, centrifugal pumps, or air lifting. Wells will not be developed by jetting. The progression and successfulness of well development will be assessed by observation of fines in the evacuated water using Imhoff cones. Pumps and other development tools and equipment must be fully operational, meet applicable electrical or other code provisions, and must be thoroughly cleaned in accordance with procedures set forth in Section 1.1. 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 one hour, 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 containerized at the well head and pumped to the lower extraction trench sump.

2.0 ANALYTICAL SAMPLING PROCEDURES

2.1 General

Unless otherwise specified in this Plan, sampling procedures outlined in "Samplers and Sampling Procedures for Hazardous Waste Streams," United States Environmental Protection Agency (EPA)-600/2-80-018, will be followed in the collection of samples from various media at the site. A copy of this plan will be available at the site for reference by site personnel. Split or duplicate samples in appropriate containers accompanied by a sample tag and chain-of-custody form will be provided to the NYSDEC upon request.

2.2 In-Situ Soil Sampling Procedures

Generally, a split-spoon sampler which has been cleaned as outlined in Section 1.1 for decontamination of sampling equipment, will be advanced into the media to be sampled, at locations designated in Figure 1 to retrieve a sample for analysis. An organic vapor analyzer (OVA) will be utilized to select the appropriate soil sample with the highest reading from each borehole. Upon retrieval of the split-spoon sampling device, immediately collect the soil sample by filling two 4-ounce jars to capacity. The sample will then be labeled in accordance with quality assurance/quality control (QA/QC) protocols given in Section 3.0 and finally stored in an iced cooler for transport to the laboratory.

2.3 Well Purging Procedures

All monitoring wells will be purged prior to sampling. The preferred method for purging of the monitoring wells is with a submersible pump providing a uniform rate of discharge. Pumps causing aeration or agitation of the water are not to be used for sampling purposes. Clean tubing will be used for intake/discharge lines as required for pump

operation. In small diameter, low purging volume monitor wells, purging and sampling can be effected with a bailer constructed of stainless steel or Teflon™ materials. While pumps may be used for purging, monitoring wells will be sampled using a bailer. Purge waters will be containerized at the well head and transported to the former pit area for subsequent disposal. All monitoring wells to be installed at the Site will be capped and locked to prevent unauthorized access to the well and the possible contamination of the well between sampling episodes.

Immediately prior to purging each well, the depth from top of well casing to top of water surface will be determined to the nearest 0.01 foot and recorded. Monitoring wells will be purged by removing three well casing volumes of ground water (Vw) determined by one of the following equations:

$$Vw = 0.017 (d*d) W \text{ cubic feet}$$

or $$Vw = 0.12 (d*d) W \text{ gallons}$$

Where d is the well casing diameter in inches and W is the depth of water in the well casing measured in feet.

Note that W must be calculated by subtracting the measured depth to water in the well from the total well casing length reported on the well installation details or boring log. Recognizing the variabilities of well size and depth, water depth, and aquifer characteristics, it is intended for pumping rates to be such that the specified purge values are removed in a time period not exceeding 90 minutes. If a well is evacuated during the purge, it will be allowed to recharge for a period not exceeding 24 hours before sampling. An evacuated well which has not recovered sufficiently to allow sampling after 24 hours of recharge time will be noted as "dry" and deleted from the sampling event.

At each well to be sampled, purged waters will be monitored for temperature, pH, and conductivity as a function of time. This data will be accurately recorded such that the

variation of parameters can be related to elapsed purging time. These relationships along with sample data from selected purge evaluation wells will be used to modify the purging volumes at each specific well. Wells will be sampled after pH and conductance have stabilized, and within three hours of purging if well recovery is adequate.

Purging methods, volumes, times, pH, conductance, and any other pertinent information will be recorded and reported by the sampling team. The sampling team will discharge purged waters from the monitoring wells onto the ground near the wells. Purged waters will not be discharged in a manner which will allow direct runoff of the waters into surface water courses.

2.4 HydroPunch® Sampling Procedures

The HydroPunch® sampler will be used to collect ground water samples from the bottom of selected boreholes. All downhole tools will first be thoroughly cleaned in accordance with the procedures set forth in Section 1.1. The HydroPunch® will be advanced five feet from the bottom of borehole using a standard rod drive or downhole hammer. Once the appropriate five-foot sampling interval has been achieved, the drive rods or hammers are pulled back permitting ground water to enter the tool. Due to the low permeability of the in-situ soils, it may take several hours to collect the required sample volume. Once filled, the HydroPunch® is pulled to the surface. The ground water sample is collected by unthreading the upper check valve, and replacing it with a Teflon™ stopcock and tubing. The 40-mil vials will be directly filled from the stopcock, as described in Section 2.5 below.

2.5 Ground Water Sampling Procedures

The ground water samples collected from a bailer or HydroPunch® will be placed in 40-ml glass bottles fitted with caps having Teflon™-faced seals. Each sample bottle will be labeled with a selected numerical or alpha-numerical designation which allows the sampling team to identify the sample for tracking purposes.

Additional information to be shown on the bottle label will include:

1. General site name, identification, or location;

2. Sampling location (i.e., well number, stream station);

3. Sampling date and time;

4. Name of the person collecting the sample.

Ground water samples for volatile organic analysis will be collected by filling the sample vial in such a manner as to prevent air bubbles from passing through the sample as well as eliminating the entrapment of any air in the bottle. After pH adjustment, the sample bottles will be capped, inverted, and tapped to test for air bubbles. If any bubbles are observed, the sample will be discarded and a fresh sample obtained from the monitor well. Samples will be placed in an ice chest or similar container capable of maintaining a temperature of 4 degrees Celsius while the samples are transported via courier delivery service to the laboratory. Two separate sample bottles of ground water will be collected at each monitor well as the sample set so that duplicate samples are available for analysis if required.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

The overall QA objective for this field program is to provide analytical data which are representative of the site conditions. In the field, this will require employing consistent sampling techniques plus proper sampling handling, collection of field QC samples, and detailed record keeping. In the laboratory, this will require adherence to the test methods established in the EPA SW-846 and includes sample handling, instrument calibration, methods control, performance evaluation, analytical data generation, and reporting.

3.1 Sample Handling/Chain of Custody

The sample containers will be properly labeled and placed in the sample cooler. Packing material will be placed around the sample containers to prevent breakage during shipment. A sufficient quantity of ice packs will be placed around the sample containers to ensure that they remain at approximately four degrees Celsius during shipment. The sample cooler will be delivered within 24 hours via express courier to the laboratory for analysis.

The chain-of-custody record is initiated in the field by the individual physically in charge of the sample collection. The sampler is personally responsible for the care and custody of the sample until it is transferred or dispatched properly. When transferring the possession of samples, the individuals relinquishing and receiving the sample will sign, date, and write the time on the chain-of-custody record.

The chain-of-custody record contains information on the date of sample collection, the sample identification, the sampler, the project name and number, laboratory project number, the number of containers of each sample being shipped and an itemization of the analyses requested for each sample, as well as any remarks about the sample,

including the method of shipment and courier's name. The chain-of-custody record is enclosed with the samples after it has been signed by the sampler.

3.2 Quality Control Samples

Quality control samples collected during this program will include duplicates and rinse blanks. Duplicate samples will provide an evaluation of field and laboratory precision. At least two duplicate samples will be collected, or a minimum of five percent of all the soil and ground water samples. Rinse blanks will be collected at a minimum of five percent to evaluate field decontamination procedures. All quality control samples will be analyzed for halogenated organics by EPA Method 8010 (soils matrix) and EPA Method 601 (aqueous matrix).

3.3 Record Keeping

Maintaining proper records is an important aspect of the sample collection program. The entire sampling process is designed to be conducted in a manner that provides samples suitable for the intended analyses and is properly documented to assure comparability at a later date. At the time samples are obtained, the following information must be recorded by the sampling team:

1. Sample site location;

2. Depth or position;

3. Surface preparation method used;

4. Date and time of sampling;

5. Sample identification number;

6. Identification of sampler;

7. Analyses required.

In addition to preserving pertinent information regarding the sampling, the sample team must initiate chain-of-custody procedures and describe the sample site in adequate detail to allow analytical results to be properly interpreted.

3.4 Data Quality

In order to achieve the data requirements that are consistent with the objectives of this plan, there must be an assessment of the performance of five data quality parameters. These data quality parameters are precision, accuracy, representativeness, completeness, and comparability. Definitions of these data quality parameters are presented below:

1. Precision - A measure of the reproducibility of measurements under a given set of conditions.

2. Accuracy - A measure of how close a result is to the true value.

3. Representativeness - The degree to which a single measurement is indicative of the characteristics of a larger sample or area or the degree to which the data gathered by the project represents the field conditions.

4. Completeness - A measure of the amount of valid data obtained from the measurement system compared to the amount that is planned, e.g.:

$$\text{Percent Completeness} = \frac{\text{Number of Valid Results}}{\text{Total Number of Results}}$$

Valid results will be defined for each task by addressing precision, accuracy, and representativeness parameters quantitatively.

5. Comparability - A measure of the confidence with which one data set can be described as similar to another.

3.4.1 Precision and Accuracy

In general, the precision and accuracy requirements for the remedial action will be met by assuring that at least 5 percent of the samples gathered for analytical evaluation in each matrix type (i.e., concrete core, wood, etc.) during each sampling episode are duplicates or splits, so that field precision may be evaluated. In the laboratory, at least 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 other duplicate sampling or replicate sampling to be appropriate.

Calculations performed with the data generated during the project are also checked for precision and accuracy in order to ensure continued compliance with the objectives of this document.

Analytical laboratory instrumentation and associated equipment will be tuned and calibrated in accordance with the manufacturer's instructions and the standard operating procedures adopted for the appropriate EPA methodologies selected for use during the project.

3.4.2 Representativeness

In sampling, the characteristic of representativeness is achieved by acquiring an aliquot of a larger mass which possesses the same qualities, properties, and attributes as the

mass from which it was taken. 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 will be used to protect the representativeness of the samples gathered during the project. Proper documentation in the field and the laboratory will be used to establish that protocols designed to preserve the representativeness of samples have been followed and that sample identification as well as integrity have been preserved.

3.4.3 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. The goal of completeness is 100 percent. After collection, analysis, and evaluation of all sample data is completed, a value of 90 percent completeness will be considered acceptable.

3.4.4 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 those gathered by other organizations measuring the same parameter. Comparability of data gathering and measuring procedures should also be addressed if gathered data 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. Statistical analysis is often required to define whether the outliers represent significant values which require recognition in the decision-making process. Outliers will be assessed on an individual basis. In reviewing data, technical expertise and statistical procedures will be weighed equally.

4.0 HEALTH AND SAFETY PLAN

The personal safety and health of each Canonie employee and each subcontracted employee of Canonie is of primary importance. The prevention of occupationally induced injuries and illness is of such a consequence that it will be given precedence over operating productivity whenever necessary. To the greatest degree possible, management will provide all mechanical and physical facilities required for personal safety and health in keeping with the highest standards.

This Health and Safety Plan (HASP) is based upon information and data obtained during the hydrocarbon investigation and long-term monitoring program at the Fairchild Semiconductor Corporation (Fairchild) Site, and upon conservative assumptions which Canonie has made based on accepted practices and its experience in this field. This plan has been specifically developed for the proposed field investigation activities at the Fairchild manufacturing facility in Wappingers Falls, New York.

4.1 Key Personnel and Responsibilities

The person on-site responsible for the total implementation of the HASP will be the site safety officer (SSO), Mr. Joseph Clifford.

The SSO will direct and control all matters pertaining to health and safety as required in this plan. The SSO will have responsibility for:

1. Enforcing adherence to the HASP;

2. Determining the existence of unsafe conditions and stopping work until unsafe conditions are corrected;

3. Determining the need for, and implementing contingency actions;

4. Reviewing planned site activities and reviewing specific safety procedures for ensuring adherence to the HASP;

5. Specifying the level of personal protective equipment (PPE) required for specific operations;

6. Handling any liaison concerning health and safety at the site with representatives of the state and federal agencies;

7. Implementing and reviewing air monitoring program to assure adequate worker protection in all areas of the site.

All major changes in operation at the site must be reported to and approved by the SSO before commencing. The SSO may stop construction, excavation, hauling, or any operation if unsafe conditions exist. The site SSO will report to the northeast regional health and safety coordinator, Mr. Clayton Bock. Mr. Bock will be consulted when health and safety problems arise which cannot be resolved on-site. The telephone numbers of these personnel, along with other emergency telephone numbers, will be posted at the site at all times.

4.2 Site Security

A private security firm currently maintains continuous surveillance throughout the site, 24 hours a day, 7 days a week. The site security officer will be responsible for maintaining control over vehicle and personnel movement into and out of the site (during working hours). Daily records will be kept at the security desk of personnel, visitor, and vehicle entrance and exit, to and from the site. Sign-in and sign-out procedures will be followed at the main gate and any entrance to the site.

The site security officer will also be responsible for maintaining night security to assure that no unauthorized personnel enters that site area. The security personnel will have the authority to remove any person from the site, and to prevent any individual from entering the site. They will also serve as a liaison with local police and fire departments.

4.3 Work Area

A site plan of the field investigation work area is shown on Figure 1. The field boring program involves the drilling of 12 soil borings and installation of three wells. The facilities and related areas associated with the field activities include the following:

1. Investigation areas for the soil boring and well installation;

2. A designated precautionary area within the limits of which EPA Level "C" and Level "D" protection will be required;

3. A heavy equipment decontamination area.

The area of highest potential for organic vapor evolution will be in the immediate vicinity of each soil boring. This area will be designated as the precautionary area and workers will don the necessary protective clothing and equipment specified by the SSO before being permitted to enter this area. The precautionary area, as well as all open excavation areas, will be barricaded and marked with signs stating:

-- Danger --
Construction Area
Unauthorized Personnel
-- Keep Out --

A second sign will be posted at the entrance to the precautionary area when Level "C" respiratory protection is determined necessary by the SSO. The sign will read:

-- Warning --
Respiratory Protection Required
Unauthorized Personnel
-- Keep Out --

Based on analytical results of soil and water analyses performed during the hydrocarbon investigation and long-term monitoring program, TCE is the predominant analyte with concentrations in the soils and ground water expected to be below 2 parts per million (ppm). In view of this fact, Canonie proposes that Level "D" protection be utilized in the precautionary area. Canonie also proposes that the parameter for upgrading protection of Level "C" will be the detection of 5 ppm (v) above background of total organic vapors anywhere within the precautionary area for a period of five minutes. This represents a very conservative value when comparing it to the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 50 ppm for trichloroethene (TCE) and the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) of 100 ppm for TCE. The TLV represents the concentration a worker can be exposed to a compound continuously for eight hours a day, five days a week, while experiencing no adverse effects, as determined by ACGIH or OSHA.

During normal operations within the precautionary area, if levels of organic vapors are verified to be below 5 ppm(v) above background, no respiratory protection will be necessary. If organic vapor levels are monitored to be above 5 ppm(v) above background for a five minute time period in the worker breathing zone, the level of respiratory protection will be upgraded to Level "C", and workers will don air purifying particulate and organic vapor filter masks. The precautionary area will be closely monitored with and Hnu to ensure that organic vapor levels are maintained within the specified limits.

4.4 Personal Protection Plan

PPE will include protective clothing, chemical resistant boots, gloves, head and eye protection, and other equipment specified by the SSO (such as air purifying respirators) for use in protecting worker's health and safety. The SSO will be responsible for designating and providing the appropriate health and safety equipment, and subsequent cleaning for reuse (gloves and/or boots) or disposal of contaminated clothing and equipment.

Workers in the precautionary area will be required to wear the following at the discretion of the SSO:

1. Disposable Tyvek coveralls;
2. Inner and outer gloves taped at the wrists;
3. Boots - steel toe and shank, chemical resistant;
4. Hard hat;
5. Full-face respirator (carried at all times and worn upon SSO's directive);
6. Gloves - chemical resistant.

Prior to entering the precautionary area, persons will be supplied with and will don the appropriate safety equipment necessary for the level of protection required, as determined by the SSO. If the 5 ppm(v) five minute level is monitored above background readings, the SSO will verbally direct the personnel within the precautionary area to don their respirators immediately. Level "C" protection will be maintained until levels of volatile organic vapors are verified to be below 5 ppm above background continuously for 15

minutes, as determined by the SSO. Level "C" respiratory protection will be Mine Safety Appliance (MSA) Ultra Twin II full-face air purifying mask with twin cartridges. Each cartridge will contain a combination mechanical particulate filter and an organic vapor filter. The ultra-twin respirator cartridges will be changed at least daily, or more frequently whenever breakthrough is suspected.

When working in the precautionary area, an explosimeter will always be kept on hand to ensure explosive mixtures of solvents do not exist. The oxygen/explosimeter device will also be used to monitor oxygen levels within the precautionary area. Oxygen levels must be at least 20 percent, and explosimeter readings less than two percent Lower Explosive Limits (LEL) for workers to enter the precautionary area. If oxygen content or explosive vapors are a problem, the trench will be vented and purged with blowers until levels are acceptable.

4.5 Training Requirements

All personnel (including subcontractors and visitors) entering the precautionary area must have completed training requirements for hazardous waste site work in accordance with OSHA 29 Code of Federal Regulations (CFR) 1910.120. Documentation of training requirements is the responsibility of each employer. However, written documentation verifying compliance with 29 CFR 1910.120 (e)(3), (e)(4) [as applicable] and (e)(8) must be submitted to the SSO prior to entering the precautionary area.

General site workers (such as equipment operators, general laborers, and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of 3 days actual field experience under the direct supervision of a trained, experienced supervisor.

Workers on-site only occasionally for a specific limited task (such as, but not limited to, land surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Workers regularly on-site who work in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Workers with 24 hours of training who are covered by the paragraphs above and who become general site workers or who are required to wear respirators, shall have the additional 16 hours and 2 days of training necessary to total the training specified.

4.5.1 Medical Monitoring Requirements

All personnel (including subcontractors and visitors) entering the precautionary area must have completed appropriate medical monitoring program as required under OSHA 29 CFR 1910.120(f). Documentation of medical monitoring is the responsibility of each employer. Written documentation verifying compliance must be submitted to the SSO prior to entry into the precautionary area. Canonie's medical monitoring program includes the following:

1. Medical History Questionnaire;

2. Occupational History Questionnaire;

3. Medical Evaluation by Physician:

   - o Vital Statistics;
   - o Physical Examination;
   - o Visual Acuity;
   - o Audiometry;
   - o Electrocardiogram;
   - o Pulmonary Function Test;
   - o Fecal Occult Blood (Hemoccult).

2. Blood and Urine Screens:

   - o Blood Chemistry Profile;
   - o CBC with Differential;
   - o Urinalysis with Microscopic;
   - o Heavy Metal Screen (As, Cd, Hg);
   - o Blood Pb and ZnProtoporphyrin

3. Mandatory Tests:

   - o Tetanus Shot;
   - o Chest X-Ray (2 Views);
   - o Lumbosacral X-Ray (3 Views).

4. Optional Tests:

   - o Pesticides Screen (Serum Cholinesterase);
   - o PCB Screen.
   - o Flexible Sigmoidoscopy;
   - o Mammography;
   - o PAP Smear.

4.5.2 Fit Testing Requirements

All personnel (including visitors) entering the precautionary area, where the potential exists to need a negative pressure respirator, must have successfully passed a qualitative respirator fit test in accordance with OSHA 29 CFR 1910.134 or American National Standards Institute (ANSI) Z88.2 within the last 12 months. Documentation of fit testing is the responsibility of each employer and will be submitted to the field SSO prior to entering the precautionary area and subsequent use of respiratory protection on-site. Respirator fit tests will be re-performed if an employee loses or gains 10 pounds of

weight, has dental work performed, or otherwise alters the facial area where the respirator seals to the face.

4.6 Air Monitoring Plan

An instantaneous air emissions monitoring program will be implemented at the site to protect workers from potential exposure to TCE generated during the field investigation activities. TCE may volatilize into the atmosphere during field investigation activities and will be measured using a HNu PI-101. The HNu will be calibrated as follows:

1. Carefully attach probe (9.5eV, 10.2eV, 11.7eV);

2. Turn the function switch to BATT and check the battery. (charge this unit overnight with probe connected in the off-position);

3. Turn the function switch to STANDBY and rotate the zero adjustment until the meter reads zero;

4. Turn the function switch to the 0-200 range;

5. Attach a .25 lpm regulator to a disposable cylinder of isobutylene gas (100 ppm). Connect the regulator to the probe with tubing;

6. Open the regulator and allow the needle to stabilize. Unlock the span dial and adjust the span until the meter reading equals:

   - o Sixty-seven ppm with an 11.7eV probe;

   - o Fifty-five ppm with a 10.2eV probe;

- Fifty-five ppm with a 9.5eV probe.

If the span setting is changed after the zero is set, the zero should be rechecked and adjusted, if necessary.

Initial site activity will include determining background volatile organic vapor levels which will define background existence of volatile organics present on-site. The main criteria for upgrading the respiratory protection within the precautionary area from Level "D" to Level "C" is the existence of 5 ppm(v) of TCE above background for a period of five minutes. Once this level of organic vapors is verified at any area within the precautionary area and/or its boundaries, the level of respiratory protection required will be upgraded to Level C.

4.7 Hazards and SOPs Associated with Operating a Drill Rig

Hazard: Physical injury from the drill rig such as pinch points and tangling hair or PPE in rotating parts. Lightning during storms or power supplies from utilities can cause electric shock. In addition, workers could be exposed to contaminants on-site via inhalation of gases or contact and ingestion of contaminated liquids.

SOPs: The rig must be level prior to lifting the mast. All ropes, cables, hydraulic lines, and fluids on the rig must be checked daily. Personnel should locate themselves upwind of the boreholes, whenever possible. Personnel must keep a safe distance from rotating augers, winches, etc. The drill rig must not be operated beneath or within 30 feet of overhead power lines. All underground utilities must be located prior to start of the job. The drill rig must not be operated in the presence of lightning. The breathing zones at the drill rig operations must be monitored for VOCs with an HNu and percent LEL with an explosimeter/O_2 meter at all times. The criteria for the LEL and percent O_2 must be followed as given in Section 4.4. Protective clothing during drilling will

include chemical resistant outer boots, inner and outer gloves taped at wrists, a polycoated tyvek, and respiratory protection according to Section 5.0.

4.8 Daily Tailgate Meetings

All personnel who plan to enter the precautionary area must attend the daily tailgate meeting. This meeting will be conducted by the field manager/SSO and will cover the specific health and safety issues, site activities, changes in site conditions, and a review of topics covered in the initial health and safety meeting as they apply to daily activities. Issues addressed in the daily tailgate meeting will be documented along with the signatures of personnel who attend. An attendance log will be kept by the SSO in the job site office.

4.9 Contingency Plan

The air quality in the work area will be monitored during remediation activities. If the TCE vapor levels exceed 5 ppm(v) above background for five minutes, or 30 ppm(v) above background for one minute within any operational area, the SSO will direct everyone within that area to evacuate the area and/or to don the appropriate respiratory equipment for EPA Level "C" protection. If the TCE vapor concentrations at breathing level (five feet above local ground surface) exceed 30 ppm(v) for 30 minutes or 100 ppm(v) for more than one minute, the on-going activity will be stopped, the construction area evacuated, and contingency measures evaluated. If stopping the field activities does not decrease the TCE levels in the air to below 5 ppm(v) above background, contingency actions to reduce volatilization will be initiated, and might include:

1. Covering of soil surfaces or open boreholes with plastic or tarps;

2. Re-evaluating soil boring methods and procedures;

3. Backfilling of open boreholes.

4.10 Emergency Telephone Numbers

1. Police - State (914) 896-6242;

2. Police - Wappingers Falls (914) 297-1011;

3. Fire Department (914) 297-2122;

4. Ambulance (914) 297-3777;

5. Vassar Brothers Hospital (914) 454-8500

6. Clayton Bock, Regional Health and Safety Coordinator, (215) 337-2551

7. Directions to the Hospital: Myers Corner Road to Route 9 North; Route 9 North toward Poughkeepsie; exit at Academy Street; go right on South Street; follow signs for Vassar Hospital; Hospital is on the left.