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**A Sampling Plan Prepared for:**

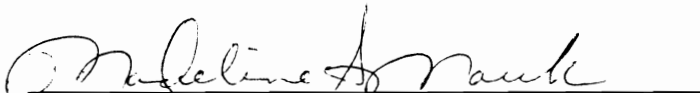
**Olin Chemicals  
Lower River Road  
Charleston, Tennessee 37301**

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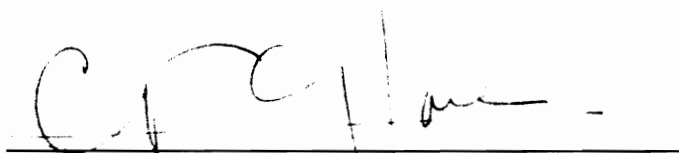
**FINAL SAMPLING PLAN  
OLIN CHEMICALS  
GIBSON SITE  
NIAGARA FALLS, NEW YORK**

**HLA Job No. 17497,001.12**

**by:**



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ATTACHMENTS

1. Groundwater Sampling Form
2. Monitoring Well Location Map

**1.0 INTRODUCTION**

This sampling plan has been prepared to provide guidance for all field activities to collect groundwater samples from five monitoring wells located at the Olin Chemicals, Gibson Site, located in Niagara Falls, New York. This document details the sample collection procedures, sample containerization and labeling, sample shipment, decontamination and disposal, and field sampling quality assurance and quality control.

**2.0 SAMPLING OBJECTIVES**

The objective of sampling the monitoring wells at the Olin Chemicals facility is to satisfy Paragraph 5(e)(i) of the Stipulation and Consent Judgement. Monitoring well MW-A3, located across Cayuga Creek from the northern parcel of the site, will be monitored to establish that there is no contamination that can be connected with the site. Monitoring well MW-1 Replacement will be monitored because it is the only truly upgradient well, and it is located at the upgradient boundary of the site. Monitoring well MW-A1 will be monitored because it is located along the upgradient boundary of the site. Monitoring well MW-5, which is located downstream of the burial site, will be monitored instead of monitoring well MW-6, which was destroyed during construction. Monitoring well MW-3 will be monitored because it is located directly downstream from monitoring well MW-5. Based on data collected during the RI which demonstrated what contaminants were

buried at the site, all samples collected will be submitted for analysis for alpha, beta, delta, and gamma - BHC using U.S. EPA Methods 3510 and 8080 and HCB using U.S. EPA Methods 3510 and 8270.\*

*Review*

All sampling and analysis procedures will be performed in accordance with the applicable requirements specified in Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846, Third Edition.

The wells will be sampled according to the following schedule:

- Quarterly monitoring for seven years - if no change or decreasing concentration, then Olin has the opportunity to petition the DEC to modify the monitoring and fiscal requirements.
- If the monitoring requirements are not modified, Olin will continue monitoring for 23 years.

At the end of the 30 year monitoring, the data generated will be reviewed to determine whether monitoring requirements may be modified. If at any time during the 30 year monitoring period, the results of analysis of samples collected from the groundwater monitoring wells indicate increased contamination over several quarters, the Contingency Plan, Section 9.0, will be implemented.

**3.0 SAMPLING PROCEDURES**

NYSDEC will be notified at least one week prior to any sampling activities in order to afford them the opportunity to collect and split samples.

*groundwater*

buried at the site, all samples collected will be submitted for analysis for alpha, beta, delta, and gamma - BHC using U.S. EPA Methods 3510 and 8080 and HCB using U.S. EPA Methods 3510 and 8250. All sampling and analysis procedures will be performed in accordance with the applicable requirements specified in Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846, Third Edition.

The wells will be sampled according to the following schedule:

- Quarterly monitoring for seven years - if no change or decreasing concentration, then Olin has the opportunity to petition the DEC to modify the monitoring and fiscal requirements.
- If the monitoring requirements are not modified, Olin will continue monitoring for 23 years.

At the end of the 30 year monitoring, the data generated will be reviewed to determine whether monitoring requirements may be modified. If at any time during the 30 year monitoring period, the results of analysis of samples collected from the groundwater monitoring wells indicate increased contamination over several quarters, the Contingency Plan, Section 9.0, will be implemented. ?

### 3.0 SAMPLING PROCEDURES

NYSDEC will be notified at least one week prior to any sampling activities in order to afford them the opportunity to collect and split samples.

Prior to initiation of sampling activities, a polyethylene drop cloth will be placed on the ground around the base of the well being sampled, to ensure that no sampling equipment touches the ground. A new drop cloth will be used at each sampling location. Disposable latex gloves will be worn during all sampling activities and changed between sampling locations.

Prior to collecting samples from each well, the water level will be measured and the parameters of each well will be measured and recorded in the field logbook to verify that purging of the well has produced stable parameters. Wells will be purged until at least three volumes have been removed, and the pH, temperature, and conductivity of the discharged water have stabilized (pH  $\pm 0.1$  unit, temperature  $\pm 0.5^{\circ}\text{C}$ , and conductivity  $\pm 5$  percent of measurement). After the water level in each well has been measured, according to the procedures described in Section 3.1.1, the well will be purged using a polypropylene or teflon bailer, with a cotton rope. A new bailer and rope will be used for each well. If the recovery rate is sufficient, three well volumes will be removed and the water level allowed to recover, prior to sample withdrawal. The amount of water removed can be measured by collecting the purged water in a container of known volume during purging. If a well is purged dry before three casing volumes have been removed, the sample will be collected after the

well has recovered to within 80 percent of the pre-purging water level, or after 24 hours, whichever occurs first.

All purge water removed from the groundwater monitoring wells will be placed in 55-gallon drums (in good condition, with tight lids, with all bungs closed) for transport off-site to a permitted disposal facility.

### 3.1 Measurement of Field Parameters

The following procedures will be used for measurement of field parameters:

#### 3.1.1 Water Level

The water level in each well will be measured using an electronic sounder or a steel tape. The electronic sounder will have permanent marks on the line at intervals of 0.05 feet. Each sounder will have a calibration log available which will be completed prior to water level measurement. Two calibration checks are necessary. The first check will be performed by checking the markings on the line for proper spacing, by physically comparing the spacings with a graduated steel tape. The second calibration check will be performed by checking the depth to water by both electronic sounder and a steel tape. All calibration checks will be logged on an instrument calibration log. The calibration check will be made at the beginning of each sampling sequence and after any incident that may alter calibration, such as cable stretching,



entanglement, or sensor tip replacement. Portions of the cable that are submerged below fluid levels in wells will be decontaminated according to the decontamination procedures described in Section 6.0.

A graduated steel tape will be used, when required, for quality control checks. The steel tape will be regularly checked for kinks and kinked tapes will not be used. If an approximate depth to water is known, the bottom two feet of tape will be chalked, otherwise, the bottom five feet of tape will be chalked. The tape will be slowly lowered into the well, to avoid contact with the casing, and will be held at the measuring point on the well casing. Separate measurements will be taken until successive measurements differ by less than 0.02 feet. If oil products or sheens exist on top of the water table, a separate measurement using a water-finding paste will be made to determine both the depth to oil and depth to water. Sections of the tape that are submerged below fluid levels in wells will be decontaminated according to the decontamination procedures described in Section 6.0.

### 3.1.2 Field Chemical Parameters

Conductivity, water temperature, and pH will be measured during purging, prior to sampling.

A conventional pH meter will be used for field pH determinations. A conventional conductivity meter such as a YSI

Model 33, will be used for field specific conductance measurements. Temperature will be measured using an ASTM mercury thermometer. If agreement within 0.5 ° C is maintained between the thermometer on the conductivity meter and the mercury thermometer, either may be used.

Field conductivity measurements will be converted to conductivity at 25 ° C by the following:

$$SC (25) = \frac{SC (measured)}{\{(T - 25)(.02)\} + 1}$$

where SC (25) = Conductivity at 25°C

SC (measured) = Measured Conductivity

T = Temperature in ° C.

### 3.2 Sample Collection

The following procedures will be used for sample collection:

- After purging of the well, select a new polypropylene bailer for sample withdrawal.
- Check the operation of the check valve assemblies to confirm free operation.
- Attach the bailer to a new cotton rope of sufficient length to allow for water level drawdown during sampling. Clean sampling equipment should not be placed directly on the ground, therefore, a polyethylene drop cloth will be placed around the well to prevent the rope from contacting the ground. A new drop cloth will be used at each sampling location.
- Lower the bailer slowly into the well until it contacts the water surface.

- Allow the bailer to sink and fill with minimal surface disturbance.
- Slowly raise the bailer to the surface, ensuring that the bailer rope does not contact the side of the well or the ground.
- Open the bottom emptying device to allow a slow discharge and ensure that the water flows gently down the side of the sample bottle, with minimal entry turbulence.
- Measure the pH, temperature, and specific conductance, and record in the field log book.
- Repeat the above steps as needed to acquire a sufficient sample volume to fill the sample containers.

#### 4.0 SAMPLE HANDLING, PACKAGING, AND SHIPPING

##### 4.1 Sample Containers

Sample containers will be prepared by the analytical laboratory designated to perform the analyses and shipped in sealed containers to assure they remain clean. Sample containers will be selected to ensure compatibility with the media being collected, preserve sample integrity, and minimize breakage during transportation.

##### 4.2 Sample Labels

Each sample container will be clearly labeled with a sample label filled out at the time of sampling, and affixed to each sample container to identify the sampling location, sample number, sampler's name, and date and time of sample collection.

Sample labels will be secured to each sample container with clear, waterproof tape.

4.3 Sample Packaging

Each sample container will be placed in clean, plastic, ziploc bags and placed in a clean, insulated, ice chest that is filled with ice. Prior to shipment, additional ice should be added as necessary. The insulated cooler lid will then be closed and sealed with waterproof tape. All drain valves on each ice chest will be closed and sealed with waterproof tape to avoid the entrance of contaminants into the cooler and to avoid leaking from the cooler.

4.4 Sample Shipment

Samples will be transported to the analytical laboratory in accordance with Department of Transportation (DOT) and commercial carrier regulations. Shipment of samples will take place on the same day as sample collection. Samples will be shipped by overnight courier services to ensure that the 7 day holding times are met. The analytical laboratory will be notified by telephone as to the schedule of sample shipment.

5.0 **SAMPLE CUSTODY DOCUMENTATION**

Sample custody procedures will be followed to ensure that an accurate, written, verified record is maintained which can

be used to trace the possession and handling of the samples during sample collection, transfer, analysis, and ultimate disposal.

#### 5.1 Chain-of-Custody Record

A Chain-of-Custody form will be completed to record the custody of every sample collected. A Chain-of-Custody form will accompany every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession.

The sample portion of the Chain-of-Custody form will include the following information:

- Site name (location);
- Sample Identification;
- Name of sampler;
- Sampling information (sampling location, number of samples per location, media type, date and time of sample collection);
- Analyses to be performed;
- Signatures of persons involved in the Chain-of-Custody possession, including dates of possession.

The method of shipment will be recorded, along with the airbill numbers, or other shipping numbers, in the space provided at the bottom of the Chain-of-Custody form. The completed Chain-of-Custody forms will be placed in a waterproof plastic bag and securely affixed to the inside of the lid of each cooler, with

waterproof tape, prior to shipment. One copy of the Chain-of-Custody form will be kept by the sampler. Shipping receipts (e.g., air bills) will be retained as part of the documentation of the Chain-of Custody.

## 6.0 DECONTAMINATION AND DISPOSAL PROCEDURES

All equipment used during sampling will be initially decontaminated and packaged to protect it from exposure. In order to prevent unnecessary contamination of sampling equipment prior to use, a clean dedicated area will be established at each sampling location and covered with a polyethylene drop cloth, such that contaminated media do not come into contact with any sampling tools or equipment.

### 6.1 Equipment Decontamination

#### 6.1.1 Laboratory Decontamination Procedures

All equipment used during sampling activities will be decontaminated prior to site entry. Decontamination of equipment prior to sampling will consist of the following:

- Wash equipment thoroughly with non-phosphate detergent and hot water, using a brush to remove any particulate matter or surface film.
- Rinse equipment thoroughly with hot tap water.
- Rinse equipment thoroughly with deionized water.
- Allow equipment to air dry.

- Wrap equipment completely with aluminum foil to prevent contamination during storage and/or transport to the field.

#### 6.1.2 Field Decontamination Procedures

Dedicated disposable bailers will be used for sampling, therefore field decontamination of this equipment is not anticipated.

Decontamination of equipment will consist of washing with a non-phosphate detergent and deionized water. Sampling and monitoring equipment which will be re-used on-site such as steel tapes, well sounders, and thermometers will be decontaminated as follows:

- Rinse with deionized water;
- Scrub with a soft-bristle brush and a nonphosphate detergent;
- Rinse thoroughly with deionized water;
- Allow to dry thoroughly in a clean environment;
- Wrap in plastic and seal with tape.

Generally, only the wetted end of these devices will require cleaning, provided it is washed and rinsed prior to being reeled onto the take-up spool.

6.2 Disposal of Contaminants

Fluids that are produced or used during sampling of monitoring wells or residual fluids or sediments generated during decontamination procedures will be contained and remain on-site until chemical testing has been completed to determine the proper means of disposal. Residual substances generated during decontamination procedures, that are known or suspected to pose a threat to human health or the environment, will be placed in appropriate containers until chemical testing has been completed to determine the proper means for disposal.

All purge water removed from the groundwater monitoring wells will be placed in 55-gallon drums (in good condition, with tight lids, with all bungs closed) for transport off-site to a permitted disposal facility.

7.0 **FIELD SAMPLING QUALITY ASSURANCE AND QUALITY CONTROL**

Field sampling quality assurance and quality control procedures will be followed in order to obtain and evaluate data in an accurate, precise, and complete manner so as to provide information that is comparable and representative of actual field conditions. The quality assurance samples which will be collected and used to evaluate these objectives are described below.

Quality Control (QC) checks will be accomplished by submitting controlled samples into the laboratory from the field. Two external types of QC samples will be used: blanks (field



blanks) and duplicates (replicate samples). A duplicate sample and field blank will be collected during every sampling event. Blank and duplicate samples will be submitted to the laboratory as "blind" samples. Any samples submitted as "blind" samples will be noted in the field logbook and given a sample number that does not indicate to the laboratory that the sample is a QC check. Results of field blank analysis will be reported in the final data package.

#### 7.1 Laboratory Quality Control Checks

Laboratory QC checks are accomplished through the use of system checks and QA/QC samples that are introduced into the same analysis stream. Laboratory system checks and QA/QC samples are defined below.

- Initial Calibration - Analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the mass spectrometer to the target compounds.
- Continuing Calibration - Analytical standard run every 12 hours to verify the calibration of the GC/MS system.
- Method Blank - An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.
- Calibration Check Compounds (CCCs) - Target compounds used to evaluate the calibration stability (precision) of the GC/MS system. Maximum percent deviations of the CCCs are defined in the protocol.

- System Performance Check Compounds (SPCCs) - Target compounds designated to monitor chromatographic performance, sensitivity, and compound instability or degradation of active sites. Minimum response factor criteria for the SPCCs are defined in the protocol.
- Internal Standards - Compounds added to every standard, blank, matrix spike, matrix spike duplicate, sample (for volatile organic analysis [VOAs]), and sample extract (for semi-volatiles) at a known concentration, prior to analysis. Internal standards are used as the basis for quantitation of the target compounds.
- Surrogates - Compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard; used to evaluate analytical efficiency by measuring recovery. Surrogates are brominated, fluorinated, or isotopically labeled compounds not expected to be detected in environmental media.

## 7.2 Project Quality Control Checks

The level and types of project QC check samples that will be introduced into the analytical program for groundwater samples are described below.

The following project QC check samples will be submitted for analyses to ensure and document groundwater data quality.

- Blanks
  - Field blank
  - Rinsate blank
- Field duplicate
- Matrix spike
- Matrix spike duplicate

The project QC samples are described in Section 7.3 of this document.

7.3 Specific Routine Procedures for QA/QC Data Precision, Accuracy, Representativeness, and Completeness

This section summarizes the QA/QC procedures used in assessing the quality of the chemical data and the format for presenting the results of the QA/QC evaluations.

The data evaluation procedures will be used by the Analytical QA/QC Officer or a designated representative for assessing duplicate and spike samples and checking blank samples that are submitted blind to the analytical laboratories from the field or generated internally by the laboratories. The purpose of implementing these procedures is to assess the chemical data generated for accuracy, precision, representativeness, and completeness for both the laboratory analytical program and field sample collection activities.

The primary goal of the program is to ensure that the data generated are representative of environmental conditions at the site. To meet this goal, a combination of statistical procedures and qualitative evaluations will be used to check the quality of the data. Accuracy, precision, representativeness, and completeness will be computed in the manner described in the following paragraphs. A qualitative assessment of accuracy, precision, representativeness, and completeness will be made and

recoveries with those of the matrix spike duplicate.

- Blanks: Blanks are intended to evaluate whether laboratory or field procedures represent a possible source of contamination of the field samples. There are two types of blanks that will be analyzed: field blanks and equipment blanks.

Field blanks are prepared by the sampler during the sampling event by pouring organic-free, deionized water into the actual sample containers in the field, which are kept with the investigative samples throughout the sampling event. They are then packaged for shipment with the other samples and sent to the laboratory for analysis. There should be one field blank included in each sample shipping container. At no time after their preparation are the sample containers opened before they reach the laboratory. Field blanks are collected to assess the presence of contamination introduced by sample bottles or from handling of sample during field operations and shipping.

Equipment blanks are defined as samples that are obtained by pouring water through sample collection equipment after decontamination and placing it in the appropriate sample containers for analysis. These samples will be used to determine if decontamination procedures have been sufficient.

- Duplicate Samples

Replicate Samples - Are samples that have been divided into two or more portions at some step in the sampling and analysis process. Each portion is then carried through the remaining steps in the measurement process. A sample may be replicated in the field or at different points in the analytical process. For field replicated samples, precision information would be gained on homogeneity, handling, shipping, storage, preparation, and analysis. For analytical replicates, precision information would be gained on preparation and analysis.

Because the QA/QC samples are generated for analysis both in the field and internally by the laboratories, a system of cross-checking has been established that provides independent evaluations of the chemical data on two levels (project and laboratory).

The completeness of the data represents the amount of validated data obtained from the field programs versus the amount of data expected under normal conditions. Completeness will be assessed prior to preparation of the final report.

These procedures for evaluating the field and laboratory QA/QC data are the same and are presented below for QA/QC matrix spike, blank, and duplicate samples.

#### 7.3.1 Accuracy and Precision

Accuracy and precision for sample data will be calculated in the final report by evaluating data from blanks, duplicate, and spike QA/QC samples. Procedures for evaluating accuracy and precision are described below for each QA/QC sample type.

##### 7.3.1.1 Spikes

The procedures for assessing spike samples will be as follows:

Tabulate spike sample data and calculate the percent recovery as shown below for each sample:

$$\text{Percent Recovery} = \frac{(T - X)}{A} \times 100$$

Where: T = total concentration found in spiked sample  
X = original concentration in sample prior to spiking  
A = actual spike concentration added to sample

#### 7.3.1.2 Blanks

The evaluation procedures for blanks is a qualitative review of the chemical analysis data reported by the laboratories. The procedure for assessing blank samples will be as follows:

1. Tabulate the data from the blank samples;
2. Identify any blank samples that have target analyte chemicals detected in the sample;
3. If no target analytes are detected in any blank samples, the tables are ready for entry into the data report;
4. If chemicals are found in blank samples, the compound and concentration will be reported and the field data for that period of time will be assessed for potential problems with data interpretation. No data will be removed from the data base based on chemicals being detected in blank samples. Appropriate notations will be made in the data base reports.

#### 7.3.1.3 Duplicates

The procedures for assessing duplicate samples will be as follows:

- Tabulate duplicate data and calculate the duplicate sample agreement (DSA) percent, and relative percent difference (RPD) as shown below for each duplicate pair

$$\text{DSA}(\%) = \frac{X_1 + X_2}{(X_1 + X_2) / 2}$$

$$\text{RPD}(\%) = \frac{(X_1 - X_2) \times 100\%}{X}$$

Where

$X_1$  or  $R_1$  = concentration of sample 1 of duplicate/replicate

$X_2$  or  $R_2$  = concentration of sample 2 of duplicate/replicate

$X$  = average of  $N$  samples

### 7.3.2 Completeness

Overall completeness for the sample data collected will be calculated in the report according to the following equation:

$$C(\%) = v/t \times 100\%$$

Where:  $C$  = completeness of analytical effort in percent  
 $V$  = amount of valid data obtained  
 $T$  = amount of valid data expected to be obtained under normal conditions

Validation of data will be done on 20 percent of the data collected. Based upon the results of this 20 percent level of validation, a decision will be made to assume the remaining data to be valid or to increase the level of validation accordingly. If the data is considered valid and representative based upon a 20 percent validation effort, completeness of the data will be calculated on this basis.

### 7.3.3 Representativeness

Representativeness is addressed previously by describing sampling techniques. Furthermore, representativeness will be assessed by the analysis and interpretation of the results of /internal (laboratory) and external (field) QC samples. Precision and accuracy information developed from the evaluation of QC samples will be used to qualitatively evaluate representativeness.

## 7.4 Data, Validation, Reduction, and Reporting

All data collected will be managed, distributed, and preserved to substantiate and document that data are of known quality and are properly maintained. Technical data, including field data and the results of laboratory sample analyses, will be tracked and validated to monitor the performance of the tasks.

### 7.4.1 Data Validation

Technical data, including field data and results of laboratory sample analyses, will be validated to monitor the performance of the sampling activities. The data collection and quality assurance procedures for validating field and laboratory data are described below.

#### 7.4.1.1 Laboratory Data Validation

Under the direction of the laboratory QA officer, the laboratory will review all analytical data to ensure that results



for samples meet all method specified criteria. The requirements to be checked in validation are:

1. Sample Holding Times
2. Tuning Criteria
3. Calibration
  - Internal
  - Continuing
4. Blanks
5. Surrogate Recovery
6. Matrix Spike/Matrix Spike Duplicate
7. Field Duplicate
8. Internal Standards Performance
9. Target Compound Identification
10. Interference Check Sample Analysis
11. Compound Quantitation and Reported Detection Limits
12. Tentatively Identified Compounds
13. System Performance
14. Overall Assessment of Data
15. Interference check sample analysis
16. Laboratory control sample analysis

The laboratory will perform analytical data reduction and in-house validation under the direction of the laboratory QA officer. The laboratory QA officer will be responsible for assessing data quality and advising appropriate

laboratory section supervisors of any data that are "unacceptable" or have notations that would caution the data user to possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as follows:

- Raw data produced by the analyst will be turned over to the respective Supervisor.
- The Supervisor will review the data for attainment of QC criteria as outlined in method protocols and established EPA methods.
- Upon acceptance of the raw data by the Supervisor, a computerized report will be generated and sent to the laboratory QA Officer.
- The laboratory QA Manager will complete a thorough audit of reports at a frequency of one in ten and an audit of every report for consistency.
- The laboratory QA Manager and Supervisor will decide whether any sample reanalysis is required.
- Upon acceptance of the preliminary reports by the laboratory QA Manager, final reports will be generated and signed by the Laboratory Director. The laboratory data package will be presented in the same order as the samples were analyzed.

The laboratory QA Manager will conduct an evaluation of data reduction and reporting by the laboratory. These evaluations will consider the finished data sheets, calculation sheets, document control forms, blank data, duplicate data, and recovery data for matrix and surrogate spikes. The material will be checked for legibility, completeness, correctness, and the presence of necessary dates, initials, and signatures. The results of these checks will be assessed and reported, noting any discrepancies and

their effect upon acceptability of the data. In addition, the Analytical QA/QC Officer or designated representative will check for data consistency by assessing comparability of duplicate analyses, comparability to previous criteria, transmittal errors, and abnormally high or low parameter values. The results of these checks will be reported in writing.

The following is a description of the validation steps that will be used by the laboratory QA/QC Manager or his representative to validate the laboratory data. These validation results will be summarized in the Final Report. The validation steps are as follows:

- Compile a list of all samples.
- Compile a list of all QC samples, including:
  - Field blanks;
  - Laboratory blanks;
  - Blind Field duplicate samples;
  - Split samples taken by other parties;
  - Laboratory replicates;
  - QC performance samples;
  - Bottle blanks;
  - Matrix spikes; and
  - Matrix spike duplicates.
- Review laboratory analytical procedures and instrument performance criteria.
  - Sample holding time;

- Blanks;
  - Surrogate recovery;
  - Matrix spike/matrix spike duplicate percent recovery; and
  - Overall assessment of data.
- Specific evaluations critical to the integrity of the data include:
    - Review of chain-of-custody documents for completeness and correctness;
    - Transcription, calculation, completeness, and accuracy check; and
    - Review of laboratory analytical procedures, appropriateness, and instrument performance criteria.
  - A data summary will be prepared and will include:
    - Results;
    - Sample media identification;
    - Sample location and descriptions;
    - Appropriate concentration units;
    - Appropriate significant figures;
    - Data qualifiers; and
    - Definitions.
  - The laboratory data summary will be reviewed for potential data quality problems, including:
    - Unexpected results;
    - Common laboratory contaminants;
    - Unusual spatial concentration/identification relationships;

- Unexpected compound or parameter relationships;
- Samples in which dilution was necessary;
- Samples which may have exhibited carry-over; and
- Time and date of sample collection.

A sample data summary will be prepared to assess precision, accuracy, and completeness of the analytical data. Laboratory records and data package requirements will be checked to assess completeness of the data package. The validation effort will be done by personnel qualified and experienced in the field of laboratory data validation.

Despite all efforts to achieve the objectives of the project, the potential for error exists in laboratory chemical analyses and in the data reporting process. Every reasonable effort will be made to compare and double-check data reported from the laboratory, and data entered into the data base management system.

#### 7.4.1.2 Field Measurement Data Validation

Validation of data obtained from field measurements will be performed by the QA/QC Officer. Such validation will be performed by regularly checking procedures utilized in the field and comparing the data to previous measurements. Data that cannot be validated will be so documented.

Field data requiring validation includes the raw data and supportive documentation generated from field investigations and will include, but is not limited to, the following:

- Field notebooks;
- Field instrument readings and calibration data sheet;
- Field log of sampling;
- Sample labels;
- Chain-of-custody forms;
- Sample tracking records; and
- Maps

Field measurements that could affect the quality of the data (such as temperature, pH, conductivity, water level) will also be validated. Validation of all field data will be performed in terms of meeting DQOs by checking the procedures utilized in the field and comparing the data to previous measurements. The following areas will be addressed during validation:

- Sampling methodology;
- Sample holding times and preservation;
- Field instrument selection and use;
- Field instrument calibration and standardization;
- Field instrument preventative and remedial maintenance;
- Field deviations; and
- Units of measure and reference points from which field data will be measured.

Additional specific evaluations of data critical to the integrity of the decision-making process for this task will be performed on 20 percent of the data and will include:

- Chain-of-custody integrity check;
- Review of the appropriateness of field methodologies;
- Transcription, calculation, completeness, and accuracy check of field data; and
- Analysis of field notes to determine presence of bias.

#### 7.4.2 Data Reduction

Data quality and utility depends on many factors, including sampling methods, sampling preparation, analytical methods, quality control, and documentation. Once all physical and chemical data are validated and assembled, these data are further evaluated with respect to Precision, Accuracy, Representativeness, Completeness and Comparability, (PARCC) parameters. Satisfaction of these criteria will be documented as listed below. Chemical data must meet criteria of (1) quantitative statistical significance, (2) custody and document control, and (3) sample representativeness. Physical data must meet criteria of: (1) sampling location, time, and personnel; (2) documentation; and (3) methodologies.

To evaluate the custody and document control for samples and results, the following items will be documented:

1. Field custody noted in field logbook or chain-of-custody documentation available;
2. Samples hand-delivered to laboratory or chain-of-custody documentation available;
3. Laboratory custody documented by chain-of-custody documentation from either field personnel or shipper;
4. Laboratory custody documented through designated laboratory sample custodian with secured sample storage area;
5. Sample designation number(s) traceable through entire laboratory monitoring system;
6. Field notebooks and all custody documents stored in secure repository or under the control of a document custodian;
7. All forms filled out completely in indelible ink without alterations except as initialed;
8. Identity of sampler; and
9. Date of sample collection, shipping, and laboratory analysis.

To determine sample representativeness the following items must be checked:

1. Compatibility between appropriate field and laboratory measurements or suitable explanation of discrepancy;
2. Analysis within holding time limits suitable for the preservation and analysis methods used;
3. Sample storage within suitable temperature, light, and moisture conditions;
4. Proper sample containers used;
5. Proper sample collection equipment used, properly decontaminated, not biased;



6. Proper sample preservation techniques used;
7. Proper laboratory preparation techniques used (e.g., grinding, sieving, drying, digestion);
8. An evaluation of factors to determine bias screening; and
9. Sample site selection criteria to provide representativeness.

To evaluate the field physical data that support the analytical data, the following items will be documented:

1. Sampling date and time;
2. Sampling team, observation taker and recorder, and team leader;
3. Sampling location;
4. Physical description of sampling location;
5. Sample collection technique;
6. Field preparation techniques;
7. Visual classification of sample using an accepted classification system (if applicable);
8. A thorough description of the methodology used and a rationale for the use of that methodology;
9. Complete documentation of record-keeping practices;
10. Field notebooks and all custody documents stored in a secure repository or under the control of a document custodian; and
11. All forms filled out in indelible ink without alterations except as initialed.

#### 7.4.2.1 Reduction of Analytical Data

Reduction of analytical data will be performed in accordance with validation procedures described previously. These procedures specify the documentation needed and the technical criteria required to validate the data. Once validated, the data will be evaluated with respect to precision, accuracy, completeness and representativeness. The definitions of these parameters have already been presented.

Accuracy is evaluated by assessing the percent recovery for a spiked sample for organic analyses. Matrix spikes (MS) and matrix spike duplicates (MSD) are used to evaluate the data for accuracy. MS and MSDs are actual samples spiked in the laboratory with a representative group of Target Compound List analytes. One sample for each twenty samples, or one per analytical batch, whichever is less, is required to be used for matrix spike analysis.

Precision is evaluated by assessing the relative percent difference of matrix spike recoveries for two matrix spikes of the same sample (matrix spike and matrix spike duplicates recoveries) for organics analyses. Precision will also be assessed by comparing results for field sample duplicates to provide information on homogeneity of field sampling techniques and on laboratory sample preparation and analysis.

Upon completion of the data validation and assessment of the data with respect to precision, accuracy, representativeness

and completeness, QA/QC reports will be developed for each analytical data package. This report, along with a field activities documentation report, will be prepared summarizing the results obtained for all samples collected. Where test data have been reduced, the method of reduction will be described in the report.

#### 7.4.2.2 Reduction of Field Measurement Data

Reduction of field measurement data will be done in accordance with validation procedures described previously in Section 7.4.1. Validity of all data will be determined by checking calibration procedures utilized in the field and by comparing the data to previous measurements obtained at the specific site. The Engineer/Site Manager will summarize the data obtained from field measurements and will include the information in the field activities documentation report, which will be submitted to the designated QA Officers and the Project Manager for review.

#### 7.4.3 Reporting

Data generated will be appropriately identified, validated, and summarized in the final report. The QA/QC Officer will develop a data storage and information system to facilitate and manipulate data for tracking, data calculations, and transfer

of data to various forms and reports and transmittal of data into a data storage system.

The field reports will include: presentation of results, summaries of field data from field measurements, and field location of sampling points. All other information (Chain-of-Custody forms, etc.) will be bound into an appendix. Raw data, when provided, will be transmitted as a separate appendix. The laboratory reports will include at a minimum the following components:

- Report title page;
- Sample description information;
- Analytical tests assigned;
- Analytical results;
- Quality control report;
- Description of analytical methodology; and
- Description of QC methodology.
- Significant QA/QC problems, recommended solutions, and results of corrective actions;
- Discussions of whether the QA objectives were met, and the resulting impact on decision making; and
- Limitations on the use of the measurement data.

## 8.0 RECORDKEEPING

### 8.1 Field Logbook

Sampling activities will be recorded in a bound field logbook on a daily basis. The field logbook will contain all

pertinent sampling information, including the sampling locations, descriptions of any factors which might affect sampling procedures (prevailing weather, etc.). Any deviations from this sampling plan will be documented in the field logbook. All routine measurements and observations will be recorded in the field logbook, including collection of blank samples and water depths, as well as pH, conductivity, temperature, turbidity, color, and odor of the groundwater.

#### 8.2 Groundwater Sampling Form

All purging and groundwater sampling information will be logged on a Groundwater Sampling Form. The following information will be included on the Groundwater Sampling Form: well number, well location, well material, date and time of collection, name of sampler, casing diameter, total depth of casing, well depth, water level depth, number of well volumes to be purged, total volume to be purged, purge method and time, actual purge volume, pH, conductivity, temperature, turbidity, color, and odor of groundwater, well condition, sampling method, sample numbers, volume of each sample container, type of analysis requested, blank samples.

8.3 NYSDEC Reporting

A report summarizing the groundwater monitoring activities and analytical results will be prepared and sent to the NYSDEC each time a monitoring cycle is scheduled.

8.4 Field Instrumentation Calibration Log

All groundwater sampling equipment (e.g., specific conductance, temperature, and pH meters) will be calibrated on a daily basis. The calibration procedures will follow standard manufacturer's instructions to assure that the equipment is functioning within tolerances established by the manufacturers. Copies of the manuals for each instrument should be available in the field with each instrument. Each time an instrument is calibrated, a calibration log should be completed with the following information: date and time of calibration, name of individual performing calibration, instrument, model number of instrument, calibration method, adjustments to instrument required, whether instrument is functioning properly, whether a back-up instrument was required for an instrument not functioning properly, and if so, replacement instrument used and model number.

**9.0 CONTINGENCY PLAN**

If the results of analysis of samples collected from the groundwater monitoring wells at the Gibson site indicate increased contamination over four quarters, further investigation of the

data will be undertaken to determine the nature and extent of contamination. Based on the results of the investigation, a meeting will be held with representatives from Olin Corporation and the State of New York to discuss the contamination. If necessary, a sampling plan and a remediation program will be developed to address the source and migration of contaminants.

ATTACHMENT 1

Groundwater Sampling Form





**GROUND-WATER SAMPLING FORM**

Job Name \_\_\_\_\_  
Job Number \_\_\_\_\_  
Recorded by \_\_\_\_\_  
(Signature)

Well No. \_\_\_\_\_  
Well Type:  Monitor  Extraction  Other \_\_\_\_\_  
Well Material:  PVC  St. Steel  Other \_\_\_\_\_  
Date \_\_\_\_\_ Time \_\_\_\_\_  
Sampled by \_\_\_\_\_  
(Initials)

**WELL PURGING**

**PURGE VOLUME**

Casing Diameter (D in inches):  
 2-inch  4-inch  6-inch  Other \_\_\_\_\_  
Total Depth of Casing (TD in feet BTOC): \_\_\_\_\_  
Water Level Depth (WL in feet BTOC): \_\_\_\_\_  
Number of Well Volumes to be purged (# Vols)  
 3  4  5  10  Other \_\_\_\_\_

**PURGE METHOD**

Bailer - Type: \_\_\_\_\_  
 Submersible  Centrifugal  Bladder; Pump No.: \_\_\_\_\_  
 Other - Type: \_\_\_\_\_

**PUMP INTAKE SETTING**

Near Bottom  Near Top  Other \_\_\_\_\_  
Depth in feet (BTOC): \_\_\_\_\_ Screen Interval in Feet (BTOC)  
from \_\_\_\_\_ to \_\_\_\_\_

**PURGE VOLUME CALCULATION:**

$$\left( \frac{\text{TD (feet)} - \text{WL (feet)}}{\text{D (inches)}} \right)^2 \times \text{\# Vols} \times 0.0408 = \text{Calculated Purge Volume (gallons)}$$

**PURGE TIME**

**PURGE RATE**

**ACTUAL PURGE VOLUME**

Start \_\_\_\_\_ Stop \_\_\_\_\_ Elapsed \_\_\_\_\_ Initial \_\_\_\_\_ gpm Final \_\_\_\_\_ gpm \_\_\_\_\_ gallons

**FIELD PARAMETER MEASUREMENT**

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T <input type="checkbox"/> °C <input type="checkbox"/> °F	Other _____

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T <input type="checkbox"/> °C <input type="checkbox"/> °F	Other _____

Observations During Purging (Well Condition, Turbidity, Color, Odor): \_\_\_\_\_

Discharge Water Disposal:  Sanitary Sewer  Storm Sewer  Other \_\_\_\_\_

**WELL SAMPLING**

**SAMPLING METHOD**

Bailer - Type: \_\_\_\_\_  Same As Above  
 Submersible  Centrifugal  Bladder; Pump No.: \_\_\_\_\_  Grab - Type: \_\_\_\_\_  
 Other - Type: \_\_\_\_\_

**SAMPLING DISTRIBUTION**

Sample Series: \_\_\_\_\_

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments

**QUALITY CONTROL SAMPLES**

Duplicate Samples

Blank Samples

Other Samples

Original Sample No.	Duplicate Sample No.

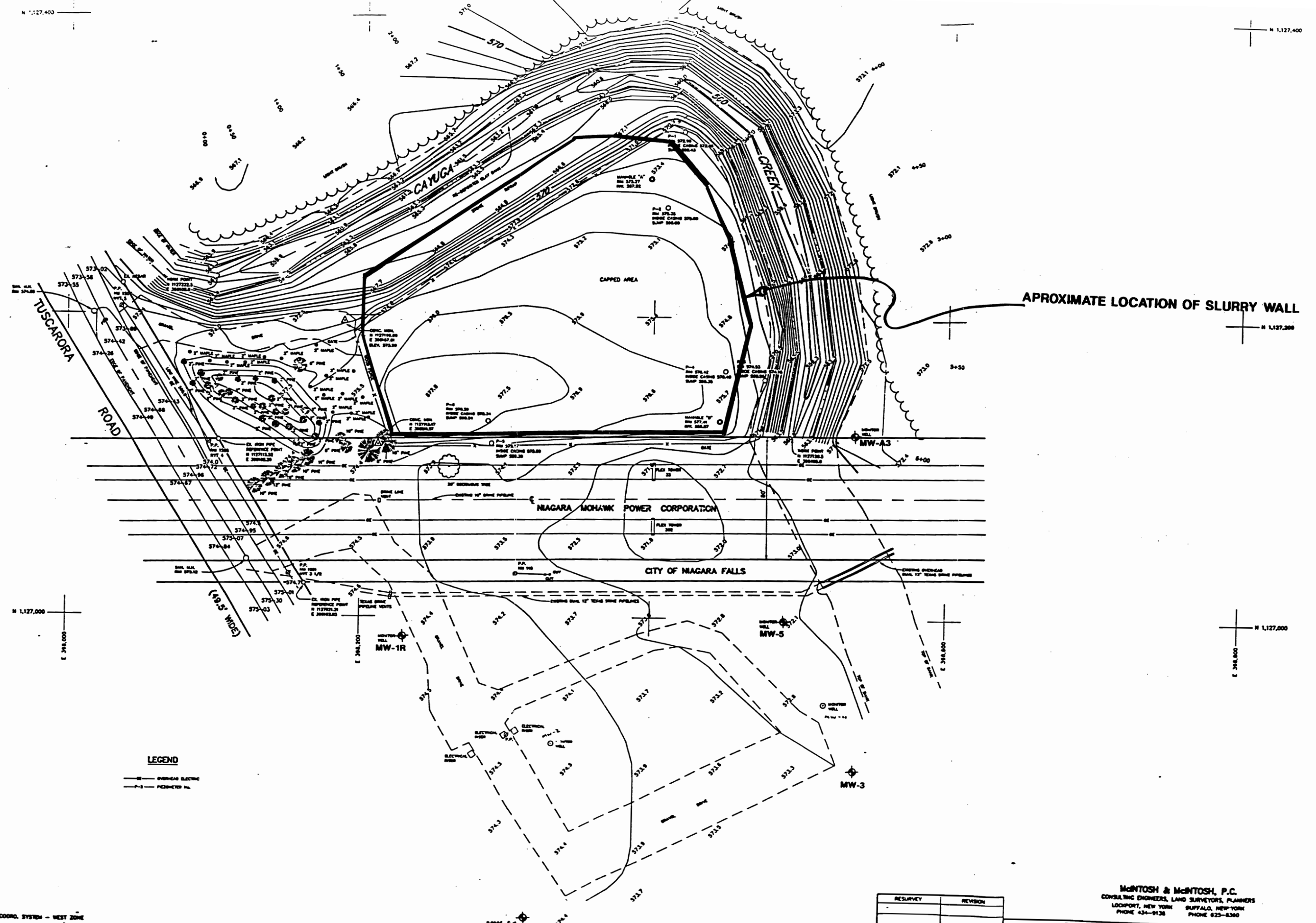
Type	Sample No.

Type	Sample No.

**ATTACHMENT 2**

**Monitoring Well Location Map**

N 1,127,400



APPROXIMATE LOCATION OF SLURRY WALL

**LEGEND**

- POWER LINE
- P— P-3 PERIMETER WALL

1. NORTHWEST PLANCE BOLT  
NORTHEAST CORNER OF  
2 & NIAGARA FALLS BLVD.  
3.00

2. SYSTEM - NEW YORK STATE PLANE COORD. SYSTEM - WEST ZONE  
3. BASED ON NAD 83

RESURVEY	REVISION

McINTOSH & McINTOSH, P.C.  
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS  
LOCKPORT, NEW YORK    BUFFALO, NEW YORK  
PHONE 434-9128    PHONE 625-8300

TOPOGRAPHIC MAP OF THE GIBSON SITE - OLIN CORP.  
LOCATION: CITY OF NIAGARA FALLS & TOWN OF NIAGARA, NIAGARA COUNTY, NEW YORK

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JOB No. 5237-A    SCALE: 1" = 30'    DATE: NOVEMBER 16, 1990