TOWN OF SALINA LANDFILL

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SITE I.D. NO. 734036

MAY 8

QUALITY ASSURANCE PROJECT PLAN

PREPARED FOR:

TOWN OF SALINA
201 School Road
Liverpool, New York 13088

MAY 15, 1998

PREPARED BY:

CLOUGH, HARBOUR & ASSOCIATES LLP
Engineers, Surveyors, Planners & Landscape Architects
109 South Warren Street, Suite 1300
Syracuse, New York 13202

CHA Project No. 6967

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1.0 PROJECT DESCRIPTION

Clough, Harbour & Associates LLP (CHA) has been retained by the town of Salina to conduct a Remedial Investigation and Feasibility Study (RI/FS) of the former Town of Salina Landfill. The landfill has been designated a Class 2 Inactive Hazardous Waste Site by the New York State Department of Environmental conservation (NYSDEC) and is also considered a subsite to the Onondaga Lake National Priorities List (NPL) site by the United State Environmental Protection Agency (USEPA).

This Quality Assurance Project Plan (QAPP) addresses the major quality assurance/quality control (QA/QC) considerations and guidelines for the field and analytical activities to support the RI/FS at the Town of Salina Landfill. As the project proceeds, new considerations may need to be addressed and additional guidelines provided in order to maximize the efficiency and quality of the field work.

The town of Salina Landfill is located off Route 11 in the Town of Salina (Figure 1). The landfill has previously been defined as approximately 55 acres in size. The landfill opened in 1960 and stopped accepting waste in 1975. During the period the landfill was open, in addition to accepting municipal solid waste, the landfill also accepted hazardous wastes including paint sludge, paint thinner, PCB-contaminated wastes, and contaminated sediment dredged from the adjacent Ley Creek. A soil cover was placed over the landfill in 1982. In 1996, the NYSDEC designated the Town of Salina Landfill as a Class 2 Inactive Hazardous Waste Site.

The objectives of this project consist of the following:

- Obtain historical and site data to support cost recovery from potentially responsible parties (PRPs).
- Determine the nature and extent of contamination through a detailed field investigation. The investigation will include verification of current landfill dimensions, soil properties, waste types, and obtain other limited design data to support the Feasibility Study.

- Assess human exposure potential and current and potential impacts to flora and fauna.
- Conduct a Feasibility Study, with a presumptive focus on containment, especially construction of a landfill cap.
- Inform the public of investigation activities and their results, responding to concerns as required and appropriate under 6NYCRR Part 375, New York State Regulations for Inactive Hazardous Waste Sites.

The schedule for performance of this RI/FS is from approximately November 1997 to June 2000. During this time period the following will occur:

- Visit the site and scope the project - complete by January 1997;
- Preparation of Draft and Final NYSDEC approved Work Plan - complete by mid-June 1998;
- Perform Site Investigation Field and Laboratory Analyses – completed by February 1999;
- Complete RI Report - by June 1999;
- Complete Draft and Final NYSDEC approved Risk Assessment Report – by January 2000;
- Prepare Draft and Final NYSDEC approved Feasibility Study - complete by mid-April 2000;
- Public Review of Project and Remedy - complete by July 2000.

The project site will be characterized through a series of field investigations consisting of:

- a site survey
- an ecological field survey,
- a waste area investigation,
- a groundwater investigation,
- surface water/sediment investigation,
- surface soil sampling, and
- analysis of samples.

CHA, Lawler Matusky and Skelly Engineers LLP (LMS) and subcontractor personnel will perform this work, which is described in further detail below:

Site Survey – the CHA survey crew will develop a topographic map of the site using a baseline referenced to New York State Plane coordinates, at a 2 foot contour interval referenced to National Geodetic Vertical Datum of 1988. CHA will also locate the horizontal position of all sampling points and will locate the vertical elevation of all wells and piezometers to the nearest 0.01 foot.

Ecological Field Survey - this LMS task involves identification of area flora and fauna, and identifying fate and transport mechanisms to the environment.

Waste Area Investigation - The waste area investigation will consist of review of historical aerial photographs, a soil gas survey, and excavation of test pits to define the limit of waste. CHA will first compile and review historical aerial photographs to track the development of the landfill over time.

To determine if the landfill is still producing methane gas and determine whether gas is migrating off site, CHA will perform a soil gas survey. The survey will be performed by advancing a steel probe approximately 3-4 feet into the ground and then using a meter designed to detect methane gas to analyze the soil gas in the hole made by the probe.

Although a soil cover was placed over the landfill in 1982, it is necessary to verify the limit of waste at the landfill. To efficiently determine the limit of waste, CHA proposes to excavate test trenches around the apparent perimeter of the landfill verifying the position of waste at approximately 100-foot intervals. We will also excavate test pits in the area between the current Ley Creek channel and the former Ley Creek channel to identify the limit of waste in this area.

To determine if the bedding material surrounding the sewer that crosses the site is acting as a preferred pathway for contaminant migration, we will excavate test pits in this material to facilitate sample collection. We will subcontract the excavation work to a qualified excavating contractor.

Groundwater Investigation – The current monitoring network around the landfill consists of six groundwater-monitoring wells. CHA will install an additional eight (8) permanent monitoring wells on the project site in the water table aquifer. Currently there is no information on water quality or depth to water in the middle of the landfill. Therefore, based on our discussions with

the NYSDEC, we propose to install two of the eight wells in the middle of the landfill. Based on existing information, we are assuming that the wells will be approximately 20 feet deep. CHA will subcontract the drilling work to a qualified drilling contractor.

Because of the importance of characterizing groundwater contaminant transport adjacent to Ley Creek, we propose to install seven (7) temporary wells to an average depth of 20 feet along the southern edge of the landfill. These temporary wells will also be used to help determine whether a leachate collection system would be effective. CHA will retain a qualified Geoprobe contractor to perform this work.

Currently, there is no information on the vertical extent of groundwater contamination. Therefore, we propose to install three- (3) permanent "deep" monitoring wells. The wells will be installed above the bedrock/overburden interface; however, the depth to bedrock is unknown. For the purpose of the workplan budget, we are assuming that the three "deep" wells will be 75 feet deep.

A second objective for installing three deep wells is to identify the subsurface soils beneath the site. To help understand the subsurface transport of contamination, it will be useful to construct cross-sections through the landfill. Therefore, as the borings for the deep wells are drilled, soil samples will be collected continuously from surface grade until bedrock is encountered. In addition to the three deep wells discussed above, we propose to drill four additional borings to bedrock through the landfill. As with the deep wells, we assume that these borings will each be up to 75 feet deep.

CHA's research of the available information identified areas of possible sand and gravel deposits buried beneath silt and clay deposits in Onondaga County. Areas beneath Onondaga Lake and Ley Creek (in the landfill vicinity) were identified as such areas. If in the course of drilling the deep test borings, we identify this sand and gravel deposit, we will need to ensure that there is no cross-contamination from the upper water table aquifer, into this deeper confined aquifer. To

address this potential concern, we have accounted for additional drilling costs for the deep borings and wells.

After the wells are installed, the wells must be developed to remove silt and clay introduced as part of the drilling process. The drilling contractor will perform this work under CHA's supervision. We are not proposing to develop the temporary wells. After the wells are developed, all new wells (11) and all existing wells (6) will be sampled. Note that existing well MW-0 is considered to represent background for the site.

To evaluate groundwater contaminant transport rates, we need to determine the hydraulic conductivity and the hydraulic gradient of the aquifer. We propose to perform falling head and rising head slug tests in each of the newly installed wells to measure the hydraulic conductivity. We will measure water levels in the monitoring well network to evaluate the hydraulic gradient.

Surface Water/Sediment Investigation - Previous samples of surface water and sediments collected from Ley Creek and adjacent drainage ways provides baseline data on the nature and extent of contamination in these media. However, because of the importance of Ley Creek in potentially transporting contaminants to Onondaga Lake, we propose to collect samples of surface water and sediment samples from five (5) new locations during this investigation. The samples will be collected from the stretch of channel located between the bridge over Route 11 and the bridge over Seven North Street. Leachate samples will also be collected from up to six (6) locations along the north and south banks of Ley Creek.

Surface Soil Sampling - As mentioned previously, a soil cap was placed over the landfill in 1982. However, to evaluate the potential risk of contact with potentially contaminated surface soil, we propose to collect seven surface soil samples from the landfill. Four of the samples will be collected from the landfill on the north side of Ley Creek and two samples will be collected from the area located between the current Ley Creek channel and the former Ley Creek channel.

Sample Analysis - All of the samples discussed above will be analyzed for the full Target Compound List of chemical parameters plus cyanide, with the exception of the temporary wells. We propose to sample the seven- (7) temporary wells for leachate indicator parameters only. Additionally, the groundwater samples will be analyzed for both total and dissolved metals, and various leachate indicator parameters.

Based on NYSDEC protocols, we will collect and analyze one set of quality assurance/quality control samples (QA/QC) for every 20 samples collected. All samples will be analyzed by laboratory certified under the New York State Department of Health Environmental Laboratory Approval Program (ELAP) using Revision 95 of the Analytical Services Protocols (ASP). The laboratory will produce an ASP Category B deliverable package.

For this project, a first phase field investigation will be performed. The data generated from that phase will be evaluated and data gaps will be identified. At this time, CHA has planned that a Work Plan for a second phase investigation will be prepared and be implemented. The scope for the second phase investigation will depend on the results received from this first round of sampling. CHA has accounted for a second round of sampling in the project schedule, but has not budgeted for this work at this time.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The site-specific organization chart, describing the chain of command for this project is presented in Figure 2. The responsibilities of the project personnel are described below. Resumes for project personnel are on file with NYSDEC. A complete listing of names and addresses of key project personnel is also provided in Table 1.

- *NYSDEC Project Manager* - Provides oversight of the contract, and all program activities. Reviews final project QA objectives, needs, problems, and requests. Approve appropriate QA corrective actions as needed. Provide contacts and approval for methods and analytical procedures. Ensure compliance with NYSDEC QA/QC policies. Provide coordination between NYSDEC and CHA for field operations and analytical services. Monitor analytical requirements.

- *Program Administrator* - Implements necessary action and adjustment to accomplish program objectives. Oversees project performance to ensure contract compliance.

- *Project Manager* - Directs project and provides technical expertise to accomplish program objectives. Ensures that project tasks are successfully completed within the projected time periods and projected budget. Oversee all remedial investigation activities, subcontractor management, technical support, and supervise and schedule field activities.

- *Quality Assurance Office* - Responsible for preparation and approval of QAPP. Responsible for performing quality assurance audits and ensuring that any necessary corrective actions are implemented.

- *Remedial Investigation Task Manager* – Coordinate oversight of field activities, for both personnel and subcontractors. Also will serve as the on-site health and safety officer, to ensure compliance with the HASP.

- *Feasibility Study Task Manager* - Responsible for screening and evaluation of alternatives and will be the primary author of the FS report.

- *Field Technicians*- Performs tasks identified in work plan and field sampling plan in accordance with designated procedures. Adheres to procedures within health and safety plan. Provide technical QA assistance on site to accomplish project objectives including making suggestions for corrective actions.

- *Analytical Laboratory*- Performs analysis of samples, including all required QC sample analysis (analytical duplicates, blanks, matrix spikes, performance evaluation samples, etc.). Initiates and documents required corrective action pertaining to laboratory analysis. Performs preliminary review of data for completeness and transcription or analytical error. Follows good laboratory practices and NYSDEC guidelines.

3.0 QA OBJECTIVES FOR MEASUREMENT

The overall data quality objectives (DQOs) for measurement of data are to ensure that data of known and acceptable quality are provided; that all measurements will be made to yield consistent results representative of the media and conditions measured; and all data will be reported in units consistent with those of other agencies and organizations to allow comparability of data. These objectives will be obtained by adherence to this QAPP. The specific DQOs for the sampling program are summarized in Table 2.

Levels of quality for all laboratory analyses shall be based on those stipulated by the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP). QC samples will be run for QA/QC purposes according to specifications in the laboratory's QA/QC Plan (on file with CHA). NYSDEC Analytical Services Protocol (ASP) or EPA analytical methods will be used for all analyses unless otherwise noted (see Table 3). Detection limits set by the relevant NYSDEC or EPA methods will be used for all sample analyses unless otherwise noted.

The project objectives defined below are designed to assure the data user that the proper QA/QC procedures have been implemented. The data generated must meet the following objectives for precision, accuracy, representativeness, completeness, and comparability (PARCC parameters) to determine the overall acceptability of the analytical results. The PARCC parameters are described below:

Precision - The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical method on samples of the same matrix. For this investigation, precision is evaluated using analyses of laboratory and field duplicate samples, which not only exhibit analytical precision, but also the reproducibility of the analytical results. Relative Percent Difference (RPD) criteria, published by the NYSDEC as part of ASP, and those determined from the laboratory performance data, are used to evaluate precision.

Accuracy - The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Percent recovery criteria, those published by the NYSDEC as part of the ASP and those determined from the laboratory performance data, are used to estimate accuracy based on recovery in the matrix spike and matrix spike duplicate samples (MS/MSD). The MS/MSD samples will give an indication of matrix effects that may be affecting the target compounds.

Representativeness - Expresses, in a qualitative manner, the degree to which data represents the environmental condition, characteristics of a population, parameter variations at the sampling point, or a process condition. The representativeness of the data from the site depends on the sampling design and sampling procedures.

Comparability - Expresses, in a qualitative manner, the confidence with which one data set can be compared to another. Comparable data is generated by using standard units of measure, using the same or similar analytical instrumentation, and using standard analytical methods.

Completeness - A measure of the amount of valid data obtained compared to the amount expected to be collected under normal conditions. It is usually expressed as a percentage. The completeness objective will be calculated as a percentage of the number of samples successfully analyzed versus the number of samples collected and proposed. Achievement of this objective will rely on the use of the sample identification and custody procedures, the use of laboratory QA/QC criteria and corrective action any time QC acceptance criteria are exceeded.

The objectives for the precision, accuracy, and completeness of the laboratory data have been established and are presented on Table 4. The procedures for calculating these parameters are included in Appendix A.

For field QC data, CHA sampling personnel shall follow the guidelines in the Standard Operating Procedures (SOPs) of the Field Sampling Plan (FSP) for quality control of field measurements.

4.0 SAMPLING PROCEDURES

The sampling program for this project consists of representative sampling of groundwater, surface water and sediment, surface and subsurface soil, and leachate as described in the FSP. The sampling program has been developed for this investigation to provide additional data necessary to identify the extent and severity of contamination and to determine if any imminent health hazard exists from any of the contaminated media. All samples will be handled in accordance with the Health and Safety Plan (HASP), the Field Sampling Plan (FSP) and this QAPP. Site-specific details as to number of samples, sample locations, and sampling procedures are discussed in the FSP.

The following considerations form the basis of the sampling plan:

- Site background and history;
- Sampling objectives;
- Sample location and frequency;
- Sample designation;
- Sampling equipment and procedures; and
- Sample handling and analysis.

The sampling objectives, locations and frequency are based upon an evaluation of the data quality objectives. A detailed discussion of the sampling activities is presented under separate cover in the FSP, which also includes standard operating procedures.

5.0 SAMPLE CUSTODY

Sample custody is a vital aspect of the program. The samples must be traceable by Chain-of-Custody procedures from the time of sample collection until the time data are utilized for any major decision. As such, evidence of collection, shipment, and laboratory receipt must be documented. The sample custody procedures to be implemented on this project are as follows.

The laboratory initiates sample chain-of-custody with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples should be minimized. Immediately following sample collection, each sample container will be marked with the following information:

- Sample Code;
- Project Number;
- Date/Time;
- Sample Type;
- Sampler's Initials;
- Preservative; and,
- Analytical Method.

The sample code will indicate the site location, media sampled, and sample station. The procedures for defining the sample code are contained in the Field Sampling Plan.

After all sample identification information has been recorded, each sample label will be covered with waterproof clear plastic tape to preserve its integrity. In the field, each sample will be sealed and checked for proper labeling. A chain-of-custody record accompanies the sample from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation, and return to the laboratory. Samples are to be received by

the laboratory within 48 hours of the sampling event. Two copies of the chain-of-custody follow the samples to the laboratory. The laboratory maintains one file copy and the completed original is returned to the site inspection team. Individual sample containers provided by the laboratory are used for shipping the samples. The shipping container is closed and a seal provided by the laboratory is affixed to the latch. All samples will be recorded and tracked under proper Chain-of-Custody protocols. Prior to shipping to the analytical laboratory, the samples will be packed into coolers with ice and a Chain-of-Custody form (Figure 3) will then be completed for each cooler. The forms will be signed and dated by the person who collected the samples, the person the samples were relinquished to for transportation to the laboratory, and the laboratory sample controller/custodian who receives the samples.

The seal affixed to the sample transport container indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the Quality Assurance Officer and the sample will not be analyzed if tampering is apparent.

The CHA project manager notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample custody program is further described in the QA/QC plan from the laboratory, and meets the following criteria:

- The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.

- Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.

- Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the project QA Officer, as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.

- The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.

- A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.

- A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project record. Final evidence files include all originals of laboratory reports and are maintained under documented control in a secure area.

6.0 CALIBRATION PROCEDURES

Calibration procedures, calibration frequency, and standards for field measurement variables and systems shall be in accordance with the manufacturer's recommendations for the equipment. The field equipment will be calibrated twice each working day, once at the start and once in the middle of each day, unless otherwise specified by the equipment manufacturer's recommendations.

The instruments that will be used to make measurements in the field during the project site investigation include the following;

- Portable field combined pH, specific conductance, temperature and dissolved oxygen meter;
- Eh meter;
- HNu photoionization detector;
- Turbidimeter; and
- GPS survey units

Documentation of field equipment calibration will be completed using an equipment calibration log. The equipment calibration log shall be completed according to the frequency of calibration previously stated and will include the following information when appropriate.

- Type and identification number of equipment;
- Calibration frequency and accepted tolerances;
- Calibration dates;
- Identification of individual(s) and/or organization(s) performing the calibration;
- Reference standards used for each calibration;
- Calibration data;
- Certifications or statements of calibration provided by manufactures and external agencies, and traceable to national standards; and,
- Information on calibration acceptance and failure.

Specific calibration procedures for laboratory instrumentation are explained in the QA/QC Plan provided by the laboratory.

7.0 ANALYTICAL PROCEDURES

To achieve the previously stated QA/QC goals, the analyses will be performed according to NYSDEC Analytical Services Protocol (ASP), October 1995 revision. The NYSDEC ASP has specific requirements regarding Laboratory QA/QC procedures which will be followed on all samples collected and analyzed. These requirements are presented in the Laboratory QA/QC documentation (on file with CHA). Samples not analyzed under ASP protocol shall be completed according to SW-846 methodologies.

All analytical procedures, including procedural steps and options, QC requirements, etc., for ASP are referenced in accordance with the ASP Statement of Work (SOW), or as specified by the method used. It should be noted that detection limits are highly matrix dependent and may not always be the same for all samples. The deliverables for this project will be in ASP Category B format.

A summary of the analytical parameters, sample preservation, and holding time requirements are presented on Table 5.

8.0 DATA REDUCTION, VALIDATION AND REPORTING

The following procedures summarize the practices utilized for data reduction, validation, and reporting. These procedures are to be utilized for both field data and laboratory data. CHA staff will conduct data reduction and reporting in accordance with the NYSDEC guidance documents. Validation of at least the first round of data will be performed.

Both objective (measured) and subjective (descriptive) data are subject to data review. All data collected in the field shall be documented following the procedures detailed in the FSP and CHA's SOPs. Objective data shall be reviewed at the time of collection to ensure that the correct codes and units have been included. After the field data have been reduced into tabular form, the data shall be reviewed for anomalous or inconsistent values by the Project Manager. Any anomalous or inconsistent data shall be resolved or clarified by evaluating the raw data, equipment calibration logs, etc., and consulting with field personnel. Subjective field or technical data shall be evaluated by the Project Manager for reasonableness and completeness in use. Periodic field reviews of subjective data collection shall be conducted if deemed necessary. All validated field and technical data shall be reported in preliminary, draft, and final RI reports for review and comment.

For all laboratory analyses, the reporting and deliverable requirements for each sampling event will conform to the NYSDEC ASP-Oct. 1995 criteria. Contract required quantitation limits (CRQL) will be reported in accordance with ASP. The standard NYSDEC ASP report forms will be completed by the analytical laboratory and included in each deliverable data package.

Upon completion of laboratory analysis, the data generated shall be validated in accordance with NYSDEC guidance and USEPA guidelines by an independent third party on the data deliverables package.

The environmental scientist preparing the data validation report will also submit a resume to the NYSDEC Quality Assurance Unit documenting relevant experience in environmental sampling and analysis methods and data review and hold a Bachelors Degree in a Natural Science or Engineering.

The validation report is prepared by reviewing and evaluating the analytical data. The parameters that will be evaluated in reference to compliance with the analytical method protocols includes all sample chain-of-custody forms, holding times, raw data (instrument printout data and chromatograms), calibrations, blanks, spikes, controls, surrogate recoveries, duplicated and sample data. The Field Sampling Notes will also be reviewed and any quality problems will be evaluated as to their effect on the usability of the sample data.

The data validation report will describe the samples and analysis parameters reviewed. Data deficiencies, analytical method protocol deviations and quality control problems are described and their effect on the data is discussed.

Resampling/reanalysis recommendations will be made as part of the validation report. Data qualifications will be documented for each sample analyte following the NYSDEC Analytical Services Protocol 1995 Review guidelines. The analysis will evaluate the following items:

- determination of whether or not the DQO's were met;
- consistency of the data with the site history;
- consistency of the data with regard to previous data rounds;
- evaluation of blanks for potential field or laboratory contamination;
- evaluation of the matrix effect for high or low bias tracking;
- evaluation of the data characteristics (i.e., precision, accuracy, representativeness, comparability, completeness and defensibility) and justification for the use of both compliant and non-compliant data; and,
- integration of field and laboratory data with hydrogeological, geological, and meteorological data to provide information for the intended use of the data.

9.0 INTERNAL QUALITY CONTROL

Quality Control of the analytical data will involve the use of a number of control samples including field duplicates, equipment rinsate blanks, trip blanks, matrix spike/matrix spike duplicates, and method blanks.

In addition to the procedures for sample collection and handling described in the FSP, all laboratory quality control procedures specified in NYSDEC ASP, Oct. 1995 and the methods specified, will be implemented. Quality control checks in the field will consist of equipment calibration and peer review as the data is collected. The ASP QC program for routine laboratory analysis is structured to provide consistent results of known and documented quality. The program places quality control requirements on all laboratories performing sample analyses. Any data package in which specific samples do not meet ASP QA/QC criteria will be brought to the attention of the CHA Project Manager. The CHA Project Manager will discuss the appropriateness of using the analytical results with the NYSDEC.

All data and final reports generated are subject to internal QC review procedures. All reports are reviewed by the QA Officer for each project deliverable. Any revisions or corrections required by the senior technical reviewer are incorporated into the report before its submittal.

QC samples are used to assess the quality of the analytical data by identifying and quantifying any external sources of contamination to which the samples may have been exposed. The types of QC samples that will be analyzed are describes below.

Trip Blanks

Trip blanks are used to identify sources of contamination resulting from preparation and transportation of the sample bottles. Potential sources of contamination include:

- passage of airborne contaminants through container vials;

- use of improperly cleaned sample bottles; and,
- the use of contaminated laboratory water.

Trip blanks will be shipped to the field with the empty sample bottles and received into the field within one day of preparation in the lab. The blanks may be held on site for a maximum of two days. They must be shipped back to the lab at the end of the second day with the same sample bottles they accompanied to the field. The temperature of the trip blanks must be maintained at four degrees Celsius (4°C) on site and during shipment. Trip blanks will accompany samples at a rate of one blank per shipment or per two-day sampling event. All trip blanks will be analyzed for volatile organic compounds only.

Equipment Rinsate Blanks

Equipment rinsate blanks are used to identify contamination resulting from improper equipment cleaning procedures. They will only be used when using non-dedicated sampling equipment. Laboratory grade water is poured over cleaned sampling equipment and collected into sample containers. The temperature of the equipment rinsate blanks must be maintained at 4° C while on site and during shipment. Field blanks will be shipped with other samples at a rate of one blank per 20 samples for each sample media. The equipment rinsate blanks will be analyzed for the same parameters as the samples collected for each sample media.

Field Duplicate Samples

Collection of duplicate samples provides for the evaluation of the laboratory's performance and sample homogeneity by comparing analytical results of two samples from the same location. Duplicate samples will be taken at a rate of one duplicate per twenty samples.

Matrix Spike/Matrix Spike Duplicate Samples

The analysis of matrix spike and matrix spike duplicate samples consists of the addition of a known amount of analyte to a sample and subsequent analysis of the spiked sample. Recovery of the analyte added to the sample is then calculated, permitting a measure of the accuracy of the analysis. Inorganic analyses are complemented with analyses of spike and duplicate samples to evaluate the accuracy of sample preparation and analysis applied. At a minimum, one spiked sample analysis will be performed for each type of sample matrix (aqueous and non-aqueous) for each group of twenty samples.

Method Blanks

Method blanks are laboratory grade water that is carried throughout the entire analytical process. Method blanks are used to determine the level of laboratory background contamination. Per the NYSDEC ASP, methylene chloride, acetone, 2-butanone and toluene are common laboratory contaminants. These four (4) compounds may be present in the method blank but are not to exceed the criteria stipulated by the ASP document, or corrective action is to be used before samples are analyzed. Method blanks are analyzed at a rate defined by the ASP.

10.0 PERFORMANCE AND SYSTEMS AUDITS

Audits shall be performed to ascertain whether the QA/QC Plan is being correctly implemented, and to review and evaluate the adequacy of the field and laboratory performance, where applicable for field activities. At least one unannounced performance audit will be conducted during field activities. Follow-up audits will be conducted should inconsistencies or problems be identified. The audits, to be conducted by the CHA Quality Assurance Officer, will assess the effectiveness of the QA program, identify non-conformance, and verify that identified deficiencies are corrected. Audits, at a minimum shall evaluate:

- project responsibilities;
- sample handling and custody procedures;
- document/data management control;
- sample identification; and,
- corrective action procedures.

All laboratories must have successfully completed the analysis of "proficiency samples" in order to receive New York State Department of Health ELAP Certification. This certification is a requirement in order to participate in the NYSDEC ASP Program. The ASP Program requires that the laboratory receive a performance evaluation sample set from NYSDOH on a semi-annual basis to verify the laboratories continuing ability to produce acceptable analytical results. The analytical laboratory maintains this certification throughout the duration of this project, or another certified laboratory will be used.

The results of all audits shall be reported according to the procedures outlined in Section 14.0.

11.0 PREVENTIVE MAINTENANCE

Preventive maintenance of equipment is essential if project resources are to be used cost effectively. Preventive maintenance of field and laboratory equipment is necessary to minimize down time and ensure accuracy of measurement systems. Preventive maintenance typically consists of two main components: routine scheduled maintenance and having critical spare parts or backup equipment available.

All instruments will be maintained according to the manufacturer's recommendations. For major (laboratory) instruments, service contracts are maintained to provide the routine scheduled maintenance and emergency repair, if needed. Minimal instrument downtime is experienced through the use of service contracts and through the availability of back-up equipment. In addition, support equipment, such as vehicles, is periodically inspected to maintain performance standards necessary for all site activities.

Logs will be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instrument, tool, or gauge. Records produced shall be reviewed, maintained and filed by the operators at the laboratory and by the data and sample control personnel when and if equipment, instruments, tools or gauges are used at the site. The project QA Officer may audit these records to verify completeness and adherence to these procedures.

While on site, the Field Coordinator is responsible for ensuring that all equipment is in good working order, and that backup equipment is available if needed.

12.0 PROCEDURES TO ASSESS PARCC PARAMETERS

Routine procedures to be used for measuring precision, accuracy, representativeness, completeness, and comparability (PARCC) include the use of replicate analysis, matrix spikes, and procedural blanks. Replicate matrix spikes and method blanks are analyzed routinely through the ASP program.

Precision is calculated as the relative percent difference between the measured result from two duplicate or replicate samples.

Accuracy will be determined by comparing the measured value with the 95 percent confidence interval established for each analyte.

The representativeness of the data is qualitatively evaluated in relation to the sampling design.

Completeness will be measured for each set of data received by dividing the number of valid measurements actually obtained by the number of valid measurements that were planned.

Comparability is evaluated through review of different data sets (collected at different times, different personnel, etc.) to determine if all data are consistent.

All data sets shall be evaluated for the PARCC parameters by the data validator and the site QA/QC Officer. As previously mentioned, the procedures for calculating precision, accuracy, and completeness are described in Appendix A.

13.0 CORRECTIVE ACTIONS

If the validity of the data should become suspect during performance of the QA/QC procedures found in the preceding sections of the QA/QC Plan, then corrective actions will be initiated. The project QA Officer has primary responsibility for taking corrective action. Some of the types of problems and the corrective actions to be taken are listed below. The actual trigger, as well as the form of the appropriate corrective action is dependent on the specific method/procedures, time at which the error was detected, and the type of error that has occurred. The following procedures have been established to assure that conditions averse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated and corrected.

Corrective actions are usually addressed on a case-by-case basis but may be initiated when:

- predetermined acceptance standards are not attained,
- procedures or data complied are determined deficient,
- equipment or instrumentation is found faulty,
- samples and test results are questionably traceable,
- quality assurance requirements have been violated,
- designated approvals have been violated, or
- system, performance, or management audits show deficiencies.

Following is a description of some of the types of problems and corrective actions that can be taken.

Performance/Systems Audits

If problems are detected by the Field Coordinator during any audit:

- The Field Coordinator will immediately notify the field/lab person responsible and notify them of any action(s) he has taken.
- The Field Coordinator and the responsible field lab person shall correct the problem, then notify the Project QA Officer.
- The Project QA Officer will then prepare and send a problem/action-taken memo to the program manager and the Field Coordinator.

Data Outside Control Limits

- If any time the data falls outside the control limits, the field and/or lab person that observes data problems, will immediately notify the Field Coordinator. The Field Coordinator, once aware of the data problems, shall decide on the severity of the problem and take the appropriate action:

- Minimal Problems: The problem/corrective action taken shall be documented; no further action is necessary.

- Moderate to Severe Problems: A problem memo shall be prepared and sent to the NYSDEC; a collective decision on the appropriate action shall then be taken. The Field Coordinator will then implement the corrective action, document the problem and action to be taken, and prepare and send a problem/action taken memo to the NYSDEC.

Loss of Data

- The Field Coordinator shall investigate the problem, then perform one or more of the following actions:

- If the loss occurred in the field, a staff member will be sent to the site to correct the problem. If a major problem is then discovered, the staff member will contact the Project QA Officer for additional instructions.

- If the loss occurred in-house, the field coordinator shall correct the problem.

- If the problem is limited in scope, the problem/action taken is documented; the Field Coordinator then prepares and sends a problem/action memo to the NYSDEC.

- If a large quantity of data is affected, the problem/action taken is documented; the Field Coordinator then prepares and sends a problem/action-taken memo to the NYSDEC.

Significant QA Problems

- In general, the Field Coordinator will identify technical problems. Following this, there is a series of actions that may be taken:

- The Field Coordinator prepares and sends a problem memo to the NYSDEC and the Site QA Officer; if the problems are significant, the action is determined collectively.

- The action taken is documented.

14.0 QUALITY ASSURANCE PROJECT REPORTS

Review of the appropriateness and adequacy of the QA Program is on going. Inspections and audits shall be conducted during the course of the work assignment, as detailed in section 10.0. Within twenty (20) working days of the completion of the audit, the CHA QAO shall prepare and submit an audit report, with copies forwarded to the NYSDEC. The report shall address, at a minimum, the following aspects:

- Staff qualifications;
- Equipment maintenance records;
- Equipment calibration records;
- Protocol adherence;
- Documentation practices;
- Sample traceability and control;
- Data traceability and document control;
- Record keeping practices;
- Review and validation practices;
- Computation practices;
- QC data and practices; and,
- QA compliance.

If necessary, the report shall include a plan for implementing the corrective actions to be taken (including a schedule of action) as well as measures to prevent recurrence. The reply shall also address revisions, where required of the QA/QC Plan. The QA Officer will ascertain the effectiveness of the corrective actions (by re-audit or other verification) and issue a final audit report detailing corrective actions and closing the audit.

CHA will prepare an audit report summary and submit the results to the NYSDEC after the closure of each audit. Once all audits are complete, a final QA report shall be prepared to summarize the following:

- QA management;
- Measures of the data quality from the project;
- Summary of quality problems, quality accomplishments, and corrective actions taken;
- Summary of QA performance and system audits;
- Data quality assessments;
- Documentation of QA related training; and,
- Status of the QA/QC Plan.

TABLES

TABLE 1
NAMES & ADDRESSES OF KEY PERSONNEL
TOWN OF SALINA LANDFILL RI/FS

TITLE	NAME	ADDRESS
NYSDEC Project Manager	Kathleen McCue, P.E.	NYSDEC Division of Environmental Remediation 50 Wolf Road Albany, NY 12233-7010
NYSDEC QA Officer	Amit Charaborti	NYSDEC Division of Environmental Remediation 50 Wolf Road Albany, NY 12233-7010
CHA Program Manager	Richard Loewenstein, P.E.	Clough, Harbour & Associates, LLP III Winners Circle Albany, NY 12205
CHA Project Manager	Christopher Burns, Ph.D.	Clough, Harbour & Associates, LLP 109 South Warren Street, Suite 1300 Syracuse, NY 13202
CHA QA Officer	Margaret Rudzinski	Clough, Harbour & Associates, LLP III Winners Circle Albany, NY 12205
Site Safety Officer	Steve Pidgeon	Clough, Harbour & Associates, LLP III Winners Circle Albany, NY 12205

TABLE 2
DATA QUALITY SUMMARY
TOWN OF SALINA LANDFILL RI/FS

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	DATA QUALITY OBJECTIVES LEVELS
Soil Gas	Methane	NA	I
Groundwater	pH, Eh, cond., temp., turb.	Full TCL, Filtered and Unfiltered TAL Metals, Cn, Leachate Indicator Parameters	I, III, IV
Surface Water	pH, Eh, cond., temp., DO	Full TCL, TAL Metals, Cn	I, IV
Sediment	NA	Full TCL, TAL Metals, Cn, SO_3, TOC	IV
Surface Soil	NA	Full TCL, TAL Metals, Cn	IV
Subsurface Soil	NA	Full TCL, TAL Metals, Cn	IV

DQO LEVELS

I - Field Screening (PID/OVA); II - Field Analysis; III - Non-ASP; IV – TCL/TAL ; V - Nonconventional Parameters

TABLE 3
ANALYTICAL SUMMARY
TOWN OF SALINA LANDFILL RI/FS

PARAMETER LIST	Surface Soil			Subsurface Soil			Groundwater Rnd 1			Surface Water Rnd 1			Leachate			Sediment Rnd 1		
	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total
VOCs	7	3	10	22	3	25	17	6	23	5	3	8	6	3	9	10	4	14
Semi-VOCs	7	3	10	22	3	25	17	5	22	5	3	8	6	3	9	10	4	14
Pest/PCBs	7	3	10	22	3	25	17	5	22	5	3	8	6	3	9	10	4	14
Metals + Cn	7	1	8	22	1	23	17	3	20	5	1	6	6	1	7	10	1	11
Dissolved Metals							17	3	20									
Wet Chem Parameters																		
Turbidity							24	0	24									
BOD										20	0	20						
TOC	7	1	8	22	0	22	24	0	24							20	1	21
Hardness										5	0	5						
TDS							24	0	24									
Alkalinity							24	0	24									
Chloride							24	0	24									
Sulfate							24	0	24									
Sulfide							24	0	24									
Nitrate							24	0	24									
TKN							24	0	24									
Ammonia							24	0	24									
Phenols							24	0	24									
Hardness							24	0	24									
Field Parameters																		
Specific Conductance							24	0	24	20	0	20						
pH							24	0	24	20	0	20						
Temperature							24	0	24	20	0	20						
Dissolved Oxygen							24	0	24	20	0	20						

TABLE 3
ANALYTICAL SUMMARY
TOWN OF SALINA LANDFILL RI/FS

PARAMETER LIST	Surface Soil			Subsurface Soil			Groundwater Rnd 1			Surface Water Rnd 1			Sediment Rnd 1		
	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total	Primary	QC	Total
VOCs	7	3	10	4	3	7	16	6	22	20	6	26	20	4	24
Semi-VOCs	7	3	10	4	3	7	16	5	21	20	5	25	20	4	24
Pest/PCBs	7	3	10	4	3	7	16	5	21	20	5	25	20	4	24
Metals + Cn	7	1	8	4	1	5	16	3	19	20	3	23	20	2	22
Dissolved Metals							16	3	19						
Wet Chem Parameters															
Turbidity							23	0	23						
BOD										20	0	20			
TOC	7	1	8	4	1	5	23	0	23				20	1	21
TDS							23	0	23						
Alkalinity							23	0	23						
Chloride							23	0	23						
Sulfate							23	0	23						
Sulfide							23	0	23						
Nitrate							23	0	23						
TKN							23	0	23						
Ammonia							23	0	23						
Phenols							23	0	23						
Hardness							23	0	23						
Field Parameters															
Specific Conductance							23	0	23	20	0	20			
pH							23	0	23	20	0	20			
Temperature							23	0	23	20	0	20			
Dissolved Oxygen							23	0	23	20	0	20			

TABLE 4
OBJECTIVES FOR MEASUREMENT DATA
SUMMARY OF PRECISION, ACCURACY, AND COMPLETENESS OBJECTIVES

PARAMETER	PRECISION	ACCURACY	COMPLETENESS
FULL TCL	± 30 %	±30 %	± 100 %
TAL METALS	± 20 %	± 20 %	± 100 %

The values shown above are for CLP data sets, and generally apply to ASP analyses as well. The protocol for ASP analyses provides precision and accuracy values that are required for each compound analyzed for, within each possible matrix (soil, groundwater, surface water, waste, leachate, sediment. These general precision and accuracy values presented herein also can be applied to the other analyses being performed -- TCLP, Hazardous Characteristics, PCBs, CN^-, NH_3, SO_3, and TOC.

TABLE 5
ANALYTICAL PARAMETERS, PRESERVATION, HOLDING TIMES AND CONTAINERS FOR WATER SAMPLES

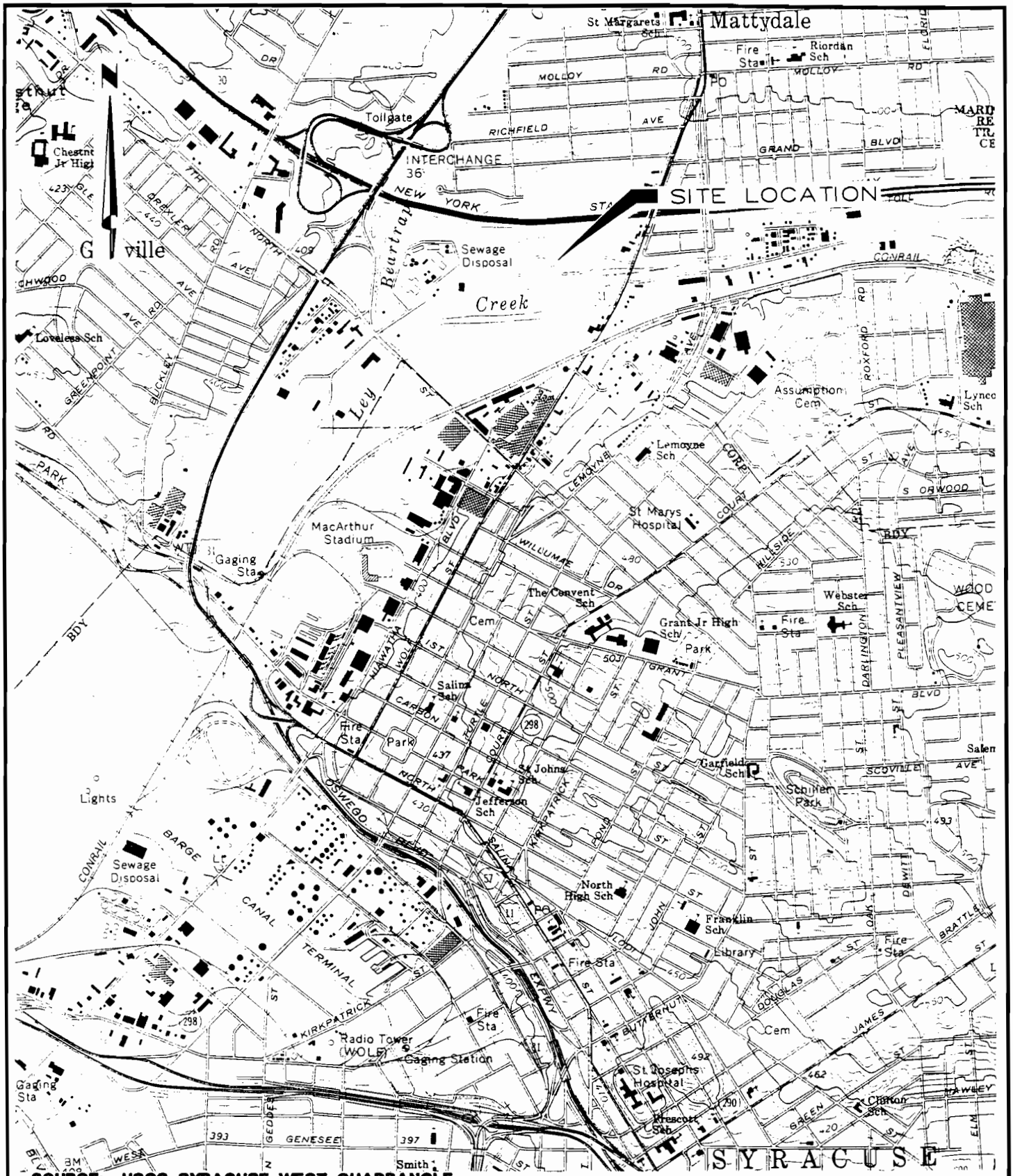
LABORATORY ANALYSES	METHOD	SAMPLE PRESERVATION	HOLDING TIME[a]	CONTAINER
Volatile Organics	95-1	Cool to 4°C	5 days	3 - 40 ml glass vials
Extractable Organics	95-2	Cool to 4°C	5 days	3 - 1 L amber glass bottles
Pesticides/PCBs	95-3	pH 5-9	7 days	3 - 1 L amber glass bottles
Metals	CLP Inorganics	HNO_3 to pH<2	28 days	1 - 1 L plastic bottle
Cyanide	335.2	NaOH to pH>12, 4°C	14 days	1 - 1 L plastic bottle

ANALYTICAL PARAMETERS, PRESERVATION, HOLDING TIMES AND CONTAINERS FOR SOIL/WASTE SAMPLES

LABORATORY ANALYSES	METHOD	SAMPLE PRESERVATION	HOLDING TIME[a]	CONTAINER
Volatile Organics	95-1	Cool to 4°C	14 days	2 - 40 ml glass vials
Extractable Organics	95-2	Cool to 4°C	5 days	2 - 4 oz glass jars w/teflon tops
Pesticides/PCBs	95-3	Cool to 4°C	7 days	2 - 4 oz glass jars w/teflon tops
Metals	CLP Inorganics		28 days	2 - 4 oz glass jars w/teflon tops
Cyanide	335.2	NaOH to pH>12, 4°C	14 days	2 - 4 oz glass jars w/teflon tops
Total Organic Carbon	415.1	Cool to 4°C	28 days	1 - 4 oz glass jars w/teflon tops

[a] *Holding times per ASP calculated from Verified Time of Sample Receipt at Laboratory*

FIGURES



SOURCE: USGS SYRACUSE WEST QUADRANGLE

CHA

CLOUGH, HARBOUR & ASSOCIATES LLP

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109 SOUTH WARREN STREET SYRACUSE, NEW YORK – 13202

315-471-3920

CHA FILE NO. 6967 | SCALE: 1"=2000'

FIGURE 1
SITE LOCATION MAP
TOWN OF SALINA LANDFILL
SYRACUSE, NEW YORK

I:\6967\DRAWINGS\FIG1.DWG

FIGURE 2
TOWN OF SALINA LANDFILL RI/FS
PROJECT MANAGEMENT PLAN

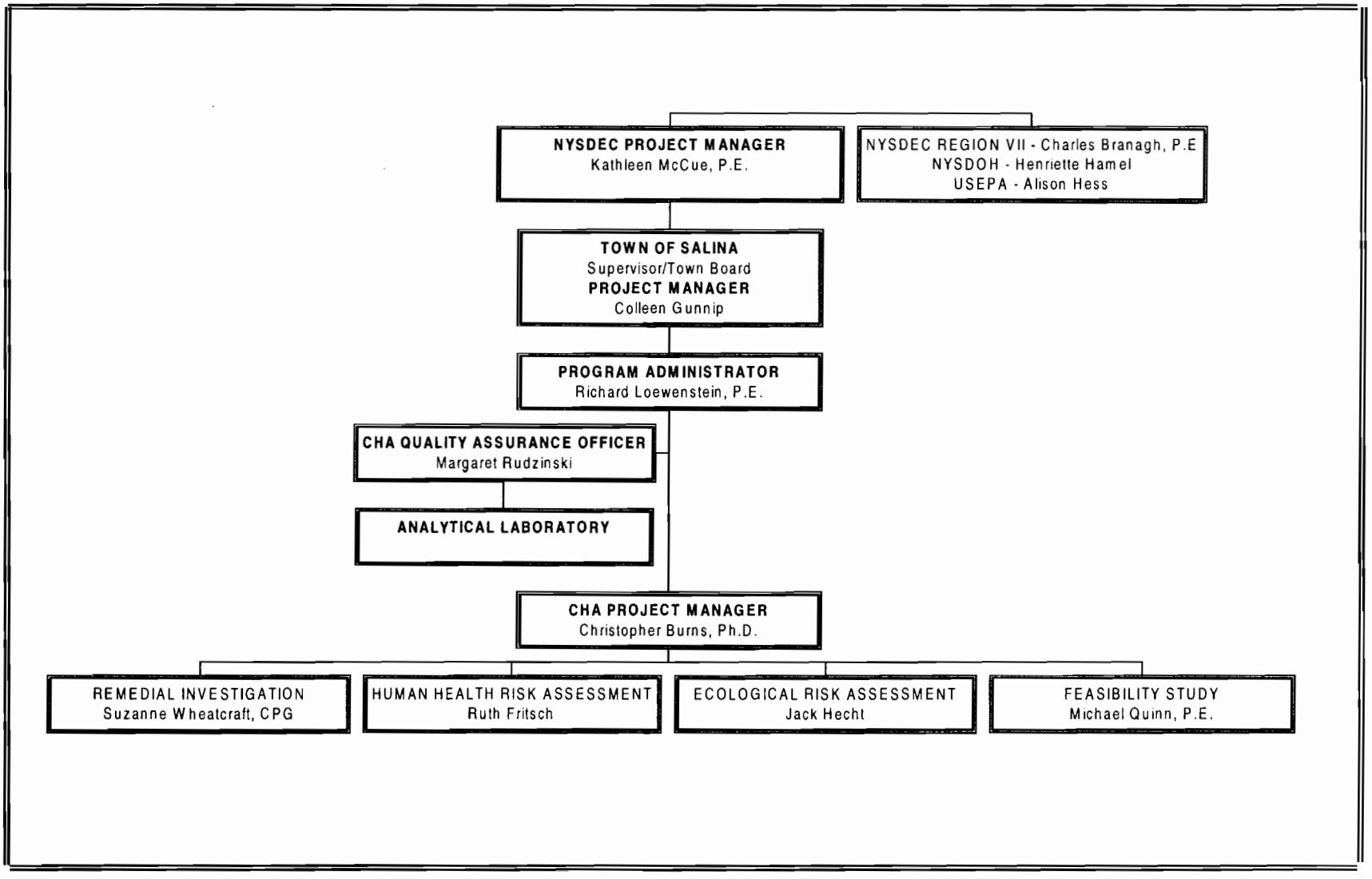

Figure 3. An Example of a Chain-of-Custody Record

CHAIN OF CUSTODY RECORD

SAMPLERS (Signature)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: WATER (Comp, Grab)	SAMPLE TYPE: AIR	SEQ NO	NO. OF CONTAINERS	ANALYSIS REQUIRED

Relinquished by (Signature)	Received by (Signature)	DATE/TIME
Relinquished by (Signature)	Received by (Signature)	DATE/TIME
Relinquished by (Signature)	Received by (Signature)	DATE/TIME
Received by (Signature)	Received by Mobile Laboratory for field analysis (Signature)	DATE/TIME
Received by (Signature)	DATE/TIME Received for Laboratory by	DATE/TIME
Method of Shipment		

Distribution: Original - Accompany Shipment
Copy - Survey Coordinator Field Files

APPENDICES

PARCC PROCEDURES

ANALYTICAL PRECISION

Precision is determined by performing replicate analysis. For data sets with one set of duplicate analysis, the estimate of precision will be expressed as relative percent difference (RPD).

$$\textbf{RPD} = \frac{(X_1 - X_2)}{(X_1 + X_2)/2} * 100$$

where X_1 = highest value determined
X_2 = lowest value determined
X = mean value of the set

For one or two values below the detection limit (BDL):
BDL = DL/2; where DL = detection limit

For large data sets (n>8), the estimate of precision will be expressed as percent relative standard deviation (%RSD):

$$\textbf{R.S.D.} = \textbf{SD/X} * 100$$

where :

SD = the standard deviation
X = mean of replicate analysis

$$\textbf{S.D.} = \textbf{square root of } \frac{\sum_{I=1}^{n} (Xi-X)^2}{n-1}$$

where:

n = number of replicate determinations
Xi = measured value of ith replicate
X = mean of replicate measurements

ANALYTICAL ACCURACY

Percent accuracy (%A) may be determined from the results of analysis of performance audit samples. Where appropriate, accuracy will be assessed by comparison to a reference method. Accuracy as percent recovery (%R) may be determined from the results of analysis of surrogate or analyte compounds spiked into samples.

$$\%A = C_M / C_A \times 100$$

where:

C_M = measured concentration in standard reference material
C_A = actual concentration in standard reference material

$$\%R = C_S - C_U / C_A \times 100$$

where:

C_S = measured concentration in spiked aliquot
C_U = measured concentration in unspiked aliquot
C_A = actual concentration of spike added

COMPLETENESS

Percent completeness (%C) will be determined as below.

$$C = N_A / N_C * 100$$

where:

N_A = number of samples successfully analyzed
N_C = number of samples collected