Quality Assurance Project Plan

For

23-01 42nd ROAD
Long Island City, New York

Prepared For:

QPS 23-10 Developer LLC
c/o Property Markets Group, Inc.
5 East 17th Street – 2nd Floor
New York, New York 10003

Prepared By:

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001

July 19, 2013
170244602

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared on behalf of QPS 23-10 Development LLC (the "Volunteer"), for 23-01 42nd Road, Long Island City, New York (the "Site"). The Volunteer applied for acceptance into the New York State Brownfield Cleanup Program (BCP) in July 2013. This QAPP supports the Remedial Investigation and Work Plan (RIWP) and the Interim Remedial Measure (IRM) Work Plan, both of which provide additional Site information and data collected previously by Langan and others.

This Quality Assurance Project Plan (QAPP) specifies the sampling procedures to be followed and the analytical methods to be used to ensure that data from the proposed investigation and interim remedial action at the Site are precise, accurate, representative, comparable, and complete.

1.2 PROJECT OBJECTIVES

The IRM Work Plan describes the proposed IRM and initial remedial design components for site work to be performed in advance of an approved Remedial Action Work Plan (RAWP). Due to the necessary rapid nature of this construction Project, implementation of the IRM Work Plan would not be under NYSDEC's BCP oversight since this work must be performed before the formal RAWP approval process.

The objective of the RIWP is to investigate and characterize the nature and extent of environmental impacts on the Site and provide sufficient information to evaluate remedial actions, as required.

1.3 SCOPE OF WORK

The scope of work is described in detail in the RIWP and IRM Work Plan. The IRM will be conducted by the remediation contractor and overseen by Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. (Langan) on behalf of QPS 23-10 Developer, LLC. The proposed development, will occupy the entirety of the project Site. The proposed development is anticipated to be a 38-story residential apartment building with commercial space on the ground floor.

The proposed IRM includes the demolition of the existing on-Site structure, removal of a 5,000-gallon aboveground storage tank (AST), removal of suspected underground storage tanks (UST), and excavation and disposal of contamination source material. The IRM activities cease when the RAWP is approved, and any remaining remediation work left to be done will be performed under the RAWP. The IRM activities would involve the execution of the following tasks:

- Transportation and off-Site disposal of soil/fill material excavated before RAWP approval at permitted facilities in accordance with applicable laws and

regulations for handling, transport, and disposal, and the Soil Management Plan (SMP);

- Collection and analysis of soil waste characterization as required for off-site disposal as described in the IRM work plan; and
- Collection and analysis of soil endpoint samples as required for source material excavation as described in the IRM work plan.

The RIWP scope consists of a geophysical survey, soil borings and sampling, well installation and sampling, and soil vapor port installation and sampling.

1.4 DATA QUALITY OBJECTIVES AND PROCESSES

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and matrix spike duplicates.
- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. Sampling accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.
- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness will be determined by assessing a number of investigation procedures, including chain of custody, decontamination, and analysis of field blanks and trip blanks.
- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis, instrument calibrations, using standard reporting units and reporting formats, and data validation.

  Each of the above objectives are discussed in detail in Section 3.

2.0 PROJECT ORGANIZATION

The IRM and RIWP will be overseen by Langan on behalf of QPS 23-10 Developer, LLC. Langan will oversee the excavation and off-site disposal of contaminated soil. Langan will collect waste characterization as required by the IRM Work Plan. Langan perform the sampling collection as described in the RIWP and subcontract drilling, geophysical, and analytical services.

The analytical services will be performed by York Analytical Laboratories, Inc. of Stratford, Conn., NYSDOH ELAP certification number 10854. Data validation services will be performed by Emily Strake; resume attached.

Key contacts for this project are as follows:

QPS 23-10 Developer, LLC:	Mr. Brett Wolfe Telephone: (212) 610-2818
Langan Project Manager:	Mr. Michael Burke, CHMM Telephone: (212) 479-5582 Fax: (212) 479-5444
Langan Quality Assurance Officer (QAO):	Mr. Jason Hayes, PE Telephone: (212) 479-5427 Fax: (212) 479-5444
Program Quality Assurance Monitor:	Mr. Ryan Wohlstrom Telephone: (212) 479-5483
Data Validator:	Ms. Emily Strake Telephone: (215) 491-6526
Laboratory Representatives:	York Analytical Laboratories, Inc. Phil Murphy Telephone: (203) 598-1371

3.0 QUALITY ASSURANCE/QUALITY CONTROL OBJECTIVES FOR MEASUREMENT OF DATA

3.1 INTRODUCTION

The quality assurance and quality control objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. These objectives are defined in following subsections. They are formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Contract Required Quantification Limits (CRQLs) are given in Section 7.

3.2 PRECISION

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters, and then, during data validation (Section 8), calculating the RPD for duplicate sample results.

Analytical precision will be determined by the laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

RPD	=	Relative Percent Difference.
V1, V2	=	The two values to be compared.
$\|V1 - V2\|$	=	The absolute value of the difference between the two values.
$(V1 + V2)/2$	=	The average of the two values.

The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in Tables 3.1 and 3.2.

TABLE 3.1
QUALITY CONTROL LIMITS FOR WATER SAMPLES

			Laboratory Accuracy and Precision				
Analytical Parameters	**Analytical Method (a)**	**Matrix Spike (MS) Compounds**	**MS/MSD (b) % Recovery**	**MS/MSD RPD l**	**LCS (d) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
VOCs (e)	8260	1,1-Dichloroethane	61-145	-	NA	Toluene-d8	88-110
		Trichloroethene	71-120	-	NA	Bromofluorobenzene	86-115
		Benzene	76-127	-	NA	1,2-Dichloroethane-d4	76-114
		Toluene	76-125	-	NA		
		Chlorobenzene	75-130	-	NA		
SVOCs (f)	8270	Phenol	12-110	-	NA	Nitrobenzene-d5	35-114
		2-Chlorophenol	27-123	-	NA	2-Fluorobiphenyl	43-116
		1,4-Dichlorobenzene	36-97	-	NA	Terphenyl-d14	33-141
		N-Nitroso-di-n-propylamine	41-116	-	NA	Phenol-d5	10-110
		1,2,4-Trichlorobenzene	39-98	-	NA	2-Fluorophenol	21-110
		4-Chloro-3-methylphenol	23-97	-	NA	2,4,6-Tribromophenol	10-123
		Acenaphthene	46-118	-	NA	2-Chlorophenol-d4	33-110 (g)
		4-Nitrophenol	10-80	-	NA	1,2-Dichlorobenzene-d4	16-110 (g)
		2,4-Dinitrotoluene	24-96	-	NA		
		Pentachlorophenol	9-103	-	NA		
		Pyrene	26-127	-	NA		
Inorganics (i)	6010,7470/7471 ,7841,9010, OIA-1677	Inorganic Analyte	75-125 (j)	- (k)	80-120	NA	NA

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990; any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds plus library search
(f) Target Compound List Semivolatile Organic Compounds plus library search
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Target Analyte List Inorganics (metals)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

TABLE 3.2
QUALITY CONTROL LIMITS FOR SOIL SAMPLES

Laboratory Accuracy and Precision

Analytical Parameter	Analytical Method (a)	Matrix Spike (MS) Compounds	MS/MSD (b) % Recovery	MS/MSD RPD (c)	LCS (d) % Recovery	Surrogate Compounds	Surrogate % Recovery
VOCs (e)	8260	1,1-Dichloroethane	59-172	22	NA	Toluene-d8	84-138
		Trichloroethene	62-137	24	NA	Bromofluorobenzene	59-113
		Benzene	66-142	21	NA	1,2-Dichloroethane-d4	70-121
		Toluene	59-139	21	NA		
		Chlorobenzene	60-133	21	NA		
SVOCs (f)	8270	Phenol	26-90	35	NA	Nitrobenzene-d5	23-120
		2-Chlorophenol	25-102	50	NA	2-Fluorobiphenyl	30-115
		1,4-Dichlorobenzene	28-104	27	NA	Terphenyl-d14	18-137
		N-Nitroso-di-n-propylamine	41-126	38	NA	Phenol-d5	24-113
		1,2,4-Trichlorobenzene	38-107	23	NA	2-Fluorophenol	25-121
		4-Chloro-3-methylphenol	26-103	33	NA	2,4,6-Tribromophenol	19-122
		Acenaphthene	31-137	19	NA	2-Chlorophenol-d4	20-130 (g)
		4-Nitrophenol	11-114	50	NA	1,2-Dichlorobenzene-d4	20-130 (g)
		2,4-Dinitrotoluene	28-89	47	NA		
		Pentachlorophenol	17-109	47	NA		
		Pyrene	35-142	36	NA		
Inorganics (i)	6010, 7470/7471, 7841, 9010	Inorganic Analyte	75-125 (j)	20 (k)	80-120	NA	NA
PCBs	8082	PCB (Aroclor 1260)	50-128	50	NA	Tetrachlorometaxylene Decachlorobiphenyl	24-154 25-159

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Target Analyte List Inorganics (metals and cyanide)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

3.3 ACCURACY

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity, which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes, which are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

- %R = Percent recovery.
- SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added.
- SR = Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample.
- SA = Spiked analyte: concentration of the analyte spike added to the sample.

The acceptance limits for accuracy for each parameter are presented in Tables 3.1 and 3.2.

3.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Field Sampling Plan. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank, duplicate and Chain-of-custody procedures are presented in Sections 4 and 5.

3.5 COMPLETENESS

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA, 1987). The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness.

V = Number of measurements judged valid.

T = Total number of measurements.

3.6 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

4.0 SAMPLING PROGRAM

4.1 INTRODUCTION

The RIWP and IRM will consist of the following sampling:

- Soil Borings and Sampling
    - Advancement of five soil borings to approximately 10 feet below groundwater or to refusal.
    - Collection of two soil samples from each soil boring location for a total of 10 soil samples (plus QA/QC sampling)
- Monitoring Wells and Sampling
    - Installation of five monitoring wells at soil boring locations
    - Collection of one groundwater sample from each monitoring well for a total of 5 groundwater samples (plus QA/QC sampling).
    - Survey and gauging of monitoring wells to evaluate flow and contour
- Soil Vapor Points and Sampling
    - Installation of five soil vapor sampling points to a depth of approximately 5 to 10 feet bgs.
    - Collection of one soil vapor sample from each soil vapor point for a total of 5 soil vapor samples (plus QA/QC sampling)
- Documentation (Endpoint) Sampling
    - Collection of soil samples from excavation sidewalls and base in accordance with DER-10 frequency requirements.

This section presents sample container preparation procedures, sample preservation procedures, sample holding times, and field QC sample requirements. Sample locations, and the number of environmental and QC samples will be determined per disposal facility requirements. The sampling will be conducted as per IRM Work Plan.

4.2 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be labeled and the appropriate preservatives will be added. The types of containers are shown in Tables 4.1, 4.2.

Samples shall be preserved according to the preservation techniques given in Tables 4.1 and 4.2. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4°C with ice or "blue ice", and delivered to the laboratory within 48 hours of collection. Chain-of-custody procedures are described in Section 7.

4.3 SAMPLE HOLDING TIMES

The sample holding times for organic and inorganic parameters are given in Tables 4.1 and 4.2 and must be in accordance with the NYSDEC ASP requirements. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to Langan.

4.4 FIELD QC SAMPLES

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include:

a. Trip Blanks - A trip blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-ml VOA vial containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for Part 375 volatiles analysis. The Trip Blank will be analyzed for volatile organic compounds to assess any contamination from sampling and transport, and internal laboratory procedures.

b. Field Blanks - Field blanks will be taken at a minimum frequency of one per 20 field samples per sample matrix. Field blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. The field blank will consist of a sample of deionized, distilled water provided by the laboratory that has passed through a decontaminated bailer, tubing or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The field blank may be analyzed for all or some of the parameters of interest.

The duplicates will include:

a. Coded Field Duplicate - To determine the representativeness of the sampling methods, coded field duplicates will be collected at a minimum frequency of one per 20 field samples. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.

b. Matrix Spike/Matrix Spike Duplicate (MS/MSD) - MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess

the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are given in Tables 3.1 and 3.2.

TABLE 4.1
WATER SAMPLE CONTAINERIZATION, PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation (a)	Holding Time (b)
Volatile Organic Compounds (VOCs)	2-40 mL glass vial w/ Teflon septum	Cool to 4^{O}C, HCL pH<2	7 days
Semi-volatile Organics Compounds (SVOCs)	1000 mL glass w/ Teflon lined cap	Cool to 4^{O}C	7 days*
Metals	1000 mL plastic bottle	Nitric Acid to pH < 2 Cool to 4^{O}C	6 months, except mercury (28 days)

(a) All samples to be preserved in ice during collection and transport.

(b) Days from validated time of sample receipt (VTSR).

* Continuous liquid-liquid extraction is the required extraction for water samples for SVOCs. Continuous liquid-liquid extraction and concentration of water samples for SVOCs analysis completed within 7 days of VTSR. Extracts of water samples must be analyzed within 40 days of extraction.

TABLE 4.2
SOIL SAMPLE
CONTAINERIZATION, PRESERVATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation [a]	Holding Time [b]
Volatile Organic Compounds (VOCs)	Wide-mouth glass w/ Teflon lined cap	Cool to 4°C	14 days
Other Organic Compounds [c]	Wide-mouth glass w/ Teflon lined cap	Cool to 4°C	14 days*
Metals	Wide-mouth plastic or glass	Cool to 4°C	6 months, except mercury (28 days)
PCBs	Wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	14 days**

(a) All samples to be preserved in ice during collection and transport.
(b) Days from date of sample collection.
(c) Semi-volatile organic compounds or PCBs.

* Soxhlet or sonication procedures for extraction and concentration of soil/waste samples for SVOCs must be completed within 10 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

** Procedures for extraction and concentration of soil/waste samples for PCBs must be completed within 14 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

TABLE 4.3
SOIL VAPOR, INDOOR AIR, AND AMBIENT AIR SAMPLES
CONTAINERIZATION PRESENTATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation	Holding Time [a]
Volatile Organic Compounds (VOCs)	6- Liter Summa Canister	None	30 days

(a) Days from date of sample collection.

* Summa canisters will be batch certified by the laboratory.

5.0 SAMPLE TRACKING AND CUSTODY

5.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the Chain-of-custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

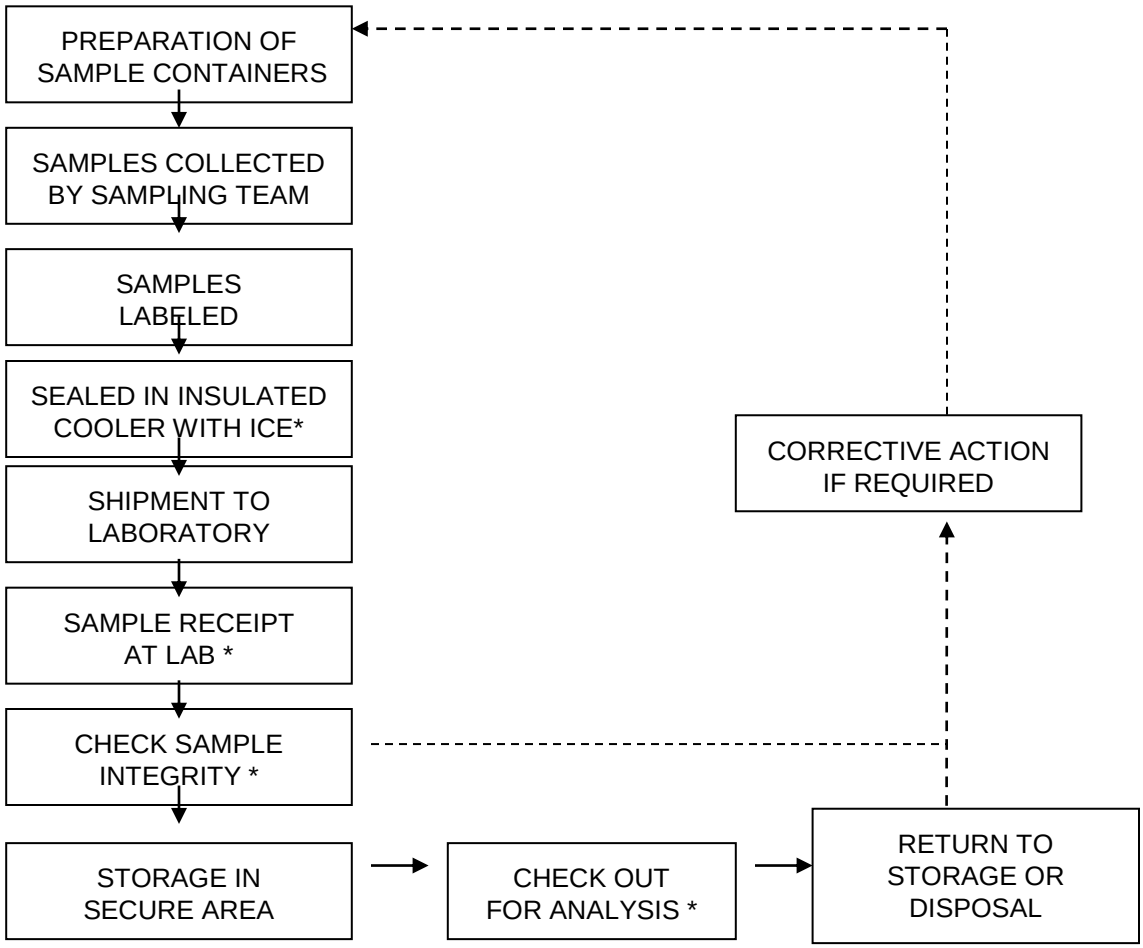
5.2 FIELD SAMPLE CUSTODY

A COC record (Figure 5.2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

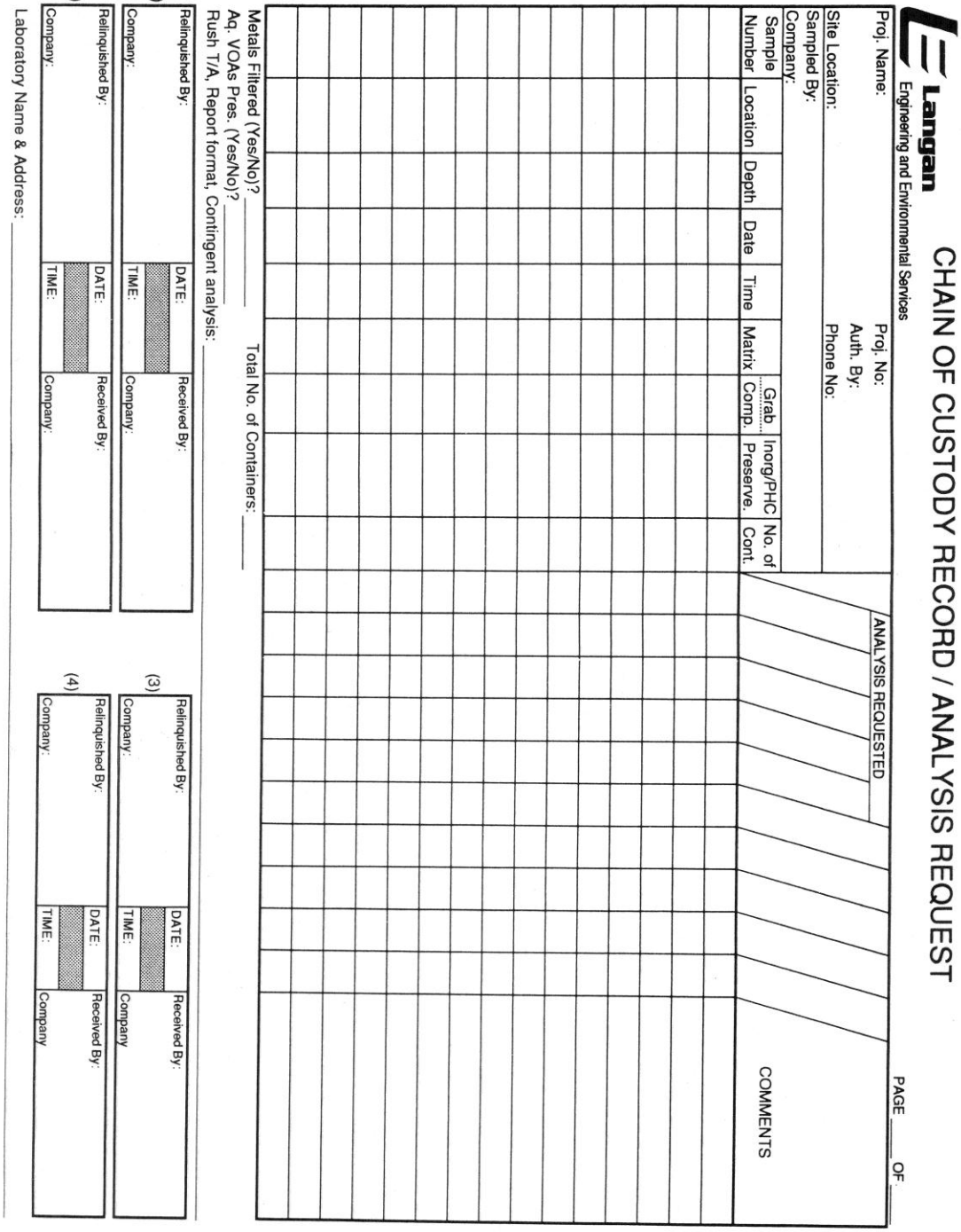
The REMARKS space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC.

Figure 5-1 Sample Custody



* REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Figure 5.2 Sample Chain-of-Custody Form



Langan
Engineering and Environmental Services

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

PAGE ____ OF ____

Proj. Name:
Proj. No:
Auth. By:
Site Location:
Phone No:
Sampled By:
Company:

Sample Number	Location	Depth	Date	Time	Matrix	Grab / Comp.	Inorg/PHC Preserve.	No. of Cont.

ANALYSIS REQUESTED

COMMENTS

Metals Filtered (Yes/No)? _____ Total No. of Containers: ____
Aq. VOAs Pres. (Yes/No)? _____
Rush T/A, Report format, Contingent analysis: _____

	Relinquished By:	DATE:	Received By:
(1)	Company:	TIME:	Company:
(2)	Relinquished By:	DATE:	Received By:
	Company:	TIME:	Company:
(3)	Relinquished By:	DATE:	Received By:
	Company:	TIME:	Company
(4)	Relinquished By:	DATE:	Received By:
	Company:	TIME:	Company

Laboratory Name & Address: _____

Mistakes will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

5.3 LABORATORY SAMPLE CUSTODY

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities, and the subsequent shipment 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 following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be 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 cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.
- The samples will be stored in a secured area at a temperature of approximately 4°C until analyses commence.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

6.0 CALIBRATION PROCEDURES

6.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained on-site by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector and explosimeter) are provided in the Health and Safety Plan.

6.2 LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods given in Section 7.

7.0 ANALYTICAL PROCEDURES

7.1 INTRODUCTION

Samples will be analyzed according to the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition and subsequent updates. The methods to be used for the laboratory analysis of water and soil samples are presented in Table 7.1. These methods were selected because they attain the desired quantitation limits, which are compiled on Table 7.1.

TABLE 7.1
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL(mg/kg)
	Volatile Organics			
1	Methylene Chloride	SW8260B	0.034	0.0028
2	1,1-Dichloroethane	SW8260B	0.0051	0.001
3	Chloroform	SW8260B	0.0051	0.0011
4	Carbon Tetrachloride	SW8260B	0.0034	0.00072
5	1,2-Dichloropropane	SW8260B	0.012	0.00087
6	Dibromochloromethane	SW8260B	0.0034	0.001
7	1,1,2-Trichloroethane	SW8260B	0.0051	0.0013
8	Tetrachloroethene	SW8260B	0.0034	0.001
9	Chlorobenzene	SW8260B	0.0034	0.00064
10	Trichloroflouromethane	SW8260B	0.017	0.0013
11	1,2-Dichloroethane	SW8260B	0.0034	0.00078
12	1,1,1-Trichloroethane	SW8260B	0.0034	0.00092
13	Bromodichloromethane	SW8260B	0.0034	0.0016
14	Trans-1,3-Dichloropropene	SW8260B	0.0034	0.0017
15	Cis-1,3-Dichloropropene	SW8260B	0.0034	0.00082
16	1,1-Dichloropropene	SW8260B	0.017	0.001
17	Bromoform	SW8260B	0.014	0.00083
18	1,1,2,2-Tetrachloroethane	SW8260B	0.0034	0.00076
19	Benzene	SW8260B	0.0034	0.0027
20	Toluene	SW8260B	0.0051	0.0022
21	Ethylbenzene	SW8260B	0.0034	0.0026
f22	Chloromethane	SW8260B	0.017	0.0015
23	Bromomethane	SW8260B	0.0068	0.00089
24	Vinyl Chloride	SW8260B	0.0068	0.0013
25	Chloromethane	SW8260B	0.0068	0.00077
26	1,1-Dichloroethene	SW8260B	0.0034	0.0012
27	Trans-1,2-Dichloroethene	SW8260B	0.0051	0.0014
28	Trichloroethene	SW8260B	0.0034	0.0014
29	1,2-Dichlorobenzene	SW8260B	0.017	0.0017
30	1,3-Dichlorobenzene	SW8260B	0.017	0.0015
31	1,4-Dichlorobenzene	SW8260B	0.017	0.0014
32	Methyl tert butyl ether	SW8260B	0.0068	0.001
33	p/m-Xylene	SW8260B	0.0068	0.0015

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Water (mg/L)	Soil (mg/kg)
	Volatile Organics (cont.)			
34	o-xylene	SW8260B	0.0068	0.0014
35	Cis-1,2-Dichloroethene	SW8260B	0.0034	0.001
36	Dibromomethane	SW8260B	0.034	0.0015
37	Styrene	SW8260B	0.0068	0.0025
38	Dichlorodiflouromethane	SW8260B	0.034	0.0013
39	Acetone	SW8260B	0.034	0.011
40	Carbon disulfide	SW8260B	0.034	0.0013
41	2-Butanone	SW8260B	0.034	0.013
42	Vinyl acetate	SW8260B	0.034	0.0026
43	4-Methyl-2pentanone	SW8260B	0.034	0.0028
44	1,2,3-Trichloropropane	SW8260B	0.034	0.0013
45	2-Hexanone	SW8260B	0.034	0.0014
46	Bromochloromethane	SW8260B	0.017	0.001
47	2,2-Dichloropropane	SW8260B	0.017	0.0027
48	1,2-Dibromoethane	SW8260B	0.014	0.0014
49	1,3-Dichloropropane	SW8260B	0.017	0.0019
50	1,1,1,2-Tetrachloroethane	SW8260B	0.0034	0.0011
51	Bromobenzene	SW8260B	0.017	0.00075
52	n-Butylbenzene	SW8260B	0.0034	0.0011
53	Sec-Butylbenzene	SW8260B	0.0034	0.00094
54	Tert-Butylbenzene	SW8260B	0.017	0.0021
55	0-chlorotoluene	SW8260B	0.017	0.0011
56	p-chlorotoluene	SW8260B	0.017	0.0012
57	1,2-Dibromo-3-chloropropane	SW8260B	0.017	0.0029
58	Hexachlorobutadiene	SW8260B	0.017	0.0016
59	Isopropylbenzene	SW8260B	0.0034	0.00061
60	p-Isopropylbenzene	SW8260B	0.0034	0.00094
61	Naphthalene	SW8260B	0.017	0.0026
62	Acrylonitrile	SW8260B	0.034	0.0013
63	n-Propylbenzene	SW8260B	0.0034	0.00097
64	1,2,3-Trichlorobenzene	SW8260B	0.017	0.0014
65	1,2,4-Trimethylbenzene	SW8260B	0.017	0.0027
66	1,3,5-Trimethylbenzene	SW8260B	0.017	0.0021
67	1,2,4-Trimethylbenzene	SW8260B	0.017	0.002

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (ug/L)	MDL (ug/kg)
	Volatile Organics (cont.)			
68	1,4-Diethylbenzene	SW8260B	0.014	0.00068
69	4-Ethyltoulene	SW8260B	0.014	0.00033
70	1,2,4,5-Tetramethylbenzene	SW8260B	0.014	0.00062
71	Ethyl ether	SW8260B	0.017	0.0013
72	Trans-1,4-Dichloro-2-butene	SW8260B	0.017	0.0051
	Semivolatile Organics			
1	Acenahpthalene	SW8270C	0.18	0.042
2	1,2,4-Trichlorobenzene	SW8270C	0.22	0.037
3	Hexachlorobenzene	SW8270C	0.14	0.035
4	Bis(2-chloroethyl)ether	SW8270C	0.2	0.043
5	2-Chloronaphthalene	SW8270C	0.22	0.068
6	1,2-Dichlorobenzene	SW8270C	0.22	0.066
7	1,3-Dichlorobenzene	SW8270C	0.22	0.07
8	1,4-Dichlorobenzene	SW8270C	0.22	0.064
9	3,3'-Dichlorobenzidine	SW8270C	0.22	0.081
10	2,4-Dinitrotoluene	SW8270C	0.22	0.06
11	2,6-Dinitrotoluene	SW8270C	0.22	0.074
12	Fluoranthene	SW8270C	0.14	0.029
13	4-Chlorophenyl phenyl ether	SW8270C	0.22	0.031
14	4-Bromophenyl phenyl ether	SW8270C	0.22	0.036
15	Bis(2-chloroisopropyl)ether	SW8270C	0.27	0.072
16	Bis(2-chloroethoxy)methane	SW8270C	0.24	0.051
17	Hexachlorobutadiene	SW8270C	0.22	0.042
18	Hexachlorocyclopentadiene	SW8270C	0.65	0.18
19	Hexachloroethane	SW8270C	0.18	0.032
20	Isophorone	SW8270C	0.2	0.036
21	Naphthalene	SW8270C	0.22	0.072
22	Nitrobenzene	SW8270C	0.2	0.066
23	NitrosoDiPhenylAmine(NDPA/DPA)	SW8270C	0.18	0.056
24	n-Nitrosodi-n-propylamine	SW8270C	0.22	0.063

25	Bis(2-Ethylhexyl)phthalate	SW8270C	0.22	0.047

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Semivolatile Organics (cont.)			
26	Butyl benzyl phthalate	SW8270C	0.22	0.063
27	Di-n-butylphthalate	SW8270C	0.22	0.038
28	Di-n-octylphthalate	SW8270C	0.22	0.061
29	Diethyl phthalate	SW8270C	0.22	0.039
30	Dimethyl phthalate	SW8270C	0.22	0.037
31	Benzo(a)anthracene	SW8270C	0.14	0.045
32	Benzo(a)pyrene	SW8270C	0.18	0.054
33	Benzo(b)fluoranthene	SW8270C	0.14	0.036
34	Benzo(k)fluoranthene	SW8270C	0.14	0.035
35	Chrysene	SW8270C	0.14	0.029
36	Acenaphthylene	SW8270C	0.18	0.058
37	Anthracene	SW8270C	0.14	0.03
38	Benzo(ghi)perylene	SW8270C	0.18	0.057
39	Fluorene	SW8270C	0.22	0.041
40	Phananthrene	SW8270C	0.14	0.038
41	Dibenzo(a,h)anthracene	SW8270C	0.14	0.042
42	Indeno(1,2,3-cd)Pyrene	SW8270C	0.18	0.055
43	Pyrene	SW8270C	0.14	0.037
44	Biphenyl	SW8270C	0.51	0.016
45	4-Chloroaniline	SW8270C	0.22	0.024
46	2-Nitroaniline	SW8270C	0.22	0.041
47	3-Nitroaniline	SW8270C	0.22	0.023
48	4-Nitroaniline	SW8270C	0.22	0.051
49	Dibenzofuran	SW8270C	0.22	0.036
50	2-Methylnaphthalene	SW8270C	0.27	0.089
51	1,2,4-Tetrachlorobenzene	SW8270C	0.22	0.066
52	Acetophenone	SW8270C	0.22	0.072
53	2,4,6-Trichlorophenol	SW8270C	0.14	0.041
54	P-chloro-M-Cresol	SW8270C	0.22	0.046
55	2-Chlorophenol	SW8270C	0.22	0.07

TABLE 7.1 (Continued)

PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Semivolatile Organics (cont.)			
56	2,4-Dinitrophenol	SW8270C	0.2	0.066
57	2,4-Dimethylphenol	SW8270C	0.22	0.034
58	2-Nitrophenol	SW8270C	0.2	0.16
59	4-Nitrophenol	SW8270C	0.49	0.096
60	2,4-Dinitro	SW8270C	0.32	0.35
61	4,6-Dinitro-o-cresol	SW8270C	1.1	0.21
62	Pentachlorophenol	SW8270C	0.59	0.053
63	Phenol	SW8270C	0.18	0.066
64	2-Methylphenol	SW8270C	0.22	0.056
65	3-Methylphenol/4-Methylphenol	SW8270C	0.22	0.097
66	2,4,5-Trichlorophenol	SW8270C	0.32	0.052
67	Benzoic Acid	SW8270C	0.22	0.19
68	Benzyl Alcohol	SW8270C	0.73	0.052
69	Carbazole	SW8270C	0.22	0.032
	PCBs			
1	Aroclor-1016	SW8082	0.0469	0.009
2	Aroclor-1221	SW8082	0.0469	0.014
3	Aroclor-1232	SW8082	0.0469	0.01
4	Aroclor-1242	SW8082	0.0469	0.009
5	Aroclor-1248	SW8082	0.0469	0.006
6	Aroclor-1254	SW8082	0.0469	0.007
7	Aroclor-1260	SW8082	0.0469	0.008
	Metals			
1	Aluminum	SW6010B	10	2.3
2	Antimony	SW6010B	5.2	1
3	Arsenic	SW6010B	1	0.36
4	Barium	SW6010B	1	0.09
5	Beryllium	SW6010B	0.52	0.04
6	Cadmium	SW6010B	1	0.07

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Metals (cont.)			
7	Calcium	SW6010B	10	2.3
8	Chromium	SW6010B	1	0.21
9	Cobalt	SW6010B	2.1	0.22
10	Copper	SW6010B	1	1
11	Iron	SW6010B	5.2	1.8
12	Lead	SW6010B	5.2	0.29
13	Magnesium	SW6010B	10	4.7
14	Manganese	SW6010B	1	0.11
15	Mercury	SW7471A	0.1	0.02
16	Nickel	SW6010B	2.6	0.29
17	Potassium	SW6010B	260	84
18	Selenium	SW6010B	2.1	0.34
19	Silver	SW6010B	1	0.17
20	Sodium	SW6010B	210	83
21	Thallium	SW6010B	2.1	0.65
22	Vanadium	SW6010B	1	0.23
23	Zinc	SW6010B	5.2	0.57

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Pesticides			
1	Delta-BHC	SW8081A	0.0029	0.000448
2	Lindane	SW8081A	0.000954	0.000426
3	Alpha-BHC	SW8081A	0.000954	0.000271
4	Beta-BHC	SW8081A	0.00229	0.000868
5	Heptachlor	SW8081A	0.00114	0.000513
6	Aldrin	SW8081A	0.00429	0.000806
7	Heptachlor epoxide	SW8081A	0.00429	0.00129
8	Endrin	SW8081A	0.000954	0.000391
9	Endrin Ketone	SW8081A	0.00229	0.00059
10	Dieldrin	SW8081A	0.00143	0.000715
11	4,4'-DDE	SW8081A	0.00229	0.000529
12	4,4'-DDD	SW8081A	0.00229	0.000816
13	4,4'-DDT	SW8081A	0.0033	0.00184
14	Endosulfan I	SW8081A	0.00229	0.000541
15	Endosulfan II	SW8081A	0.00229	0.000765
16	Endosulfan sulfate	SW8081A	0.000954	0.000436
17	Methoxychlor	SW8081A	0.00429	0.00134
18	Toxaphene	SW8081A	0.0429	0.012
19	Trans-Chlordane	SW8081A	0.00286	0.000756
20	Chlordane	SW8081A	0.0186	0.00758

Notes:

(1) - = No Standard
(2) RL = Reporting Limit
(3) MDL = Minimum Detection Limit
(4) RL and MDL values are taken from representative laboratory reports issued by Alpha Analytical Laboratories
(5) RL and MDL values are estimated and may vary depending on instruments

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 INTRODUCTION

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the Chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

8.2 DATA REDUCTION

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

8.3 DATA VALIDATION

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of the QC sample results,
- Verification of the identification of sample results (both positive hits and non-detects),
- Recalculation of 10% of all investigative sample results, and
- Preparation of Data Usability Summary Reports (DUSR).

A DUSR will be prepared and reviewed by the QAO before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- ICP serial dilutions; and

- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and
- No Flag - Result accepted without qualification.

9.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

9.1 QUALITY ASSURANCE BATCHING

Each set of samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). The MS/MSD samples will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Langan Project Manager for corrective action.

9.2 CALIBRATION STANDARDS AND SURROGATES

All organic standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. All standards are traceable to a source of known quality certified by the USEPA or NIST, or other similar program. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or more frequently, based upon data indicating deterioration.

9.3 ORGANIC BLANKS AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants or detect "false positives". The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing $KMnO_4$. The matrix spike is generated by addition of surrogate standard to each sample.

9.4 TRIP AND FIELD BLANKS

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 4. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

10.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

10.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

10.2 SYSTEM AUDITS

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

10.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

10.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

11.0 PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

11.1 PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

A list of critical spare parts will be established by the operator. These spare parts will be available for use in order to reduce the downtime. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

11.2 SCHEDULES

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule, and arrange any necessary and prompt service. Required service will be performed by qualified personnel.

11.3 RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories. The QAO may audit these records to verify complete adherence to these procedures.

12.0 CORRECTIVE ACTION

12.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

12.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible

for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 12.1

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

13.0 REFERENCES

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.

Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan

USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA/540/G-87/003, OSWER Directive 9355.0-7- U.S. Environmental Protection Agency, Washington, D.C.

USEPA, 1992a. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision #8, dated January 1992. USEPA Region II.

USEPA, 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90. SOP No. HW-2, Revision XI, dated January 1992. USEPA Region II.

ATTACHMENT A

Joel B. Landes, PE

Senior Associate/ Program Director
Environmental Engineering & Project Management

37 years in the industry ~ 13 years with Langan

Mr. Landes has over thirty-seven years of diversified experience directing environmental engineering and consulting projects for Fortune 500 manufacturing firms, real estate developers and public utilities. His experience includes management of environmental compliance for a major pharmaceutical company and as an environmental affairs consultant for private clients. He has expertise redeveloping former industrial, chemical, petroleum storage and manufactured gas plant sites into residential and commercial use through the New York State Brownfield Cleanup Program. He has lead environmental studies for acquisitions and divestitures of pharmaceutical and industrial facilities; industrial site selection and permitting.

He currently oversees all Langan environmental services in the New York City Metropolitan area including Phase I and II Environmental Site Assessments, remedial investigations, feasibility studies; remedial measure design and implementation.

Selected Projects

BROWNFIELD CLEANUP PROGRAM

The Shops at Atlas Park, Glendale, Queens, NY
Gateway at Bronx Terminal Market, Bronx, NY

INDUSTRIAL

711 Stewart Avenue, Garden City, NY
Acme/Whitehead, Brooklyn, NY
Waterside Generating Plan and Office Building, New York, NY
FSM Partners, New York, NY
Consolidated Edison of New York, Multiple Former MGP Facilities, Various Locations, New York, NY
Sterling Drug, Inc., Rensselaer, NY
Fresh Kills Landfill, New York City Department of Sanitation, Staten Island, NY
Property Investigation for Village of Sleepy Hollow, Tarrytown, NY
Vehicle Service Facility, City of Yonkers, NY
Crane Company, Roseland, NJ
Confidential Industrial Client, Environmental Risk Management, Bound Brook, NJ
Confidential Client, Superfund Site Remediation, Bound Brook, NJ
Elizabethtown Gas Company, Elizabeth, NJ

Education

Graduate Studies in
Business Management
Union College

M.E., Environmental Planning
and Management
The Cooper Union

B.S., Chemical Engineering
Polytechnic Institute of Brooklyn

Professional Registration

Professional Engineer (PE) in NY, NJ

Affiliations

New York Building Congress

NYC Partnerships of Brownfield Professionals

Business Council of New York State

Environmental Business Association

National Brownfield Association – NYS Chapter

LANGAN

Ethicon, Somerville, NJ
Indiana General, Keasbey, NJ
Sumitomo Machinery, Teterboro, NJ
Schmid Labs, West Patterson, NJ
L&F Products, ISRA/ECRA Cleanup, Belle Mead, NJ
CPC International, Various Locations, NY and IL
Pnemo Abex, Cleveland, OH
NL Chemicals, Various Locations, NJ and MI
Copper Processing Plant, Sofia, Bulgaria
Steel Processing Plant, Environmental Assessment, Pernik, Bulgaria
American Home Products, Mexico
Confidential Pharmaceutical Acquisition, Europe, Caribbean, and Africa
Colgate-Palmolive, Paris, France, Mexico City, Mexico, Brazil, Argentina and South America
Pfizer Pharmaceutical Company, PA and Europe
Riverwood Capital, US, Mexico, Central and South America
Sterling Drug, Puerto Rico
Laport, Ltd., Chile, South America

POWER

Sithe Energy, Kenilworth, NJ
Confidential Independent Power Producer Siting Analysis, Midwest, Mid-Atlantic and Southern, United States
Confidential IPP, Various Locations, VA
Florida Power and Light (FPL), Miami, FL
TXU Energy, Dallas, TX
Confidential Independent Power Producer, Midwest, Mid-Atlantic and Southern United States

AIRPORTS

American Airlines Terminals, Environmental Assessments, Queens, NY
JFK International Airport, International Arrivals Building, Jamaica, Queens, NY
Nippon Cargo, Jamaica, Queens, NY
JFK International Airport, Eastern Airlines Hangar, Jamaica, Queens, NY
First Aviation Services Hangar and Terminal at Teterboro Airport, Teterboro, NJ

TRANSPORTATION

New Jersey Turnpike Authority, East Brunswick, NJ

HOSPITAL

Memorial Sloan-Kettering Cancer Center, New York, NY
Memorial Sloan-Kettering Cancer Center, 1133 York Avenue, New York, NY
Memorial Sloan-Kettering Cancer Center, 64th Street, New York, NY
Memorial Sloan-Kettering Cancer Center, 74th Street, New York, NY
Memorial Sloan-Kettering Cancer Center, West Harrison, NY

COMMERCIAL

Jacob K. Javits Convention Center Expansion, New York, NY
7 World Trade Center, New York, NY

Atlantic Avenue Service Center, Brooklyn, NY
Yamato Transport, Tuckahoe, NY and Leonia, NJ
Mutual Oil Company, RI

HIGHER EDUCATION

Columbia University, Manhattanville Development Project, New York, NY
Columbia University Real Estate Group, 220 East 138th Street, Bronx, NY
Columbia University Real Estate Group, 1734 Bathgate Avenue, Bronx, NY
Columbia University Real Estate Group, 1745 Bathgate Avenue, Bronx, NY
Columbia University, The Studebaker Building Renovation, New York, NY
City University of New York (CUNY) John Jay College Expansion,
New York, NY

K-12 EDUCATION

PS 192, New York, NY

RESIDENTIAL AND MIXED-USE

Sullivan Street Residential, New York, NY
475 Ninth Avenue, New York, NY
River Place I and II, New York, NY
10 Chelsea, New York, NY
Silvercup West, Long Island City, NY
Superior Ink, New York, NY
Peter Cooper Village/Stuyvesant Town, MGP Consultations, New York, NY
Duane Street Condominium, New York, NY
Archstone Clinton, New York, NY

PARKS AND RECREATION

Highline Park, New York, NY
Yankee Stadium Redevelopment Project, Bronx, NY
Proposed New York Jets Stadium, New York, NY
AMF Bowling Centers, Phase I ESA's, 285 Locations, United States

EXPERT WITNESS

Confidential Client, Expert Affidavit, New York, NY
Confidential Client, Four New York Properties, New York, NY
Confidential Client, Expert Review and Remediation, Yonkers, NY
Confidential Client, Senior Environmental Consulting, Brooklyn, NY
Expert Affidavit, Confidential Client, New York, NY
Underground Storage Tank Removals, New York, NY

Jason J. Hayes, PE, LEED AP

Associate
Environmental Engineering & Project Management

13 years in the industry ~ 10 years with Langan

Mr. Hayes has 13 years of experience in New York, New Jersey, California, Washington, Oregon and Alaska. His experience includes Environmental Protection Agency (EPA), New York State (NYS) Brownfield's application, investigation, and remediation; New York City Department of Environmental Protection (NYCDEP) and New York City Office of Environmental Remediation (OER) E-designated site application, investigation, and remediation; Phase I and II Environmental Site Assessments; contaminated building cleanup and demolition; Underground Storage Tank (UST) permitting, removal specifications, and closure reporting; soil vapor intrusion investigation and mitigation system design (sub-slab depressurization systems, etc.); development of screening-level groundwater contaminant (volatile organic compounds - VOCs) plume migration models; environmental analysis; and oversight, design and specification generation for remediation operations with contaminants of concern to include polychlorinated biphenyls (PCBs), solvents, mercury, arsenic, petroleum products, asbestos, mold and lead.

Selected Projects

New York Police Academy, Queens, NY
Gateway at Bronx Terminal Market, Bronx, NY
Jacob Javits Convention Center, New York, NY
Yankee Stadium Development, Bronx, NY
Bushwick Inlet Park, Brooklyn, NY
Silvercup West, Queens, NY
29 Flatbush, Brooklyn, NY
Gowanus Village I, Brooklyn, NY
Sullivan Street Hotel, New York, New York
Riker's Island, Co-Generation Plant, Bronx, NY
The Shops at Atlas Park, Glendale, NY
Memorial Sloan-Kettering Cancer Center, New York, NY
Element West 59th Street, New York, NY
Teterboro Airport, Teterboro, NJ
Proposed New York JETS Stadium, New York, NY
Former Con Edison Manufactured Gas Plant (MGP) Sites, New York, NY
7 World Trade Center, New York, NY
Peter Cooper Village, New York, NY

Selected Publications, Reports, and Presentations

NYC Mayor's Office of Environmental Remediation – Big Apple Brownfield Workshop – Presented on Soil Vapor Intrusion Remedies (e.g., SSD Systems, Vapor Barriers, Modified HVAC)

Education

M.S., Environmental Engineering
Columbia University

B.Sc., Chemistry, Environmental Toxicology
Humboldt State University

Business Administration (minor)
Humboldt State University

Professional Registration

Professional Engineer (PE) in NY

LEED Accredited Professional (LEED AP)

OSHA 40-Hour HAZWOPER

OSHA HAZWOPER Site Supervisor

Affiliations

US Green Building Council, NYC Chapter (USGBC)

Urban Land Institute (ULI)

NAIOP

National Brownfield Partnership

LANGAN

Michael D. Burke, LEED AP

Associate

Environmental Engineering and Remediation

15 years in the industry ~ 6 years with Langan

Mr. Burke is a geologist/environmental scientist whose practice involves site investigation and remediation, environmental site assessments, in-situ remedial technology, sub-slab depressurization system design, emergency response, environmental and geotechnical site investigations, and health and safety monitoring. He has experience with projects in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup, Voluntary Cleanup and Spill Programs and New York City Department of Environmental Protection (NYCDEP) "E" Designated and New York City Brownfield Cleanup Program sites. He has extensive experience in soil and groundwater investigation and remediation, design of in-situ chemical oxidation and enhanced bioremediation strategies, Phase I Site Assessments, Phase II site investigations, UST Closures, NYSDEC spill closure, remedial excavation oversight and excavation and off-site treatment and/or disposal of contaminated soils.

Selected Projects

Meeker Avenue Plume Trackdown Site, Brooklyn, NY
Borden Avenue Distribution Facility, Queens, NY
Consolidated Edison of New York, West 17th Street Development Site (Former MGP Site), New York, NY
Consolidated Edison of New York, Governors Island Dielectric Fluid Spill, New York, NY
Montefiore Medical Center, PCB Remediation, Bronx, NY
New York University, 4 Washington Square Village Fuel Oil Remediation, New York, NY
New York City School Construction Authority (NYCSCA), Proposed New York City School Construction Sites, Boroughs of New York City, NY
Consolidated Edison of New York, East 60th Street Generating Station, New York, NY
82 Irving Place, New York, NY
1113 York Avenue, New York, NY
Peter Cooper Village/Stuyvesant Town, New York, NY
Superior Ink, New York, NY
Bronx Mental Health Redevelopment Project, Bronx, NY
2950 Atlantic Avenue, East New York, Brooklyn, NY
Consolidated Edison of New York, East 74th Street Generating Station, New York, NY
Gowanus Village I, Brooklyn, NY
Consolidated Edison of New York, First Avenue Properties, New York, NY
Queens West Development Corp. Stage II, Long Island City, Queens, NY

Education

M.S., Environmental Geochemistry
Rutgers University

B.S., Geological Sciences
Rutgers University

B.S., Environmental Science
Rutgers University

Professional Registration

OSHA Certification for Hazardous Waste Site Supervisor

OSHA 29 CFR 1910.120 Certification for Hazardous Waste Operations and Emergency Response

NJDEP Certification for Community Noise Enforcement

Troxler Certification for Nuclear Densometer Training

LANGAN

Article X Project Experience, Proposed Electrical Generation Sites,
Multiple Locations, New York State
Poletti Generating Station, Queens, NY
Arthur Kill Generating Station, Staten Island, New York, NY
K. Hovnanian, New Jersey Development Sites, New Jersey

Anthony Moffa Jr, CHMM

Corporate Health and Safety Manager

Health & Safety Coordinator, Contingency Planning, Compliance Auditing

19 years in the industry ~ 12 years with Langan

Mr. Moffa has over nineteen years experience in providing environmental compliance assistance to both commercial and industrial facilities. His compliance auditing experience includes facility and process specific including the areas of waste management, stormwater and wastewater issues and air emissions. He has an extensive background in the areas of hazardous, non-hazardous and universal waste management. His level of experience includes working with federal, state and local authorities to ensure clients environmental compliance status on all levels. His compliance reporting includes federal and state specific reports. Completed federal reports include the Tier II, Toxic Chemical Release Inventories under SARA Title III and Biennial Hazardous Waste Reporting. Completed state specific reporting includes the Pennsylvania Form 26R and the New Jersey Release Pollution Prevention Report. He is experienced in the preparation, submittal and compliance monitoring of NPDES & stormwater applications and permits. He has developed site specific contingency plans for both industrial and commercial facilities for facilities throughout Pennsylvania and New Jersey.

Selected Projects

Verizon - Pennsylvania, Inc. Philadelphia Naval Yard, PA
Confidential Client, Philadelphia, PA
Penn Color, Doylestown, PA
Verizon - Pennsylvania, Inc., Phase I Environmental Assessment, Lansdowne, PA
Verizon - Pennsylvania, Inc. (formerly Bell Atlantic Corporation), Various Locations, PA
Kinder Morgan Bulk Terminals, Inc. Fairless Hills, PA
PP&L – Martins Creek, Bangor, PA
Concord Beverage Company, Concordville, PA
Penn Color, Hatfield, PA
National Starch & Chemical Company, Bloomfield, NJ
Air Products and Chemicals, Inc.., Middlesex, NJ
PSEG Services Corporation, Jersey City, NJ
Sampson Coatings, Richmond, VA
Custom Chemicals Corporation, Elmwood Park, NJ

Education

M.E., Science
Penn State University

B.S., Physics
West Chester University

Professional Registration

Certified Hazardous Material Manager (CHMM)

Professional Affiliations

Pennsylvania Chamber of Business & Industry

Chemical Council of New Jersey

New Jersey Business & Industry Association

Professional Training

OSHA 40-Hour Hazardous Waste Site Training Course

National Safety Council – CPR, Bloodborne Pathogen and First Aid Training

Steel Tank Institute Certified AST Inspector

PADEP Pollution Prevention & Energy Efficiency Qualified Assessor

LANGAN

Emily G. Strake

Project Chemist/ Risk Assessor
Environmental Engineering

13 years in the industry

Ms. Strake has thirteen years of environmental chemistry, risk assessment, auditing, and quality assurance experience. Most recently, she has focused her efforts on human health risk assessment, and has been the primary author of risk assessment reports for projects governed under RCRA, DNREC, and MDE. She has experience in site-specific strategy development, which has enabled her to perform assessments to focus areas of investigation and identify risk-based alternatives for reducing remediation costs.

Ms. Strake has extensive experience in environmental data validation, focused on ensuring laboratory deliverables follow specific guidelines as described by regulatory agencies and the analytical methods employed. In addition, she has experience in EQuIS 5.5 chemical database management. She also has a broad range of environmental field experience and maintains current OSHA HAZWOPER certification.

Ms. Strake is experienced in auditing laboratory and field-sampling activities for compliance with Quality Assurance Project Plans (QAPPs), the National Environmental Laboratory Accreditation Conference Standards Quality Systems manual, and applicable USEPA Guidance. Ms. Strake has also audited on-site laboratories in support of groundwater treatment operations and implemented corrective actions. Her responsibilities include writing reports on the value of laboratory work, writing/editing QAPPs for clients and project-specific sites, peer reviewing colleague's work, and mentoring staff within the office. She has also served as the Quality Assurance officer for several long-term projects, responsible for the achievement of all forms of Quality Control/Quality Assurance by onsite personnel relating to sampling, analysis, and data evaluation.

Ms. Strake has several years' experience analyzing investigative samples, writing laboratory Standard Operating Procedures (SOPs), and managing all aspects of procedures and analyses for Optical Emission Spectrometry, X-Ray Fluorescence, Ignition analysis, and Atomic Absorption. Her experience also includes operating and performing routine instrument maintenance for GC/MS and IR. Ms. Strake has worked extensively on developing rapid soil characterization programs for PCB and pesticide analyses utilizing enzyme-linked immunosorbent assays, and was also involved in efforts to develop new instrumentation to quantify microbial nitrification of ammonium.

Selected Project Experience

- Reviewed and validated data packages for RCRA Facilities Investigation at a Philadelphia-area chemical site; issued data validation reports to project personnel and regulatory agencies. The reviews included evaluation of quarterly groundwater, soil, and soil vapor matrices. Participated in RCRA groundwater sampling, developed and executed the investigation's QAPP, and

Education

MBA
The University of Scranton

B.Sc., Chemistry
Cedar Crest College

Training

40 hr. OSHA HAZWOPER Training/Nov 2002

8 hr. HAZWOPER Supervisor/June 2004

8 hr. OSHA HAZWOPER Refresher/Oct 2012

American Red Cross First Aid & CPR certified

coordinated with the laboratory to schedule and perform field-sampling events.

- Audited multiple accredited laboratories in New Jersey and Pennsylvania on behalf of clients using USEPA Guidance on Technical Audits and Related Assessments for Environmental Data Operations. The audits included full-suite USEPA and SW-846 methodology; and included reviewing staff experience and training records, equipment and facilities, policies, practices, procedures, and documentation for sample receipt, analysis, instrument maintenance, standard preparation, calibration and traceability, control charting, corrective actions, data reduction and review, report generation, and waste disposal.
- Acted as the Quality Assurance Officer for several long-term projects in Pennsylvania, Maryland, and Delaware, responsible for the achievement of all forms of QA/QC as it related to sampling, analysis, and data evaluation.
- Performed comprehensive human health risk assessment for a petroleum refinery in Delaware City, Delaware. The risk assessment was the basis for a thorough characterization and assessment of potential risks posed by site-specific conditions. Developed various human exposure scenarios by using both Federal and State-Specific guidance.
- Performed human health risk assessment for contamination resulting from a 3.5 million gallon diesel oil tank collapse along the Monongahela River. Evaluated potential impacts to human health via exposure to soil, groundwater, and surface water. Calculated site-specific standards for soil remediation.
- Calculated Medium Specific Concentrations (MSCs) for unregulated contaminants using the PADEP protocols to assist in the clean-up of a monomer tank explosion in Bristol, Pennsylvania.
- Developed human health risk assessment for a utility-owned former Manufactured Gas Plant (MGP) site in Pennsylvania, under Pennsylvania's Act 2 Program. Used ProUCL 4.0 statistical software to determine upper limits for full data sets and non-detect data. Conducted vapor intrusion modeling (via the Johnson & Ettinger model) and prepared vapor intrusion reports showing that risks to volatile organic compounds in soils and groundwater were not impacting indoor air quality.
- Participated in a CERCLA site investigation; assessed the usability of sample results for numerous matrices including dust, sediment, soils, and various aqueous matrices for a remedial investigation under the Contract Laboratory Program. Implemented an on-site pesticide immunoassay program to delineate soil contamination in real-time.
- Conducted vapor intrusion modeling for a dry cleaning facility in the Philadelphia area. Predictive modeling using the Johnson and Ettinger approach indicated that estimated contaminant levels would not adversely affect human receptors.
- EQuIS data manager for database migration of historical groundwater results associated with remediation activities; assisted with natural attenuation data evaluation and gained experience in geochemical trends associated with intrinsic biodegradation.

- Prepared an Act 2 site-specific human health risk assessment for an industrial facility in southeast Philadelphia to determine possible future land-use options under Pennsylvania's Land Recycling Program.
- Coordinated the collection of fish tissue samples and determined the validity of the analytical results associated with CERCLA and RCRA site characterizations. Assessed duck blood analytical results for the Connecticut Department of Environmental Protection Bureau of Natural Resources.

Gerald F. Nicholls, CHMM, EIT

Project Engineer

Environmental Engineering & Hazardous Materials Management

10 years in the industry ~ 2 years with Langan

Mr. Nicholls has ten years of experience in environmental engineering and project management. His expertise includes management of remediation and site investigations, industrial hygiene, air monitoring and environmental health and safety projects including data collection, inspection and reporting for projects throughout New York and New Jersey. Mr. Nicholls has relevant work experience serving Department of Defense, state, commercial, industrial, and municipal clients.

Selected Projects

170 Amsterdam Avenue, New York, NY
Urban Health Plan, 1095 Southern Boulevard, Bronx, NY
Whitehead Realty, Acme Sites, Brooklyn, NY
Second Avenue Subway, New York, NY
West 17th Street Development Project, New York, NY
New York University (NYU) Spill Sites 4 WSV, 7-13 WSN and
251 Mercer Street, New York, NY
Dormitory Authority of New York (DASNY), City College of New York,
Fuel Protection and Leak Detection System Repair and Upgrades,
New York, NY
Surfactant Remediation Project, Margate City, NJ
400 Trumbull Street Site Investigation, Elizabeth, NJ
Koppers Site, Trans-Hudson Express Project, Kearny, NJ
Former Cornell Manufacturing Site, Orangeburg, NY
DC034 Horse Pasture Site, Robins Air Force Base, GA
Williams Air Force Base, Thermal Enhanced Extraction, Mesa, AZ
NJ Transit 32nd Street Station Stop (former Hicor Site), Bayonne, NJ
Nikolski Radio Relay Station, Umnak Island, AK
Middletown Post Office, Middletown, NY
Oliktok LRRS and Sterling Landing Tatalina LRRS, AK
Lower Manhattan Construction Command Center (LMCCC)
Environmental Services Contract, New York, NY
Da Nang International Airport, Da Nang, Vietnam
22nd to 8th Street Station Light Rail Extension, Bayonne, NJ
69th Street Grade Separation Project, North Bergen, NJ
Hurricane Katrina Support, New Orleans, LA
Dukes Parkway Landfill, Hillsboro/Manville, NJ

Selected Publications, Reports, and Presentations

"Biodegradation Pathways and End Products of Sodium Dioctyl Sulfosuccinate/Sodium Hexadecyl Diphenyl Oxide Disulfonate Surfactant Solution." Florida Remediation Conference, Orlando, Florida, November

Education

M.S., Environmental Engineering
New Jersey Institute of Technology

B.S., Chemistry and
Environmental Studies (Double Major)
Ursinus College

Professional Registration

Engineer-in-Training (EIT)

Certified Hazardous Materials Manager (CHMM)

Affiliations

City of Jersey City Environmental Commission, Vice Chair

Alliance of Hazardous Materials Professionals (AHMP)

Academy of Hazardous Materials Managers (ACHMM), NJ Chapter

American Chemical Society

Association of NJ Environmental Commissions (ANJEC)

2005.

Ryan J. Wohlstrom, EIT

Senior Staff Engineer
Environmental Engineering & Project Management

4 years in the industry ~ 2 years with Langan

Mr. Wohlstrom is an environmental engineer with four years of experience. His environmental expertise includes Phase I and II Environmental Site Assessments, Underground Storage Tank (UST) permitting, removal specifications, and closure reporting; soil, soil gas, and groundwater remediation evaluation, innovative and sustainable remedial action design, environmental analysis, and oversight, design and specification generation for remediation operations with contaminants of concern to include polychlorinated biphenyls (PCBs), solvents, mercury, arsenic, lead, petroleum products, and asbestos. Mr. Wohlstrom is also experienced in the evaluation of laboratory analytical data and preparation of environmental reports. He regularly uses the latest Microsoft applications, all word-processing systems and AutoCAD.

Education

B.S., Engineering
Roger Williams University

Professional Registration

Engineer-in-Training (EIT)

OSHA 40-Hour HAZWOPER

Selected Projects

Columbia University, Manhattanville Development, New York, NY
Brooklyn Bridge Park Development, Brooklyn, NY
Lehigh Northeast Cement Company Closed CKD Pile and Wetlands Assessments, Alsen NY
Gateway Estates Phase II, Brooklyn, NY
New York City Housing Authority (NYCHA), Various Sites in the Five Boroughs of New York City, NY
Hudson Yards, Terra Firma Development, New York, NY
29 Flatbush Avenue, Brooklyn, NY
Soil Vapor Remediation System Experience, Various Sites, Southern CA
Former Artistic Brass Facility, South Gate, CA
Hassayampa Superfund Site, Maricopa County, AZ
Client Confidential, Burbank, CA
Former Calstyle Manufacturing Facility, Compton, CA
Irvine Ranch Water District Cienega Filtration Project, Irvine, CA
Bolsa Chica Lowlands Assessment and Remediation, Orange County, CA
Post-Fire Emergency Response 2007 Santiago Fire, Orange County, CA
Lehigh Cement Company Cement Kiln Dust Pile, Metaline Falls, WA
Trident Plating, Santa Fe Springs, CA
Hi-Shear Corporation, Torrance, CA
Los Angeles Unified School District, San Pedro, CA
Newport Banning Ranch LLC, Newport Beach, CA
Client Confidential, Thousand Oaks, CA
Irvine Ranch Water District Cienega Filtration, Irvine, CA

LANGAN