CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN

For the:

Rockaway Park Former Manufactured Gas Plant Site
Rockaway Park, Queens County, New York
Site Number 2-41-029

Prepared for:

KeySpan Corporation
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1.0 INTRODUCTION

This Construction Quality Assurance Project Plan (CQAPP) presents the organization, objectives, planned activities, and quality assurance/quality control (QA/QC) procedures associated with the remedial activities proposed for the Rockaway Park Former Manufactured Gas Plant (MGP) Site (Site) located in Rockaway Park, Queens County, New York. The selected Remedial Contractor, Posillico Environmental, Inc. (Posillico), has provided submittals regarding the general construction quality control. This information has been incorporated into both the Remedial Design Report and the CQAPP, for use during the planned remedial activities at the Site.

The CQAPP describes specific protocols for field testing, material handling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the CQAPP was based on the USEPA Quality Assurance Project Plan (QAPP) and New York State Department of Environmental Conservation (NYSDEC) guidance documents, including:

- *USEPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5, October 1998), and*
- *Guidance for Quality Assurance Project Plans (EPA QA/G-5, February 1998),*
- *Draft DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, December, 2002), and*
- *Unified Facilities Guide Specifications, USACE, NAVFAC, AFCESA UFGS 2111, 2140, 2325, and 2373.*

The CQAPP lists the project quality objectives and outlines the proposed samples and analytical parameters. The data generated from the analysis of samples will be used to determine the extent of contamination, identify impacted intervals, and compare the results of the remedial actions to site-specific remedial goals. A list of the potential parameters to be analyzed, including their respective quantitation limits (QLs), and data quality levels (DQLs), is shown in Tables 1a and 1b.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Posillico will coordinate and manage in conjunction with Paulus, Sokolowski and Sartor Engineering, PC (PS&SPC) and/or KeySpan Corporation (KeySpan), site sampling and analysis program, material testing, data reduction, QA/QC, data validation, analysis, and reporting. Posillico will direct the sampling activities, coordinate laboratory and remediation activities.

Posillico's Quality Assurance Officer (QAO) will assure that data validation screening is performed by trained and experienced data validators using the applicable criteria specified in the NYSDEC 2001 Analytical Services Protocol (ASP) and that the QA/QC plan is implemented. They will be responsible for review of data upon receipt from the analytical laboratory, and provide technical support for the sampling and analytical procedures followed in this project. The field personnel have the broad authority to approve or disapprove project plans, specific analyses, and final reports. They are independent from the data generation activities. In general, the QA personnel will be responsible for reviewing and advising on all QA/QC aspects of this program. This process is not intended to supercede the Department's authority or absolve KeySpan of its responsibilities under the Administrative Consent Order or the Record of Decision. The process is merely meant to serve as a QA/QC measure to satisfy the objectives of the remedial activities are achieved in accordance with the Administrative Consent Order and the Record of Decision.

The QAO will have qualifications that meet the minimum requirements as specified in the NYSDEC guidance document DER-10, Appendix 2A. Specifically:

- The Project QAO will not have another position on the project, such as a project or task manager, that involves project productivity or profitability as a job performance criteria;

- The Project QAO must have a minimum of a bachelors degree in chemistry or natural science with a minimum of 20 hours in chemistry;

- The Project QAO must be proficient in analytical methodology, data interpretation and validation, the development of sampling plans, quality control procedures, and auditing techniques; and

- The Project QAO will assist the project manager in the development of the material handling, sampling and analytical portion of the CQAPP. The QAO or their designee shall conduct periodic field and sampling audits, interface with the analytical laboratory to make requests and resolve problems, interface with the data validator and develop a project specific data usability report. As part of this project on-site work may be necessary, therefore verification of completion of the 40-hour OSHA safety training course and 8-hour refresher is required.

Posillico has selected Environmental Testing Laboratories, Inc. of Farmingdale, New York (NYSDOH ELAP Certification Number 10969) and Accutest Laboratories of Dayton, New Jersey York (NYSDOH ELAP Certification Number 10983) to serve as the analytical laboratories. Both of these laboratories are certified by the New York State Department of Health ELAP certified laboratory. The laboratories will communicate directly with Posillico regarding the analytical results and reporting. Laboratories will be responsible for providing all labels, sample jars, field blank water, trip blanks, shipping coolers, and laboratory documentation. As necessary, Posillico may supplement the list of laboratories providing the new labs are certified by the New York State Department of Health ELAP.

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

All analytical data will be provided by the laboratory(ies) using the New York State Analytical Services Protocol (ASP) Category B deliverable format.

All analytical measurements will be made so that the results are representative of the media sampled (soil, groundwater and waste characterization) and the conditions measured. Data will be reported in consistent dry weight units for solid samples (i.e., mg/kg) and in µg/L or mg/L for aqueous samples. Table 2 presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers for the Site.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses. Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this Site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this CQAPP.

Tables 3a and 3b present the precision and accuracy requirements for each parameter to be analyzed. In regards to quantitation limits for soil parameters, the laboratory will be required to attempt to meet or surpass the parameter-specific limits listed in the STARS and/or TAGM guidance, whichever is lower. Note, however, that NYSDEC is in the process of consolidating the STARS and TAGM guidance levels into one guidance document that largely reflects the TAGM standards. Given this development, the analytical results will be interpreted primarily using the TAGM criteria.

In certain instances, if the STARS or TAGM criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit (See Table 1a for affected analytes). For quantitation limits for groundwater parameters, the laboratory will be required to attempt to meet or surpass the parameter-specific limits for groundwater from the Division of Water Technical and Operational Guidance Series (1.1.1), June 1998 (TOGS) Ambient Water Quality Standards and

Guidance Values or the TAGM Recommended Groundwater Standards/Criteria. It should be noted that the TOGS standards were first used to develop DQLs for groundwater. When TOGS standards did not exist for an analyte of interest, the TAGM groundwater standards were used. In certain instances, if the TOGS or TAGM criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit (See Table 1b for affected analytes). The QA objectives are defined as follows:

- ***Accuracy*** is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

  Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

  The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. Tables 3a and 3b summarize the laboratory accuracy requirements.

- ***Precision*** is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

  Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). Field duplicates will be collected at a frequency of one per twenty investigative samples per matrix per analytical parameter, with the exception of the TCLP parameters. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be less than 50% for soil samples and less than 30% for aqueous samples. These criteria apply only if the sample and/or duplicate results are >5x the quantitation limit; if both results are <5x the quantitation limit, the criterion will be doubled.

Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicate pairs and field duplicate pairs. MS/MSD samples or matrix duplicate pairs will be performed at a frequency of one per twenty investigative samples per matrix per parameter. Tables 3a and 3b summarize the laboratory precision requirements.

- ***Completeness*** is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

  Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

  Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

- ***Representativeness*** is a qualitative parameter that expresses the degree to which data accurately and precisely represents either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data.

  Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and Plan are followed and that proper sampling, sample handling, and sample preservation techniques are used.

  Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample-holding times.

- ***Comparability*** expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and Plan are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used.

Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
Volatile Organic Compounds (mg/kg) –STARS/TAGM[3]		
Acetone	0.005	0.2
Benzene	0.002	0.06
2-Butanone	0.005	0.3
Carbon Disulfide	0.005	2.7
Carbon Tetrachloride	0.005	0.6
Chlorobenzene	0.005	1.7
Chloroethane	0.005	1.9
Chloroform	0.005	0.3
Dibromochloromethane	0.005	NS
1,2-Dichlorobenzene	0.005	7.9
1,3-Dichlorobenzene	0.005	1.6
1,4-Dichlorobenzene	0.005	8.5
1,1-Dichloroethane	0.005	0.2
1,2-Dichloroethane	0.005	0.1
1,1-Dichloroethene	0.005	0.4
trans-1,2-Dichloroethene	0.005	0.3
1,3-Dichloropropane	0.005	0.3
Ethylbenzene	0.005	5.5
Freon 113	0.005	6.0
Methylene chloride	0.005	0.1
4-Methyl-2-pentanone	0.005	1.0
Tetrachloroethene	0.005	1.4
1,1,1-Trichloroethane	0.005	0.8
1,1,2,2-Tetrachloroethane	0.005	0.6
1,2,3-Trichloropropane	0.005	0.4
1,2,4-Trichlorobenzene	0.005	3.4
Toluene	0.005	1.5
Trichloroethene	0.005	0.7
Vinyl chloride	0.005	0.2
Xylenes	0.005	1.2
Isopropylbenzene	0.005	5.0
n-Propylbenzene	0.005	14
p-Isopropyltoluene	0.005	11
1,2,4-Trimethylbenzene	0.005	13
1,3,5-Trimethylbenzene	0.005	3.3
n-Butylbenzene	0.005	18
sec-Butylbenzene	0.005	25
t-Butylbenzene	0.005	0.1[2]

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
MTBE	0.005	0.12
Polynuclear Aromatic Hydrocarbons (mg/kg) –STARS/TAGM		
Acenaphthene	0.066	50
Acenaphthylene	0.066	41
Anthracene	0.066	50
Benzo(a)anthracene	0.066	0.224
Benzo(a)pyrene	**0.066**	**0.061**
Benzo(b)fluoranthene	0.066	1.1
Benzo(g,h,i)perylene	0.066	50
Benzo(k)fluoranthene	0.066	1.1
Chrysene	0.066	0.4
Dibenzo(a,h)anthracene	**0.066**	**0.014**
Fluoranthene	0.066	50
Fluorene	0.066	50
Indeno(1,2,3-cd)pyrene	0.066	3.2
2-Methylnaphthalene	0.066	36.4
Naphthalene	0.066	13
Phenanthrene	0.066	50
Pyrene	0.066	50
Semivolatile Organic Compounds (mg/kg) –STARS/TAGM		
Acenaphthene	0.066	50
Acenaphthylene	0.066	41
Aniline	0.066	0.1
Anthracene	0.066	50
Benzo(a)anthracene	0.066	0.224
Benzo(a)pyrene	**0.066**	**0.061**
Benzo(b)fluoranthene	0.066	1.1
Benzo(g,h,i)perylene	0.066	50
Benzo(k)fluoranthene	0.066	1.1
Bis(2-ethylhexyl)phthalate	0.066	50
Butylbenzylphthalate	0.066	50
Chrysene	0.066	0.4
4-Chloroaniline	0.16	0.22
4-Chloro-3-methylphenol	0.16	0.24
2-Chlorophenol	0.16	0.8
Dibenzofuran	0.066	6.2
Dibenz(a,h)anthracene	**0.066**	**0.014**
3,3’-Dichlorobenzidine	0.16	NS
2,4-Dichlorophenol	0.16	0.4
2,4-Dinitrophenol	**0.66**	**0.2**

Table 1a Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples Rockaway Park Former MGP Site		
Parameter	**QL**	**DQL[1]**
2,6-Dinitrotoluene	0.66	1
Diethylphthalate	0.66	7.1
Dimethylphthalate	0.066	2
Di-n-butylphthalate	0.066	8.1
Di-n-octylphthalate	0.066	50
Fluoranthene	0.066	50
Fluorene	0.066	50
Hexachlorobenzene	0.066	0.41
Indeno(1,2,3-cd)pyrene	0.066	3.2
Isophorone	0.066	4.4
2-Methylnaphthalene	0.066	36.4
2-Methylphenol	**0.16**	**0.1**
4-Methylphenol	0.16	0.9
Naphthalene	0.066	13
Nitrobenzene	0.066	0.2
2-Nitroaniline	0.16	0.43
2-Nitrophenol	0.16	0.33
4-Nitrophenol	**0.66**	**0.1**
3-Nitroaniline	0.16	0.5
Pentachlorophenol	0.66	1
Phenanthrene	0.066	50
Phenol	**0.16**	**0.03**
Pyrene	0.066	50
2,4,5-Trichlorophenol	**0.16**	**0.1**
Metals (mg/kg) – TAGM		
Aluminum	20	NS
Antimony	1.0	NS
Arsenic	1.0	8.0
Barium	20	300
Beryllium	**0.5**	**0.16**
Cadmium	0.5	1.0
Calcium	500	NS
Chromium	1.0	10
Cobalt	5.0	30
Copper	2.5	25
Iron	10	2000
Lead	1.0	NS (background)
Magnesium	500	NS
Manganese	1.5	NS
Mercury	0.04	0.1

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
Nickel	4	13
Potassium	500	NS
Selenium	1	2
Silver	1	NS
Sodium	500	NS
Thallium	1	NS
Vanadium	5	150
Zinc	2	20
PCBs (mg/kg)[4]		
Aroclor 1016	0.330	1 Surface/ 10 Subsurface
Aroclor 1221	0.330	1 Surface/ 10 Subsurface
Aroclor 1232	0.330	1 Surface/ 10 Subsurface
Aroclor 1242	0.330	1 Surface/ 10 Subsurface
Aroclor 1248	0.330	1 Surface/ 10 Subsurface
Aroclor 1254	0.330	1 Surface/ 10 Subsurface
Aroclor 1260	0.330	1 Surface/ 10 Subsurface
TCLP VOCs (µg/L) – STARS/TAGM[7]		
Benzene	**5**	**0.7[5]**
2-Butanone	25	200,000[6]
Carbon Tetrachloride	5	500[6]
Chlorobenzene	10	100,000[6]
Chloroform	25	6000[6]
1,4-Dichlorobenzene	25	7500[6]
1,2-Dichloroethane	10	500[6]
1,1-Dichloroethene	10	700[6]
Ethylbenzene	5	5[5]
Tetrachloroethene	5	700[6]
Toluene	5	5[5]
Trichloroethene	5	500[6]
Vinyl chloride	5	200[6]
Xylenes	**25**	**5[5]**
Isopropylbenzene	**10**	**5[5]**
n-Propylbenzene	**25**	**5[5]**
p-Isopropyltoluene	**25**	**5[5]**
1,2,4-Trimethylbenzene	**25**	**5[5]**
1,3,5-Trimethylbenzene	**25**	**5[5]**
n-Butylbenzene	**25**	**5[5]**
sec-Butylbenzene	**25**	**5[5]**
t-Butylbenzene	**25**	**5[5]**
MTBE	5	50[5]

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
TCLP PAHs (µg/L) – STARS/TAGM[7]		
Acenaphthene	2	20[5]
Anthracene	2	50[5]
Benzo(a)anthracene	**2**	**0.002[5]**
Benzo(a)pyrene	**2**	**0.002[5]**
Benzo(b)fluoranthene	**2**	**0.002[5]**
Benzo(g,h,i)perylene	**2**	**0.002[5]**
Benzo(k)fluoranthene	**2**	**0.002[5]**
Chrysene	**2**	**0.002[5]**
Dibenzo(a,h)anthracene	2	50[5]
Fluoranthene	2	50[5]
Fluorene	2	50[5]
Indeno(1,2,3-cd)pyrene	**2**	**0.002[5]**
Naphthalene	2	10[5]
Phenanthrene	2	50[5]
Pyrene	2	50[5]
TCLP Metals (µg/L) –PP[8]		
Arsenic	5	5,000[6]
Barium	200	100,000[6]
Cadmium	4	1,000[6]
Chromium	10	5,000[6]
Lead	3	5,000[6]
Mercury	0.2	200[6]
Selenium	5	1,000[6]
Silver	10	5,000[6]

[1] DQL based on TAGM Recommended Soil Cleanup Objectives (January 24, 1994) unless otherwise specified
[2] DQL based on STARS TCLP Alternative Guidance Values (August 1992)
[3] Includes QLs and DQLs for BTEX and MTBE when required individually for a particular sample
[4] DQL listed is for total PCBs
[5] DQL based on STARS TCLP Extraction Guidance Values (August 1992)
[6] DQL based on TCLP standards (SW-846 Chapter 7, Table 7-1)
[7] Analyte list based on STARS/TAGM compounds but only those compounds which exhibit TCLP standards based on the STARS document or SW-846
[8] Analyte list based on PP metals and barium but only for those metals which exhibit TCLP standards based on SW-846
QL=Quantitation Limit
DQL=Data Quality Level
NS = None specified
Compounds which will not achieve the DQL are highlighted.

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
Volatile Organic Compounds (µg/L) –STARS/TAGM[2]		
Acetone	5	50
Benzene	1	1
2-Butanone	5	50
Carbon Disulfide	5	50[3]
Carbon Tetrachloride	1	5
Chlorobenzene	2	5
Chloroethane	5	5
Chloroform	5	7
Dibromochloromethane	5	50
1,2-Dichlorobenzene	2	3
1,3-Dichlorobenzene	2	3
1,4-Dichlorobenzene	2	3
1,1-Dichloroethane	5	5
1,2-Dichloroethane	**2**	**0.6**
1,1-Dichloroethene	2	5
trans-1,2-Dichloroethene	5	5
1,3-Dichloropropane	5	5
Ethylbenzene	1	5
Freon 113	5	5
Methylene chloride	2	5
4-Methyl-2-pentanone	5	50[3]
Tetrachloroethene	1	5
1,1,1-Trichloroethane	5	5
1,1,2,2-Tetrachloroethane	2	5
1,2,3-Trichloropropane	**5**	**0.04**
1,2,4-Trichlorobenzene	5	5
Toluene	1	5
Trichloroethene	1	5
Vinyl chloride	1	2
Xylenes	5	5
Isopropylbenzene	2	5
n-Propylbenzene	5	5
p-Isopropyltoluene	5	5
1,2,4-Trimethylbenzene	5	5
1,3,5-Trimethylbenzene	5	5
n-Butylbenzene	5	5

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
sec-Butylbenzene	5	5
t-Butylbenzene	5	5
MTBE	1	10
Polynuclear Aromatic Hydrocarbons (µg/L) –STARS/TAGM		
Acenaphthene	2	20
Acenaphthylene	2	20[3]
Anthracene	2	50
Benzo(a)anthracene	**2**	**0.002**
Benzo(a)pyrene	2	ND
Benzo(b)fluoranthene	**2**	**0.002**
Benzo(g,h,i)perylene	2	5[3]
Benzo(k)fluoranthene	**2**	**0.002**
Chrysene	**2**	**0.002**
Dibenzo(a,h)anthracene	2	50[3]
Fluoranthene	2	50
Fluorene	2	50
Indeno(1,2,3-cd)pyrene	**2**	**0.002**
2-Methylnaphthalene	2	4.7
Naphthalene	2	10
Phenanthrene	2	50
Pyrene	2	50
Pesticides (µg/L) – TAGM		
Aldrin	0.02	ND
alpha-BHC	**0.02**	**0.01**
beta-BHC	0.02	0.04
delta-BHC	0.02	0.04
Chlordane	**0.5**	**0.05**
4,4'-DDD	0.02	0.3
4,4'-DDE	0.02	0.2
4,4'-DDT	0.02	0.2
Dieldrin	**0.02**	**0.004**
Endosulfan I	0.02	0.1[3]
Endosulfan II	0.02	0.1[3]
Endosulfan sulfate	0.02	0.1[3]
Endrin	0.02	ND
Endrin ketone	0.05	5
gamma-BHC (Lindane)	0.02	0.05
gamma-Chlordane	0.02	0.1[3]
Heptachlor	0.02	0.04

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
Heptachlor epoxide	0.02	0.03
Methoxychlor	0.05	35
2,4'-DDD	0.02	NS
Semivolatile Organic Compounds (µg/L) –STARS/TAGM		
Acenaphthene	2	20
Acenaphthylene	2	20[3]
Aniline	2	5
Anthracene	2	50
Benzo(a)anthracene	**2**	**0.002**
Benzo(a)pyrene	2	ND
Benzo(b)fluoranthene	**2**	**0.002**
Benzo(g,h,i)perylene	2	5[3]
Benzo(k)fluoranthene	**2**	**0.002**
Bis(2-ethylhexyl)phthalate	2	5
Butylbenzylphthalate	2	50
Chrysene	**2**	**0.002**
4-Chloroaniline	5	5
4-Chloro-3-methylphenol	**5**	**1**
2-Chlorophenol	**5**	**1**
Dibenzofuran	5	5[3]
Dibenz(a,h)anthracene	2	50[3]
3,3'-Dichlorobenzidine	5	5
2,4-Dichlorophenol	5	5
2,4-Dinitrophenol	**20**	**10**
2,6-Dinitrotoluene	2	5
Diethylphthalate	2	50
Dimethylphthalate	2	50
Di-n-butylphthalate	2	50
Di-n-octylphthalate	2	50
Fluoranthene	2	50
Fluorene	2	50
Hexachlorobenzene	**2**	**0.04**
Indeno(1,2,3-cd)pyrene	**2**	**0.002**
Isophorone	2	50
2-Methylnaphthalene	2	50[3]
2-Methylphenol	**5**	**1**
4-Methylphenol	**5**	**1**
Naphthalene	2	10
Nitrobenzene	**2**	**0.4**

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
2-Nitroaniline	5	5
2-Nitrophenol	**5**	**1**
4-Nitrophenol	**20**	**1**
3-Nitroaniline	5	5
Pentachlorophenol	**20**	**1**
Phenanthrene	2	50
Phenol	**5**	**1**
Pyrene	2	50
2,4,5-Trichlorophenol	**5**	**1**
Metals (µg/L) – TAGM		
Aluminum	200	NS
Antimony	**5**	**3**
Arsenic	5	25
Barium	200	1000
Beryllium	3	3
Cadmium	4	5
Calcium	5000	NS
Chromium	10	50
Cobalt	50	NS
Copper	25	200
Iron	100	300
Lead	3	25
Magnesium	5000	35,000
Manganese	15	300
Mercury	0.2	0.7
Nickel	40	100
Potassium	5000	NS
Selenium	5	10
Silver	10	50
Sodium	5000	20,000
Thallium	**5**	**0.5**
Vanadium	50	NS
Zinc	20	2000
PCBs (µg/L)[4]		
Aroclor 1016	**0.5**	**0.09**
Aroclor 1221	**0.5**	**0.09**
Aroclor 1232	**0.5**	**0.09**
Aroclor 1242	**0.5**	**0.09**
Aroclor 1248	**0.5**	**0.09**

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples
Rockaway Park Former MGP Site

Parameter	QL	DQL[1]
Aroclor 1254	**0.5**	**0.09**
Aroclor 1260	**0.5**	**0.09**
Wet Chemistry (µg/L)		
Ammonia	100	2000
Nitrate	100	10,000
Nitrite	10	10,000
Carbonate	5000	NS
Bicarbonate	5000	NS
Sulfate	20,000	250,000
Cyanide	10	200
Total Dissolved Solids	10,000	NS
Chloride	20,000	250,000

[1] DQL based on TOGS Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (June, 1998) unless otherwise specified
[2] Includes QLs and DQLs for BTEX and MTBE when required individually for a particular sample
[3] DQL based on TAGM Recommended Groundwater Standards/Criteria (January 24, 1994)
[4] DQL listed is for total PCBs
QL=Quantitation Limit
DQL=Data Quality Level
NS = None specified
ND = Not detected when analyzed by method listed in Table 2
Compounds which will not achieve the DQL are highlighted.

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Soil/Solid Waste	VOCs (TCL or STARS/TAGM)	Grab	TBD	SW 846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	BTEX	Grab	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	BTEX/MTBE	Grab	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil/Solid Waste	PCBs	Grab	TBD	SW 846 Method 8082	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Solid Waste	Pesticides (TCL)	Grab	TBD	SW-846 Method 8081A	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Solid Waste	SVOCs (TCL)	Grab	TBD	SW-846 Method 8270C	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	PAHs or SVOCs (STARS/TAGM)	Grab	TBD	SW 846 Method 8270C	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	Lead	Grab	TBD	SW 846 Method 6010B	Cool to 4^0 C	6 months to analysis	(1) 300 mL amber glass jar
Soil	Metals (TAGM)	Grab	TBD	SW-846 Method 6010B/7000 Series	Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 300 mL amber glass jar
Solid Waste	Metals (PP)	Grab	TBD	SW-846 Method 6010B/7000 Series	Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 300 mL amber glass jar
Soil	GRO	Grab	TBD	SW-846 Method 8015B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Soil	DRO	Grab	TBD	SW-846 Method 8015B	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil/Solid Waste/Liquid Waste	TCLP VOC (STARS/TAGM or RCRA)	Grab	TBD	SW 846 Methods 1311/8260B	Cool to 4^0 C; no headspace	14 days to TCLP extraction; 14 days from TCLP extraction to analysis	(1) 60 ml VOC vial
Soil/Solid Waste	TCLP SVOC or PAHs (STARS/TAGM or RCRA)	Grab	TBD	SW 846 Methods 1311/ 8270C	Cool to 4^0 C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis	(1) 950 mL amber glass jar
Liquid Waste	TCLP SVOC (RCRA)	Grab	TBD	SW 846 Methods 1311/ 8270C	Cool to 4^0 C	7 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis	(1) 950 mL amber glass jar
Solid Waste	TCLP Pesticides (RCRA)	Grab	TBD	SW-846 Methods 1311/8081A	Cool to 4ºC	14 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis	(1) 950 mL amber glass jar
Liquid Waste	TCLP Pesticides (RCRA)	Grab	TBD	SW-846 Methods 1311/8081A	Cool to 4ºC	7 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis	(1) 950 mL amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Solid Waste	TCLP Herbicides (RCRA)	Grab	TBD	SW-846 Methods 1311/8151A	Cool to 4°C	14 days to TCLP extraction; 7 days from TCLP extraction to herbicide extraction; 40 days from herbicide extraction to analysis	(1) 950 mL amber glass jar
Liquid Waste	TCLP Herbicides (RCRA)	Grab	TBD	SW-846 Methods 1311/8151A	Cool to 4°C	7 days to TCLP extraction; 7 days from TCLP extraction to herbicide extraction; 40 days from herbicide extraction to analysis	(1) 950 mL amber glass jar
Soil/Solid Waste/Liquid Waste	TCLP Metals (PP or RCRA)	Grab	TBD	SW 846 Methods 1311/ 6010B/7000 Series	Cool to 4^0 C	Hg: 28 days to TCLP extraction; 28 days from TCLP extraction to analysis Other Metals: 6 months to TCLP extraction; 6 months from TCLP extraction to analysis	(1) 500 mL amber glass jar
Soil	TCLP Lead	Grab	TBD	SW 846 Methods 1311/ 6010B	Cool to 4^0 C	6 months to TCLP extraction; 6 months from TCLP extraction to analysis	(1) 500 mL amber glass jar
Soil/Solid Waste/Liquid Waste	Ignitability	Grab	TBD	SW-846 Method 1010	Cool to 4^0 C	None specified	(1) 500 mL amber glass jar
Soil/Solid Waste/Liquid Waste	Corrosivity	Grab	TBD	SW-846 Method 9045C	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Soil/Solid Waste/Liquid Waste	Reactive cyanide	Grab	TBD	SW-846 Chapter 7, Section 7.3.3	Cool to 4^0 C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Soil/Solid Waste/Liquid Waste	Reactive sulfide	Grab	TBD	SW-846 Chapter 7, Section 7.3.4	Cool to 4^0 C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Groundwater	VOCs (STARS/TAGM)	Grab	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	BTEX	Grab	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	BTEX/MTBE	Grab	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	PCBs	Grab	TBD	SW-846 Method 8082	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater	PAHs (STARS/TAGM)	Grab	TBD	SW-846 Method 8270C	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater	SVOCs (STARS/TAGM)	Grab	TBD	SW-846 Method 8270C	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater	Pesticides (TAGM)	Grab	TBD	SW-846 Method 8081A	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Groundwater	Lead	Grab	TBD	SW-846 Method 6010B	pH<2 with HNO_3; Cool to 4^0 C	6 months to analysis	(1) 1L polyethylene container
Groundwater	Metals (TAGM)	Grab	TBD	SW-846 Method 6010B/7000 Series	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1L polyethylene container
Groundwater	Ammonia	Grab	TBD	EPA Method 350.1 (350.2 for distillation)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 250 mL polyethylene container
Groundwater	Nitrate	Grab	TBD	EPA Method 353.2/SM 4500-NO_2B (18th edition)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 100 mL polyethylene container
Groundwater	Nitrite	Grab	TBD	SM 4500-NO_2B (18th edition)	Cool to 4^0 C	48 hours to analysis	(1) 100 mL polyethylene container
Groundwater	Sulfate	Grab	TBD	SW-846 9056	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 100 mL polyethylene container
Groundwater	Carbonate	Grab	TBD	SM 4500-CO_2D (18th edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Bicarbonate	Grab	TBD	SM 4500-CO_2D (18th edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Total Cyanide	Grab	TBD	EPA Method 335.3	pH>12 with NaOH; Cool to 4°C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Total Dissolved Solids	Grab	TBD	EPA Method 160.1	Cool to 4°C	7 days to analysis	(1) 100 mL polyethylene container

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Groundwater	Chloride	Grab	TBD	EPA Method 300.0	Cool to 4°C	28 days to analysis	(1) 100 mL polyethylene container

[1] For soil samples, a six-inch sampling interval is the preferred sample size; however, sample volume recovery, analytical method requirements, and field conditions can affect the actual sample interval size. For these reasons, the actual sampling interval may change in order to obtain adequate volume.
[2] Actual number of samples may vary depending on field conditions, sample material availability, and field observations
[3] From date of sample collection
[4] I-Chem Series 300 bottles
[5] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices
TBD = To Be Determined

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs (TCL or STARS/TAGM)	SW-846 Method 8260B	Soil/Solid Waste	Surrogates — % Rec. 1,2-Dichloroethane-d4 33-145 4-Bromofluorobenzene 70-148 Toluene-d8 60-138 Matrix Spikes 1,1-Dichloroethene 59-172 Trichloroethene 62-137 Benzene 66-142 Toluene 59-139 Chlorobenzene 60-133	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD ≤50 MS/MSDs — RPD 1,1-Dichloroethene 22 Trichloroethene 24 Benzene 21 Toluene 21 Chlorobenzene 21	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
BTEX and BTEX/MTBE	SW-846 Method 8260B	Soil	Surrogates — % Rec. 1,2-Dichloroethane-d4 33-145 4-Bromofluorobenzene 70-148 Toluene-d8 60-138 Matrix Spikes Benzene 71-142 Toluene 83-129 Ethyl Benzene 80-129 Xylenes (total) 79-133 MTBE 70-130	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤50 MS/MSDs — RPD Benzene 21 Toluene 21 Ethyl Benzene 20 Xylenes (total) 20 MTBE 20	Field Duplicates: One per 20 MS/MSDs: One per 20

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
PCBs	SW-846 Method 8082	Soil/Solid Waste	Surrogates Decachlorobiphenyl Tetrachloro-m-xylene Matrix Spikes Aroclor 1016 Aroclor 1260	% Rec. 30-150 30-150 50-136 45-154	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD ≤50 MS/MSDs Aroclor 1016 Aroclor 1260	 RPD 40 40	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
PAHs (STARS/TAGM)	SW-846 Method 8270C	Soil	Surrogates 1,2-Dichlorobenzene-d4 Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Matrix Spikes Naphthalene Acenaphthene Fluorene Fluoranthene Pyrene Phenanthrene Anthracene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenzo(a,h)anthracene Benzo(g,h,i)perylene	% Rec. 20-130 20-120 30-115 18-137 43-109 31-137 48-114 48-132 50-116 48-132 46-130 56-136 55-109 41-119 35-137 62-110 47-119 52-112 46-118	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤50 MS/MSDs Naphthalene Acenaphthene Fluorene Fluoranthene Pyrene Phenanthrene Anthracene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenzo(a,h)anthracene Benzo(g,h,i)perylene	 RPD 20 19 20 20 36 20 20 20 20 20 20 20 20 20 20	Field Duplicates: One per 20 MS/MSDs: One per 20

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
SVOCs (TCL or STARS/TAGM)	SW-846 Method 8270C	Solid Waste	Surrogates — % Rec. 1,2-Dichlorobenzene-d4 20-130 Phenol-d5 24-113 2-Fluorophenol 25-121 2,4,6-Tribromophenol 19-122 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 30-115 Terphenyl-d14 18-137 2-Chlorophenol-d4 20-130 Matrix Spikes Phenol 26-90 n-Nitroso-di-n-propyl-amine 41-126 2-Chlorophenol 25-102 4-Chloro-3-methylphenol 26-103 Acenaphthene 31-137 4-Nitrophenol 11-114 Pentachlorophenol 17-109 Pyrene 35-142 2,4-Dinitrotoluene 28-116 1,2,4-Trichlorobenzene 38-107 1,4-Dicholorobenzene 28-104	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	MS/MSDs — RPD Phenol 35 n-Nitroso-di-n-propyl-amine 38 2-Chlorophenol 50 4-Chloro-3-methylphenol 33 Acenaphthene 19 4-Nitrophenol 50 Pentachlorophenol 47 Pyrene 36 2,4-Dinitrotoluene 47 1,2,4-Trichlorobenzene 23 1,4-Dicholorobenzene 27	MS/MSDs: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Pesticides (TCL)	SW-846 Method 8081A	Solid Waste	Surrogates — % Rec. Decachlorobiphenyl 30-150 Tetrachloro-m-xylene 30-150 Matrix Spikes gamma-BHC 44-139 Heptachlor 57-148 Aldrin 35-147 Dieldrin 47-134 Endrin 37-146 4,4'-DDT 64-127	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	MS/MSDs — RPD Gamma-BHC 31 Heptachlor 20 Aldrin 43 Dieldrin 38 Endrin 45 4,4'-DDT 27	MS/MSDs: One per 20 per matrix type
GRO	SW-846 Method 8015B	Soil	Surrogates — % Rec. Fluorobenzene 60-140 Matrix Spikes GRO (C_6-C_{10}) 60-140	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤50 MS/MSDs — RPD GRO (C_6-C_{10}) 20	Field Duplicates: One per 20 MS/MSDs: One per 20
DRO	SW-846 Method 8015B	Soil	Surrogates — % Rec. 1,2-Dichlorobenzene-d4 10-190 Matrix Spikes DRO 50-150	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤50 MS/MSDs — RPD DRO 20	Field Duplicates: One per 20 MS/MSDs: One per 20

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Metals (PP or TAGM)	SW-846 Methods 6010B/7000 Series	Soil/Solid Waste	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD ≤50 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 per soils Matrix Duplicates: One per 20 per matrix type
TCLP VOCs (STARS/TAGM)	SW-846 Methods 1311/ 8260B	Soil	Surrogates — % Rec. 1,2-Dichloroethane-d4 53-183 4-Bromofluorobenzene 63-140 Dibromofluoromethane 81-118 Toluene-d8 60-135 Matrix Spikes SEE 8260 STARS OR RCRA 1311/8260 (Benzene is the only compound in both the STARS and TCLP list)	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	FOR TCLP, ONLY AN MS IS ANALYZED MS/MSDs SEE 8260 STARS OR RCRA 1311/8260 (Benzene is the only compound in both the STARS and TCLP list)	MS/MSDs: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
TCLP VOCs (RCRA)	SW-846 Methods 1311/8260B	Solid Waste	Surrogates — % Rec. 1,2-Dichloroethane-d4 53-183 4-Bromofluorobenzene 63-140 Toluene-d8 60-135	Surrogates: All samples, standards, QC samples	FOR TCLP, ONLY AN MS IS ANALYZED	
			Matrix Spikes 1,1-Dichloroethene 58-112 1,2-Dichloroethane 52-133 2-Butanone 14-166 Chloroform 75-119 Carbon Tetrachloride 64-126 Benzene 50-127 Trichloroethene 57-115 Tetrachloroethene 59-133 Chlorobenzene 72-124 Vinyl chloride 14-152	Matrix Spikes: One per 20 per matrix type	MS/MSDs — RPD 1,1-Dichloroethene 20 1,2-Dichloroethane 20 2-Butanone 20 Chloroform 20 Carbon Tetrachloride 20 Benzene 20 Trichloroethene 20 Tetrachloroethene 20 Chlorobenzene 20 Vinyl chloride 20	MS/MSDs: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
TCLP PAHs (STARS/TAGM)	SW-846 Methods 1311/ 8270C	Soil	Surrogates — % Rec. 1,2-Dichlorobenzene 16-110 Nitrobenzene-d5 35-114 2-Fluorobiphenyl 43-116 Terphenyl-d14 33-141 Matrix Spikes SEE 8270 STARS OR SEE RCRA 1311/8270	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	FOR TCLP, ONLY AN MS IS ANALYZED MS/MSDs SEE 8270 STARS OR SEE RCRA 1311/8270	MS/MSDs: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
TCLP SVOCs (RCRA)	SW-846 Methods 1311/8270C	Solid Waste	Surrogates — % Rec. Phenol-d5 10-110 2-Fluorophenol 21-110 2,4,6-Tribromophenol 10-123 Nitrobenzene-d5 35-114 2-Fluorobiphenyl 43-116 Terphenyl-d14 33-141 2-Chlorophenol-d4 33-110 1,2-Dichlorobenzene-d4 16-110 Matrix Spikes Hexachloroethane 39-111 Nitrobenzene 39-129 Hexachlorobutadiene 49-115 2,4,6-Trichlorophenol 37-133 2,4,5-Trichlorophenol 16-148 2,4-Dinitrotoluene 46-118 Hexachlorobenzene 55-127 Pentachlorophenol 13-123 Pyridine 12-82 2-Methylphenol 27-141 3&4-Methylphenol 15-141 1,4-Dichlorobenzene 38-116	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	FOR TCLP, ONLY AN MS IS ANALYZED MS/MSDs — RPD Hexachloroethane 30 Nitrobenzene 30 Hexachlorobutadiene 30 2,4,6-Trichlorophenol 30 2,4,5-Trichlorophenol 30 2,4-Dinitrotoluene 30 Hexachlorobenzene 30 Pentachlorophenol 30 Pyridine 30 2-Methylphenol 30 3&4-Methylphenol 30 1,4-Dichlorobenzene 30	MS/MSDs: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
TCLP Pesticides	SW-846 Methods 1311/8081A	Solid Waste	Surrogates / % Rec. Decachlorobiphenyl 30-150 Tetrachloro-m-xylene 30-150 Matrix Spikes gamma-BHC 58-124 Heptachlor 61-110 Heptachlor epoxide 52-131 Endrin 57-147 Methoxychlor 51-124	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	FOR TCLP, ONLY AN MS IS ANALYZED MS/MSDs / RPD Gamma-BHC 20 Heptachlor 20 Heptachlor epoxide 20 Endrin 20 Methoxychlor 20	MS/MSDs: One per 20 per matrix type
TCLP Herbicides	SW-846 Methods 1311/8151A	Solid Waste	Surrogates / % Rec. 2,4-DCAA 36-121 Matrix Spikes 2,4-D 39-111 2,4,5-TP 48-113	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	FOR TCLP, ONLY AN MS IS ANALYZED MS/MSDs / RPD 2,4-D 30 2,4,5-TP 56	MS/MSDs: One per 20 per matrix type
TCLP Metals	SW-846 Methods 1311/ 6010B/7000 Series	Soil/Solid Waste	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20 per matrix type	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type
Ignitability	SW-846 Method 1010	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Corrosivity	SW-846 Method 9045C	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤5	Matrix Duplicates: One per 20 per matrix type
Reactive cyanide	SW-846 Chapter 7, Section 7.3.3	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type
Reactive sulfide	SW-846 Chapter 7, Section 7.3.4	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.
Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs (STARS/TAGM)	SW-846 Method 8260B	Groundwater	Surrogates — % Rec. 1,2-Dichloroethane-d4 68-124 4-Bromofluorobenzene 75-127 Dibromofluoromethane 81-118 Toluene-d8 85-119	Surrogates: All samples, standards, QC samples	Field Duplicates RPD ≤30	Field Duplicates: One per 20
			Matrix Spikes 1,1-Dichloroethene 72-134 Trichloroethene 77-132 Benzene 61-138 Toluene 55-147 Chlorobenzene 83-124	Matrix Spikes: One per 20	MS/MSDs — RPD 1,1-Dichloroethene 17 Trichloroethene 13 Benzene 11 Toluene 12 Chlorobenzene 12	MS/MSDs: One per 20
BTEX and BTEX/MTBE	SW-846 Method 8260B	Groundwater	Surrogates — % Rec. 1,2-Dichloroethane-d4 68-124 4-Bromofluorobenzene 75-127 Dibromofluoromethane 81-118 Toluene-d8 85-119	Surrogates: All samples, standards, QC samples	Field Duplicates RPD ≤30	Field Duplicates: One per 20
			Matrix Spikes Benzene 61-138 Toluene 55-147 Ethyl Benzene 68-139 Xylenes (total) 57-146 MTBE 35-151	Matrix Spikes: One per 20	MS/MSDs — RPD Benzene 11 Toluene 12 Ethyl Benzene 12 Xylenes (total) 12 MTBE 11	MS/MSDs: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Pesticides (TAGM)	SW-846 Method 8081A	Groundwater	Surrogates — % Rec. Decachlorobiphenyl 22-147 Tetrachloro-m-xylene 48-136 Matrix Spikes gamma-BHC 55-144 Heptachlor 31-164 Aldrin 32-158 Dieldrin 48-167 Endrin 73-156 4,4'-DDT 46-163	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤30 MS/MSDs — RPD gamma-BHC 35 Heptachlor 35 Aldrin 35 Dieldrin 35 Endrin 34 4,4'-DDT 35	Field Duplicates: One per 20 MS/MSDs: One per 20
PCBs	SW-846 Method 8082	Groundwater	Surrogates — % Rec. Decachlorobiphenyl 14-150 Tetrachloro-m-xylene 25-134 Matrix Spikes Aroclor 1016 49-138 Aroclor 1260 25-133	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤30 MS/MSDs — RPD Aroclor 1016 21 Aroclor 1260 35	Field Duplicates: One per 20 MS/MSDs: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
SVOCs (STARS/TAGM)	SW-846 Method 8270C	Groundwater	Surrogates — % Rec. Phenol-d5 10-93 2-Fluorophenol 10-112 2,4,6-Tribromophenol 37-159 Nitrobenzene-d5 42-127 2-Fluorobiphenyl 38-131 Terphenyl-d14 22-153	Surrogates: All samples, standards, QC samples	Field Duplicates RPD ≤30	Field Duplicates: One per 20
			Matrix Spikes Phenol 10-126 2-Chlorophenol 44-105 n-Nitroso-di-n-propylamine 50-120 4-Chloro-3-methylphenol 45-116 Acenaphthene 51-116 4-Nitrophenol 28-131 2,4-Dinitrotoluene 52-114 Pentachlorophenol 33-139 Pyrene 53-124	Matrix Spikes: One per 20	MS/MSDs — RPD Phenol 16 2-Chlorophenol 13 n-Nitroso-di-n-propylamine 16 4-Chloro-3-methylphenol 14 Acenaphthene 15 4-Nitrophenol 25 2,4-Dinitrotoluene 17 Pentachlorophenol 19 Pyrene 17	MS/MSDs: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
PAHs (STARS/TAGM)	SW-846 Method 8270C	Groundwater	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Nitrobenzene-d5	42-127				
			2-Fluorobiphenyl	38-131		RPD ≤30		
			Terphenyl-d14	22-153				
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			Naphthalene	47-116		Naphthalene	16	
			2-Methylnaphthalene	47-125		2-Methylnaphthalene	18	
			Acenaphthylene	53-108		Acenaphthylene	16	
			Acenaphthene	51-116		Acenaphthene	15	
			Fluorene	47-129		Fluorene	16	
			Fluoranthene	54-125		Fluoranthene	18	
			Pyrene	53-124		Pyrene	17	
			Phenanthrene	52-119		Phenanthrene	16	
			Anthracene	51-122		Anthracene	17	
			Benzo(a)anthracene	55-121		Benzo(a)anthracene	16	
			Chrysene	53-119		Chrysene	16	
			Benzo(b)fluoranthene	52-133		Benzo(b)fluoranthene	25	
			Benzo(k)fluoranthene	47-123		Benzo(k)fluoranthene	24	
			Benzo(a)pyrene	52-122		Benzo(a)pyrene	17	
			Indeno(1,2,3-cd)pyrene	42-134		Indeno(1,2,3-cd)pyrene	25	
			Dibenzo(a,h)anthracene	51-135		Dibenzo(a,h)anthracene	20	
			Benzo(g,h,i)perylene	49-128		Benzo(g,h,i)perylene	24	

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Metals (TAGM)	SW-846 Methods 6010B/7000 Series	Groundwater	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Ammonia	EPA Method 350.1 (350.2 for distillation)	Groundwater	Matrix Spikes 60-134% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤24	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Nitrate	EPA Method 353.2/SM 4500-NO_2B (18th edition)	Groundwater	Matrix Spikes 56-129% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤6	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Nitrite	SM 4500-NO_2B (18th edition)	Groundwater	Matrix Spikes 71-122% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Sulfate	SW-846 9056	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Carbonate	SM 4500-CO_2D (18th edition)	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Bicarbonate	SM 4500-CO_2D (18th edition)	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤11	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Cyanide	EPA Method 335.3	Groundwater	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples
Rockaway Park Former MGP Site

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Total Dissolved Solids	EPA Method 160.1	Groundwater	Not Applicable	Not Applicable	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤18	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Chloride	EPA Method 300.0	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.
Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

4.0 SAMPLING PLAN

Sampling for the Rockaway Park Former MGP Site will include soil, water (if required) and waste characterization sampling. Hand auger or stainless steel trowel will be the preferred methods for obtaining soil samples. Dedicated dippers, glass tube samplers, pump and tubing, kemmerer bottles, and Bacon Bomb samplers will be the preferred methods for obtaining water sampling. Performing grab or composite sampling by appropriate hand-held sampling equipment will be the preferred method for waste characterization sampling in accordance with the acceptance criteria of the selected disposal facility.

All fill material delivered to the Site will be accompanied by documentation stating the fill is certified "clean" from a virgin source or a blend of soils originating from virgin sources not subject to manufacturing operations and free of contaminants. The fill material will not be a manufactured soil from a construction or demolition debris processing facility. In addition, the fill material is required to originate from a NYSDOT approved source or other source approved by the NYSDEC and KeySpan. Posillico will provide the facility name, owner name and street address of the fill source to KeySpan prior to on-site delivery.

In addition to the above documentation, analytical testing will be required for any soil backfill brought to the Site. For soil backfill, Posillico will be required to collect representative confirmatory samples from each off-site source of soil backfill material at a rate of one per every 5,000 cubic yards. Alternatively, when sources of backfill are greater than 10,000 yds^3, the sampling frequency can be reduced to one per 10,000 yds^3. The samples will be analyzed at a New York State Department of Health (NYSDOH)-certified Environmental Laboratory Accreditation Program (ELAP)-approved laboratory for total volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organic pesticides/herbicides, polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) parameters. Analytical results from backfill samples will be submitted to the NYSDEC to obtain written authorization to use the backfill materials.

4.1 Grab/Composite Sampling

Grab soil/solid samples will be collected from the material or interval in question by retrieving a volume for analysis using a decontaminated or dedicated stainless steel, aluminum, plastic, or scoop, trowel, spoon, or bucket auger. Samples may be collected from a discrete interval or from consecutive intervals by placing the soil in a cleaned stainless steel pan for homogenization before inserting into the sample container. Samples for volatile organics analysis will be placed directly into the sample container.

Composite samples will be collected in the same manner described above, except that the discrete sample volumes will be placed in a clean stainless steel pan and mixed to form the composite. Composites for volatile organics analysis will have the discrete sample volumes placed directly into the sample container without mixing.

4.2 Soil Sampling

Soil sampling will be performed using a decontaminated or dedicated stainless steel, aluminum or plastic scoop, trowel, spoon, or bucket auger. To sample solid material at varying depths, a hollow stem auger or a core sampler in conjunction with an auger can be utilized. Stainless steel thiefs are similar to a scoop and are used for the collection of a core sample of a solid material. Thiefs are long hollow tubes, with an inner tube, and are used for sampling of dry free running solids (e.g., pile of fine sand). The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). The soil sample column will be logged per the Unified Soil Classification System (U.S.C.S.). The soil samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). Field screening will include physical observations (visual and olfactory) as well as the use of field screening methodologies including but not limited to the use of properly calibrated photo or flame ionization detectors (PID/FID).

VOC samples will go directly into the sample containers without homogenization. Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample.

4.3 Soil Vapor Sampling (Soil Screening)

Soil samples will be screened using an organic vapor monitor (OVM) or a photoionization instrument, to detect possible organic vapors. Field screening methodologies will include a headspace sample collected in a jar or sealed plastic bag. The sample will be allowed to equilibrate and warm up for at least ten minutes before analyzing the headspace with a PID/FID. All field screening instruments (PIDs, FIDs, etc.) will be calibrated daily and documented as per the requirements of the CQAPP. The screening information as well as the observations of soil characteristics will be documented in field logs.

4.4 Waste Classification Sampling

Waste classification sampling will be conducted for the purpose of characterizing a waste material for its proper off-site disposal. Specific methods for sampling liquid and solid wastes are listed in Table 4 and briefly discussed below.

4.4.1 Solid Waste

As indicated by Table 4, solid sampling methods include utilizing dedicated stainless steel or Teflon scoops/shovels. Utilizing a scoop and/or shovel is the preferred method for sampling solids from piles or containers. To sample solid material at varying depths, a hollow stem auger or a core sampler in conjunction with an auger can be utilized (See Soil Sampling Section).

4.4.2 Liquid Waste

As indicated by Table 4, liquid sampling methods include utilizing dedicated dippers, glass tube samplers, pump and tubing, kemmerer bottles, and Bacon Bomb samplers. Dippers are used to collect samples from the surface of the liquid, and are appropriate for wastes that are homogeneous. Glass tube samplers consist of glass tubes of varying length and diameter used to collect a full-depth liquid sample from a drum or similar container. Pump and tubing (e.g. bladder pump or peristaltic pump) are used to collect liquid samples from a depth (up to approximately 20 feet below grade), and are typically relied upon for sampling subsurface structures, such as underground storage tanks. To minimize the loss of volatile organic components in the liquid, the lowest achievable flow rate is utilized for collecting the sample by this method. Kemmerer bottles and Bacon Bomb samplers are discrete-depth samplers. These samplers are lowered into the liquid and opened to collect a sample at a desired depth.

Table 4
Sampling Methods Summary For Waste Characterization
Rockaway Park Former MGP Site

	1	2	3	4	5	6	7	8	9	10	11
Waste Type/Unit Type	**Scoops/ Shovels**	**Triers**	**Thief**	**Sample Core**	**Auger**	**Core Sampler***	**Glass Tubes**	**Dipper**	**Pump/ Tubing**	**Kemmerer Bottle**	**Bacon Bomb**
Solid Wastes											
Waste Piles	X	X	X	X	X						
Drums	X		X	X							
Sacks/Bags	X	X	X								
Trucks	X	X	X			X					
Sludge Wastes											
Waste Piles	X	X		X		X					
Drums	X					X	X				
Tanks	X							X			
Surface Impoundment	X							X			
Trucks	X	X				X		X			
Liquid Wastes											
Drums							X	X	X		
Tanks									X	X	X
Surface Impoundment								X	X	X	X
Trucks								X	X	X	X

* Core sampler modified to serve as airtight container for retention of volatile fraction

4.4.3 Grab versus Composite Sampling

Waste characterization of a liquid or a solid can involve grab or composite sampling depending upon the homogeneity and the volume of the waste. Grab sampling consists of collecting discrete sample or samples of a material, and submitting each sample for separate analysis. Grab sampling is appropriate for characterizing small quantities of waste as well as waste streams of varying content (e.g. drums of different contents). Composite sampling consists of taking discrete grab samples of a material and combining them into a smaller number of samples for analysis. Composite sampling generally is appropriate for large volumes of a homogenous waste material, such a pile of soil or construction debris. The specific number of composite and grab samples largely will depend upon the size and nature of the waste pile (i.e. cubic yards) as well as the analysis required for characterization of the waste.

4.5 QC Sample Collection

QC samples will include equipment blanks, trip blanks, field duplicates and MS/MSDs.

Equipment blanks will consist of distilled water and will be used to check for potential contamination of the equipment that may cause sample contamination. Equipment blanks will be collected by routing the distilled water through the sampling equipment prior to sample collection. Equipment blanks will be submitted to the laboratory at a frequency of one per 20 samples per matrix per type of equipment being used per parameter or one per week, with the exception of TCLP parameters; equipment blanks will not be submitted for the TCLP parameters.

Trip blanks will consist of distilled water (supplied by the laboratory) and will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant migration during sample shipment and storage. Trip blanks will be transported to the site unopened, stored with the investigative samples, and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler which contains VOC groundwater samples.

Field duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample but identified with a separate sample number to the analytical laboratory. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 samples or one per week for all matrices and all parameters, with the exception of TCLP parameters; field duplicates will not be submitted for the TCLP parameters.

MSs and MSDs are two additional aiquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs will be submitted at a frequency of one per 20 investigative samples per matrix for organic parameters. MSs will be submitted at a frequency of one per 20 investigative samples per matrix or one per week for inorganic parameters.

Refer to Table 5 for a summary of QC sample preservation and container requirements.

4.6 Sample Preservation and Containerization

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest USEPA's Specifications and Guidance for Contaminant-Free Sample Containers. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to USEPA specifications. The containers will be pre-preserved, where appropriate (See Table 2).

4.7 Equipment Decontamination

4.7.1 Sampling Equipment

All sampling equipment shall be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture
- Tap water rinse
- 10 percent HNO_3 rinse for non-dedicated groundwater sampling equipment for metals analysis only (excludes submersible pump and flow cell)
- Hexane rinse (optional, only if required to remove heavy petroleum coating)
- Distilled/deionized water rinse
- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with deionized water.

Table 5
QC Sample Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2,3]
Soil	VOCs (TCL or STARS/TAGM)	/MS/MSDS	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	BTEX/MTBE	/MS/MSDS	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	PCBs	/MS/MSDS	TBD	SW-846 Method 8082	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	PAHs or SVOCs (STARS/TAGM)	/MS/MSDS	TBD	SW-846 Method 8270C	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	Lead	/MS/MSDS	TBD	SW-846 Method 6010B	Cool to 4^0 C	6 months to analysis	(1) 300 mL amber glass jar
Soil	Metals (TAGM)	/MS/MSDS	TBD	SW-846 Method 6010B/7000 Series	Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 300 mL amber glass jar
Soil	GRO	/MS/MSDS	TBD	SW-846 Method 8015B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	DRO	/MS/MSDS	TBD	SW-846 Method 8015B	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Groundwater	VOCs (STARS/TAGM)	/MS/MSDS	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	BTEX/MTBE	/MS/MSDS	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials

Table 5
QC Sample Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2,3]
Groundwater	Pesticides (TAGM)	/MS/MSDS	TBD	SW-846 Method 8081A	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	PCBs	/MS/MSDS	TBD	SW-846 Method 8082	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	SVOCs (STARS/TAGM)	/MS/MSDS	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	PAHs (STARS/TAGM)	/MS/MSDS	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	Lead	/MS/MSDS	TBD	SW-846 Method 6010B	pH<2 with HNO_3; Cool to 4^0 C	6 months to analysis	(1) 1L polyethylene container
Groundwater	Metals (TAGM)	/MS/MSDS	TBD	SW-846 Method 6010B/7000 Series	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1L polyethylene container
Groundwater	Ammonia	/MS/MSDS	TBD	EPA Method 350.1 (350.2 for distillation)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 250 mL polyethylene container
Groundwater	Nitrate	/MS/MSDS	TBD	EPA Method 353.2/SM 4500-NO_2B (18th edition)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 100 mL polyethylene container
Groundwater	Nitrite	/MS/MSDS	TBD	SM 4500-NO_2B (18th edition)	Cool to 4^0 C	48 hours to analysis	(1) 100 mL polyethylene container
Groundwater	Sulfate	/MS/MSDS	TBD	SW-846 9056	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 100 mL polyethylene container

Table 5
QC Sample Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2,3]
Groundwater	Carbonate	/MS/MSDS	TBD	SM 4500-CO_2D (18th edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Bicarbonate	/MS/MSDS	TBD	SM 4500-CO_2D (18th edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Cyanide	/MS/MSDS	TBD	EPA Method 335.3	pH>12 with NaOH; Cool to 4ºC	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Chloride	/MS/MSDS	TBD	EPA Method 300.0	Cool to 4ºC	28 days to analysis	(1) 100 mL polyethylene container
Groundwater	Total Dissolved Solids	/MS/MSDS	TBD	EPA Method 160.1	Cool to 4ºC	7 days to analysis	(1) 100 mL polyethylene container
Aqueous	Ammonia	Equipment Blank	TBD	EPA Method 350.1 (350.2 for distillation)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 250 mL polyethylene container
Aqueous	Nitrate	Equipment Blank	TBD	EPA Method 353.2/SM 4500-NO_2B (18th edition)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 100 mL polyethylene container
Aqueous	Nitrite	Equipment Blank	TBD	SM 4500-NO_2B (18th edition)	Cool to 4^0 C	48 hours to analysis	(1) 100 mL polyethylene container
Aqueous	Sulfate	Equipment Blank	TBD	SW-846 9056	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 100 mL polyethylene container
Aqueous	Carbonate	Equipment Blank	TBD	SM 4500-CO_2D (18th edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container

Table 5
QC Sample Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2,3]
Aqueous	Bicarbonate	Equipment Blank	TBD	SM 4500-CO_2D (18th edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Aqueous	Cyanide	Equipment Blank	TBD	SW-846 Method 9010B	pH>12 with NaOH; Cool to 4ºC	14 days to analysis	(1) 250 mL polyethylene container
Aqueous	Chloride	Equipment Blank	TBD	SW-846 Method 9250	Cool to 4ºC	28 days to analysis	(1) 100 mL polyethylene container
Aqueous	Total Dissolved Solids	Equipment Blank	TBD	EPA Method 160.1	Cool to 4ºC	7 days to analysis	(1) 100 mL polyethylene container
Aqueous	VOCs (TCL or STARS/TAGM)	Equipment Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	BTEX/MTBE	Equipment Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	Pesticides (TAGM)	Equipment Blank	TBD	SW-846 Method 8081A	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Aqueous	PCBs	Equipment Blank	TBD	SW-846 Method 8082	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Aqueous	SVOCs (STARS/TAGM)	Equipment Blank	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars

Table 5
QC Sample Preservation and Container Requirements
Rockaway Park Former MGP Site

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2,3]
Aqueous	PAHs (STARS/TAGM)	Equipment Blank	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Aqueous	Lead	Equipment Blank	TBD	SW-846 Method 6010B	pH<2 with HNO_3; Cool to 4^0 C	6 months to analysis	(1) 1L polyethylene container
Aqueous	Metals (TAGM)	Equipment Blank	TBD	SW-846 Method 6010B/7000 Series	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1L polyethylene container
Aqueous	GRO	Equipment Blank	TBD	SW-846 Method 8015B	pH<2 with HCl; Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	DRO	Equipment Blank	TBD	SW-846 Method 8015B	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1L amber glass bottles
Aqueous	VOCs (TCL or STARS/TAGM)	Trip Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	BTEX/MTBE	Trip Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials

[1] From date of sample collection
[2] I-Chem Series 300 bottles
[3] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices
TBD = To Be Determined

5.0 GENERAL CONSTRUCTION QUALITY CONTROL

The selected Remedial Contractor, Posillico Environmental, Inc. (Posillico), has provided submittals regarding the general construction quality control. This information has been incorporated into both the Remedial Design Report and the CQAPP, for use during the planned remedial activities at the Site. This CQAPP includes a detailed description of the QA/QC procedures that will be implemented as part of the remedial activities proposed for the Site. All QA/QC procedures will adhere to industry standards and will follow generally accepted practices as well as complying with applicable ASTM standards.

This CQAPP sets forth the general framework and specific details of the methods and procedures that will be implemented to demonstrate that the remedial construction activities will be performed pursuant to the Final RDR and Technical Specifications. Further, this CQAPP describes the quality control organization of the Contractor and the allocation of responsibilities for performing quality control activities

5.1 Material Handling Plan

A Materials Handling Plan has been prepared by Posillico and includes information on the handling and management of material throughout the duration of the remedial construction activities. Specific information in the plan includes: the segregation and stockpiling of excavated impacted materials; the segregation and management of construction debris; the segregation, stockpiling, placement and compaction of backfill material and topsoil; and specifications for geosynthetic materials. The plan has been prepared prior to shipment of material to the project site. Borrow source should be confirmed as certified clean New York State Department of Transportation (NYSDOT) approved material or other sources approved by KeySpan and the NYSDEC; and testing shall confirm results as previously referenced in this CQAPP.

All fill material delivered to the Site shall be accompanied by documentation stating the fill is certified "clean" from a virgin source or a blend of soils originating from virgin sources not subject to manufacturing operations and free of contaminants. The fill material will not be a manufactured soil from a construction or demolition debris processing facility. In addition, the fill material is required to originate from a NYSDOT approved source or other sources approved by KeySpan and the NYSDEC. Posillico will provide facility name, owner name and street address of the fill source to KeySpan and/or PS&SPC prior to on-site delivery.

In addition to the above documentation, analytical testing will be required for any soil backfill brought to the Site. For soil backfill, Posillico will be required to collect representative confirmatory samples from each off-site source of soil backfill material at a rate of one per every 5,000 cubic yards. Alternatively, when sources of backfill are greater than 10,000 yds^3, the sampling frequency can be reduced to one per 10,000 yds^3. The samples will be analyzed at a New York State Department of Health (NYSDOH)-certified

Environmental Laboratory Accreditation Program (ELAP)-approved laboratory for total volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organic pesticides/herbicides, polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) parameters. Posillico will submit the analytical results from confirmatory samples to KeySpan and/or PS&SPC in order to obtain approval to use the material on-site.

5.2 Mobilization, Site Preparation and Temporary Facilities

Preparation of the Site for remedial activities will involve the setup of temporary support facilities (i.e. electrical power, water, telephone service, security, etc.), the installation of soil erosion and sediment control measures, establishing controlled access to the Site, set up truck routes and decontamination areas. All necessary permits will be acquired prior to initiation of the remedial work.

Product Data: Posillico has and will continue to submit supporting data for all backfill material, topsoil, gravel, geosynthetics, etc., associated with remedial construction activities.

Material Test Reports: Posillico has and will continue to submit the reports obtained from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

a. Classifications, in accordance with the Technical Specifications.
b. Laboratory compaction curve according to ASTM D 1557 for soil material proposed for fill and backfill in accordance with the Technical Specifications.
c. Certifications and analytical results in accordance with the Technical Specifications.

Pre-Remediation Photographs or Videotape: Posillico will submit photographs or videotape before intrusive remedial activities commence to show existing conditions of the Site and adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations.

Topographic Surveys: Posillico will utilize the topographic survey supplied by KeySpan and/or PS&SPC in the Remedial Design Report. Posillico will supplement the information on this survey by developing a new survey to be prepared by a Professional Surveyor licensed in the State of New York.

5.3 Support and Protection of Existing Utilities

Prior to intrusive activities, Posillico will identify and document the locations of all existing structures, former gas holder foundations, former and existing building foundations and appurtenances, above and below ground utilities, environmental wells, and any other features identified by KeySpan and/or PS&SPC.

Posillico shall protect and support all identified site features. Posillico shall repair any damage to protected structures and features during the remedial construction operations in accordance with applicable regulations and as approved by KeySpan and/or PS&SPC.

A former Gas Regulator Station is located in the southeast corner of the Site. The station was relocated to an off-site location in order not to impede the implementation of the remedial activities. Currently, all gas mains and appurtenances associated with the former gas regulator station are reported to be abandoned. However, Posillico will work in conjunction with KeySpan personnel to ensure that all features associated with the former Gas Regulator station have been abandoned prior to the start of remedial activities in this area of the Site.

All work must also be completed without negatively impacting the surrounding community. If coordination is necessary with adjacent property owners, Posillico shall work with KeySpan to make the proper arrangements to secure it.

5.4 Construction of a Decontamination Pad(s)

The decontamination pad(s) shall consist of an area of suitable size for the decontamination purposes underlain by crushed stone or sand and lined with an impermeable liner 40 mil or thicker at a location agreed to by KeySpan and/or PS&SPC. Posillico may utilize a pre-fabricated decontamination pad as approved by KeySpan and/or PS&SPC. The decontamination pad should at a minimum be capable of handling any piece of large construction equipment, truck or tools utilized at the site and adequately contain the decontamination fluids. The decontamination area will be within the contamination reduction zone as approved by KeySpan and/or PS&SPC.

Decontamination activities shall include the removal of contaminated soil, debris and other miscellaneous materials from all construction equipment and tools utilized within the Exclusion Zone using a high-pressure, low volume steam cleaner. Physical/mechanical agitation (scraping with hand tools) of soil can be utilized to minimize wastewater generation.

Upon completion of the remedial activities, the components of the decontamination pads (i.e., sand or stone dust, HDPE geomembrane layers, the non-woven geotextile and the clean stone will be managed as contaminated materials. These materials will be characterized and disposed of at an off-site facility permitted to accept the various types of waste.

5.5 Site Clearing and Soil and Erosion Control Measures

Clearing shall include the removal of vegetation as required and any on-site debris within the limits of the proposed remedial work as shown on the Design Drawings. Any site clearing other than shown or not specified requires prior written approval from KeySpan and/or PS&SPC. To address concerns regarding dust, the entire site will not be cleared at one time.

The site will be cleared in a phased approach consisting of two to three locations after the active excavation area.

Prior to commencement of land disturbance and demolition activities, temporary soil erosion and sediment control measures shall be installed and maintained for remedial activities as specified in the Contract Documents.

Remedial activities shall be carried out so as to minimize erosion and silting in accordance with the New York Guidelines for Urban Soil and Sediment Control. Erosion and sediment control measures must be implemented, designed and constructed to satisfy at a minimum the requirements of the Stormwater Pollution Prevention Plan (SWPPP) and as required by the EPA Region I Construction General Permit (CGP).

During remedial construction, soil erosion and sediment control measures will be inspected and maintained on a daily basis. Accumulated sediment will be removed from the erosion and sediment controls as needed. Sediment that originates from excavation areas will be added to the stockpile for off-site disposal.

Remedial activities will be performed so as to limit the potential for fugitive odor and dust emissions. Dust control will consist of water spraying or approved equivalent. The type of dust control (e.g. water spray) and odor suppression measures (e.g. Rusmar Foam™) will be established in the subsequent remedial design submittals. In addition, a temporary fabric enclosure(s) will be utilized during the excavation activities in the Shallow Excavation Areas.

5.6 Excavation Activities

As depicted on Design Drawing C-04, excavation activities within the Shallow Excavation Areas will consist of removing observed source material to the depth of eight feet bgs, to remove visually observed source material (i.e., soil containing visible tar, oils, and purifier wastes). The remedial excavation will be deeper in some areas to facilitate the removal foundations or other former MGP structures encountered that potentially contain source material. As previously discussed, the results of the supplemental geotechnical and environmental investigation warranted the expansion of the Shallow Excavation Areas beyond the limits detailed in the ROD. Assuming an average excavation depth of eight feet bgs, the estimated volume of material to be removed from the proposed shallow excavation areas is estimated to be 88,000 cubic yards (in-place). In addition, excavation outside of the designated Shallow Excavation Area will occur to a depth of two feet bgs in order to accommodate installation of the Site-Wide cap. Excavation depths to establish the Site-Wide Cap may be less in areas of the Site where the proposed grade is higher than the existing grade.

Excavated material within the Shallow Excavation Areas will be consolidated under a temporary fabric enclosure(s) to control the release of volatile emissions and odors and to load transport vehicles for off-site disposal. The temporary fabric enclosure will be equipped with a vapor management system (VMS) that will provide six air exchanges per hour for the interior of the enclosure and suitable for the planned depth of excavation.

If source material is visually observed to extend beyond the excavation boundaries, then excavation activities will extend beyond the boundaries to the extent feasible without water handling difficulties. The maximum horizontal expansion will be limited to the Site boundaries or limiting site features. Excavation that has the potential to undermine existing public rights-of-way (i.e., sidewalks, roadways, infrastructure beyond the Site perimeter) will not be implemented. KeySpan and/or PS&SPC and the NYSDEC representative will make the final determination as to whether or not encountered material is constituted to be source material that requires removal. This determination for removal will be based upon visual observation and field screening techniques, as applicable.

Posillico is to verify quantities in the field of the estimated in-place volume of excavation within the excavation areas. Actual volumes will be based on field surveys by a Professional Surveyor licensed in the State of New York as agreed upon by KeySpan and PS&SPC.

Posillico will submit Weekly Reports summarizing activities conducted during the week. Each Weekly Report will include narratives discussing any problems encountered during the subject week, as well as a progress summary (i.e., material excavation and backfilling volumes, material loading, NAPL recovery, air monitoring summary, VMS performance, etc.).

5.7 Backfilling Excavation Areas

The types of backfill that will be brought on-site by Posillico will consist of a clean, well-graded sandy soil and gravel material for the Shallow Excavation Areas and the construction of a Site-Wide Cap. The Site-Wide cap will consist of 18 inches of a well graded sandy soil overlain by six inches of gravel. The soil cover will be underlain by a geotextile fabric to serve as a demarcation barrier. A well-graded sandy soil material will be used to backfill the Shallow Excavation Areas as well supplementing the soil cover.

Within the Bulkhead Area, the Site-Wide Cap will consist of a minimum of 18 inches of well-graded sandy soil topped with six inches of topsoil capable of sustaining vegetation.

Well-Graded Sandy Soil

The sandy soil shall consist of clean naturally occurring or blended soil and aggregate mix conforming to the following gradation (or equivalent):

Sieve Size	Percent Passing
2"	100%
3/4 inch	70% - 100%
No. 4	30% - 80%
No. 50	10% - 35%
No. 200	5% - 12%

Gravel Layer

The six inches of gravel will be a crushed gravel or crushed stone with a New York State Department of Transportation (NYSDOT) Standard Specifications for Coarse Aggregate size designation Type 2 (or approved equivalent). This NYSDOT designation includes the following designation:

Sieve Size	Percent Passing
1.5"	100%
1 inch	90% - 100%
1/2 inch	0% - 15%

If gravel material meeting this gradation requirement is not commercially available at the time of remedial construction, Posillico will propose an alternative for review and approval by KeySpan and the NYSDEC.

Topsoil Layer

Within the Bulkhead Area, a six inch topsoil layer shall be included with the soil cap, which will facilitate the growth of vegetation. Topsoil will generally conform to the following parameters (or as approved):

- Topsoil shall have at least 2 percent by weight of fine textured stable organic material and no greater than 6 percent. Muck soil shall not be considered topsoil;
- Topsoil shall have not less than 20 percent fine textured material (passing the No. 200 sieve) and not more than 15 percent clay.
- The pH of the topsoil shall be between 5.5 and 6.5.
- Topsoil shall not be treated with soil sterilants or herbicides

- Topsoil shall be relatively free of stones and other materials over 1½ inches in diameter, trash, noxious weeds such as nutsedge and quackgrass, and will have less than 10 percent gravel by volume.
- Topsoil containing soluble salts greater than 500 ppm shall not be used.

Posillico is required to verify, in the field, the actual in-place compacted volume of backfill material. Actual volumes will be based on field surveys by a Professional Surveyor licensed in the State of New York as approved upon by KeySpan and PS&SPC.

Posillico shall provide a qualified independent geotechnical engineering testing agency to perform field quality control testing. The testing agency shall inspect and test subgrades and each lift or backfill layer. Posillico will proceed with subsequent earthwork only after test results for previously completed work complies with requirements of the Contract Documents. The testing agency will test compaction of soils in place according to ASTM D 1557, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. The tests will be performed for each compacted backfill layer, at least 1 test for every 2,500 square feet, but no fewer than 2 tests per backfill lift. For the pre-trenching along the barrier alignment, 1 test shall be taken every 50 feet but no fewer than 2 tests per backfill lift. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, Posillico shall either compact the backfill further until the specified degree of compaction is achieved or, if the fill material is too wet for proper compaction, remove and replace the fill to the depth required and re-compact and retest until specified compaction is obtained.

When the independent testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, Posillico is to scarify and moisten or aerate, or remove and replace soil to the depth required; re-compact and re-test until specified compaction is obtained. KeySpan will have full-time representatives on-site in the form of PS&SPC's Quality Control/Quality Assurance (QA/QC) Engineer and ARCADIS, the Construction Manager, who will be monitoring the construction activities. If fill is noted that is of questionable integrity (i.e., high moisture content), the situation will be discussed with the Remedial Contractor.

5.8 Pre-Trenching for Installation of the Waterloo Barrier® Sheeting

In order to manage subsurface obstructions and utilities, a trench will be excavated along the proposed alignment of the migration barriers. The trench will be excavated to a depth of eight feet below grade (or immediately above the groundwater table, whichever is encountered first). The width of the trench will allow for the top of the sheeting to be driven to a terminal depth of two feet bgs.

Any obstructions such as former foundations and construction debris encountered during the pre-trenching activities that have the potential of hindering the installation of the migration barrier will be removed and staged on-site for off-site disposal

If there are active utilities encountered they will be temporary disconnected or relocated to facilitate the installation of the containment barrier. The impacted utilities would then need to be re-established in accordance with the requirements of the utility companies.

In the event that soil containing source material is encountered during the pre-trenching activities, the soil will be removed. The soil will be staged on-site where KeySpan and the NYSDEC representatives will make the determination as to whether or not the soil will be disposed of off-site. This determination will be based on visual observation and field screening techniques (i.e. PID readings).

It is anticipated that the trench will be backfilled with either excavated soil (non-source material containing soil) or clean off-site material to within three feet of the ground surface. The migration barrier will then be driven to two feet below ground surface as described below. Final backfilling of the remaining three feet of the trench will occur during installation of the site wide cap. In the Bulkhead Area, the final three feet of the trench will be backfilled during the subsequent installation of the cap.

5.9 Utility Management

All pipes that are noted to extend onto the subject site from off-site areas, including those which extend from the tunnel under Beach Channel Drive, will be cut and capped. Posillico will perform a utility cut and cap excavation along the perimeter of the Site to identify and manage these utilities.

A variety of methods will be used to initially locate and identify underground utilities. The methods will consist of reviewing historical facility drawings as well as the results of a subsurface obstruction survey performed as a pre-design activity provided by KeySpan. In addition, Posillico will contact the New York City – One Call Center to field locate and mark-out all off-site underground utilities along the site perimeter. Finally, Posillico will retain the services of a utility contracting service to investigate the site perimeter for potential utilities. KeySpan will also coordinate with LIPA and its own internal representatives to field locate its utilities along the Site perimeter, to the extent feasible.

Posillico will excavate a two to three foot wide trench along the perimeter of the Site with the exception of the northern perimeter (adjacent to Beach Channel Drive). Along the northern perimeter, the perimeter cut/cap trench will be expanded to a width of approximately 10 to 12 feet. The extension of the width of the trench in this area is due to the presence of the overhead utility lines and logistical issues with the use of the temporary enclosure and the proposed trench support system (trench box).

An alternating sequence of hand excavation followed by mechanical excavation will be employed at all times. Manual excavation activities will begin at a distance of two feet from the utility markout. Posillico will manually excavate and probe the surface of the excavation prior to any soil being removed from the trench via mechanical means. The utility clearance activities will proceed at all times under the assumption that there will be an unmarked and active utility underground.

The depth of the manual probe will average six to ten inches. The amount of soil removed from the trench by the backhoe will not exceed the depth of the previous manual probe in order to minimize the chance of a premature line break. After completion of the probe, the next cut shall be removed by the backhoe. Alternatively, soft dig techniques (i.e., use of Vactor or Guzzler-type equipment) can be used to excavate the trench and expose subsurface utilities. The excavation will be observed, at all times, for any indications of movement of the soils, soil consistency and foreign objects which may identify the presence of underground utilities.

In addition to the active overhead 33 kV electrical transmission/distribution line that extends along the southern side of Beach Channel Drive, there is an active underground 33 kV electrical transmission/distribution line that is located along the northern boundary of the Site. During the perimeter utility cut and cap work, Posillico will identify the exact location and depth of this utility in order to eliminate potential electric power reductions or losses. No machinery or tools will be allowed to contact the surface of the 33 kV line.

When a utility line or piping is located, Posillico (in consultation with KeySpan, PS&SPC and ARCADIS), will attempt to identify the utility/line. Utilities encountered during trenching activities, whether marked or unmarked, will be assumed active unless otherwise determined. Identification of the status of a utility line will be made using the following procedures:

- Consultation with KeySpan, PS&SPC and ARCADIS;
- Review of historical drawings of the former MGP Site;
- If the utility cannot be identified as an inactive line, Posillico will contact the New York City One Call Center and request that a notice be transmitted to all utility owners in the area; and
- If the utility owners cannot identify the utility, Posillico will attempt to determine the orientation, origin and/or terminus of the utility by investigating nearby surface features (i.e., pull boxes, manhole covers, etc.), utilizing manual or soft dig methods or by procuring the services of a private utility mark-out service employing ground penetrating radar (GPR) and/or electromagnetic methods.

If a utility appears to be active, a representative of the utility company will be contacted to evaluate the line, determine its disposition and terminate the service, as required.

Once the 33 kV line is exposed, its location and elevation will be surveyed by a Professional Surveyor licensed in the State of New York. The surveying will be performed adjacent to the 33 kV line so as no instruments come in contact with the line.

For utilities/lines that are determined to be inactive, initial penetration of the utility/pipe will involve use of spark-proof drilling tools to create a small, approximately one-inch diameter hole in the utility/pipe. Access to the interior of the line will allow initial screening of the internal atmosphere with a combustible gas indicator (CGI) as well as a photo- or flame ionization detector (PID/FID) to determine the potential for an explosive atmosphere. Action levels presented in the Site-Specific HASP (Appendix G) will be used to determine if an explosive atmosphere is present within the line. If screening indicates that a potentially explosive atmosphere exists within the utility, one or both of the following activities will be taken to mitigate the hazard:

- Purge or ventilate the line; and/or,
- Inert the line with a non-reactive gas (i.e., carbon dioxide or nitrogen).

Prior to and during purging or inerting activities, all potential sources of ignition will be removed from the immediate work area.

Once screening has identified acceptable conditions within the line, a non-sparking saw, such as a "Nibbler", or similar, shall be utilized to cut and remove a section of pipe within the existing property line, or as close as is practical. Utility/piping sections that will be cut and removed for purposes of line breaking and capping shall be visually examined for presence of asbestos or asbestos containing material (ACM).

Subsurface piping that contains product, product residue or exhibits elevated PID/FID readings will be drained to the extent practical. In connection with piping that extends beyond the perimeter of the Site, residual product will be evacuated through the use of either vacuum extraction, high pressure water, steam or an equivalent method. The final method of product evacuation will be determined in the field based on the size and condition of the encountered utility. Any residual material that drains or is evacuated from the line will be collected and segregated for characterization and off-site transportation and disposal.

Piping will then be cut, capped/plugged and abandoned in-place. Plugging of the line will require the mixing and placing of grout (hydraulic cement) into the open end of the cut line. Bentonite will be mixed with the soils being placed as backfill adjacent to the plugged lines.

Posillico will protect and support existing on-site utility poles that are actively in service and are within or immediately adjacent to the planned remedial work areas. Posillico will protect and support the existing on-site utility poles that are to remain in place in accordance with the requirements of the pertinent utility company and Design Drawing C-09.

5.10 Installation of the Migration Barriers

The subsurface migration barrier, consisting of a Waterloo Barrier® sheet pile system, will be installed along the proposed alignment as depicted on Design Drawings. The barrier will consist of unmodified Waterloo Barrier® EZ95 steel sheeting. Both the top and bottom 5 feet of each steel sheet will be reinforced to improve driving mechanics. The sheeting will be installed in a manner consistent with the field demonstration program.

All sheeting will be driven using a variable frequency vibratory hammer due to both the relative speed of installation and lower noise and vibration generation compared to use of an impact hammer. The center 120-foot depth section of the on-site barrier will likely be installed first followed by the two 50-foot depth sections. The Bulkhead Area barrier will be installed after the completion of the on-site barrier.

The remedial excavation areas adjacent to the alignment of the migration barriers will not have been remediated at the time of their installation. The barriers will be installed in these areas and then the excavation portion of the remedial actions will be conducted in these areas. This sequence will eliminate the need to excavate and dispose of clean backfill materials that would have then been contaminated by the flush water.

Following installation of the sheets, the interlocks will be properly flushed to remove soils/debris. The full length of the interlock channels between each of the installed sheets will be flushed with clean water to remove soil/debris. Flush water will be allowed to percolate onto the ground surface immediately adjacent to the installed sheets. If necessary, in instances where interlock obstructions can not be cleared by standard flushing, high-pressure jetting will be employed to clear obstructions within the interlocks.

Flush water that contains NAPL will not be allowed to percolate back into the ground surface. Flush water containing NAPL will be collected and disposed of at an off-site facility.

Finally, the seams in the sheet piles will be sealed with WBS-301 joint sealants as defined in the Technical Specifications.

The Construction Quality Assurance for the installation of the Waterloo Barrier® system shall be performed by a representative from C3 Environmental Limited (C3), a subcontractor to Posillico. The C3 representative will direct the installation of the Waterloo Barrier® system sheeting, the inspection of the joints, and the application of the joint sealant.

C3 will provide KeySpan and/or PS&SPC with certification or documentation that the materials meet the requirements of the manufacturer's specifications, drawings, and the RDR. Following approval of this information, C3 can proceed with the installation of the Waterloo Barrier® system.

Splicing is permitted only if shown on the contract drawings or as approved by the Engineer. Splices shall be made using a full penetration weld or as otherwise directed by the Engineer for structural purposes. C3 shall provide welding procedures and certification that welders to be employed have passed qualification tests within the previous 12 months. All welding shall comply with provisions of the American Welding Society (AWS) D1.1 “Structural Welding Code – Steel”, latest edition.

KeySpan may engage an independent testing and inspection agency to inspect welded connections. C3 shall provide free access to all materials and workmanship subject to inspection. The inspection agency may 1.) Check that all welders are certified; 2) Perform periodic visual inspections of random welds; and 3) Perform ultrasonic testing on all penetration welds performed in the field. C3 shall correct the deficiencies in which inspections have indicated.

C3 will document the Waterloo Barrier® installation and submit to KeySpan and/or PS&SPC daily reports during construction. C3 is to verify quantities in the field of the Waterloo Barrier® system sheeting installed. Actual areas will be based on field surveys by a Professional Surveyor licensed in the State of New York as agreed upon by KeySpan and PS&SPC.

6.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

6.1 Sample Collection Documentation

6.1.1 Field Notes

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the investigation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned,
- The logbook number,
- Project name and number,
- Site name and location,
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of all sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the writer. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook may include:

- Chronology of activities, including entry and exit times,
- Names of all people involved in sampling activities,
- Level of personal protection used,
- Any changes made to planned protocol,
- Names of visitors to the site during sampling and reason for their visit,
- Sample location and identification,
- Changes in weather conditions,
- Dates (month/day/year) and times (military) of sample collection,

- Measurement equipment identification (model/manufacturer) and calibration information,
- Sample collection methods and equipment,
- Sample depths,
- Whether grab or composite sample collected,
- How sample composited, if applicable,
- Sample description (color, odor, texture, etc.)
- Sample identification code.
- Tests or analyses to be performed,
- Sample preservation and storage conditions,
- Equipment decontamination procedures,
- QC sample collection,
- Unusual observations,
- Record of photographs,
- Sketches or diagrams, and
- Signature of person recording the information

Field logbooks will be reviewed on a daily basis by PS&SPC and/or KeySpan. Logbooks will be supported by standardized forms.

6.1.2 Chain-of-Custody Records

Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and login procedures at the laboratory are described on this CQAPP.

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratory, via third-party commercial carriers or via laboratory courier service. Sample packaging and shipping procedures, and field chain-of-custody procedures are described in this CQAPP.

6.1.3 Sample Labeling

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier. The following identification scheme will be used:

The sample ID number will include the soil sampling, soil boring, or monitoring well location, along with the sample depth, sample interval, and the depth interval at which it was collected.

Example:

Sample "BS-B22, 5.0 - 5.5' indicates the sample was taken at boring location B-22, from the 6-inch interval in the spoon beginning at 5.0 feet below grade and ending at 5.5 feet below grade. Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g. Equipment Blank, Soil

MS/MSDs will be noted in the Comments column of the COC.

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the Contractor QA/QC Officer.

6.2 Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if

- the item is in the actual possession of a person;
- the item is in the view of the person after being in actual possession of the person;
- the item was in the actual physical possession of the person but is locked up to prevent tampering;
- the item is in a designated and identified secure area.

6.2.1 Field Custody Procedures

Samples will be collected following the sampling procedures documented in Section 4.0 of this CQAPP. Documentation of sample collection is described in Section 6.1 of this CQAPP. Sample chain-of-custody and packaging procedures are summarized below. These procedures will ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.

- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample numbering system is presented in this CQAPP.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.
- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.
- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.
- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.
- If the samples are sent by common carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.
- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian, and signature of the laboratory sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

6.2.2 Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,
- Examine all sample containers for damage,

- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on chain-of-custody forms,
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the Contractor Project QA Officer,
- Attach laboratory sample container labels with unique laboratory identification and test identifiers, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

7.0 CALIBRATION PROCEDURES

7.1 Field Instruments

Field instruments will be calibrated according to the manufacturer's specifications. All calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

7.2 Laboratory Instruments

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in Table 2 of this CQAPP). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

8.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for the CQAPP. If site conditions were to warrant field analysis, Posillico will prepare an addendum establishing the field analytical procedures. Analyses of all soil, groundwater and waste classification samples will be performed by either Environmental Testing Laboratories, Inc. of Farmingdale, New York (NYSDOH ELAP Certification Number 10969) or Accutest Laboratories of Dayton, New Jersey York (NYSDOH ELAP Certification Number 10983). Table 2 summarizes the analytical methods to be used during this investigation.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to provide for the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation to support the generation of a Data Usability Summary Report (DUSR) according to NYSDEC requirements will be provided by the analytical laboratory.

For all analyses, the laboratory will report results which are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by KeySpan and/or PS&SPC on an as-needed basis.

9.1 Data Evaluation/Validation

9.1.1 Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the consultant's QAO will be made to confirm that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the CQAPP, and that any deviations were documented and approved by the appropriate personnel.

9.1.2 Analytical Data Validation

Posillico will be responsible for performing an independent validation of the analytical data. Project-specific procedures will be used to validate analytical laboratory data. The basis for the validation will be the USEPA CLP National Functional Guidelines for Organic Data Review (October 1999) and the USEPA CLP National Functional Guidelines for Inorganic Data Review (February 1994), modified to accommodate the criteria in the analytical methods used in this program, and Region II Standard Operating Procedures (SOPs) for CLP Organic Data review (Revision 11, June 1996) and Evaluation of Metals for the CLP Program (Revision 11, January 1992). Tables 1a, 1b, 2, 3a, 3b, 4 and 5 highlight the QC criteria and holding time requirements for all analyses conducted under this program. These criteria will be used to evaluate and qualify the data during validation.

Posillico will validate an appropriate number of soil samples collected for the purpose of characterizing the subsurface and/or delineating impacted areas to confirm that verifiable data are used to support decision-making and endpoint documentation. Likewise, an appropriate number of groundwater samples will be validated to confirm that cleanup criteria have been achieved. Samples collected for waste classification will not be validated. Validation will include all technical holding times, as well as QC sample results (blanks, surrogate spikes, laboratory duplicates, MS/MSDs, and LCSs), tunes, internal standards, calibrations, target compound identification, and results calculations.

The overall completeness of the data package will also be evaluated by the data validator. Completeness checks will be administered on all data to determine whether full data deliverables were provided. The reviewer will determine whether all required items are present and request copies of missing deliverables.

Upon completion of the validation, a report will be prepared. This report will summarize the samples reviewed, elements reviewed, any nonconformances with the established criteria, and validation actions. Data qualifiers will be consistent with EPA National Functional Guidelines. This report will be in a format consistent with NYSDEC’s Data Usability Summary Report (DUSR).

9.2 Identification and Treatment of Outliers

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one-tailed t-test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

10.0 INTERNAL QUALITY CONTROL

The subcontracting laboratory Quality Assurance Project Plan will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control spike samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270C analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for SW-846 8260B and 8270C analyses
- Detection limit determination and confirmation by analysis of low-level calibration standard

Field quality control samples will include:

- Equipment blanks as outlined in Section 4.8 and Table 5
- Field duplicate samples as outlined in Section 4.8 and Table 5
- Trip blanks as outlined in Section 4.8 and Table 5
- MS/MSDs described in Section 4.8 and Table 5

11.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of Contractor's QAO. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or Posillico. The corrective action will usually involve recalculation, reanalysis, or repeating a sample run.

11.1 Immediate Corrective Action

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the CQAPP), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The Contractor may identify the need for corrective action. The QAO will approve the corrective action and notify KeySpan and/or PS&SPC for approval. The Contractor QAO will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field record book. Documentation will include:

- A description of the circumstances that initiated the corrective action;
- The action taken in response;
- The final resolution; and
- Any necessary approvals.

No personnel will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample login or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the Contractor QAO will be notified. The Contractor QAO will notify the Contractor Superintendent, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to Posillico. If the corrective action does not rectify the situation, the laboratory will contact the Contractor QA Officer, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, Posillico will apply formalized long-term corrective action if necessary and as approved by KeySpan and/or PS&SPC.