New Jersey Department of Environmental Protection

Site Remediation Program

DATA OF KNOWN QUALITY PROTOCOLS TECHNICAL GUIDANCE

Version 1.0

April 2014

1. INTENDED USE OF GUIDANCE DOCUMENT

This guidance is designed to help the person responsible for conducting remediation to comply with the New Jersey Department of Environmental Protection's (Department's) requirements established by the Technical Requirements for Site Remediation (Technical Rules), N.J.A.C. 7:26E. Because this guidance will be used by many different people that are involved in the remediation of a contaminated site such as Licensed Site Remediation Professionals (LSRPs), Non-LSRP environmental consultants and other environmental professionals, the generic term "investigator" will be used to refer to any person that uses this guidance to remediate a contaminated site on behalf of a remediating party, including the remediating party itself.

The procedures for a person to vary from the technical requirements in regulation are outlined in the Technical Rules at N.J.A.C. 7:26E-1.7. Variances from a technical requirement or departure from guidance must be documented and adequately supported with data or other information. In applying technical guidance, the Department recognizes that professional judgment may result in a range of interpretations on the application of the guidance to site conditions.

This guidance supersedes previous Department guidance issued on this topic. Technical guidance may be used immediately upon issuance. However, the NJDEP recognizes the challenge of using newly issued technical guidance when a remediation affected by the guidance may have already been conducted or is currently in progress. To provide for the reasonable implementation of new technical guidance, the NJDEP will allow a 6-month "phase-in" period between the date the technical guidance is issued final (or the revision date) and the time it should be used. This guidance was prepared with stakeholder input. The following people were on the committee who prepared this document:

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- Nancy Rothman, Ph.D., New Environmental Horizons, Inc.
- Rodger Ferguson, CHMM, LSRP, Pennjersey Environmental Consulting
- Stuart Nagourney (Department), Office of Quality Assurance
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2. PURPOSE

It has been a major goal of the Site Remediation Program (SRP) to have decisions concerning the use of analytical data made consistently and, toward this end, technical guidance addressing the generation, assessment and usability of analytical data has been written. However, many of the analytical methods used in conjunction with the remediation of sites for SRP contain QA/QC criteria that are specified as guidance, the results of which are QA/QC criteria that are variable and different for each laboratory, albeit QA/QC criteria that may be acceptable under the constraints of a method. It is this variability that poses an impediment to the goal of consistency, especially with regard to data usability decisions. If the assessment and usability process is to work efficiently and effectively, then it is important that the analytical QA/QC followed is the same for all laboratories. If not, the task of creating and using a technical guidance document that addresses the assessment and usability of data, most decisions of which are based on the results of laboratories' QA/QC results, becomes confusing, difficult, unruly, and burdensome. If data are to be assessed and used uniformly and consistently by the investigator, then it is beneficial to standardize, to the extent possible, the QA/QC associated with analytical methods. To this end, the Department developed Data of Known Quality Protocols.

The Data of Known Quality Protocols (DKQPs) are analytical performance objectives that were developed to standardize the minimum Quality Assurance/Quality Control (QA/QC) and reporting documentation expected for analytical laboratory data used by investigators. These objectives assume samples have been collected properly and are representative of the site location to the greatest extent possible.

This document provides general information and guidance regarding the DKQPs. For purposes of this guidance, the DKQPs are a collection of analytical performance standards that are based on analytical methods published by the United States Environmental Protection Agency (USEPA) and the Connecticut Department of Energy and Environmental Protection's (CTDEEP) *Laboratory Quality Assurance Quality Control Reasonable Confidence Protocols (effective November 2007 and revised December 2010)* and *Laboratory Quality Control Assurance and Quality Control, Data Quality Assessment and Data Usability Evaluation Guidance Document (DQA/DUE Guidance) (effective May 2009 and revised December 2010).* DKQPs have been developed for the most commonly used analytical methods and DKQPs may be developed for other methods in the future.

The primary function of the DKQPs is to describe specific quality assurance and quality control procedures that will be performed by the laboratory to provide analytical data of known and documented quality. Other components of this guidance include a Data of Known Quality Conformance/Non-Conformance Summary form that the laboratory could use to indicate whether the data meets the guidelines for "Data of Known Quality," and a narrative that describes QA/QC non-conformances. When "Data of Known Quality" is achieved for a particular data set, the investigator will have confidence that the laboratory has followed the DKQPs, has described non-conformances, if any, and has adequate information to make judgments regarding data quality. This will enable the investigator to evaluate subsequently whether the quality of the data is sufficient for its intended purpose.

A basic premise of the DKQPs is that good communication and the exchange of information between the investigator and the laboratory will increase the likelihood that the quality of the analytical data will meet project-specific Data Quality Objectives (DQOs), and therefore, be suitable for the intended purpose. To this end, an example laboratory communication form was developed to provide guidance regarding the specific information that the laboratory should have prior to analyzing the associated samples.

The process of obtaining analytical data that is of sufficient quality for the intended purpose and evaluating the quality of analytical data in relation to project-specific DQOs occurs throughout the course of a project. This process includes the following:

- Development of project-specific DQOs in accordance with a site specific Quality Assurance Project Plan (QAPP);
- Communication with the laboratory regarding project-specific DQOs and the selection of appropriate analytical methods;
- Performance of quality assurance and quality control activities during the analysis of the samples and reporting of QC results by the laboratory;
- Performance of a data quality assessment (DQA) of the laboratory quality control data, and laboratory narrative by the investigator to identify QC non-conformances;
- Performance of a data usability evaluation (DUE) by the investigator to determine if the analytical data is of sufficient quality for the intended purpose. The DUE uses the results of

the DQA and evaluates the quality of the analytical data in relation to the project-specific DQOs.

Additional information concerning DQAs and DUEs is presented in NJDEP's *Data Quality Assessment and Data Usability Evaluation Technical Guidance, March 2013*, which is presented as supplemental guidance to this document and may be found at: http://www.nj.gov/dep/srp/guidance/ .

3. DOCUMENT OVERVIEW

The New Jersey Laboratory Certification Program (LCP) certifies laboratories that meet the minimum requirements of applicable New Jersey (and EPA) statutes and regulations. The LCP evaluates laboratories based upon the qualifications of the laboratory personnel, the results of on-site inspections; their facilities and equipment; methods employed; their annual proficiency test samples' results; and QA/QC practices. Certification alone cannot guarantee the validity of data produced by a laboratory.

Many of the DKQPs are based upon promulgated methods appearing in *Test Methods for Evaluating Solid Wastes,* SW-846 (SW-846) published by USEPA, which provides recommended test procedures and guidance. As such, the QA/QC requirements in SW-846 are guidelines. When SW-846 methods were developed, it was anticipated that most projects utilizing these methods would have an associated Quality Assurance Project Plan (QAPP), which would document the specific QA/QC requirements for the project. However, in practice most projects did not have a QAPP. While SW-846 methods are routinely used by environmental laboratories, each laboratory may have its own interpretation of the QA/QC requirements of those SW-846 methods. In contrast, the DKQPs provide a minimum set of QA/QC criteria. If the laboratory follows the DKQP standards, the associated data set is given a "Data of Known Quality" status. Investigators should understand that the "Data of Known Quality" status <u>does not mean</u> that data will automatically meet their needs. Conversely, failure to meet a DKQ status does not mean data are unusable. "Data of Known Quality" only means the laboratory followed the recommendations in the DKQPs. The investigator should evaluate the associated laboratory report to ascertain whether the data is of sufficient quality to meet the project-specific DQOs and support the environmental decisions to be made.

4. PROCEDURES

Each DKQP performance standard is written using the same general format. Each standard includes a table listing specific QA/QC performance criteria. These tables may be found in Appendix B of this document. They have been designed such that investigators have readily available to them the DKQ method-specific performance criteria that are used for making data evaluations and data usability assessments. These tables have also been designed such that investigators involved in preparing QAPPs may incorporate these tables directly into the QAPPs "as-is" in fulfillment of the QAPP content requirements. This should simplify the QAPP preparation process, improve communication between investigators and laboratories as well as enhancing the understanding of the expected quality control sample acceptance performance criteria for the analytical methods chosen. Investigators should note that the DKQPs do not list laboratory reporting limits, with the exception of DKQP Method 8260, low-level volatile organics. It is the responsibility of the investigator to specify the reporting limits that the laboratory should meet for each data set which are specific to the data quality objectives (DQOs) for a particular remedial activity. The following sub-sections describe several important aspects of the DKQPs.

4.1 Handling Times, Holding Times, Containers, and Preservatives

Handling time is the maximum amount of time that field QC samples (field blanks or trip blanks) can be out of the laboratory's possession and/or the maximum amount of time between sample collection and receipt of the samples at the laboratory. The maximum amount of time a sample may be stored between collection and analysis is referred to as the holding time. Samples analyzed past the handling or holding time are compromised and may be considered biased low or invalid, depending on the target analytes and the intended use of the data. The target analytes may have been lost due to volatilization, chemical or microbial degradation, or other processes. In order to retard these processes, certain analytes require chemical preservation and/or cooling. In order to preserve samples, the preservative should be added to the sample container prior to, or at, the time of collection. The appropriate types of sample containers for specific analytes are listed in each DQK standard, along with recommended sample volumes. Investigators should consult with the laboratory to identify the minimum volume of sample necessary for the desired analysis. This practice should help ensure that an adequate volume of sample is collected and sent to the laboratory.

It is NJDEP policy that field and trip blanks travel with the sample containers to the field and must arrive on-site within a day of their preparation in the laboratory. (It should be noted that

field and trip blanks are not required for USEPA _TO-15). Trip blanks are seldom used with non-aqueous samples as noted in the NJ Field Sampling Procedures Manual, section 2.5.1.2. Blanks and site samples may be held on-site for no more than two calendar days and must arrive back at the laboratory within a day of shipment from the field. The DKQPs require that any holding time exceedances, issues related to improper containers, or issues related to sample preservation be described as a non-conformance in the narrative that should accompany each laboratory analytical report.

4.2 Target Analytes

The target analytes/compounds are specified for each DKQ method. The DKQPs require laboratories to report all target analytes/compounds, except when otherwise requested by the investigator. Please note that per N.J.A.C. 7:26E, all unknown source investigations require the investigator to sample and analyze for all compounds/analytes listed in the current spell out (TCL/TAL) + 30 TICs, Extractable Petroleum Hydrocarbons (EPH), hexavalent chromium and pH (for air samples, samples must be analyzed for the full compound list specified in NJDEP LL-TO15) unless the investigator can supply evidence to justify a reduction in the number of analytes/compounds. The current TCL/TAL may be found at:

http://www.epa.gov/superfund/programs/clp/target.htm

If an investigator requests that not all analytes be reported, the investigator should justify and document this decision in the report that uses the data.

Investigators should specify to the laboratory any additional site-specific analytes that are needed. The laboratory must demonstrate that the additional analyte(s) can be determined using the analytical method through an initial demonstration of capability (IDOC). The laboratory must perform a MDL study to demonstrate an appropriate level of analytical sensitivity and calibrate and evaluate the additional analytes in accordance with the method QA/QC requirements. For scheduling purposes, the investigator should take into account that the laboratory may need several weeks to complete the IDOC.

4.3 Reporting Limits

The reporting limit is defined as the concentration of the lowest standard in the calibration curve for organics and the lowest concentration standard used in the calibration of the method and for inorganics, derived from the concentration of that analyte in the lowest level check standard

(which could be the lowest calibration standard in a multi-point calibration curve). If an instrument does not allow for a calibration curve, then a low-level check standard may be analyzed as described in the specific DKQP standard. In general reporting limits are not specified in a method except for the low-level option for DKQP Method 8260. It is expected that reporting limits will be at or below any regulatory criteria or screening level when necessary. Reporting limits are not to be artificially raised by the laboratory nor is the laboratory permitted to report their Method Detection Limits (MDLs) or a multiple of the MDLs as reporting limits. A listing of common regulatory criteria and screening levels may be found for the following categories at the following web addresses:

- Residential Direct Contact Health Based Criteria and Soil Remediation Standards (RDC SRS), http://www.nj.gov/dep/srp/regs/rs/rs_rule.pdf
- Nonresidential Direct Contact Health Based Criteria and Soil Remediation Standards (NRDC SRS), http://www.nj.gov/dep/srp/regs/rs/rs_rule.pdf
- Default Impact to Ground Water Soil Screening Levels for Contaminants, http://www.nj.gov/dep/srp/guidance/rs/partition_equation.pdf
- Default Leachate Criteria for Class II Ground Water (Synthetic Precipitation Leachate Procedure), http://www.nj.gov/dep/srp/guidance/rs/splp_guidance.pdf
- Specific Ground Water Quality Criteria (Groundwater Quality Standards), http://www.nj.gov/dep/rules/rules/njac7_9c.pdf
- Surface Water Quality Criteria for Toxic Substances (SWQC), http://www.nj.gov/dep/rules/rules/njac7_9b.pdf
- Maximum Contaminant Levels (MCL) for State Regulated VOCs, http://www.state.nj.us/dep/rules/rules/njac7_10.pdf
- NJDEP Master Table Generic Vapor Intrusion Screening Levels including
    - Vapor Intrusion Groundwater Screening Levels (GWSL);
    - Vapor Intrusion Residential Indoor Air Screening Level (RIASL);
    - Vapor Intrusion Nonresidential Indoor Air Screening Level (NRIASL);
    - All at http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_tables.pdf
- NJDEP Action Levels for Indoor Air, http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_tables.pdf
- Vapor Intrusion Health Department Notification levels (HDNL), http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_tables.pdf
- Extractable Petroleum Hydrocarbons (EPH), http://www.nj.gov/dep/srp/guidance/srra/eph_method.pdf

Reporting Limits must meet the requirements as defined by N.J.A.C. 7:26E.

4.4 Quality Control/Quality Control Criteria

If any of the QA/QC criteria given in the DKQPs are not met, the laboratory is required to narrate in detail the failed criteria, including which analytes and which samples are affected. Some methods with an extremely long list of target analytes, such as volatile organics by Method 8260B, will routinely have a limited number of analytes that do not meet the QA/QC criteria. ***This is not unexpected and should not be a cause of concern unless the number of analytes not meeting criteria is excessive (e.g. >10%) or the analytes are of specific concern at the site.*** The investigator should always communicate to the laboratory, prior sampling, if there are specific constituents of concern at a site that are not typically found at most sites. The Project Communication Form in Appendix A can be used for this purpose.

4.5 Report Deliverables

Every laboratory analytical report should consist of the information required such that data usability may be determined and meet the requirements of N.J.A.C. 7:26C & E. The laboratory may determine the exact format of the laboratory analytical report. The investigator should work with the laboratory to obtain reports in a format that meets their needs.

In order for “Data of Known Quality” to be achieved, the DKQP Data of Known Quality Conformance/Non-Conformance Summary Questionnaire and required narrative should accompany each report. A copy of the DKQP Data of Known Quality Conformance/Non-Conformance Summary Questionnaire is included in Appendix A. This form includes a series of questions that the laboratory should answer, and a responsible official of the laboratory should sign and date the form. Failure to include with the sample delivery group a completed, signed and dated DKQP Data of Known Quality Conformance/Non-Conformance Summary Questionnaire and required narrative automatically means the data set cannot be presumed to meet the requirements for Data of Known Quality; and additional documentation will be needed to demonstrate that the quality control for the specific sample delivery group is at least equivalent to, or better than, those specified in the DKQPs.

The narrative is a critical part of the laboratory report deliverable. In the narrative, laboratories should note all QC non-conformances required by the DKQP standard. Further information on

report narratives is provided in Section 5.9. Investigators should evaluate the entire laboratory report deliverable in order to evaluate if the data is suitable for its intended use.

4.6 Allowable Modifications to GC/MS Methods

The DKQP for Methods 8260 and 8270 includes an option to achieve reporting limits that might not otherwise be attainable by the conventional/"routine" (i.e., full scan) analytical procedures described in the methods. The option available is known as Selected Ion Monitoring (SIM). It is the responsibility of the Investigator to inform the laboratory of their reporting limit requirements which may make the SIM option necessary. For instance, it may be necessary to use the SIM option of DKQ Method 8270 to meet certain Ground Water Quality Standards. Also, it is noted that some Surface Water Quality Standards (SWQS) are below the typical reporting limits available by DKQ Method 8260 and in this instance, use of the SIM option would also be appropriate.

4.7 Project-Specific Laboratory Quality Assurance/Quality Control

The types and/or frequency of project-specific laboratory QA/QC data are determined by the project-specific data quality objectives (DQOs). DKQPs refer to laboratory procedures, not project-specific QA/QC samples. Therefore, Data of Known Quality status is not related to the collection of project-specific QA/QC samples.

The investigator should plan to collect additional sample volume for the analysis of project-specific QA/QC samples in order to meet the project's DQOs. Project-specific QA/QC samples include, but are not limited to, field duplicates, matrix spikes, matrix duplicates, matrix spike duplicates, trip blanks, field blanks, and equipment-rinsate blanks. The utility of the specific QA/QC samples are discussed in the NJDEP Field Sampling Procedures Manual. The investigator should contact the laboratory for sample volume requirements. The Project Communication Form in Appendix A can be used for this purpose.

4.8 Tentatively Identified Compounds

The evaluation of Tentatively Identified Compounds (TICs) in conjunction with Gas Chromatography/Mass Spectrometry (GC/MS) analyses is a powerful and cost-effective analytical tool that can be utilized by the investigator when evaluating the constituents of concern at an area of concern, or at a discharge. The Technical Rule, at N.J.A.C. 7:26E-2.1(c), requires in most instances that up to 15 TICs be reported when GC/MS is used to analyze

samples for volatiles and 15 TICs be reported when GC/MS is used to analyze samples for semi-volatiles. The use of TICs is particularly effective at locations with suspect disposal practices, complex or uncertain site history, and/or sites that require detailed evaluation of critical exposure pathways.

It is the responsibility of the investigator to request that the laboratory report TICs. Depending on specific site circumstances, re-sampling/re-analysis with analyte-specific calibration and quality control may be required to confirm both the identity and concentration of the TICs. No regulatory judgments or remedial decisions should be made without re-analysis of samples for the TICs using a five-point, analyte-specific calibration and appropriate quality control, as described in the applicable DKQP method. This may require re-sampling in order to meet analytical holding times.

4.9 Laboratory Reports

The following information is to be included in the laboratory report along with the sample results. In general, the exact format of the laboratory report will not be specified. Actual deliverable requirements on a matrix-specific basis are defined in N.J.A.C. 7:26E-2.1(a)15 and N.J.A.C. 7:26E Appendix A.

4.9.1 Index of Samples

A table listing field sample identification numbers that are cross-referenced to laboratory sample identification numbers, matrix, date of collection, and date of receipt at the laboratory should be included with the laboratory report.

4.9.2 Methodology

The laboratory report must state the methods used to analyze the samples. An example could be "volatile organics were determined using guidance from EPA Methods 5030A/8260B for aqueous samples and 5035A/8260B for soil samples in accordance with the NJDEP DKQPs."

4.9.3 Subcontracting Information

Laboratory reports should clearly state what tests (if any) were subcontracted to another laboratory and identify the laboratory. The subcontracted laboratory's laboratory certification number, and a copy of the subcontracted laboratory's report, narrative, and DKQP Data of Known Quality Conformance/Non-Conformance Summary Questionnaire should be included.

4.9.4 Laboratory Narrative Describing Non-Conformances

The DKQPs recommend that the laboratory include, as part of the laboratory report, a narrative that provides a detailed explanation of all nonconformances that occurred. The narrative provides detailed documentation of any QC, sample, shipment, or analytical problems encountered in the processing of the samples in the data set reported. Narratives should be as specific as possible to guide the investigator to the issues noted. For example, the narrative could simply state that two compounds failed to meet the DKQP recovery limits for the LCS in Method 8270C. As a supplement to the non-conformance summary required in N.J.A.C. 7:26E, the laboratory may be requested by the investigator to complete the *Data of Known Quality Conformance/Non-Conformance Summary Questionnaire* found in Appendix A. If the questionnaire is not requested and completed, the non-conformance summary, at a minimum, shall contain (pursuant to N.J.A.C. 7:26E Appendix A) the information noted in the questionnaire where appropriate.

4.9.5 Reporting of Analytical Results

Laboratory reports should include sampling date, sample identification numbers, analytical results, sample specific reporting limits, preparation date, and analysis date for each sample. As required by N.J.A.C. 7:26E, results for soil and sediment samples should be reported in milligrams per kilogram (mg/kg) on a dry-weight basis unless the results are from a leaching method, such as the DKQP for the Synthetic Precipitation Leaching Procedure (SPLP). The results for aqueous samples (and SPLP results) should be reported in micrograms per liter (µg/L) as required by N.J.A.C. 7:26E.

When an analyte is not detected, the DKQPs call for reporting the result as "ND" or “U,” along with the sample-specific reporting limit. When the result for an analyte is below a reporting limit, but greater than the method detection limit (MDL), the value is to be reported with a “J” qualifier. Reporting limits (and for affected compounds, the MDLs adjusted for sample-specific conditions) must be corrected to take into account any dilutions that were performed, the exact sample weight or volume of the sample, the percent solids of the sample, and any other factors that would affect the actual reporting limit for specific sample(s). The reasons for any dilutions that were performed should be reported in the narrative.

4.9.6 Quality Control Results

The DKQPs require that all non-conformances be reported in a narrative in the laboratory report. Additionally, all QC results specified as a report deliverable by the DKQP standard should be included in the report. Each of the DKQP Methods provides information regarding the QC deliverables that should be reported in narrative. For non-DKQP methods, the laboratory should report similar QC results as those required in the DKQPs. For example, if a laboratory analyzed for organophosphorus pesticides using EPA Method 8141, which is a non-DKQP method at the time of the publication of this document, the QC information and limits for DKQP Method 8081A would be appropriate. This information should be included in the report narrative.

4.10 Data of Known Quality Forms

The NJDEP has developed several forms to assist documenting the DKQP process. These forms are described below and included in Appendix A.

4.10.1 Project Communication Form

Use of the Project Communication Form is optional and may be modified by the user to facilitate communication with the laboratory. The Project Communication Form, which is completed by the investigator and provided to the laboratory, includes in most cases, information the laboratory will need to analyze the samples. The Project Communication Form should include such information as: analytical methods, constituents of concern, applicable regulatory criteria, project-specific QA/QC requirements, required report deliverables, and scheduling.

4.10.2 Data of Known Quality Conformance/Non-Conformance Summary Questionnaire Form

The laboratory director or their designee should complete and date the Data of Known Quality Conformance/Non-Conformance Summary Questionnaire. The Data of Known Quality Conformance/Non-Conformance Summary Questionnaire content should not be altered and all questions should be answered. A signed and dated DKQ Data of Known Quality Conformance/Non-Conformance Summary Questionnaire and required narrative should be received with the laboratory reports for “Data of Known Quality” status to be achieved for the data set. If the answer to question #1, #1A, or #1B on the form is “No,” the data package does not meet the requirements for “Data of Known Quality.” If the laboratory does not meet the

QA/QC performance criteria specified in any DKQ method for the data set, then response to question #4 is “No.” The laboratory should narrate all non-conformances.

4.11 Analytical Procedures for Which No DKQP Method Is Published

There are many valid analytical methods for which no DKQP method has been established. If these methods are used, the laboratory is expected to submit QC data deemed equivalent to a similar DKQP method. In general, the QC data should include the following, as appropriate to the method:

- Method blank results;
- Sample duplicate results, identified as a duplicate;
- Matrix spike results;
- Matrix spike duplicate results;
- Surrogate recovery results; and
- Laboratory control sample results.

In addition, the laboratory should follow the reporting guidelines outlined in Section 5.9. The investigator should be aware that not all methods would have all the QC data listed. For example, in determining the pH of a sample, there would be no surrogate, method blank, or matrix spike results. Surrogate recoveries would only be appropriate for organic analytes and are not used with the TO-15 method. If the LSRP is unsure of what QC data is appropriate, or if additional clarification on any aspect of the DKQPs is needed, the investigator should contact the Office of Data Quality in the Site Remediation Program for guidance.

APPENDIX A
DATA OF KNOWN QUALITY FORMS

EXAMPLE: PROJECT COMMUNICATION FORM

Client Name:

Project Name: ***Project Number:***

Project Manager: ***Contact info:***

Field Manager:

***Sample Matrix*:** ☐ Ground Water ☐ Surface water ☐ Soil ☐ Sediment ☐ Drinking water

☐ Air (☐ Indoor ☐ Sub-slab ☐ Ambient)

☐ Other.

DKQP Analyses/Methods:

☐ VOC 8260B ☐ VOC 8260C ☐ Aromatics 8260B ☐ Aromatics 8260C

☐ Halocarbons 8260 ☐ Pesticides 8081A ☐ Pesticides 8081B

☐ PCBs 8082 ☐ PCBs 8082A ☐ PAH 8270C ☐ PAH 8270D

☐ SVOC 8270C ☐ SVOC 8270D ☐ 524.2 ☐ TO-15 ☐ LLTO-15

☐ TO-17 ☐ NJDEP EPH

☐ 6010B Metals ☐ 6010C Metals ☐ 6020 Metals ☐ 6020A Metals

☐Total CN 9010C ☐ Total CN 9013 ☐ Total CN 9014 ☐ Total CN 9012B

☐ Hex Chrome 7196A ☐ Hex Chrome 7199

☐ Mercury 7471B ☐ Mercury 7470A

☐Other tests: _____

_____.

TAT Required: Standard: Other:

Constituents of Concern: Please *note any known or suspected contaminants in high concentrations or any non-standard analytes not contained in routine target lists (see notes).*

Regulatory Criteria:

☐ Soil Remediation Standards (Residential Direct Contact);

☐ Soil Remediation Standards (Nonresidential Direct Contact);

☐ Default Impact to Ground Water Soil Screening Levels;

☐ Default Leachate Criteria for Class II Ground Water (SPLP);

☐ Specific Ground Water Quality Criteria;

☐ Surface Water Quality Criteria;

☐ Maximum Contaminant Level (MCL) for State Regulated VOCs;

☐ Vapor Intrusion Ground Water Screening Level;

☐ Vapor Intrusion Residential Indoor Air Screening Level;

☐ Vapor Intrusion Nonresidential Indoor Air Screening Level;

☐ NJDEP Action Levels for Indoor Air;

☐ Vapor Intrusion NJ Department of Health Notification Levels;

☐ Extractable petroleum Hydrocarbons;

☐ Hexavalent Chromium Cleanup Criterion;

☐ Ecological Screening Criteria;

☐ Other: _____

Quality Control Requirements: *Indicate if your project will have Project specific field quality control samples. Check all that apply. Also specify if special QA/QC site requirements exist: i.e., QAPP.*

☐ Matrix Spike ☐ Matrix Spike Dup ☐ Trip Blank(s) ☐ Sample Duplicate

☐ Other Field QC

☐ Project QAPP (send appropriate section(s) to lab)

Data Deliverables Requirements: *Indicate the data deliverable type submitted:*

☐ Full deliverables ☐ Reduced deliverables ☐ Paper copy included

☐ Excel Spreadsheet ☐ HAZSITE Electronic Deliverables ☐ TO-15 Unit Conversion Table

☐ Other:_____

Expected Sampling Date(s): *Indicate expected number of sampling events or duration*

Total Number of Samples and Expected Sample Load Per Day: *(indicate number of each matrix if applicable)*

Sample Pick Up: ☐ Office(s) ☐ Site (address) ☐ Other

Special Instructions:

☐ Report TICs

☐ Project-specific analyte list

☐ Project-specific criteria

☐ Historically elevated concentrations of target analytes

☐ Multi-day sampling event

Notes:

There are standard target analytes for organic analysis. Refer to the methods for a list of specific compounds. If a contaminant of concern is not contained on the target list of a method, it is important that the laboratory know this prior to sampling. Prior notification will allow the laboratory to obtain standards and perform necessary instrument calibration to insure proper identification and quantification. ***If requesting non-routine compounds that have no regulatory criteria, indicate required reporting limit for each compound.***

DATA OF KNOWN QUALITY CONFORMANCE/NON-CONFORMANCE SUMMARY QUESTIONNAIRE

Laboratory Name: ***Client:***

Project Location: ***Project Number:***

Laboratory Sample ID(s): ***Sampling Date(s):***

List DKQP Methods Used (e.g., 8260, 8270, et cetera)

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	□Yes □ No
1A	Were the method specified handling, preservation, and holding time requirements met?	□Yes □ No
1B	*EPH Method*: Was the EPH method conducted without significant modifications (see Section 11.3 of respective DKQ methods)	□Yes □ No □N/A
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	□Yes □ No
3	Were samples received at an appropriate temperature (4±2° C)?	□Yes □ No □N/A
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	□Yes □ No
5	a) Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? b) Were these reporting limits met?	□Yes □ No □Yes □ No □ NA
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	□Yes □ No
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	□Yes □ No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information should be provided in an attached narrative. If the answer to question #1, #1A, or #1B is "No", the data package does not meet the requirements for "Data of Known Quality."

APPENDIX B
DATA OF KNOWN QUALITY PERFORMANCE STANDARDS

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be check every 6 months	A minimum of 3 different concentration standards across the ICP range; one should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi-point calibration curve; linear curve fit with correlation coefficient $\geq$0.995.	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Initial Calibration Blanks (ICB)	After ICV	Must be matrix-matched (and same concentration of acid found in standards and samples); ICB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 of every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. all samples since last acceptable CCV	Analyst

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Sensitivity	A	Continuing Calibration Blanks (CCB)	After each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL	Re-calibrate, if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSB: 80-120% recovery ICSA: non-spiked analytes ≤ 2x RL	Re-analyze; if still out; adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/solid LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out; redigest & Re-analyze LCS & all field samples in batch	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Re-analyze, qualify data	Analyst/Data Reviewer

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Post digestion spike	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS. % Difference ≤ 10% for results >50x IDL (which will most likely equate to 10X RL).	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ linear calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Represent-ativeness	S & A	Field Duplicate Sample [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6010B (*Inductively Coupled Plasma-Mass Spectrometry*, December 1996 and February 2007) and (*Quality Assurance and Quality Control Requirements and Performance Standards for SW846 Method 6010B, Trace Metals by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP)*).

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be check every 6 months	A minimum of 3 different concentration standards across the ICP range one should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi-point calibration curve; linear curve fit with correlation coefficient $\geq$0.998.	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Sensitivity	A	Low Level Initial Calibration Verification	For method 6010C, LLICV must be analyzed at the beginning of the run before any samples and at the end of the run.	Same source as calibration standards; must contain all target analytes at the RL 70-130% recovery	Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL	Analyst

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Initial Calibration Blanks (ICB)	After ICV	Must be matrix-matched (and same conc. of acid found in standards and samples); ICB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. All samples since last acceptable CCV	Analyst
Sensitivity	A	Low Level Continuing Calibration Verification	For method 6010C, LLCCV must be analyzed at the beginning of the run before any samples and at the end of the run.	Same source as initial calibration standards; must contain all target analytes at the RL 70-130% recovery	Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL	Analyst
Sensitivity	A	Continuing Calibration Blanks (CCB)	After each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSB: 80-120% recovery ICSA: non-spiked analytes ≤ 2x RL	Re-analyze; if still out, adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/sol-id LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out' redigest & Re-analyze LCS & all field samples in batch	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Re-analyze, qualify data	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Lab narrates outlier; qualify data	Analyst/Data Reviewer

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Post digestion spike	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS % Difference ≤ 10% for results >10x RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ linear calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Sample [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum ≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, January 2012 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6010C (*Inductively Coupled Plasma-Mass Spectrometry*, Revision 3 February 2007).

Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Tuning	Daily prior to calibration	Manufacturer's Recommendation & SW-846 Method 6020A Tuning Criteria	Re-optimize instrument and re-tune, suspend all analysis until tuning is successful	Analyst
Accuracy	A	Initial Calibration	Daily following tuning prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards and at the midpoint of the linear range. Must contain all target analytes ICV: 90-110% recovery.	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 10 samples and after the last sample	CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. All samples since last acceptable CCV	Analyst
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); ICB/CCB: < ± RL	Re-calibrate, if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSAB: 80-120% recovery	This is a method requirement of SW-846 6020. If the ICSA or ICSAB are out of specifications, it indicates that the instrument is not running properly. Retune and reanalyze the associated samples.	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/solid LCS: vendor control limits (95% confidence limits)	Re-analyze if still out re-analyze & redigest with all samples in a batch unless site specific MS is in control Lab narrates outlier.	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq$ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20 aqueous, 35% solids%; Results < 5xRL: absolute difference between results ≤ RL.	Qualify data	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per $\leq$ 20 field samples	Must be performed on a Site field sample; & must contain all target analytes; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Lab narrates outlier Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per $\leq$ 20 field samples	Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer

Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Post digestion spike	Not applicable	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per $\leq$ 20 field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS % Difference $\leq$ 10% for results >50x RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	Every field sample and QC sample	For all analysis the intensity of any IS must fall between 30 and 120% of the IS in the initial calibration standard.	The sample must be diluted fivefold and reanalyzed with the appropriate amounts of IS.	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory purposes) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer

Table 3 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6020 (*Inductively Coupled Plasma-Mass Spectrometry*, September 1994).

Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Tuning	Daily prior to calibration	Manufacturer's Recommendation & SW-846 Method 6020A Tuning Criteria	Re-optimize instrument and re-tune, suspend all analysis until tuning is successful	Analyst
Accuracy	A	Initial Calibration	Daily following tuning prior to sample analysis	Minimum of 3 calibration levels plus blank; RL and Linear Range (LR) standards may be included in calibration levels; minimum of 3 integrations for each QC and field sample; linear curve fit $r \leq 0.998$; if not including RL and LR standards then LLCV and HLCV check standards need to be analyzed (see below).	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; Must contain all target analytes at the mid-range of the calibration curve ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Sensitivity	A	Low Level Initial Calibration Check Verification (LLICV)	Daily standard at the RL or lower limit of quantitation	Same source as calibration standards; must contain all target analytes at level of the RL LLCV: 70-130% recovery	Re-analyze. If still out, Recalibrate/ reanalyze unless all results > 10x RL	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 10 samples and at end of run	Same source as initial calibration standards; Must contain all target analytes at the mid-range of the calibration curve CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. all samples since last acceptable CCV	Analyst

Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); ICB/CCB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze	Analyst
Sensitivity	A	Low Level Continuing Calibration Verification Standard (LLCCV)	Daily only if RL standard not included in initial calibration	Same source as initial calibration standards; must contain all target analytes at level of the RL LLCV: 70-130% recovery	Re-analyze. If still out, Recalibrate/ reanalyze unless all results > 10x RL	Analyst
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be checked every 6 months	A minimum of 3 different concentration standards across the ICP range. One should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSAB: 80-120% recovery	This is a method requirement of SW-846 6020. If the ICSA or ICSAB are out of specifications, it indicates that the instrument is not running properly. Retune and reanalyze the associated samples.	Analyst/Data Reviewer
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level.	Analyst

Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80-120% recovery; Soil/Sediment/ solid LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out' redigest & Re-analyze LCS & all field samples in batch unless site specific MS is in control Lab narrates outlier.	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Qualify data	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; & must contain all target analytes; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Lab narrates outlier Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample. Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Post digestion spike	Not applicable	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS. Serial Dilution % Difference ≤ 10% for results >50x RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer

Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Internal Standards (IS)	Every field sample and QC sample	70% $\geq$ IS for QC samples ≤ 130% 70% $\geq$ IS for field samples ≤ 130% relative intensity % of IS compared to the intensity of the IS in the ICAL.	The sample must be diluted fivefold and reanalyzed with the appropriate amounts of IS.	Analyst/Data Reviewer
Overall Precision & Representative ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within calibration range; report from diluted analysis	Analyst/Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	Every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer

Table 4 QAPP Worksheet All Matrices – Metals (ICP-MS) USEPA SW-846 6020A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6020A (*Inductively Coupled Plasma-Mass Spectrometry*, February 2007).

Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples (matrix-specific)	All Target compounds < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples	Must contain all single-component target analytes, performed on Site field sample; 30-150% recovery for all compounds.	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples	Must contain all single-component target analytes, performed on Site field sample; 30-150% recovery for all compounds; RPD ≤ 30% for solids and RPD ≤ 20% for waters	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all single-component target analytes, concentration should be the same as MS if appropriate, be matrix-matched, 40-140% recovery for all target analytes.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a site sample, RPD ≤ 30% for solids and RPD ≤ 20% for waters for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 2 (recommend TCMX and DCB); 30-150% recovery on both GC columns	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer

Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Internal Standards (IS) (optional)	Every sample including QC (optional)	Minimum of 1 IS , Areas 50-200% of CCV; RTs $\pm$ 30 sec from ICAL	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Endrin/DDT Breakdown	Before samples are analyzed and at the beginning of each 12 hour shift	% Breakdown ≤ 15% based on peak areas	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-levels for single-component analytes and single-level for multi-component analytes using peak height or peak area; must contain all targets and lowest level ≤ RL; %RSD ≤ 20% or "r" ≥ 0.99 for all compounds; regression analysis, if used, must not be forced through the origin	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy	A	Continuing Calibration Verification(CCV)	Prior to samples, every 12 hours or every 20 samples, whichever is more frequent, and at the end of the analytical sequence	Concentration level near mid-point of ICAL curve containing all single-component target compounds; %D ≤ 20% and analytes fall within expected retention time windows; Multi-component analytes must be verified within 12 hours of being detected in a sample	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ≤ results ≤ upper calibration range on a sample-specific basis; average response factors or curve-statistics generated from the ICAL must be used for quantitation and peak height or peak area, as used for ICAL, must be used for sample. Report the highest concentration from the two GC columns and results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Precision	A	Quantitation	Every sample	RPD or %D $\leq$ 40% between two dissimilar GC Columns	Qualify result and narrate issue except if %D > 100%, then analyze sample at a secondary dilution and qualify data as necessary.	Analyst and Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD $\leq$ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	Cool to $\leq$ 6º C; allow for < 2º C if samples intact	Potential data usability issue	Data Reviewer

Table 5 QAPP Worksheet All Matrices - Pesticides USEPA SW-846 8081A & B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decon, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	$\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer / Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer / Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Pesticide Compound analyses via USEPA SW-846 Method 8081A&B (*Quality Assurance and Quality Control Requirements for SW-846 Method 8081A and 8081B Chlorinated Pesticides by Gas Chromatography [GC])*.

Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples (matrix-specific)	All Target compounds < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples	Must contain Aroclors 1016 and 1260, performed on Site field sample, 40-140% recovery	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples	Must contain Aroclors 1016 and 1260, performed on Site field sample; 40-140% recovery; RPD ≤ 30% for solids and RPD ≤ 20% for waters	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain Aroclors 1016 and 1260, be matrix-matched, 40-140% recovery	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site samples;, RPD ≤ 30% for solids and RPD ≤ 20% for waters for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer

Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Surrogates	Every sample including QC	Minimum of 2 (recommend TCMX and DCB); 30-150% recovery on both GC columns	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-levels for Aroclors 1016 and 1260 and single-level at mid-point concentration for other Aroclors; 3-5 peaks of each Aroclor evaluated using peak height or peak area; lowest level ≤ RL; other Aroclors may be warranted for 5 point calibration if PCB contamination is known. %RSD ≤ 20% or "r" ≥ 0.99 for Aroclors 1016 and 1260; regression analysis, if used, must not be forced through the origin.	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	Prior to samples, every 12 hours or every 20 samples, whichever is more frequent, and at the end of the analytical sequence	Concentration level near mid-point of ICAL curve containing Aroclors 1016 and 1260; %D ≤ ± 20% and analytes fall within expected retention time windows; Aroclors other than 1016 and 1260 must be verified within 12 hours of being detected in a sample (unless I.S. quant technique is used)	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ≤ results ≤ upper calibration range on a sample-specific basis; average response factors or curve-statistics generated from the ICAL must be used for quantitation and peak height or peak area, as used for ICAL, must be used for sample. Report the highest concentration from the two GC columns and results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Precision	A	Quantitation	Every sample	RPD or %D ≤ 40% between two dissimilar GC Columns	Qualify result and narrate issue except if %D > 100% then analyze sample at a secondary dilution and qualify data as necessary.	Analyst and Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	Cool to ≤ 6º C; allow for < 2º C if samples intact	Potential data usability issue	Data Reviewer

Table 6 QAPP Worksheet All Matrices (combined) - PCB Aroclors USEPA SW-846 8082 and 8082A
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method.	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	$\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer / Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer / Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department

2. PCB Aroclor Compound analysis via USEPA SW-846 Method 8082 and 8082A (*Quality Assurance and Quality Control Requirements for SW-846, Polychlorinated Biphenyls (PCBs) by Gas Chromatography [GC]).*

Table 7 QAPP Worksheet All Matrices – Total Cyanide SW-846 9010C, 9013. 9014, and 9012B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Initial Calibration	Daily prior to sample analysis (unless daily CCV passes 90-110 % recover)	Minimum of 5 calibration levels plus blank; low level standard at level of RL; linear regression with a correlation coefficient r $\geq$ 0.995	Perform instrument maintenance and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration/ Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; ICV: 85-115% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 20 samples and at the end of run	Same source as calibration standards; conc. near mid-point of calibration curve; CCV: 85 - 115% recovery	Re-analyze and, if still out, Re-calibrate and Re-analyze all samples since last acceptable CCV	Analyst
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); ICB/CCB: < ± RL	Re-analyze; if still out, Re-calibrate, reanalyze.	Analyst
Sensitivity	A	Low Level Calibration Check Standard	Daily only if RL standard not included in initial calibration	Low Level Check Standard: 70-130% recovery	Recalibrate/re-analyze unless all results > 10x RL	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per analytical batch - not to exceed 20 field samples	Must be distilled/extracted with samples using same preparation method; MB: < RL	Re-analyze; if still out redistill & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 7 QAPP Worksheet All Matrices – Total Cyanide SW-846 9010C, 9013. 9014, and 9012B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must be matrix-matched; aqueous LCS: 80-120% recovery; Soil/Sediment LCS within vendor control limits (95% confidence)	Re-analyze, if still out; redigest (soil/sed.) & Re-analyze LCS & all field samples in batch	Analyst/ Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq$ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. Aq.: Results RPD ≤ 20%; Soil/Sediment: Results, RPD ≤ 35%;	Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per $\leq$ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample, re-analyze, if necessary, and qualify data	Analyst/ Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range, report from diluted analysis	Analyst/ Data Reviewer
Accuracy (preservation)	S & A	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	$\leq$ 6° C per SW-846 Chapter 3 Table 3-2 but allow for Soil/Sediment: < 2° C if freezing samples are intact	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Sample Preservation	Every field sample	Aqueous samples are preserved by adding sodium hydroxide until pH is ≥12 at time of sampling. Preserved samples can be stored up to 14 days.	Lab narrates outlier; potential data usability issue	Data Reviewer

Table 7 QAPP Worksheet All Matrices – Total Cyanide SW-846 9010C, 9013. 9014, and 9012B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous and Soil/Sediment: HT = 14 days from collection to analysis If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier; potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non=matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References: USEPA SW-846 Method 9010C (*Total and Amenable Cyanide: Distillation, November, 2004*); USEPA SW-846 Method 9013 (*Cyanide Extraction Procedure for Solids and Oils, July 1992);* USEPA SW-846 Method 9014 (Titrimetric and manual spectrophotometric Determinative Methods for *Cyanide, December 1996) and* USEPA SW-846 Method 9012B (Total and Amenable Cyanide *(Automated Colorimetric with offline Distillation), November 2004 Revision 2).*

Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199
Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of 3 calibration levels plus blank; low-level standard at level of RL linear regression with a correlation coefficient r $\geq$ 0..995	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; ICV: 90-110% recovery	Re-analyze ; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 10 samples and at end of run	Concentration level near midpoint of calibration curve; same source from ICV; CCV: 90-110% recovery	Re-analyze if still out, Re-calibrate and reanalyze all samples since last acceptable CCV	Analyst
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (conc. of solution to match standards and samples); ICB/CCB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be prepared/digested with samples in batch; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199
Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must be matrix-matched; aqueous LCS: 80-120% recovery; Soil/Sediment/ solid LCS: NIST Standard Reference Material (SRM) 2701; within control limits	Re-analyze; if still out redigest & re-analyze all samples in the batch qualify data	Analyst/Data Reviewer
Precision	A	Sample Matrix Duplicate (DUP)	1 per $\leq$ 20 field samples	Must be performed on a Site field sample. Aqueous/ Soil/Sediment: RPD ≤ 20%; a control limit of $\pm$ RL if original or duplicate is < 4 times the RL.	Lab narrates outlier; Qualify data	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike Aqueous samples	1 per $\leq$ 20 aqueous field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Re-analyze[1], Lab narrates outliers; possible usability issue.	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) soluble [Site-specific QC]	1 per $\leq$ 20 soil/sediment field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Re-analyze[2]; Lab narrates outliers; possible usability issue.	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) insoluble [Site-specific QC]	1 per $\leq$ 20 soil/sediment field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Re-analyze[2], Lab narrates outliers; possible usability issue.	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199
Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy (preservation)	S & A	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	$\leq$ 6º C per SW-846 Chapter 3 Table 3-2 but allow for Soil/Sediment: < 2º C if freezing samples are intact	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aqueous /Soil/Sediment: collect unpreserved and keep cold (see above)	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	$\geq$ 90% Overall Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	Soil/Sediment: HT = 30 days from collection to digestion and 7 days after digestion to analysis. For aqueous samples HT = 24 hours from collection.	Potential data usability issue	Data Reviewer
Accuracy & Representative-ness	S & A	Preparation of samples and additional measurements	Soil/Sediment samples must be digested prior to analysis. See SW-846 Method 3060A for alkaline digestion. Additional measurements of pH and Eh are required for soil/sediment samples.	Aqueous samples are not digested. Sample preparation: follow procedures in Method 7196A or Method 7199 for Soil/Sediment: Alkaline digestion required as per Method 3060A. pH of alkaline digestates must be maintained at method requirements. For 7196A it is 7.5 ±0.5; 7199 9.0±0.5 Then follow procedures for analysis by either method 7196A or 7199. pH & Eh (oxidation reduction potential) measurements give indication of reducing or oxidizing conditions in field sample to assist in interpretation of soluble and insoluble MS results. See Method 3060A for further details.	Re-digest if sample pH is outside the QC limits.	Analyst/Data Reviewer

Table 8 QAPP Worksheet All Matrices – Hexavalent Chromium SW-846 846 7196A and 7199
Measurement Performance Criteria & QC Samples Table– Hexavalent Chromium

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 7196A *Hexavalent Chromium Colorimetric* and USEPA SW-846 Method 7199 (*Hexavalent Chromium by Ion Chromatography).*

[1] After reanalysis, if recovery is <30% SRP would reject associated non-detect data.

[2] After reanalysis if recovery, is 50-74% or 126-150% SRP would qualify associated data. If recoveries are<50% or >150% for both insoluble AND soluble spikes, SRP would reject associated data; otherwise would qualify associated data if one of the spikes was outside the <50% or >150% limits.

Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of 5 calibration levels plus blank; low level standard at level of RL; linear regression with a correlation coefficient r $\geq$ 0.995	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration/ Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 of every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; CCV: –80 - 120% recovery	Re-analyze and, if still out, Re-calibrate and Re-analyze all samples since last acceptable CCV	Analyst
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL	Re-analyze; if still out, Re-calibrate, reanalyze.	Analyst
Sensitivity	A	Low Level Calibration Check Standard	Daily only if RL standard is not included in initial calibration	Low Level Check Standard: 70-130% recovery	Recalibrate/reanalyze unless all results > 10x RL	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must be matrix-specific; aqueous LCS: 80-120% recovery; Soil/Sediment LCS vendor control limits (95% confidence)	Re-analyze, if still out; redigest (soil/sed.) & Re-analyze LCS & all field samples in batch	Analyst/ Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. Aq.: Results RPD ≤ 20%; Soil/Sediment: Results, RPD ≤ 35%;	Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample, re-analyze, if necessary, and qualify data	Analyst/ Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample Aq.: Results ≥ 5xRL, RPD ≤ 20%; Results < 5xRL: absolute difference between results ≤ RL. Soil/Sediment: Results ≥ 5xRL, RPD ≤ 35%; Results < 5xRL: absolute difference between results ≤ 2xRL	Lab narrates outlier; Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range, report from diluted analysis	Analyst/ Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy (preservation)	S & A	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	Soil/Sediment: $\leq$ 6º C per SW-846 Chapter 3 Table 3-2 but allow for < 2º C if freezing samples are intact	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	Every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved and keep cold (see above)	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous and Soil/Sediment: HT = 28 days from collection to analysis If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator

Table 9 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 7471B (*Mercury in Solid or Semisolid Waste by Manual Cold Vapor Technique*, February 2007) and USEPA SW-846 Method 7470A (*Mercury in Aqueous Samples by Manual Cold Vapor Technique*, September 1994).

Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	A	Laboratory Reagent Blank (LRB) or Method Blank	1 per batch of up to 20 field samples (matrix-specific)	Target analytes must be < RL, Except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria	Reanalyze. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Laboratory Fortified Matrix (LFM) [Site-specific QC]	Performed at least quarterly and if criteria in Section 9.4 of 524.2 are not met.	Must contain all target analytes, performed on Site field sample, 70-130%; difficult analytes ** must exhibit percent recoveries between 40-160%.	Evaluate LFM, unspiked sample, and qualify data and narrate issue	Analyst/Data Reviewer
Accuracy	A	Quality Control Sample (QCS)	Performed at least quarterly	Must contain all target analytes, performed on Site field sample, 70-130%; difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Fortified Blank (LFB)	1 per batch of up to 20 samples	Must contain all target analytes, spiked into a blank matrix, acceptable recoveries of 70-130%; difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq$ 20 field samples performed	Must be performed on a Site field sample. RPDs ≤ 20%	Qualify data and narrate issues of non-conformance	Analyst/Data Reviewer

Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Surrogates	Every sample including QC	2 surrogates 1,2-dichlorobenzene-d_4 and Bromofluorobenzene (BFB); area recoveries 70-130% of CCAL or 50-150% of ICAL	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	Every sample including QC	Fluorobenzene; Areas 70-130% of CCV or 50-150% of ICAL	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-524.2	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 3-standards; must contain all targets and lowest standard ≤ RL; average RRF $\geq$ 0.05;%RSD ≤ 20% for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; %D ≤ 30%	Recalibrate as required by method; note outliers in narrative.	Analyst
Accuracy	A	Quantitation	Every sample	RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer

Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	4º C ± 2º C; allow for < 2º C if samples intact sample preservation per USEPA 524.2 Section 8.2.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (24 hours if unpreserved); sample preservation per Section 8.0 of Method 524.2	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer

Table 10 QAPP Worksheet Aqueous – VOAs USEPA 524.2
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP April 2014; to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA 524.2 (*Measurement of Purgeable Organic Compounds in water by Capillary Column Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, and 1, 4-dioxane.

Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 4 of USEPA-SW846 Method 8260B	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: RF for SPCCs Section 7.3.5.4; %RSD ≤ 15% for all compounds except CCC's which must be ≤30% RSD or "r" ≥ 0.99; SIM: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds; regression analysis, if used, must not be forced through the origin	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per preparatory batch of up to 20 field samples (matrix-specific)	Targets analytes must be < RL except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq$ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if a MS/MSD was not performed	Must be performed on a Site field sample. RPDs ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70-130% for all compounds.	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	3 per sample including QC	Minimum of 3 IS , Areas 50-200% of the most recent CCV; RTs ±30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 20% for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to < 2 with HCL or per SW-846 Table 4-1 preservatives.	Potential data usability issue	Data Reviewer

Table 11 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method.	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260B (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260B* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4-dioxane.

Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8260C	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: %RSD ≤ 20% for all compounds and minimum RF found in Table 4 or "r" ≥ 0.99; SIM: %RSD ≤ 20% and minimum RF found in Table 4 or "r" ≥ 0.99 for all compounds;	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per preparatory batch of up to 20 field samples (matrix-specific)	Targets analytes must be < RL except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if a MS/MSD was not performed	Must be performed on a Site field sample. RPDs ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70-130% for all compounds.	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	3 per sample including QC	Minimum of 3 IS , Areas 50-200% of the most recent midpoint CCV standard; RTs ± 30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hour prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 20% for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to < 2 with HCL or per SW-846 Table 4-1 preservatives.	Potential data usability issue	Data Reviewer

Table 12 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260C (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260C* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4-dioxane.

Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	DFTPP Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270C	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; *Full Scan*: RF ≥ 0.05 for SPCCs; %RSD ≤ 15% for all compounds except CCCs which must be ≤20% RSD or "r" ≥ 0.99; *SIM*: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples	Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 20-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. RPD ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for Acid surrogates	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	6 per sample including QC	Minimum of 6 IS , Areas 50-200% of the most recent CCV standard; RTs ± 30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hour prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan*: %D or %Drift ≤ 20% for CCCs and ≤ 30% for all other compounds *SIM*: %D or %Drift ≤ 30%	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank	Not Required if using dedicated	Target analytes < RL	Potential data usability issue	Data Reviewer

Table 13 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
		[Site-specific QC]	sampling equipment. If performing decontamination of equipment, Collect 1 EB per 20 field samples collected by the same method			
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	$\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW-846 Method* 8270D *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).* 8270D:

** Potentially "difficult" analytes include: benzenthiol, benzoic Acid, 2,4-dintrophenol, 3&4 – methylphenol, 4-nitrophenol, pentachlorophenol, phenol, aniline, aramite, A,A-dimethylphenethylamine, benzidine, benzaldehyde, benzyl Alcohol, caprolactam, chlorobenzilate, 3,3'-Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p-(dimethylamine)azobenzene, decane, famphur, hexachlorocyclopentadiene, hexachloroethane, hexachlorophene, hexachloropropene, kepone, 4,4'-methylenebis(2-chloroaniline), methapyrilene, methyl methanesulfonate, methyl parathion, n-nitrosodimethylamine, 4-nitroquinoline-1-oxide, 2-Picoline, parathion, pentachloroethane, pentachlorobenzene, pentachloronitrobenzene, phorate, pronamide, pyridine, p-phenylenediamine, o-tricresyl phosphate and Tetraethyl. Please note that many of the surrogates may fall outside of the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4,6-tribromophenol and terphenyl-d14.

Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	DFTPP Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270D	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; *Full Scan*: RF see Table 4 for minimum RF; %RSD ≤ 20% for all compounds or "r" ≥ 0.99; *SIM*: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples	Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and Narrate issue	Analyst/Data Reviewer
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer

Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 20-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq$ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. RPD $\leq$ 20% for waters and $\leq$ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids Matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for acid surrogates	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	6 per sample including QC	Minimum of 6 IS, Areas 50-200% of the most recent t CCV standard; RTs $\pm$ 30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hour prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan*: %D or %Drift $\leq$ 20% for CCCs and $\leq$ 30% for all other compounds; *SIM*: %D or %Drift $\leq$ 30%	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and RL ≤results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer

Table 14 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	$\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW-846 Method* 8270D *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).* 8270D:

** Potentially "difficult" analytes include: Benzenthiol, Benzoic Acid, 2,4-Dintrophenol, 3&4 – Methylphenol, 4-Nitrophenol, Pentachlorophenol, Phenol, Aniline, Aramite, A,A-Dimethylphenethylamine, Benzidine, Benzaldehyde, Benzyl Alcohol, Caprolactam, Chlorobenzilate, 3,3'-Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p-(dimethylamine)azobenzene, Decane, Famphur, Hexachlorocyclopentadiene, Hexachloroethane, Hexachlorophene, Hexachloropropene, Kepone, 4,4'-methylenebis(2-chloroaniline), Methapyrilene, Methyl methanesulfonate, Methyl parathion, n-Nitrosodimethylamine, 4-Nitroquinoline-1-oxide, 2-Picoline, Parathion, Pentachloroethane, Pentachlorobenzene, Pentachloronitrobenzene, Phorate, Pronamide, Pyridine, p-Phenylenediamine, o-tricresyl phosphate and Tetraethyl. Please note that many of the surrogates fall outside or the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4, 6-Tribromophenol and Terphenyl-d14.

Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 24 hours	Method tune criteria based on criteria in Table 3 of USEPA- Method TO-15	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: %RSD ≤ 30% for all compounds (allowance for 2 compounds up to ≤ 40%)	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy	A	Initial Calibration Verification Sample NJDEP TO-15 ONLY	Immediately after last ICAL std. and before any field sample.	Must contain all target; 30% recovery for all compounds (allowance for 2 compounds up to ≤ 40%)	Re-analyze; if failure still observed then take corrective action: re-calibration may be necessary	Analyst
Accuracy	A	Internal Standards (IS)	Minimum of 3 IS recommend Bromochloromethane, 1,4-Difluorobenzene and Chlorobenzene-d_5	Areas 60-140% of CCAL; Areas; RTs $\pm$ 0.33 minutes from CCAL RTs	Reanalyze and qualify data	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	Every 24 hours	Must be performed on a Site field sample. RPDs ≤ 25% for results > 5x the RL.	Qualify data and narrate issues of non-conformance	Analyst/Data Reviewer

Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Calibration Verification (CCV)	1 every 24 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve using a concentration in the ICAL) containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 30% for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70-130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Reporting Limit Laboratory Control Sample (RLLCS) – NJDEP TO-15 ONLY	1per 24 hours Instrument Performance Check/ calibration sequence	Must contain all compounds; % recovery within 60-140 % of the known value for 90 % of the compounds	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Quantitation	Every sample	RL ≤ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation.	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Report up to the 15 TICs that have the highest estimated concentration	Potential data usability issue	Data Reviewer

Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Canister Certification	Batch or individual canister certification must be performed as directed by data user	Canister certifications target analytes must be < RL.	Reclean canisters until certification pass the acceptance criteria.	Analyst
Accuracy	S & A	Flow Controller Certification	Every Flow Controller	Pre-sampling and Post-sampling Flow Controller calibration checks RPD $\leq$ 20%	Narrate flow controller RPD non-conformance	Analyst
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 25% for results > 5x RL; Professional judgment for results < 5xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Temperature, atmospheric pressure and canister pressure	Every Canister	Lab must evacuate to -27 to -30 inches of Hg prior to shipment to site. Sampler must document the canister initial vacuum at the site, date/time sampling starts, ambient pressure and temperature; the sampling stop date and time and canister final vacuum. If vacuum is -27 to -30 inches of Hg upon receipt at the site, the canister may be used for sample collection. (allowances are given for vacuum down to -24 inched Hg with notification given to the investigator)The laboratory must document the canister receipt vacuum.	Potential data usability issue if initial field vacuum is too low or the final field and laboratory receipt vacuums differ significantly (e.g. by 6 inches Hg)	Data Reviewer

Table 15 QAPP Worksheet Air – VOAs USEPA TO-15 (and NJDEP LLTO-15)
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy (preservation)	S & A	Canister pressure	Every Canister	Sampler must check vacuum prior to taking samples. If the vacuum is -27 to -30 inches of Hg when it left the lab, then the vacuum should be -24 to -30 inches of Hg for samples to be taken. If the vacuum is less, then the canister should not be used.	Notify the laboratory and request a new canister or seek guidance.	Sampler
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 30 days of collection.	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	$\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer
Accuracy/ Sensitivity	A	Method Blank	1 every 24 hour prior to analysis of samples	Target analytes < RL	NA	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, April 2014 to be compliant with and the SRP VITG and meet the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA Method TO-15 (*Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: hexachlorobutadiene, 1, 2, 4-trichlorobenzene, naphthalene, acetone and 1, 4-dioxane.

[1] Please note that trip blanks, field blanks and MS/MSDs are not usually included in sampling activities associated with canister based air sampling.

Table 16 QAPP Worksheet Air – VOAs USEPA TO-17
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity Accuracy	A	BFB Tune	Every 24 hours	Method tune criteria based on criteria in Table 3 of USEPA- Method TO-15	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; for all compounds: %RSD ≤ 30% except naphthalene ≤ 40% or "r" ≥ 0.99 regression analysis, if used, must not be forced through the origin	Method allows for 2 exceptions up to a limit of 40% RSD. Recalibrate, note outliers in narrative	Analyst
Accuracy	A	Daily Calibration	1 every 24 hours prior to analysis of samples	Concentration level near mid-point of ICAL containing all target compounds; %D ≤ ± 30% IS % Recovery of CCV 50-200% of IS response in the ICAL	Recalibrate if > 10% target compounds exceed criteria or %D > 40%; note outliers in narrative.	Analyst
Accuracy	A	Laboratory Control Sample or Audit Standard	1 every 24 hours prior to analysis of samples	% Recovery 70-130%	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/ Data Reviewer
Accuracy	A	Internal Standards (IS)	Minimum of 3 IS recommend Fluorobenzene, 1,4-Dichlorobenzene-d_4, and Chlorobenzene-d_5	Areas 60-140% of CCAL; Areas; RTs ± 0.33 minutes from CCAL RTs	Reanalyze and qualify data	Analyst/ Data Reviewer

Table 16 QAPP Worksheet Air – VOAs USEPA TO-17
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Analytical Duplicate [optional]	Sample split after desorption onto GC/MS	RPDs ≤ 20% for results > 5x the RL.	Qualify data and narrate issues of non-conformance	Analyst/ Data Reviewer
Accuracy	A	Quantitation	Every sample	RL ≤ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J".	Perform dilution to bring analyte within linear range, qualify data	Analyst/ Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	RL ≤ 0.5 ppb (equivalent concentration)	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Safe Sampling Volume (SSV) Check	Each sorbent tube checked annually or once every 20 uses, whichever is more frequent	One-half the retention volume or two-thirds of the break-through volume on a compound-specific basis	Re-condition sorbent tube and re-check	Analyst
Accuracy	S & A	Flow Rate	Checked before and after each sampling	RPD > 10% for initial versus final flow rate, collection invalid	New collection of samples required	Sampler
Accuracy	S & A	Sampling Time	Every Sample	1 hour at 16.7 mL/min and 66.7 mL/min for 1L and 4L sampling volumes, respectively	Narrate sampling pump RPD non-conformance	Analyst

Table 16 QAPP Worksheet Air – VOAs USEPA TO-17
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Overall Precision & Representativeness	A	Distributed Duplicates	Recommended Duplicates collected in parallel with different sampling volumes (e.g., 1L and 4L)	RPDs ≤ 25% for results > 5x the RL.	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Conditioning of Sorbent Tubes	Every Sorbent Tube	Packed sorbent tubes must be conditioned and properly sealed prior to initial use as specified in Method TO-17. Target compounds should be ≤ RLs.	Potential data usability issue if conditioning insufficient	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 30 days of collection.	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	A	Method Blank	At least 2 per monitoring exercise using same lot of Sorbent tube as used for analysis	Target analytes < RL	NA	Data Reviewer

Table 16 QAPP Worksheet Air – VOAs USEPA TO-17
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Field Blank	1 for every 10 samples/ monitoring event	Target analytes < RL	NA	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA Method TO-17 (*Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes*) and Method TO-15 (*Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: hexachlorobutadiene, 1, 2, 4-trichlorobenzene, naphthalene, acetone and 1, 4-dioxane.

Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples (matrix-specific)	Blank concentration < 5X value of the MDL (additional action noted in section 9.1.4 of the method)	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike(sample not fractionated) [Site-specific QC]	Minimum of 5% of samples for each matrix	Must contain all aliphatic and aromatic compounds defined in method section 6.8.6; 40 - 140% recovery for all compounds (only up to & including C28 for #2 fuel/diesel).	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Matrix Spike/ (sample fractionated]	Minimum of 5% of samples for each matrix	Must contain all aliphatic and aromatic compounds defined in method section 6.8.6; 40 - 140% recovery for all compounds (only up to & including C28 for # 2 fuel/diesel).	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (#2 fuel/diesel)	1 per extraction batch (up to 20 samples of similar matrix)	Must contain #2 fuel/diesel, 40-140% recovery for # 2 fuel/diesel. (continued below)	Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer

Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (#2 fuel/diesel)		RPDs ≤ 25%	Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (non-#2 fuel/diesel)	1 per extraction batch (up to 20 samples of similar matrix)	Must contain all aliphatic and aromatic compounds defined in method section 6.8.6; 40 - 140% recovery for all compounds except n-nonane @ > 25% (continued below)	Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (non-#2 fuel/diesel)		RPDs for the aliphatic and aromatic carbon range concentrations (the sum of the individual compounds' concentrations within a carbon range) must be ≤ 25% (continued below).	Reanalyze, or re-extract/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer

Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) (fractionated samples)		Naphthalene & 2-methyl-naphthalene: concentration or each in aliphatic fraction < 5 % of total concentration	Reanalyze, or re-fractionate/re-analyze plus associated samples if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	5% of samples for each matrix from the site	Must be performed on a site sample, RPD ≤ 50%	Qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	OTP and COD, 40 – 140 % recovery; samples undergoing fractionation: no COD in aromatic fraction and/or no OTP observed in aliphatic fraction	Reanalyze, if necessary or re-extract/re-analyze if necessary; re-fractionate and analyze if COD and/or OTP are in "wrong" fraction; qualify data	Analyst/Data Reviewer
Accuracy	A	Fractionating Surrogates	Every sample undergoing fractionation including QC	2-bromonaphthalene & 2-fluorobiphenyl 40 – 140 % recovery	Re-fractionate and reanalyze; note in non-conformance summary	Analyst/Data Reviewer
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	5-point calibration must contain all compounds and lowest standard ≤ RL; CFs established for each compound and, when fractionated, also for each aliphatic and aromatic carbon range; % RSD for all individual CFs ≤ 25% and when fractionated, also for each aliphatic and aromatic carbon range.	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst

Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Continuing Calibration (CCAL)	Prior to samples, every 20 samples or every 24 hours, whichever is more frequent, and at the end of the analytical sequence	Concentration level at mid-point of ICAL curve containing all compounds: %D ≤ 25% for total range, ≤ 30% any single compound; for samples undergoing fractionation: %D ≤ 25% for each carbon range, ≤ 30% any single compound in a range	Recalibrate as required by method; note outliers in narrative.	Analyst
Accuracy	A	Quantitation	Every sample	RL ≤ results ≤ upper calibration range on a sample-specific basis; average response factors generated from the ICAL must be used for quantitation and peak area, as used for ICAL, must be used for sample. Results reported between the MDL and RL qualified "J".	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must meet site specific DQOs.	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	5% field for fractionated and 5% field samples for non-fractionated analyses per matrix	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	Cool to ≤ 6º C; allow for < 2º C if samples intact	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	pH for aqueous samples	Every field sample	pH < 2	Adjust pH as soon as possible; note outliers in narrative	Analyst/Data Reviewer

Table 17 QAPP Worksheet All Matrices – NJDEP EPH Methodology
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Samples extracted within 14 days of collection; extract analyzed within 40 days of extraction.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing de-con, collect 1 EB per 20 field samples collected by the same method	Compounds < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer / Investigator
Comparability	S & A	Based on Method (SOP) and QAPP protocols/DQOs	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer / Investigator

NOTES:
1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance, and meet the data quality needs of the Department.

2. Method reference = NJDEP Analysis of Extractable Petroleum Hydrocarbon Compounds (EPH) in Aqueous and Soil/Sediment/Sludge.

APPENDIX C
GLOSSARY

Term	Definition
Accuracy	Accuracy describes the closeness of agreement between an observed value and an accepted reference value that is accepted as the true value. Accuracy is typically evaluated using spikes (laboratory control samples, surrogate spikes, and matrix spikes) and blanks (trip, field, and method), or any other standard subjected to the entire analytical process. Accuracy is usually reported as a percentage of the observed value divided by the reference value (percent recovery) using the following equation: $\%R = \frac{\text{observed value}}{\text{reference value}} \times 100$ Where %R = percent recovery.
Acid Surrogates	Acid surrogates are compounds routinely used with semi-volatile methods that exhibit similar chemical behavior to acidic organic compounds such as phenols. Common acid surrogates include: 2-Fluorophenol, phenol-d5 (a deuterated phenol), and 2,4,6-Tribromophenol. (See also surrogate).
Analyte	Analyte means the substance being measured by an analytical procedure.
Analytical Batch	An analytical batch is a group of samples that are processed and analyzed as a unit. For quality control purposes, the maximum number of samples in a batch is 20 per matrix.

Term	Definition
Applicable Standard/Screening Level	Residential Direct Contact Health Based Criteria and Soil Remediation Standards (RDC SRS),[1] http://www.nj.gov/dep/srp/regs/rs/rs_rule.pdf Nonresidential Direct Contact Health Based Criteria and Soil Remediation Standards (NRDC SRS),[2] http://www.nj.gov/dep/srp/regs/rs/rs_rule.pdf Default Impact to Ground water Soil Screening Levels for Contaminants;[3] http://www.nj.gov/dep/srp/guidance/rs/partition_equation.pdf Default Leachate Criteria for Class II Ground Water (Synthetic Precipitation Leachate Procedure);[4] http://www.nj.gov/dep/srp/guidance/rs/splp_guidance.pdf Specific Ground Water Quality Criteria (Groundwater Quality Standards);[5] http://www.nj.gov/dep/rules/rules/njac7_9c.pdf Surface Water Quality Criteria for Toxic Substances (SWQC);[6] http://www.nj.gov/dep/rules/rules/njac7_9b.pdf Maximum Contaminant Levels (MCL) for State Regulated VOCs;[7] http://www.state.nj.us/dep/rules/rules/njac7_10.pdf NJDEP MASTER TABLE GENERIC VAPOR INTRUSION SCREENING LEVELS including • Vapor Intrusion Groundwater Screening Levels (GWSL);[8] • Vapor Intrusion Residential Indoor Air Screening Level (RIASL);[9] • Vapor Intrusion Nonresidential Indoor Air Screening Level (NRIASL);[10] All at http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_tables.pdf NJDEP Action Levels for Indoor Air ;[11] http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_tables.pdf Vapor Intrusion Health Department Notification levels (HDNL);[12] http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_tables.pdf Extractable Petroleum Hydrocarbons (EPH);[13] http://www.nj.gov/dep/srp/guidance/srra/eph_method.pdf

[1] NJDEP, *Remediation Standards*, N.J.A.C. 7:26D
[2] NJDEP, *Remediation Standards*, N.J.A.C. 7:26D
[3] NJDEP, *Development of Site-Specific Impact to Ground Water Soil Remediation Standards Using the Soil-Water Partition Equation,* December 2008, http://www.nj.gov/dep/srp/guidance/rs/.
[4] NJDEP, *Guidance for the use of the Synthetic Precipitation Leaching Procedure to Develop Site-Specific Impact to Ground Water Remediation Standards*, June 2, 2008, http://www.nj.gov/dep/srp/guidance/rs/.
[5] NJDEP, *Groundwater Quality Standards*, N.J.A.C. 7:9C
[6] NJDEP, *Surface Water Quality Standards*, N.J.A.C. 7:9B
[7] NJDEP, *Safe Drinking Water Act Regulations*, N.J.A.C. 7:10
[8] NJDEP, *Vapor Intrusion Technical Guidance*, criteria dated March 2013, http://www.nj.gov/dep/srp/guidance/vaporintrusion/.
[9] Ibid.

Term	Definition
Applicable Standard/Screening Level (continued)	Hexavalent Chromium Cleanup Criterion;[14] http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf Ecological Screening Criteria;[15] http://www.nj.gov/dep/srp/guidance/ecoscreening/esc_table.pdf Site specific criteria developed for the investigation and remediation according to the applicable NJDEP guidance.
Area of Concern	"Area of concern" means any existing or former distinct location or environmental medium where any hazardous substance, hazardous waste, or pollutant is known or suspected to have been discharged, generated, manufactured, refined, transported, stored, handled, treated, or disposed, or where any hazardous substance, hazardous waste, or pollutant has or may have migrated, including, but not limited to, each current and former objects and/or areas defined in N.J.A.C. 7:26E-1.8.
Base Neutral Semivolatile Organic Compound Surrogates	Base neutral semivolatile organic surrogates exhibit similar chemical behavior to the base-neutral semivolatile organic compounds. Common examples include: Nitrobenzene-d5, 2-Fluorobiphenyl, and terphenyl-d14. (See also surrogate).
Bias	Bias is the deviation of the measured value from the true value. This can be analytical bias within the analytical procedure, or it can be due to matrix effects. There is inherent bias within all analytical procedures. Quality control measurement tools that can be used to evaluate bias include laboratory control samples, check standards, matrix spikes, or any other standards used for analysis.
Calibration Curve/Initial Calibration	A calibration curve/initial calibration curve is generated by analyzing a series of standards and plotting instrument response versus concentration. A calibration curve is used to calibrate an analytical system. Calibration criteria are specified in each analytical method.

[10] Ibid.
[11] Ibid.
[12] Ibid.
[13] NJDEP, *Protocol for Addressing Extractable Petroleum Hydrocarbons,* Version 5.0, August 9, 2010, http://www.nj.gov/dep/srp/guidance/srra/eph_protocol.pdf.
[14] NJDEP, *Chromium Soil Cleanup Criteria,* April 2010
[15] NJDEP, *Ecological Screening Criteria,* March 10, 2009, http://www.nj.gov/dep/srp/guidance/ecoscreening.

Term	Definition
Check Standard	A check standard is a solution of one or more analytes that is used to document laboratory performance. This check standard can go by many different names including laboratory control samples, and laboratory fortified blank. Consult with the laboratory to understand the naming scheme used to identify such standards. This standard can also be used to check the validity of a purchased stock or calibration standard.
Comparability	Comparability refers to the equivalency of two sets of data. Comparability may be achieved through the use of standard or similar techniques to collect and analyze representative samples. Comparable data sets must contain the same variables of interest and must possess values that can be converted to a common unit of measurement. Comparability is normally a qualitative parameter that is dependent upon other data quality elements.
Completeness	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 correct, normal conditions.
Conceptual Site Model	Defined in NJDEP Conceptual Site Model Technical Guidance, 2012.
Contaminant or Contamination	Contaminant or contamination means any discharged hazardous substance as defined pursuant to N.J.S.A. 58:10-23.11b, hazardous waste as defined pursuant to N.J.S.A. 13:1E-38, or pollutant as defined pursuant to N.J.S.A. 58:10A-3.
Contaminant of Potential Ecological Concern (COPEC)	COPEC means a substance detected at a contaminated site that has the potential to adversely affect ecological receptors because of its concentration, distribution, and mode of toxicity. Contaminants with concentrations above their respective New Jersey Surface Water Quality Standards or ecological screening criteria are identified as contaminants of potential ecological concern.
Control Sample	Control sample means a quality control sample introduced into a process to monitor the performance of a system.
Critical Sample	Critical samples are user defined where the completeness goal is usually 100 percent.

Term	Definition
Data of Known Quality	When "Data of Known Quality" is achieved for a particular data set, the investigator will have "Data of Known Quality" that the laboratory has followed the Data of Known Quality Protocols, has described non-conformances, if any, and has adequate information to make judgments regarding data quality.
Data of Known Quality Protocols (DKQPs)	DKQPs include specific laboratory quality assurance and quality control (QA/QC) criteria that produce analytical data of known and documented quality. The DKQ protocols are shown in Appendix B of the *NJDEP Site Remediation Program, Data of Known Quality Protocols Technical Guidance, April 2014*. (DKQ Guidance)
Data Quality Objectives (DQOs)	DQOs, developed by the investigator, are qualitative and quantitative statements derived from the DQO Planning Process that clarify the purpose of the study, define the most appropriate type of information to collect, determine the most appropriate conditions from which to collect that information, and specify tolerable levels of potential decision errors.
Environmental Sample	An environmental sample is a sample of soil, groundwater, surface water, soil vapor, sediment, air, or any other environmental matrix collected for analysis.
Equipment-Rinsate Blank	An equipment-rinsate blank is a sample of analyte-free water that is used to rinse the sampling equipment. An equipment-rinsate blank is collected after decontamination to assess potential contamination from inadequate decontamination of field equipment. An equipment-rinsate blank can also be used to evaluate the potential for field sampling equipment to leach contaminants into a sample and cause cross contamination.
Field Blank	A field blank is analyte-free matrix, usually water, prepared in the laboratory and transported to the sampling location along with the empty sample containers. At the sampling location the matrix is used to fill randomly selected sample containers and then returned to the laboratory for analysis. The field blank is treated as a sample in all respects, including exposure to sampling location conditions, storage, preservation, and all analytical procedures. Field blanks are used to assess any contamination contributed from sampling location conditions and the transport, handling, and storage of the samples.

Term	Definition
Field Duplicates	Field duplicates are two samples collected from the same location in the field and submitted to the laboratory as two distinct samples. Duplicates are used to evaluate precision, sample homogeneity, and field sample collection activities.
Field Reagent Blank	See “Field Blank.”
Gas Chromatography/ Mass Spectrometry	Gas Chromatography/Mass Spectrometry is an analytical procedure in which a gas chromatograph is connected to a mass spectrometer. The technique allows for both accurate identification and quantitation of analytes.
Handling Time	The maximum amount of time for a QC sample (e.g., field or trip blanks) to be transported to a site and/or the maximum amount of time for transport of site field samples and field QC samples back to the laboratory. Samples held beyond the allowed handling time may be considered biased low or invalid, depending on the intended use of the data (see NJDEP Field Sampling Procedures manual, August 2005).
Holding Time	The holding time is the maximum time that a sample may be held, after the sample is taken prior to preparation and/or analysis and still be considered valid or not compromised. Holding times can include time to extraction and time allowed after extraction before analysis and time allowed prior to digestion and after digestion prior to analysis based on method specific requirements. Samples analyzed past the holding time are determined to be compromised and may be considered invalid, depending on the intended use of the data.
Instrument Blank	An instrument blank is analyte-free matrix (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. Typically gas chromatography methods (excluding volatile organic compounds) use pure solvent as an instrument blank while metals and wet chemistry techniques use water or acidified water. Gas chromatography methods for volatile organic compounds use either acidified water or methanol.
Internal Standards	For certain analytical methods, internal standards are compounds that are added, immediately prior to analysis, at a known concentration to every standard, blank, sample, and quality control sample. Internal standards are used to calibrate the analytical system by plotting the response of the internal standards versus the compound(s) of interest. Internal standards should closely match the chemical behavior of the compound(s) of interest and be known not to be present in the sample.

Term	Definition
Laboratory Control Sample (LCS)	A LCS is a blank matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes from the same source as the calibration standards. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The LCS is carried through the analysis along with the samples. LCSs are also known as laboratory fortified blanks or blank spikes. LCSs are from a source other than that used to make up calibration standards
Laboratory Fortified Blank	See “Laboratory Control Sample.”
License Site Remediation Professional (investigator)	An individual who is licensed by the board pursuant to section 7 of P.L. 2009, c.60 (C.58:10C-7) or the department pursuant to section 12 of P.L. 2009, c.60 (C.58:10C-12).
Matrix Duplicates	Matrix duplicates refer to the analyses of two samples taken from the same sample container and prepared in the laboratory. Matrix duplicates are used to evaluate precision and sample homogeneity.
Matrix Interference	Matrix interferences are manifestations of non-target analytes or physical/chemical characteristics of a sample that prevents the quantification of the target analyte (i.e., the compound or element of interest being effectively quantified by the test method) as it is routinely performed, typically adversely impacting the reliability of the determination. For example, some matrices including silt, clay, coal, ash, and peat effectively bind analytes which may lead to low biased results for certain extraction/analysis procedures. As another example, co-eluting peaks in a gas chromatographic (GC) chromatogram may result in a high bias for an analyte of concern.
Matrix	The matrix is the material of which the sample is composed or the substrate (e.g., surface water, ground water, drinking water, soil, sediment, air) that may or may not contain an analyte of interest.
Matrix Spike	A matrix spike is an aliquot of an environmental sample to which known quantities of target analytes are added in the laboratory. The matrix spike is analyzed in an identical manner as a sample. The purpose of a matrix spike sample is to determine the quantitative accuracy of the overall analytical procedure for determining the analytes of concern in the sample.

Term	Definition
Matrix Spike Duplicate	A matrix spike duplicate is an intra-laboratory split sample, with both aliquots spiked with identical concentrations of method analytes. The spiking occurs prior to sample preparation and analysis. The results are used to document the precision and accuracy of a method in a given sample matrix. See also “Matrix Spike.”
Method Blank	A method blank is an “analyte-free” matrix that is treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, labeled compounds, internal standards, and surrogates that are used with samples. The method blank is used to determine if analytes or interferences are present in the laboratory environment, the reagents, or the apparatus. A method blank may also be referred to as a laboratory reagent blank.
Non-conformance	A non-conformance is an occurrence during the processing or analysis of a sample that deviates from the quality control performance criteria of the analytical method. Examples of non-conformances include, but are not limited to, missed holding times, temperature excursions, recoveries of surrogates or matrix spikes outside of performance criteria, initial or continuing calibration failures.
Non-target compounds	Non-targeted compound means a compound detected in a sample using a specific analytical method that is not a targeted analyte (see below), a surrogate compound, a system monitoring compound, a deuterated monitoring compound or an internal standard compound.
PARCCS Parameters	The PARCCS parameters are precision, accuracy, representativeness, comparability, completeness, and sensitivity.
Performance Evaluation Sample	See “Proficiency Test Sample.”

Term	Definition
Petroleum (or Petroleum Products)	“Petroleum" or "petroleum products" means oil or petroleum of any kind and in any form, including, but not limited to, oil, petroleum, gasoline, kerosene, fuel oil, oil sludge, oil refuse, oil mixed with other wastes, crude oils, and substances or additives to be utilized in the refining or blending of crude petroleum or petroleum stock in this State. However, any compound designated by specific chemical name on the list of hazardous substances adopted by the Department pursuant to this section shall not be considered petroleum or a petroleum product for the purposes of P.L.1976, c.141, unless such compound is to be utilized in the refining or blending of crude petroleum or petroleum stock in this State.
Precision	Precision is the consistency of measurement values quantified by measures of dispersion such as the sample standard deviation. Precision must be defined in context – e.g., for a certain analyte, matrix, method, perhaps concentration, lab or group of labs. Precision for laboratory and field measurements can be expressed as the relative percent difference (RPD) between two duplicate determinations or percent relative standard deviation (%RSD) between multiple determinations.
Proficiency Test Sample	Proficiency test sample is a sample provided to a laboratory for the purpose of demonstrating that the laboratory and the individual analyst performing the test can successfully analyze the sample within acceptable limits. The true value of the sample is unknown by the analyst.
Quality Assurance Project Plan (QAPP)	A QAPP is a document which describes the procedures necessary to produce an orderly assemblage of detailed procedures designed to produce data of sufficient quantity and quality to meet the data quality objectives for a specific data collection activity.

Term	Definition
Quality Assurance/Quality Control (QA/QC)	QA is an integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to establish the reliability of laboratory data to ensure that a process, item, or service is of the type and quality needed and expected by the client. QC procedures are the specific tools that are used to achieve this reliability. QC is the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. QC procedures measure the performance of an analytical method in relation to the QC criteria specified in the analytical method. QC information documents the quality of the analytical data.
Qualified Data	Qualified data are analytical results that have an affixed code placed there by laboratories, and/or individuals conducting independent data review, to denote that quality control requirements or other evaluation criteria are not met. Data reviewers assess these and other criteria to determine the usability of data.
Reagent water	Reagent water is water (generally that has been generated by any purification method) demonstrated to be free from the analytes of interest and potentially interfering substances at the method detection limit for the analyte.
Rejected Data	Rejected data are data that have failed to meet QC requirements and/or method specific/contractual requirements to such an extent that the data are determined to be unusable.
Relative Percent Difference (RPD)	RPD is used to calculate the precision from duplicate measurements and is defined by the following equation: $RPD = \frac{\lvert A-B \rvert}{((A+B)/2)} \times 100$ Where A = Analytical results from first measurement and B = Analytical results from the second measurement.

Term	Definition
Reporting Limit	As per N.J.A.C. 7:26E-1.8, Reporting Limit means, for a compound analyzed by a particular method, the sample equivalent concentration (i.e., based on sample specific preparation and analysis factors), for organics, associated with the lowest concentration standard used in the calibration of the method and for inorganics, derived from the concentration of that analyte in the lowest level check standard (which could be the lowest calibration standard in a multi-point calibration curve).
Representativeness	Representativeness is a qualitative measurement that describes how well the analytical data characterizes a discharge or area of concern under investigation as part of an environmental site assessment. Many factors can influence how representative the analytical results are for a discharge. These factors include, the selection of appropriate analytical procedures, the sampling plan, and the procedures and protocols used to collect, preserve, and transport samples.
Sensitivity	Sensitivity refers to the ability of an analytical procedure to detect and quantify an analyte at a given concentration.
Spike	A known quantity of an analyte added to a sample for the purpose of determining recovery or efficiency (analyst spikes), or for quality control (blind spikes).
Split Sample	A split sample is prepared when aliquots of sample are taken from the same container and then analyzed independently. Split samples are usually taken after mixing or compositing and are used to document intra- or inter-laboratory precision.
Standards	Standards are solutions that contain known concentration of target analytes.
Surrogate	A surrogate is an organic non-target analyte that has similar chemical properties to the analyte of interest. The surrogate standard is added to the sample in a known amount and used to evaluate the response of the analyte to preparation and analysis procedures. The surrogate concentration is measured using the same procedures used to measure other analytes in the sample. Surrogate recoveries are used to evaluate the performance of the analysis.
Target Analytes	Target analytes are the compounds included on the list of analytes for an analytical method. Site-specific target analytes are defined in the QAPP.

Term	Definition
Tentatively Identified Compound (TIC)	As per N.J.A.C. 7:26E-1.8, TIC means a non-targeted compound detected in a sample using a GC/MS analytical method which has been tentatively identified using a mass spectral library search. An estimated concentration of the TIC is also determined.
Trip Blank	Trip blanks originate within the laboratory. Trip blanks are sample containers that have been filled with analyte-free reagent water carried with other sample containers out to the field and back to the lab without being exposed to sampling procedures. Trip blanks are used to ascertain if sample containers may have been contaminated during transportation and storage.
Turn-Around Time	The turn-around time is the amount of time it takes for the laboratory to report the analytical results to the customer following the submittal of the samples to the laboratory.
Uncertainty	A measure of the total variability associated with sampling and measuring that includes the two major error components: systematic error (bias) and random error.

APPENDIX D
LIST OF ACRONYMS

C	Celsius
DKQ	Data of Known Quality
DKQP	Data of Known Quality Protocol
DQA	Data Quality Assessment
DQO	Data Quality Objective
DUE	Data Usability Evaluation
EPH	Extractable Petroleum Hydrocarbons
ESA	Environmental Site Assessment
GC/MS	Gas Chromatography/Mass Spectrometry
GWQS	Ground Water Quality Standard
ICV	Initial Calibration Verification
IDOC	Initial Demonstration of Capability
ID(s)	Sample Identification Number(s)
LCP	Laboratory Certification Program
LCS	Laboratory Control Sample
LFB	Laboratory Fortified Blank

MS/MSD	Matrix Spike/Matrix Spike Duplicate
ND	Not Detected
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PP	Priority Pollutants as defined by the Clean Water Act
QA/QC	Quality Assurance/Quality Control
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
RPD	Relative Percent Difference
SVOC	Semi Volatile Organic Compound
SPLP	Synthetic Precipitation Leaching Procedure
SW-846	*Test Methods for Evaluating Solid Wastes, Physical /Chemical Methods, EPA Publication SW*-846, United States Environmental Protection Agency
TAL	Target Analyte List
TAT	Turn-Around Time
TCL	Target Compound List

TICs	Tentatively Identified Compounds
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds