Torres Rojas, Genara

Subject: FW: Freedom of Information Online Request Form

From: jhernandez@bei-env.com [mailto:jhernandez@bei-env.com]
Sent: Monday, January 12, 2015 10:38 AM
To: Duffy, Daniel
Cc: Torres Rojas, Genara; Van Duyne, Sheree; Ng, Danny
Subject: Freedom of Information Online Request Form

Information:

First Name: John
Last Name: Hernandez
Company: Brennan Env. Inc.
Mailing Address 1: 19 Chatham Road
Mailing Address 2:
City: Summit
State: NJ
Zip Code: 07901
Email Address: jhernandez@bei-env.com
Phone: 908-472-9499
Required copies of the records: Yes

List of specific record(s):
I am seeking the environmental reports and correspondence submitted to NJDEP on behalf of PA NYNJ associated with NJDEP PIG000021830. This site is known as Bayonne Bridge, 1st Street West Kennedy Blvd. I have requested the records electronic pdf from Arcadis, the environmental consulting firm on this project and they have directed my request to the PA FOI system.

THE PORT AUTHORITY OF NY & NJ

FOI Administrator

February 6, 2015

Mr. John Hernandez
Brenan Env. Inc.
19 Chatham Road
Summit, NJ 07901

Re: Freedom of Information Reference No. 15679

Dear Mr. Hernandez:

This is in response to your January 12, 2015 request, which has been processed under the Port Authority's Freedom of Information Code (the "Code"), for copies of "the environmental reports and correspondence submitted to NJDEP on behalf of PA NYNJ associated with NJDEP PIG000021830. This site is known as Bayonne Bridge, 1st Street West Kennedy Blvd."

Material responsive to your request and available under the Code can be found on the Port Authority's website at http://www.panynj.gov/corporate-information/foi/15679-O.pdf. Paper copies of the available records are available upon request.

Please refer to the above FOI reference number in any future correspondence relating to your request.

Very truly yours,

Daniel D. Duffy
FOI Administrator

4 World Trade Center, 18th Floor
150 Greenwich Street
New York, NY 10006
T: 212 435 3642 F: 212 435 7555

New Jersey Department of Environmental Protection
Site Remediation Program

PUBLIC NOTIFICATION AND OUTREACH

Date Stamp
(For Department use only)

SECTION A. SITE LOCATION

Site Name: Bayonne Bridge

List all AKAs:

Street Address: 235 W. 1st St.

Municipality: Bayonne (Township, Borough or City)

County: Hundson Zip Code: 07002

Mailing Address if different than street address:

Program Interest (PI) Number(s): G000021830 Case Tracking Number(s):

Date Remediation Initiated Pursuant to N.J.A.C. 7:26C-2: 11/15/2003

State Plane Coordinates for a central location at the site: Easting: 592050 Northing: 660972

Municipal Block(s) and Lot(s):

Block # 373	Lot # 3	Block #	Lot #
Block #	Lot #	Block #	Lot #
Block #	Lot #	Block #	Lot #
Block #	Lot #	Block #	Lot #

SECTION B. NOTIFICATION INFORMATION

1. Indicate the type of Public Notification:

   ☐ Initial ☒ Update

2. Public notification was provided via: (Check all that apply)

   Sign ☒ Yes ☐ No Fact sheet ☐ Yes ☐ No
   Letter ☐ Yes ☐ No Alternate plan ☐ Yes ☐ No

3. Were materials produced in a language other than English? ☐ Yes ☒ No

   If "Yes," in what other language was notification prepared?

4. Were copies provided to municipal clerk, local/county health dept., and local health agency? ☒ Yes ☐ No
5. Did you provide an electronic copy of all required submittals? ☒ Yes ☐ No
6. Was notification of excess fill material conducted pursuant to N.J.A.C. 7:26E-1.4(k)? ☐ Yes ☐ No
7. Was additional public outreach conducted due to the Department's determination of substantial public interest? ☐ Yes ☒ No

SECTION C. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Port Authority of New York & New Jersey

Representative First Name: Robert Representative Last Name: Pruno

Title: Chief Environmental Engineer

Phone Number: (973) 565-7620 Ext: Fax: (973) 565-7649

Mailing Address: 2 Gateway Center - 14th Floor Environmental

City/Town: Newark State: New Jersey Zip Code: 07102

Email Address: rpruno@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date: 7/10/14

Name/Title: Robert Pruno/Chief Environmental Engineer **No Changes Since Last Submittal** ☐

SECTION D. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 591315

First Name: Clint Last Name: Catania

Phone Number: (201) 403-7738 Ext: Fax: (908) 526-7886

Mailing Address: 6723 Towpath Road

City/Town: Syracuse State: New York Zip Code: 13214

Email Address: clint.catania@arcadis-us.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: Date: 7/22/14

LSRP Name/Title: Clint P. Catania/Project Manager **No Changes Since Last Submittal** ☐

Company Name: ARCADIS U.S., Inc.

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

New Jersey Department of Environmental Protection
Site Remediation Program

RECEPTOR EVALUATION (RE) FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Bayonne Bridge

List all AKAs:

Street Address: 235 West First St.

Municipality: Bayonne (Township, Borough or City)

County: Hudson Zip Code: 07002

Program Interest (PI) Number(s): G000021830 Case Tracking Number(s): NA

Indicate the type of submission:

☐ Initial RE Submission

☒ Updated RE Submission

Indicate the reason for submission of an updated RE form

☐ Submission of an Immediate Environmental Concern (IEC) source control report;
☒ Submission of a Remedial Investigation Report;
☐ Submission of a Remedial Action Report;

Check if included in updated RE

☐ The known concentration or extent of contamination in any medium has increased;
☐ A new AOC has been identified;
☐ A new receptor is identified;
☐ A new exposure pathway has been identified.

SECTION B. ON SITE AND SURROUNDING PROPERTY USE

1. Identify any sensitive populations/uses that are currently on-site or surrounding property usage within 200 feet of the site boundary (check all that apply):

	On-site	Off-site
None of the following	☒	☐
Residences or residential property	☐	☒
Public or Private Schools grades K-12	☐	☐
Child care centers	☐	☐
Public parks, playgrounds or other recreation areas	☐	☒
Other sensitive population use(s) Explain _____	☐	☐

If any of the above applies, attach a list of addresses, facility names, type of use, and a map depicting each location relative to the site.

2. Current site uses (check all that apply):

☒ Industrial ☐ Residential ☐ Commercial ☐ Agricultural
☐ School or child care ☒ Government ☐ Park or recreational use
☐ Vacant ☐ Other: _____

3. Planned future site uses and off-site use within 200 ft of site boundary (check all that apply):

☒ Industrial ☒ Residential ☒ Commercial ☐ Agricultural
☐ School or child care ☒ Government ☒ Park or recreational use
☐ Vacant ☐ Other: _____

Provide a map depicting the location of the proposed changes in land use.

SECTION C. DESCRIPTION OF CONTAMINATION

1. Identify if any of the following exist at the site (check all that apply):
   - ☐ Free product [N.J.A.C. 7:26E-1.8] identified is ☐ LNAPL* or ☐ DNAPL**. Date identified: _____
   - ☐ Residual product [N.J.A.C. 7:26E-1.8]
   - ☐ Other high concentration source materials not identified above (e.g., buried drums, containers, unsecured friable asbestos)

     Explain: _____

   * LNAPL – measured thickness of .01 feet or more

   **DNAPL – See US EPA DNAPL Overview

2. Soil Migration Pathway

   Has soil contamination been delineated to the applicable Direct Contact Soil Remediation Standard? ..... ☐ Yes ☒ No

   Are all soils either below the applicable Direct Contact Criteria or under an institutional control (i.e. deed notice)? ..... ☐ Yes ☒ No

3. If this evaluation is submitted with a technical document that includes contaminant summary information, proceed to Section D. Otherwise attach a brief summary of all currently available data and information to be included in the site investigation or remedial investigation report.

SECTION D. GROUND WATER USE

1. Has the requirement for ground water sampling been triggered? ..... ☒ Yes ☐ No ☐ Unknown

   If "No," proceed to Section F. If "Unknown," explain:

   _____

2. Is Ground water contaminated above the Ground Water Remediation Standards [N.J.A.C.7:9C]? ..... ☒ Yes ☐ No ☐ Unknown

   Or ☐ Awaiting laboratory data with the expected due date: _____

   If "Yes," provide the date that the laboratory data was available and confirmed contamination above the Ground Water Remediation Standards. Date: 12/31/2003

   If "Unknown," explain: _____

   If "No," or awaiting laboratory data proceed to Section F.

3. Has ground water contamination been delineated to the applicable Remediation Standard? ..... ☒ Yes ☐ No

4. Has a well search been completed? ..... ☒ Yes ☐ No

   Date of most recent or updated well search: 12/20/2013

   Identify if any of the following conditions exist based on the well search [N.J.A.C.7:26E-1.14(a)] (check all that apply):
   - ☐ Potable wells located within 500 feet from the downgradient edge of the currently known extent of contamination.
   - ☐ Potable well located 250 feet upgradient or 500 feet side gradient of the currently known extent of contamination.
   - ☐ Ground water contamination is located within a Tier 1 wellhead protection area (WHPA).

5. Is a completed Well Search Spreadsheet or historical well search table attached and has an electronic copy of the spreadsheet been submitted to srpgis_wrs@dep.state.nj.us. ..... ☒ Yes ☐ No

   If "No," explain: _____

6. Are any private potable or irrigation wells located within ½ mile of the currently known extent of contamination? ..... ☐ Yes ☒ No

   If "Yes," was a door to door survey completed? ..... ☐ Yes ☐ No

   If survey was not completed explain: _____

7. Has sampling been conducted of ☐ potable well(s) and /or ☐ non-potable use well(s)? ..... ☐ Yes ☐ No

   If "No," provide justification then proceed to Section E.

   _____

8 Has contamination been identified in potable well(s) above Ground Water Remediation Standards that is not suspected to be from the site? (If "Yes," provide justification) ..... ☐ Yes ☐ No

_____

9 Has contamination been identified in potable well(s) that is above the Ground Water Remediation Standards or Federal Drinking Water Standards? ..... ☐ Yes ☐ No

Provide date laboratory data was received: _____

Or ☐ awaiting laboratory data with the expected due date: _____

If "Yes" for potable well contamination **not attributable to background**, follow the IEC Guidance Document at http://www.nj.gov/dep/srp/guidance/index.html#iec for required actions and answer the following:

Has an engineered system response action been completed on all receptors? ..... ☐ Yes ☐ No

Provide a brief narrative description:

Date completed: _____ NJDEP Case Manager: _____

10. Were Non-potable use well(s) sampled and results were above Class II Ground Water Remediation Standards? ..... ☐ Yes ☐ No

Provide date laboratory data was received: _____

Or ☐ awaiting laboratory data with the expected due date: _____

11. Has the ground water use evaluation been completed? ..... ☒ Yes ☐ No

SECTION E. VAPOR INTRUSION (VI)

1. Contaminants present in ground water exceed the Vapor Intrusion Ground Water Screening Levels that trigger a VI evaluation. (see NJDEP Vapor Intrusion Technical Guidance). ... ☐ Yes ☒ No ☐ Unknown

Or ☐ Awaiting laboratory data and the expected due date: _____

Provide the date that the laboratory data was available and confirmed contamination above the Vapor Intrusion Trigger Levels. Date: _____

2. Other existing conditions that trigger a VI evaluation. (see NJDEP Vapor Intrusion Technical Guidance)

☐ Wet basement or sump containing free product or ground water containing volatile organics

☐ Methane generating conditions causing oxygen deficient or explosion concern

☐ Other human or safety concern from the VI pathway (i.e. elemental mercury, unsaturated contamination, elevated soil gas or indoor vapor (explain):

If you answered "No," or awaiting laboratory data to Question 1., *and* did not check any boxes in Question 2, proceed to Section F, "Ecological Receptors", otherwise complete the rest of this section.

3. Has ground water contamination been delineated to the applicable Ground Water Vapor Screening Level? ..... ☐ Yes ☐ No

4. Was a site specific screening level, modeling or other alternative approach employed for the VI pathway? ..... ☐ Yes ☐ No

5. Identify and locate on a scaled map any buildings/sensitive populations that exist within the following distances from ground water contamination with concentrations above the Vapor Intrusion Ground Water Screening Levels or specific threats (check all that apply):

☐ 30 feet of petroleum free product or dissolved petroleum hydrocarbon contamination in ground water

☐ 100 feet of any non-petroleum free product or any non-petroleum dissolved volatile organic ground water contamination

☐ No buildings exist within the specified distances

6. The vapor intrusion pathway is a concern at or adjacent to the site (if "No," attach justification) ..... ☐ Yes ☐ No

7. Has soil gas sampling of the building(s) been conducted? ☐ Yes ☐ No ☐ N/A
   If "No," or "N/A," proceed to #10

8. Has indoor air sampling been conducted at the identified building(s)? ☐ Yes ☐ No
   If "No," proceed to #10

9 Has indoor air contamination been identified but not suspected to be from the site?
   (if "Yes," attach justification) ☐ Yes ☐ No

10. Indoor air results were above the NJDEP's Rapid Action Levels. ☐ Yes ☐ No

    Provide the date that the laboratory data was available and confirmed contamination above the Rapid Action Levels. Date: _____

    Or ☐ Awaiting laboratory data with the expected due date: _____

    If "Yes" to #8 above, follow the IEC Guidance Document at http://www.nj.gov/dep/srp/guidance/index.html#iec **for required actions.**

    The IEC engineering system response for control was implemented for all identified structures ☐ Yes ☐ No

    Date: _____ NJDEP Case Manager: _____

11. Indoor air sampling was conducted and results were above the NJDEP's Indoor Air Screening Levels but at or below the Rapid Action Levels. ☐ Yes ☐ No

    Provide the date that the laboratory data was available. Date: _____

    Or ☐ Awaiting laboratory data with the expected due date: _____

    If "Yes" to #10 above, answer the following:

    Has the Vapor Concern (VC) Response Action Form notifying the NJDEP of the exceedances been submitted? ☐ Yes ☐ No
    Date: _____

    Has a plan to mitigate and monitor the exposure been submitted? ☐ Yes ☐ No
    Date: _____

    Has the Mitigation Response Action Report been submitted? ☐ Yes ☐ No
    Date: _____

12. Has the vapor intrusion investigation been completed? ☐ Yes ☐ No
    If "No", is the vapor intrusion investigation stepping out as part of the site investigation or remedial investigation. (If "No," attach justification) ☐ Yes ☐ No

SECTION F. ECOLOGICAL RECEPTORS

1. Has an Ecological Evaluation (EE) has been conducted? [N.J.A.C. 7:26E-1.16] ☒ Yes ☐ No

   Date conducted: _____

2. Do the results of an EE trigger a remedial investigation of ecological receptors? [N.J.A.C. 7:26E-4.8]. ☐ Yes ☒ No
3. Has a remedial investigation of ecological receptors been conducted? ☐ Yes ☐ No

   Date conducted: _____

4. Provide the name(s) of any surface water body on or within 200 feet of the site:
   None

5. Is free product or residual product located within 100 feet from an ecological receptor? ☐ Yes ☒ No
6. Available data indicate an impact on: ☐ Ecological receptor(s) ☐ Surface water ☐ Sediment

   If this evaluation is submitted with a technical document that includes contaminant summary information, proceed to Section G. Otherwise attach a description of the type of contamination and provide a schedule and a description of all actions to be taken to mitigate exposure

SECTION G. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Port Authority of New York & New Jersey

Representative First Name: Robert Representative Last Name: Pruno

Title: Chief Environmental Engineer

Phone Number: (987) 356-5762 Ext: Fax:

Mailing Address: 2 Gateway Center, 14th Floor - Environmental

City/Town: Newark State: NJ Zip Code: 07102

Email Address: rpruno@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date: 7/10/14

Name/Title: Robert Pruno/Chief Environmental Engineer **No Changes Since Last Submittal** ☐

SECTION H. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 591315

First Name: Clint Last Name: Catania

Phone Number: (315) 671-9261 Ext: Fax:

Mailing Address: 621 Tynan Rd.

City/Town: Cleveland State: NY Zip Code: 13042

Email Address: Clint.Catania@arcadis-us.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: Date: 7/22/14

LSRP Name/Title: Clint P. Catania/Project Manager **No Changes Since Last Submittal** ☐

Company Name: ARCADIS U.S., Inc.

Completed forms should be sent to the municipal clerk, designate health department, and:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

New Jersey Department of Environmental Protection
Site Remediation Program

CLASSIFICATION EXCEPTION AREA / WELL RESTRICTION AREA (CEA/WRA) FACT SHEET FORM

☒ LSRP ☐ Subsurface Evaluator

Date Stamp
(For Department use only)

SECTION A. SITE INFORMATION

Site Name: Bayonne Bridge

Program Interest (PI) Number(s): G000021830

Case Tracking Number(s): _____

1. Indicate the reason for submission of this form:

   ☒ New CEA ☐ Revise CEA ☐ Existing CEA with no changes ☐ CEA Lift/Removal

   If you are submitting this form for an existing CEA provide the CEA Subject Item ID: _____

2. Indicate the type of ground water Remedial Action (RA):

   ☒ Natural ☐ Active ☐ Final RA not yet selected

3. Has a Remedial Action Permit (RAP) application been submitted to the NJDEP? ..... ☐ Yes ☒ No

SECTION B. CEA COMPONENT INFORMATION

1. **Contaminant(s):** This CEA/WRA applies only to the contaminants above the applicable numeric values established by Ground Water Quality Standards (GWQS), N.J.A.C. 7:9C, listed in the table below. List below the maximum value for all contaminants included in Exhibit A using any well or sampling point used to establish the CEA.

Contaminant	Concentration (1)	GWQS (2)	SWQS(3)	GWSL(4)
Arsenic	306,000	3	Not applicable	Not applicable

Notes:
(1) Maximum concentration in Micrograms Per Liter
(2) New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C
(3) Surface Water Quality Standards, N.J.A.C. 7:9B - Applicable only where contaminants in the CEA may discharge to a surface water body.
(4) Current NJDEP Vapor Intrusion Ground Water Screening Levels available at http://www.nj.gov/dep/srp/guidance/vaporintrusion/

☐ Check if attaching an Addendum to list additional contaminants and associated information.

2. **CEA Boundaries:** Year of tax map used: 2012

For CEA revisions: ☐ check if CEA Boundary has changed (See instructions)

☐ check if Block and Lot numbers have changed (See instructions)

List the Block(s) and Lot(s) included in the areal extent of the Classification Exception Area:

Block(s)	Lot(s)	Check if off-site
373	3	☐
		☐
		☐
		☐
		☐

Block(s)	Lot(s)	Check if off-site
		☐
		☐
		☐
		☐
		☐

☐ Check if attaching an Addendum to list additional Blocks/Lots and associated information.

Narrative description of proposed CEA:

The contaminant is associated with regional historic fill. Therefore, the site boundaries were used to define the horizontal extent of the CEA, and the vertical extent of the CEA is defined by the approximate location of the fill layer between 5 ft bgs to 8 ft bgs. See Exhibit A: Remedial Investigation Report for details on the remedial investigation of historic fill material.

Name(s) of the affected Geologic Formation(s)/Unit(s): Rahway Till/Shallow Overburden

Direction of ground water flow: S-W (If multiple water bearing zones exist within the CEA and/or there is no predominant flow direction, see instructions)

Ground Water Classification: Class II-A

Vertical Depth of CEA: 11 (ft bgs) **and** -2.0 (msl).

Horizontal Extent of CEA: 0.99 Indicate units: ☒ acres or ☐ square feet

3. **Projected Term of CEA:** (Based on modeling/calculations in Exhibit E)

Proposed Duration in Years: _____ Expected Expiration Date: _____

or ☒ Indeterminate

4. **ATTACH THE FOLLOWING:** (see instructions for additional information)

Exhibit A: Remedial Investigation Report – Per N.J.A.C 7:26C-7.3(a)3 submit the RIR;

Exhibit B: Site Location Maps – USGS Quadrangle Map;

Exhibit C: Site Map(s) and Cross Section – See N.J.A.C 7:26C- 7.3(c)1 and 2 and instructions regarding what to include on the map(s) and the cross-section figure.

Exhibit D: GIS Deliverables – CEA Boundary Extent and CEA/WRA Spreadsheet – The CEA/WRA spreadsheet contains the vertical contaminant depth data for each sampling point used to prepare the CEA maps and cross-section figure, required by N.J.A.C 7:26C-7.3(c). The CEA Boundary Extent and CEA/WRA Spreadsheet shall be submitted via email to srpgis_cea@dep.state.nj.us. The CEA/WRA Spreadsheet shall also be included on the CD submitted with this form. See the instructions for both this form and the instructions for the CEA/WRA spreadsheet for more details.

For revisions, does the revised CEA map differ from CEA map on NJ-GeoWeb? ☐ Yes ☐ No ☐ N/A

Identify the format of the CEA Boundary Extent Map: ☒ Shape File ☐ CAD File

Exhibit E: Fate and Transport Description and Model Documentation

Is all the ground water contamination associated with the site the result of Historic Fill?..... ☒ Yes ☐ No

If "Yes," Fate and Transport Description and Model Documentation is not required.
If "No," submit all information required pursuant to N.J.A.C. 7:26C-7.3(b)2.

SECTION C. CURRENT GROUND WATER USE DOCUMENTATION

1. Indicate the year of the most recent well search completed per N.J.A.C. 7:26E-1.14: 2013
2. If this Fact Sheet form is for a revised CEA or an existing CEA with no changes, have new wells been installed since the CEA was established? ..... ☐ Yes ☐ No ☒ N/A

SECTION D. WELL RESTRICTION INFORMATION

Certain well restrictions relevant to potable ground water use, such as "Double Case Wells", "Sample Potable Wells", and "Evaluate Production Wells", are consistently set within the boundaries of all CEAs established by the NJDEP in Class I and II-A areas (see instructions).

1. Are there any other site-specific well restrictions relevant to potable ground water use that should be set within or near the boundaries of the proposed CEA? ..... ☐ Yes ☒ No

If "Yes", describe below any such site-specific well restrictions proposed for this CEA:

SECTION E. PUBLIC NOTIFICATION REQUIREMENTS

1. Indicate which of the following entities have been notified pursuant to N.J.A.C. 7:26C-7.3(d). (check all that apply)

   ☒ Municipal and county clerk(s)
   ☒ Local, county or regional health department(s)
   ☒ Designated County Environmental Health Act agency (if applicable)
   ☒ County Planning Board
   ☐ Pinelands Commission (if applicable)
   ☒ Owners of real property overlying CEA foot print

2. **List of Names and Addresses** – List name/address of all persons notified pursuant to N.J.A.C. 7:26C-7.3(d) based on the proposed CEA extent. See instructions for detailed information.

   ☒ Check here if no volatile contaminants are in the CEA

Name	Notification Address Used	Date notification sent	Property was evaluated for vapor impacts ☒ if "Yes"
Rober F. Sloan, Esp., RMC	Bayonne Clerk, 630 Avenue C, Bayonne		☐
Barbara A. Netchert	Hudson Clerk, 257 Cornelison Ave-4th Floor, Jersey City		☐
Vincent Rivelli, M.S.	Hudson Health Officer, 630 Avenue C, Bayonne		☐
Massiel Ferrara, PP, AICP	Hudson Div. of Planning, 595 County Avenue, Secaucus		☐
Robert Pruno	PANYNJ, 2 Gateway Center, 14th Floor, Newark		☐
			☐
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SECTION F. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Port Authority of New York & New Jersey

Representative First Name: Robert Representative Last Name: Pruno

Title: Chief Environmental Engineer

Phone Number: (973) 565-7620 Ext: Fax:

Mailing Address: 2 Gateway Center, 14th Floor - Environmental

City/Town: Newark State: NJ Zip Code: 07102

Email Address: rpruno@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date: 7/10/14

Name/Title: Robert Pruno/Chief Environmental Engineer

No changes to contact information since last submittal ☐

SECTION G. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 591315

First Name: Clint Last Name: Catania

Phone Number: (315) 671-9261 Ext: Fax:

Mailing Address: 621 Tynan Rd.

City/Town: Cleveland State: NY Zip Code: 13042

Email Address: Clint.Catania@arcadis-us.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

- ☐ *directly oversaw and supervised all of the referenced remediation, and\or*
- ☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: Date: 7/22/14

LSRP Name/Title: Clint P. Catania/Project Manager

Company Name: ARCADIS U.S., Inc.

No Changes To Contact Information Since Last Submittal ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIAL INVESTIGATION REPORT FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Bayonne Bridge

List all AKAs:

Street Address: 235 W. 1st St.

Municipality: Bayonne (Township, Borough or City)

County: Hudson Zip Code: 07002

Program Interest (PI) Number(s): G000021830 Case Tracking Number(s):

Date Remediation Initiated Pursuant to N.J.A.C. 7:26C-2: 11/15/2003

State Plane Coordinates for a central location at the site: Easting: 592050 Northing: 660972

Municipal Block(s) and Lot(s):

Block #	373	Lot #	3	Block #		Lot #	
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	

SECTION B. SUBMITTAL STATUS

1. Indicate how the Electronic Data Deliverable (EDD) for this submittal is being provided to the NJDEP:
   - ☐ Via Email at srpedd@dep.state.nj.us (attach NJDEP confirmation email); or
   - ☒ CD (attach to this submittal)
2. Is a Classification Exception Area (CEA) Proposal included with this submission? ..... ☒ Yes ☐ No
3. Complete the following Submittal and Permit Status Table:

	Not Applicable	Included in this Submission	Previously Submitted	Date Of Submission	Date of Revised Submission	Date of Document Withdrawal
Public Notification	☐	☒	☐	09/14/2009		
Immediate Environmental Concern Report	☒	☐	☐			
IEC Engineered System Response Action Report	☒	☐	☐			
Vapor Concern Mitigation Report	☒	☐	☐			
LNAPL Interim Remedial Measure Report	☒	☐	☐			
Preliminary Assessment Report	☒	☐	☐			
Receptor Evaluation	☐	☒	☐	03/14/2011		
Site Investigation Report	☒	☐	☐			
Remedial Investigation/Remedial Action Work Plan	☐	☒	☐			
Remedial Action Report	☒	☐	☐			
Response Action Outcome	☒	☐	☐			
Alternative Soil Remediation Standard and/or Screening level Application Form	☒	☐	☐			
Case Inventory Document	☐	☒	☐			
Technical Impracticability Determination	☒	☐	☐			

Permit Application – list:	☒	☐	☐			
	☐	☐	☐			
	☐	☐	☐			
	☐	☐	☐			
Radionuclide Remedial Investigation Workplan	☒	☐	☐			
Radionuclide Remedial Investigation Report	☒	☐	☐			
Radionuclide Remedial Action Workplan	☒	☐	☐			
Radionuclide Remedial Action Report	☒	☐	☐			

SECTION C. SITE USE

Current Site Use (check all that apply)

- ☐ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Other _____
- ☐ Agricultural
- ☐ Park or recreational use
- ☒ Vacant
- ☒ Government

Intended Future Site Use (check all that apply)

- ☐ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Park or recreational use
- ☒ Vacant
- ☒ Government
- ☐ Future site use unknown

SECTION D. CASE TYPE: (check all that apply)

- ☐ Administrative Consent Order (ACO)
- ☐ Brownfield Development Area (BDA)
- ☐ Child Care Facility
- ☐ Chrome Site (Chromate chemical production waste)
- ☐ Coal Gas
- ☐ Due Diligence with RAO
- ☐ Hazardous Discharge Remediation Fund (HDSRF) Grant/Loan
- ☐ ISRA
- ☐ Landfill (SRP subject only)
- ☐ Regulated Underground Storage Tank (UST)
- ☐ Remediation Agreement (RA)
- ☐ School Development Authority (SDA)
- ☐ School facility
- ☐ Spill Act Defense – Government Entity
- ☒ Spill Act Discharge
- ☐ UST Grant/Loan

Federal Case (check all that apply)

☐ **RCRA GPRA 2020** ☐ **CERCLA/NPL** ☐ **USDOD** ☐ **USDOE** ☐ TSCA

☐ Other (explain): _____

SECTION E. PUBLIC FUNDS

Did the remediation utilize public funds? ☐ Yes ☒ No

If "Yes," check applicable: ☐ UST Grant ☐ UST Loan ☐ Brownfield Reimbursement Program ☐ HDSRF Grant ☐ HDSRF Loan ☐ Landfill Reimbursement Program ☐ Spill Fund ☐ Schools Development Authority

SECTION F. SCOPE OF THE REMEDIAL INVESTIGATION REPORT

1. Does the Remedial Investigation address:
   - ☒ Area(s) of Concern (AOCs) Only
   - ☐ Entire Site (based on a completed and submitted Preliminary Assessment/Site Investigation)
2. Total number of contaminated AOCs associated with the case: 1
3. Total number of contaminated AOCs addressed in this submittal: 1
4. Is the Remedial Investigation complete for the contaminated AOCs addressed in this submittal? ☒ Yes ☐ No
5. Is the Remedial Investigation complete for all AOCs associated with this case? ☒ Yes ☐ No

   If "Yes," provide date: 01/11/2012

SECTION G. SITE CONDITIONS

1. Has dioxin been detected in any site media? ☐ Yes ☒ No
2. Check each media-type and highest concentration of contamination present above any applicable standards/criteria at the time of remedial investigation:

Soil in ppm					GW = Ground Water in ppb					SW = Surface Water in ppb					Sed = Sediment in ppm	
	Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm		
*VOCs	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000	
*SVOCs	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000	
*PAHs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100	
*Metals	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000	
PCBs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100	
*Pesticides	☐	☐	☐	☐	<1	☐	☐	☐	☐	1-10	☐	☐	☐	☐	>10	
Chromium	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000	
Mercury	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000	
Arsenic	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☒	☒	☐	☐	>100	
EPH	☐			☐	<1,700	☐			☐	1,700–5,100	☐			☐	>5,100	

3. For any contaminant group (*) checked above, identify the contaminant with the highest concentration over its applicable remediation standard and/or screening level:

_____ _____ _____ _____ _____

4. Were the laboratory reporting minimum detection limits below applicable remediation standards/ screening levels required for the site? ..... ☒ Yes ☐ No

5. Are any of the following conditions currently present? (check all that apply)

Ground water:

- ☒ Contaminated ground water in the overburden aquifer
- ☐ Contaminated ground water in a confined aquifer
- ☐ Contaminated ground water in the bedrock aquifer
- ☐ Contaminated ground water in multiple aquifer units
- ☐ Multiple distinct ground water plumes
- ☐ Contaminated ground water migrating off-site
- ☐ Background ground water contamination
- ☐ Contaminated ground water discharging to surface water or Environmentally Sensitive Natural Resource (ESNR)
- ☐ Residual or free product
- ☐ Radionuclides

Soil:

- ☐ On-site discharge(s) impacting soil off-site
- ☐ Chromate Chemical Production Waste/COPR
- ☐ Munitions and explosives of concern
- ☒ Contaminated soil in the saturated zone
- ☐ Historic pesticide impacts to soil
- ☐ Residual or free product
- ☐ Radionuclides
- ☒ Historic Fill
- ☐ Soil contamination due to naturally occurring background conditions
- ☐ Soil contamination in an ESNR

SECTION H. APPLICABLE REMEDIATION STANDARDS

1. Were Default Remediation Standards used for all contaminants? ..... ☒ Yes ☐ No
   (If "Yes," check all that apply)
   - ☒ Direct Contact
   - ☒ Impact to Ground Water Soil Screening Levels
   - ☒ Ecological Screening Levels

2. Has compliance averaging been utilized to determine compliance with a pathway? ..... ☐ Yes ☒ No
   If "Yes," check all that apply:

	Compliance Averaging Method Utilized			
Pathway	Arithmetic Mean	95 Percent UCL	Spatially Weighted Average	75 Percent/ 10X Procedure
☐ Ingestion-Dermal Pathway	☐	☐	☐	☐
☐ Inhalation Pathway	☐	☐	☐	☐
☐ Impact to Ground Water Pathway	☐	☐	☐	☐

3. Has a compliance option been utilized to determine compliance with the Impact to Ground Water Pathway? (If "Yes," check all that apply) ☐ Yes ☒ No
   - ☐ Immobile Compounds
   - ☐ Data evaluation for metals and semi-volatiles
   - ☐ Data evaluation for volatile organics derived from discharges of petroleum mixtures
4. Were Alternate Remediation Standards used for the Ingestion/Dermal Pathway? ☐ Yes ☒ No
5. Were Alternate Remediation Standards used for the Inhalation Pathway? ☐ Yes ☒ No
6. Were Site Specific Standards used for the Impact to Ground Water Pathway? ☐ Yes ☒ No
   (If "Yes," check all that apply)
   - ☐ Soil-Water Partitioning Equation ☐ SPLP ☐ Sesoil ☐ Sesoil/AT123D
   - ☐ DAF Modification ☐ Immobile Chemicals List
   - ☐ Soil and Ground Water Analytical Data Evaluation
7. Were Site Specific Ecological Remediation Goals used? ☐ Yes ☒ No
8. What is the ground water classification for this site as per N.J.A.C. 7:9C? (check all that apply)
   - ☐ Class I-A ☒ Class II-A
   - ☐ Class I-PL Pinelands Protection Area ☐ Class III-A
   - ☐ Class I-PL Pinelands Preservation Area ☐ Class III-B

SECTION I. BACKGROUND CONDITIONS

Did the RI demonstrate via a background investigation, outside the influence of on-site AOCs **and** operational areas, that:

1. All or any part of the ground water contamination is migrating onto this site per N.J.A.C. 7:26E-3.9? ☒ Yes ☐ No ☐ NA
2. Soil contamination is naturally occurring per N.J.A.C. 7:26E-3.8 ☐ Yes ☒ No ☐ NA

SECTION J. ALTERNATIVE STANDARD / VARIANCES

Alternative remediation standard

If proposing an alternative remediation standard pursuant to N.J.A.C. 7:26D-7.4, alternate vapor intrusion screening level, or ecological site specific goal check here ☐ and attach the Alternative Soil Remediation Standard and/or Screening Level Application Form as an addendum.

A site-specific screening level was developed for the evaluation of the VI pathway ☐ Yes ☒ No

Variance from regulations

If the Licensed Site Remediation Professional has varied from the Technical Rules, provide the citation(s) from which the remediation varied and the page(s) in the attached document where the rationale for the variance is provided.

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

SECTION K. HISTORIC FILL

Is historic fill present at the site? ☒ Yes ☐ No

If "Yes," answer the following questions:

1. Indicate how the presence of historic fill was determined (check all that apply):
   ☒ Boring logs ☐ Test Pits ☐ Trenches ☐ Aerial Photos ☐ NJDEP Mapped Areas
2. Was the historic fill characterized pursuant to N.J.A.C. 7:26E-4.7 and the NJDEP Historic Fill Material Technical Guidance Document? ☒ Yes ☐ No
3. Are any other AOCs (i.e., location of discharge and any contaminants that may have migrated from that area) located within the defined boundaries of the historic fill? ☒ Yes ☐ No

   If "Yes," have the same contaminant type(s) (e.g., lead, arsenic, and/or benzo(a)pyrene, etc.) characterized as being present in the historic fill been **sampled for** as a contaminant of concern at these co-located AOCs? ☒ Yes ☐ No

SECTION L. GROUND WATER TRIGGER

1. Was a ground water investigation conducted at all AOCs where a ground water investigation was triggered pursuant to N.J.A.C. 7:26E-3.5 and 4.3? ☒ Yes ☐ No ☐ NA
2. Is contamination in soils fully delineated? ☐ Yes ☒ No

SECTION M. GROUND WATER REMEDIAL INVESTIGATION INFORMATION

1. Are contaminants present with a specific gravity less than that of water? ☐ Yes ☒ No
   a. If "Yes," were any monitor wells installed in unconfined aquifers in which the water table is higher than the top of the well screen? ☐ Yes ☐ No

   If "Yes" to 1a, identify the affected wells. _____
2. Are contaminants present with a specific gravity greater than that of water? ☒ Yes ☐ No
   a. If "Yes," were multiple depth discrete ground water samples collected in a vertical profile at each ground water sampling location where dense contaminants were suspected? ☐ Yes ☒ No
3. Is ground water in the bedrock aquifer contaminated? ☐ Yes ☒ No

   If "Yes," answer questions 3a and 3b.
   a. Were bedrock cores collected? ☐ Yes ☐ No
   b. Were geophysical logging methods conducted to characterize the bedrock aquifer in accordance with the NJDEP Ground Water Technical Guidance (3.4.2.2)? ☐ Yes ☐ No
4. Is contamination in ground water fully delineated? ☐ Yes ☒ No

SECTION N. ECOLOGICAL RECEPTORS

1. Have soil, sediment, and/or surface water data been collected from Environmentally Sensitive Natural Resources (ESNR)? ☐ Yes ☐ No ☒ NA
   a. If "Yes," do contaminant concentrations at the ESNR exceed ecological screening criteria or the aquatic chronic NJSWQS [N.J.A.C.7:9B]? ☐ Yes ☐ No
   b. If "Yes," have soil and sediment data been collected from both surface and subsurface intervals in the ESNR? ☐ Yes ☐ No
   c. If "No" for 1b, provide explanation _____
2. Have contaminant migration pathways from the site/AOC to the ESNR been identified? ☐ Yes ☒ No
3. Do the results of the Ecological Evaluation require a remedial investigation of ecological receptors? ☐ Yes ☒ No

   If "No," provide explanation _____
4. Has an Ecological Risk Assessment been conducted [N.J.A.C.7:26E-4.8]? ☐ Yes ☒ No
5. Is remediation required in an ESNR? ☐ Yes ☒ No

SECTION O. LABORATORY DATA

1. Were all data submitted in the appropriate full and/or reduced formats according to the deliverables defined in N.J.A.C. 7:26E-2? ☒ Yes ☐ No
2. Do all data submitted meet the quality assurance/quality control (QA/QC) requirements incorporated by reference in N.J.A.C. 7:26E-2 for:

   sampling ☒ Yes ☐ No

   analysis ☒ Yes ☐ No
3. How was it determined that the data complied with the QA/QC requirements?

   ☒ Laboratory non-conformance summary/narrative

   ☐ Laboratory correspondence

   ☒ LSRP review

   ☐ Independent contractor review

   ☐ Other: _____

4. Has any data been qualified and used? ☐ Yes ☒ No
5. Has any data been rejected and used? ☐ Yes ☒ No
6. Comments:

SECTION P. MISCELLANEOUS

1. Were any regulated USTs identified during the course of the RI that were not previously known? ☐ Yes ☒ No
   If "Yes," list tank size, contents and registration number(s). _____
   a. If "Yes," to item P.1. above and if these USTs were Federally Regulated, was the source/cause of release identified on a Confirmed Discharge Notification form? ☐ Yes ☐ No
      If "No," complete and submit a revised Confirmed Discharge Notification form.
2. Were additional Areas of Concern identified during the RI? ☐ Yes ☒ No
   If "Yes," identify AOC(s): _____
3. Identify Remedial Measures (RMs) conducted during the RI (check all that apply):
   - ☐ Soil excavation
   - ☐ Potable water supply treatment or replacement
   - ☐ Hydraulic containment of source area
   - ☐ Soil vapor extraction
   - ☐ Enhanced fluid recovery (EFR)
   - ☐ Other(s), specify: _____
   - ☐ UST closure
   - ☐ Free product recovery
   - ☐ Vapor intrusion mitigation
   - ☒ No RMs were conducted during the RI
4. Did the remedial investigation include sampling to characterize any on-site contaminated media for either on-site or off-site reuse? ☐ Yes ☒ No
5. Has clean fill has been brought onto the site? ☐ Yes ☒ No
   If yes, has it been analyzed? ☐ Yes ☐ No
6. Has new information (material facts, data or other information) been generated during the RI that corrects or contradicts information, or changes conclusions from, previously submitted reports or information? ☐ Yes ☒ No
   If "Yes," explain: _____
7. Have past deficiencies/notice of deficiencies been addressed in this submittal? ☐ Yes ☐ No

SECTION Q. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Port Authority of New York & New Jersey

Representative First Name: Robert Representative Last Name: Pruno

Title: Chief Environmental Engineer

Phone Number: (973) 565-7620 Ext: Fax: (973) 565-7649

Mailing Address: 2 Gateway Center - 14th Floor Environmental

City/Town: Newark State: New Jersey Zip Code: 07102

Email Address: rpruno@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date: 7/10/14

Name/Title: Robert Pruno/Chief Environmental Engineer

No changes to contact information since last submittal ☒

SECTION R. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 591315

First Name: Clint Last Name: Catania

Phone Number: (201) 403-7738 Ext: Fax: (908) 526-7886

Mailing Address: 6723 Towpath Road

City/Town: Syracuse State: New York Zip Code: 13214

Email Address: clint.catania@arcadis-us.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: Date: 7/22/14

LSRP Name/Title: Clint P. Catania/Project Manager

Company Name: ARCADIS U.S., Inc.

No changes to contact information since last submittal ☒

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIAL ACTION WORKPLAN FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Bayonne Bridge

List all AKAs:

Street Address: 235 W. 1st St.

Municipality: Bayonne (Township, Borough or City)

County: Hudson Zip Code: 07002

Program Interest (PI) Number(s): G000021830 Case Tracking Number(s):

Date Remediation Initiated Pursuant to N.J.A.C. 7:26C-2: 11/15/2003

State Plane Coordinates for a central location at the site: Easting: 592050 Northing: 660972

Municipal Block(s) and Lot(s):

Block #	373	Lot #	3	Block #		Lot #	
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	

SECTION B. SUBMITTAL STATUS

1. Is this submittal a proposal to obtain NJDEP preapproval for using alternative fill in excess of the volume required for a remedial action? ☐ Yes ☒ No

   If "Yes," has notification been provided to:

   - ☐ Each owner of real property and the tenants of those properties, located within 200 feet of the site boundary;
   - ☐ The mayor of each municipality where the site located;
   - ☐ The county designated solid waste coordinator;
   - ☐ The municipal clerk of each municipality in which the site is located; and
   - ☐ The county health department and local health agency.

2. Indicate how the Electronic Data Deliverable (EDD) for this submittal is being provided to the NJDEP:

   - ☐ Via Email at srpedd@dep.state.nj.us (attach NJDEP confirmation email)
   - ☒ CD (attach to this submittal)

3. Is a Classification Exception Area (CEA) Proposal included with this submission? ☒ Yes ☐ No

4. Complete the following Submittal and Permit Status Table:

	Not Applicable	Included in This Submission	Previously Submitted	Date of Submission	Date of Revised Submission	Date of Document Withdrawal
Public Notification	☐	☒	☐			
Immediate Environmental Concern Report	☒	☐	☐			
IEC Engineered System Response Action Report	☒	☐	☐			
Vapor Concern Mitigation Report	☒	☐	☐			
LNAPL Interim Remedial Measure Report	☒	☐	☐			
Preliminary Assessment Report	☒	☐	☐			
Receptor Evaluation	☐	☒	☐			
Site Investigation Report	☒	☐	☐			
Remedial Investigation/Remedial Action Work Plan	☐	☒	☐			

Remedial Action Report	☒	☐	☐			
Response Action Outcome	☒	☐	☐			
Alternative Soil Remediation Standard and/or Screening level Application Form	☒	☐	☐			
Case Inventory Document	☐	☒	☐			
Technical Impracticability Determination	☒	☐	☐			
Permit Application – list:	☒	☐	☐			
	☐	☐	☐			
	☐	☐	☐			
	☐	☐	☐			
Radionuclide Remedial Investigation Workplan	☒	☐	☐			
Radionuclide Remedial Investigation Report	☒	☐	☐			
Radionuclide Remedial Action Workplan	☒	☐	☐			
Radionuclide Remedial Action Report	☒	☐	☐			

SECTION C. SITE USE

Current Site Use (check all that apply)

- ☐ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Other _____
- ☐ Agricultural
- ☐ Park or recreational use
- ☒ Vacant
- ☒ Government

Intended Future Site Use (check all that apply)

- ☐ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Park or recreational use
- ☒ Vacant
- ☒ Government
- ☐ Future site use unknown

SECTION D. CASE TYPE: (check all that apply)

- ☐ Administrative Consent Order (ACO)
- ☐ Brownfield Development Area (BDA)
- ☐ Child Care Facility
- ☐ Chrome Site (Chromate chemical production waste)
- ☐ Coal Gas
- ☐ Due Diligence with RAO
- ☐ Hazardous Discharge Remediation Fund (HDSRF) Grant/Loan
- ☐ ISRA
- ☐ Landfill (SRP subject only)
- ☐ Regulated Underground Storage Tank (UST)
- ☐ Remediation Agreement (RA)
- ☐ School Development Authority (SDA)
- ☐ School facility
- ☐ Spill Act Defense – Government Entity
- ☒ Spill Act Discharge
- ☐ UST Grant/Loan

Federal Case (check all that apply)

☐ **RCRA GPRA 2020** ☐ **CERCLA/NPL** ☐ **USDOD** ☐ **USDOE** ☐ TSCA

☐ Other (explain): _____

SECTION E. PUBLIC FUNDS

Did the remediation utilize public funds? ..... ☐ Yes ☒ No

If "Yes," check applicable: ☐ UST Grant ☐ UST Loan ☐ Brownfield Reimbursement Program
☐ HDSRF Grant ☐ HDSRF Loan ☐ Landfill Reimbursement Program
☐ Spill Fund ☐ Schools Development Authority

SECTION F. SCOPE OF REMEDIAL ACTION WORKPLAN

1. Does the RAW address:
   - ☒ Area(s) of Concern (AOCs) Only
   - ☐ Entire Site (Based on a completed and submitted Preliminary Assessment/Site Investigation)
2. Total number of contaminated AOCs associated with the case: 1
3. Total number of contaminated AOCs addressed in this submittal: 1

SECTION G. GENERAL

1. Does the proposed remedial action require a permit that requires an approval from the NJDEP Site Remediation Program? ☐ Yes ☒ No

   If "Yes," list Permit Type(s) _____

   And if: ☐ Permit Application is attached to this submittal
   ☐ Permit Application submitted to SRP on this date: _____

2. Was a remediation initiated after May 6, 2010, for new construction or a change in the use of the site proposed for the purposes of residential use, use as a licensed child care center or use as a school? ☐ Yes ☒ No

   If "Yes," is an unrestricted use or a presumptive remedy being proposed? ☐ Yes ☐ No

3. Is the proposed remedial action an alternative remedy pursuant to N.J.A.C. 7:26E-5.3? ☐ Yes ☒ No

   If "Yes," specify the section/page(s) of the RAW where the alternative remedy is proposed:

   _____

4. Is any radiological contamination currently present at the AOC/Site? ☐ Yes ☒ No
5. Did any of the site contain Ordnance and Explosives/unexploded ordnance (OE/UXO)? ☐ Yes ☒ No
6. Does the proposed remedial action involve containment of free product? ☐ Yes ☒ No
7. At any time, have any of the following contaminants ever been detected in sediment above the ecological screening levels?

   ☐ Arsenic ☐ Dioxin ☐ Mercury ☐ PCBs ☐ Pesticides ☒ None

8. Have past deficiencies been addressed in this submittal? ☐ Yes ☐ No ☒ N/A
9. Will the proposed remedial action render the property unusable for future redevelopment or for recreational use (N.J.A.C. 7:26C-6.4(b))? ☐ Yes ☒ No
10. Are ground water contaminants from the site discharging to surface water? ☐ Yes ☒ No
11. Are ground water contaminants from the site discharging to an Environmentally Sensitive Natural Resource (ESNR)? ☐ Yes ☒ No
12. If you answered "Yes," to either question 10 or 11, identify the contaminant(s) and concentration(s) in the monitoring well(s) nearest to the surface water body or ESNR in the table below:

Well	Contaminant	Concentration	Well	Contaminant	Concentration

SECTION H. SITE CONDITIONS

1. Has dioxin been detected in any site media? ☐ Yes ☒ No
2. Check each media-type and highest concentration of contamination present above any applicable standards/criteria at the time of remedial investigation:

Soil in ppm	GW = Ground Water in ppb					SW = Surface Water in ppb					Sed = Sediment in ppm				
	Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm	
*VOCs	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
*SVOCs	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
*PAHs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100
*Metals	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
PCBs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100

*Pesticides	☐	☐	☐	☐	<1		☐	☐	☐	☐	1-10		☐	☐	☐	☐	>10
Chromium	☐	☐	☐	☐	<100		☐	☐	☐	☐	100–1,000		☐	☐	☐	☐	>1,000
Mercury	☐	☐	☐	☐	<100		☐	☐	☐	☐	100–1,000		☐	☐	☐	☐	>1,000
Arsenic	☐	☐	☐	☐	<10		☐	☐	☐	☐	10–100		☒	☒	☐	☐	>100
EPH	☐			☐	<1,700		☐			☐	1,700–5,100		☐			☐	>5,100

3. For any contaminant group (*) checked above, identify the contaminant with the highest concentration over its applicable remediation standard and/or screening level:

_____ _____ _____ _____ _____

4. Were the laboratory reporting minimum detection limits below applicable remediation standards/ screening levels criteria required for the site? ..... ☒ Yes ☐ No

5. Are any of the following conditions currently present (check all that apply):

Ground water:

- ☒ Contaminated ground water in the overburden aquifer
- ☐ Contaminated ground water in a confined aquifer
- ☐ Contaminated ground water in the bedrock aquifer
- ☐ Contaminated ground water in multiple aquifer units
- ☐ Multiple distinct ground water plumes
- ☐ Contaminated ground water migrating off-site
- ☐ Background ground water contamination
- ☐ Contaminated ground water discharging to surface water or ESNR
- ☐ Residual or free product
- ☐ Radionuclides

Soil:

- ☐ On-site discharge(s) impacting soil off-site
- ☐ Chromate Chemical Production Waste/COPR
- ☐ Munitions and explosives of concern
- ☒ Contaminated soil in the saturated zone
- ☐ Historic pesticide impacts to soil
- ☐ Residual or free product
- ☐ Radionuclides
- ☒ Historic Fill
- ☐ Soil contamination due to naturally occurring background conditions
- ☐ Soil contamination in an ESNR

6. Check each of the following that applies to the primary objective of the remedial action:

☐ Treatment of:	☐ Ground Water	☐ Soil	☐ Sediments	☐ LNAPL	☐ DNAPL	☐ Soil Gas
☐ Removal of:	☐ Ground Water	☒ Soil	☐ Sediments	☐ LNAPL	☐ DNAPL	☐ Soil Gas
☐ Containment/Control of: ..	☐ Ground Water	☐ Soil	☐ Sediments	☐ LNAPL	☐ DNAPL	☐ Soil Gas

With migration pathway(s) to:

- ☐ Indoor Air
- ☐ Surface Water
- ☐ Other
- ☒ Ground Water
- ☐ Sediments or
- ☐ Other ESNRs

With exposure to:

- ☒ Human receptors
- ☐ Offsite impacts
- ☐ Ecological receptor(s) / ESNR

7. Is the remedial action an Interim Remedial Measure that was being implemented at the site? ..... ☐ Yes ☒ No

SECTION I. ALTERNATIVE STANDARD / VARIANCES

Alternative remediation standard

If proposing an alternative remediation standard pursuant to N.J.A.C. 7:26D-7.4, alternate vapor intrusion screening level, or ecological site specific goal check here ☐ and attach the Alternative Soil Remediation Standard and/or Screening Level Application Form as an addendum.

A site-specific screening level was developed for the evaluation of the VI pathway ..... ☐ Yes ☒ No

Variance from regulations

If the Licensed Site Remediation Professional has varied from the Technical Rules, provide the citation(s) from which the remediation varied and the page(s) in the attached document where the rationale for the variance is provided.

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

SECTION J. APPLICABLE REMEDIATION STANDARDS

1. Were Default Remediation Standards used for all contaminants? ☒ Yes ☐ No
   (If "Yes," check all that apply)
   - ☒ Direct Contact
   - ☒ Impact to Ground Water Soil Screening Levels
   - ☒ Ecological Screening Levels

2. Has compliance averaging been utilized to determine compliance with the Inhalation Pathway? ☐ Yes ☒ No
   If "Yes," check all that apply:

	Compliance Averaging Method Utilized			
Pathway	Arithmetic Mean	95 Percent UCL	Spatially Weighted Average	75 Percent/ 10X Procedure
☐ Ingestion-Dermal Pathway	☐	☐	☐	☐
☐ Inhalation Pathway	☐	☐	☐	☐
☐ Impact to Ground Water Pathway	☐	☐	☐	☐

3. Has a compliance option been utilized to determine compliance with the Impact to Ground Water Pathway? (If "Yes," check all that apply) ☐ Yes ☒ No
   - ☐ Immobile Compounds
   - ☐ Data evaluation for metals and semi-volatiles
   - ☐ Data evaluation for volatile organics derived from discharges of petroleum mixtures

4. Were Alternate Remediation Standards used for the Ingestion/Dermal Pathway? ☐ Yes ☒ No

5. Were Alternate Remediation Standards used for the Inhalation Pathway? ☐ Yes ☒ No

6. Were Site Specific Standards used for the Impact to Ground Water Pathway? ☐ Yes ☒ No
   (If "Yes," check all that apply)
   - ☐ Soil-Water Partitioning Equation ☐ SPLP ☐ Sesoil ☐ Sesoil/AT123D
   - ☐ DAF Modification ☐ Immobile Chemicals List
   - ☐ Soil and Ground Water Analytical Data Evaluation

7. Were Site Specific Ecological Remediation Goals used? ☐ Yes ☒ No

8. What is the ground water classification for this site as per N.J.A.C. 7:9C? (check all that apply)
   - ☐ Class I-A
   - ☐ Class I-PL Pinelands Protection Area
   - ☐ Class I-PL Pinelands Preservation Area
   - ☒ Class II-A
   - ☐ Class III-A
   - ☐ Class III-B

SECTION K. ALTERNATIVE AND CLEAN FILL USE

1. Will alternative fill be used? ☐ Yes ☒ No
2. Will clean fill be used? ☒ Yes ☐ No
3. Will material be sent off-site for use as alternative and/or clean fill? ☐ Yes ☒ No
   If "Yes," specify the section/page in the RAW where it states the SRP site receiving this alternative and/or clean fill: _____
4. Will soil that has been blended due to historically applied pesticides for agricultural purposes be used for alternative and/or clean fill? ☐ Yes ☒ No
5. Specify the section/pages where the Fill Use Plan pursuant to N.J.A.C. 7:26E-5.2(g) can be found:
   _____

SECTION L. REMEDIAL ACTION WORKPLAN INFORMATION

General

1. Are NJDEP-approved permits, other than any permits needing SRP approval, required prior to the implementation of the remedial action? ☐ Yes ☒ No
   If "Yes," please list the type. _____

2. Are land use permits required prior to the implementation of the remedial action? ☐ Yes ☒ No

If "Yes," please list the type. _____

Soils

3. Check each type of remediation being proposed:

☐ No remedial action required ☒ Excavation
☒ Capping/other Engineering Control ☐ Bioremediation
☒ Institutional Control ☐ Soil Vapor Extraction
☐ Chemical Oxidation ☐ Chemical Reduction
☐ Thermal desorption ☐ Soil Washing
☐ Other (specify): _____

4. Does the proposed remedial action address all saturated zone source material? ☒ Yes ☐ No ☐ N/A

5. If an engineering control is proposed, indicate the receptor(s) each engineering control is intended to protect (check all that apply):

☒ Human ☐ Ecological ☐ Offsite Impacts ☐ No Engineering Control

6. If a restricted use is being proposed, has consent from all involved property owners been obtained? ☒ Yes ☐ No

7. Is the proposed remedial action a presumptive remedy? ☐ Yes ☒ No

Ground Water

8. Check each type of remediation being proposed:

☒ No remedial action required ☐ Containment
☐ Multiple Phase Extraction System ☐ Hydraulic Control
☐ SVE/Air Sparging ☐ Monitored Natural Attenuation
☐ Ozone Sparging ☐ Chemical Oxidation
☐ Pump & Treat ☐ Other (specify): _____

Ecological

9. Check each type of remediation being proposed:

☒ No remedial action required ☐ Capping
☐ Excavation/Dredging ☐ Other (specify): _____

Indoor Air

10. Are soil gas concentrations currently >10x SGSLs? ☐ Yes ☒ No

11. Check each type of mitigation being proposed:

☒ No remedial action required ☐ Subsurface Depressurization System
☐ HVAC Positive Pressure ☐ Subsurface ventilation Systems
☐ Soil Vapor Extraction System ☐ Monitoring and Maintenance Schedule
☐ Other (specify): _____

Natural Resource Restoration

12. Will any injured natural resources be restored concurrent with the remedial action? ☐ Yes ☒ No
If "Yes," is the Office of Natural Resources Restoration involved? ☐ Yes ☐ No

SECTION M. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Port Authority of New York & New Jersey

Representative First Name: Robert Representative Last Name: Pruno

Title: Chief Environmental Engineer

Phone Number: (973) 565-7620 Ext: Fax: (973) 565-7649

Mailing Address: 2 Gateway Center - 14th Floor Environmental

City/Town: Newark State: New Jersey Zip Code: 07102

Email Address: rpruno@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date: 7/10/14

Name/Title: Robert Pruno/Chief Environmental Engineer

No changes to contact information since last submittal ☐

SECTION N. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 591315

First Name: Clint Last Name: Catania

Phone Number: (201) 403-7738 Ext: Fax: (908) 526-7886

Mailing Address: 6723 Towpath Road

City/Town: Syracuse State: New York Zip Code: 13214

Email Address: clint.catania@arcadis-us.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: Date: 7/22/14

LSRP Name/Title: Clint P. Catania/Project Manager

Company Name: ARCADIS U.S., Inc.

No changes to contact information since last submittal ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

ARCADIS
Infrastructure · Water · Environment · Buildings

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The Port Authority of New York and New Jersey

Remedial Investigation Report/Remedial Action Workplan

Staten Island Bridges

Bayonne Bridge
235 West First Street
Bayonne, New Jersey

NJDEP PI# G000021830

June 2014

Bayonne Bridge NJDEP PI# G000021830

I. Area(s) of Concern, Receptor and Emergency Response Tracking	Impacted Media	Contaminants of Concern	Exposure Route	Receptors		Current Status/Outcome
				Existing	***Potential***	
AOC 1 – Migration of impacts from offsite source	Soil, Groundwater	Arsenic	Direct Contact	None	None	The Port Authority Site is currently unpaved and used as storage for construction materials. A nitric acid restoring plant used to exist on the Site but was demolished prior to the Bayonne Bridge construction in the late 1920's. The site also includes a small parcel of land along the western boundary that is leased by Williams Industries, Inc. (Williams). This leased parcel has continued to support industrial operations. Williams also owns and operates the parcel of land to the west of the leased portion of the Port Authority Site. The 1995 Preliminary Assessment of Williams site revealed that from 1920 to 1929 the Williams site was owned by Nitrate Agencies Company, an agricultural insecticide manufacturer which manufactured arsenic acid. Between 1986 and 1999, Williams tenant conducted investigations related to USTs and a 5000-gallon concrete vault. Samples collected showed elevated arsenic levels up to 14,200 mg/kg in soil and up to 1,360 ug/L in groundwater. **January 1995 RIR** - Williams Site, it was stated that arsenic concentrations immediately downgradient from the concrete vault were several orders of magnitude higher than in other samples and therefore was determined to be the source of arsenic contamination of greatest concern. Sanborn maps suggested that the concrete vault was likely related to the Nitrate Agencies

						operations, which manufactured arsenic acid. **February 1999 –** Port Authority first noticed elevated arsenic levels in grab soil samples on the Port Authority property. Port Authority notified NJDEP of the contamination and notified adjacent property owner W.R. Grace & Company of the Williams site to assume responsibility for full delineation and remediation of the contamination of the Williams leasehold, as well as the adjacent Port Authority owned property. **2002 Remedial Action Report** - Williams Site, the removal of the concrete vault was reported as a remedial action. The Port Authority performed investigation activities in **2003, 2004, and 2008**. These investigations identified historic fill beneath the entire Port Authority site, and an area of elevated arsenic concentrations in the vicinity of PA-MW-2. During the **2008** remedial investigation, the Port Authority installed wells on the Williams site and continued monitored groundwater on the Port Authority Site. At Williams Site, a well was installed immediately downgradient of a previously removed source, the concrete vault. Sampling result at this well indicated higher level of arsenic concentrations than before the vault was removed. Port Authority, in discussions with the NJDEP, decided to voluntarily investigate the Port Authority Site separately from the Williams Site.
AOC-2 - Historic Fill	Soil, Groundwater	Arsenic	Direct Contact	None	None	Port Authority performed additional investigations activities in **2009 and 2012**. These investigations confirmed the presence of historic fill beneath the Port Authority Site, and indicated the historic fill is

						impacting groundwater. Additionally, soil sampling results indicated areas of elevated arsenic concentrations in the vicinity of PA-MW-17 and WP-MW-12. Groundwater sampling results from monitoring wells in these areas indicated that the elevated arsenic concentrations are contributing to groundwater impacts. **2014 Port Authority Remedial Investigation Report/Remedial Action Workplan** – The Remedial Action Workplan (RAW) proposes remedial excavation activities for hot spot areas PA-MW-2, PA-MW-17 and WP-MW-12, proposed to be completed in conjunction with the Bayonne Bridge renovation activities. A deed notice (institutional control) and a cap (engineering control) are proposed in the RAW to address soil impacts that will be left in place, and soil impacts associated with historic fill The RAW also includes a request for the NJDEP to establish a Classification Exception Area to address the presence of elevated concentrations of arsenic in the groundwater associated with historic fill.

ARCADIS

Gary M. Wroblewski, P.E.
Vice President

Clint P. Catania, P.G., L.S.R.P.
Project Manager

Raymond A. Stevenson
Project Geologist

Remedial Investigation Report/Remedial Action Workplan

Bayonne Bridge
235 West First Street
Bayonne, New Jersey

NJDEP PI#G000021830

Prepared for:
Port Authority of New York and New Jersey

Prepared by:
ARCADIS U.S., Inc.
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Fair Lawn
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Tel 201 797 7400
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Our Ref.:
04907098.0001

Date:
June 2014

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Appendix A March 2011 Initial Receptor Evaluation Submission

Appendix B Soil Boring and Monitoring Well Contruction Logs

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Attachment

Attachment 1 CD with Report Files, Laboratory Data Packages, and Electronic Data Deliverables

Executive Summary

The following Remedial Investigation Report/Remedial Action Workplan (RIR/RAW) was prepared by ARCADIS U.S., Inc. (ARCADIS) on behalf of the Port Authority of NY & NJ (Port Authority) to address arsenic impacts in soil and groundwater at 235 West First St. Bayonne, New Jersey (Site), under the existing Bayonne Bridge Memorandum of Agreement (MOA) (PI#G000021830).

The Site is currently unpaved and used to store construction materials such as jersey barriers. The Site is approximately one acre in size. The western portion of the Site, measuring approximately 0.2 acres, is leased by Williams Industries, Inc. (Williams). The Williams site itself is located immediately to the west of the Port Authority Site. Portions of the Site are proposed for bridge piers and a detention basin for the renovation of the Bayonne Bridge.

Multiple investigations have been performed at the Site between 2003 and 2009 to characterize the extent of the arsenic impacts in soil and groundwater. In January 2012, the Port Authority installed 11 soil borings, three of which were completed as groundwater monitoring wells. A total of 58 soil samples (including duplicates) and 23 groundwater samples were collected in January 2012. Based on the results, the entire Site contains historic fill with arsenic concentrations above the New Jersey Department of Environmental Protection (NJDEP) Soil Remediation Standards. Additionally, specific areas of elevated arsenic concentrations were detected in soil (and in groundwater) in the vicinity of monitoring wells PA-MW-2, PA-MW-17, and WP-MW-12 (areas with arsenic concentrations above those associated with historic fill).

The Port Authority proposes to excavate the arsenic-impacted soil from the three areas near PA-MW-2, PA-MW-17, and WP-MW-12 for disposal offsite. Remedial excavation activities are proposed in conjunction with the bridge pier construction for the Bayonne Bridge renovation. The plan is to mitigate the impacts of the soil to groundwater pathway in the potential source areas through the partial removal of source soil and limited dewatering activities. For the purposes of this RIR/RAW, it is estimated that the source material will be removed (as is practical) to a depth of 3 feet below ground surface (bgs) in the area of PA-MW-2, to a depth of 5 feet bgs in the area of PA-MW-17, and to a depth of 8 feet bgs in the area of WP-MW-12, using standard construction techniques.

The surficial soils may also represent a direct contact pathway and potential pathway for fugitive dust. Therefore, to eliminate these pathways, a cap is proposed for the

Site. Some areas of the cap will consist of 4 inches of compacted crushed stone with 3 to 4 inches of asphalt pavement on top; and other areas of the cap will consist of 12 inches of certified clean fill.

Following removal of the arsenic-impacted source soil in the three areas identified above, a Deed Notice will be prepared and filed to address the presence of residual arsenic impacts, and for arsenic impacts attributed to the presence of historic fill.

The Port Authority has included forms and documentation with this RIR/RAW requesting the NJDEP establish a Classification Exception Area (CEA). The CEA is requested to address the presence of arsenic concentrations associated with historic fill at levels above the NJDEP Groundwater Quality Standards.

1 Introduction

The following Remedial Investigation Report/Remedial Action Workplan (RIR/RAW) was prepared by ARCADIS U.S., Inc. (ARCADIS) on behalf of the Port Authority of NY & NJ (Port Authority) to address arsenic impacts in soil and groundwater at 235 West First St., Bayonne, New Jersey (Site), under the existing Bayonne Bridge Memorandum of Agreement (MOA) (PI#G000021830).

1.1 Site Location Description

The Site is located at 235 West First St. (Block #373, Lot #3) in Bayonne, Hudson County, New Jersey (Figure 1). The Site is currently unpaved and used to store construction materials such as jersey barriers. The Site is approximately one acre in size. There are currently no above ground structures on the property. A one-story warehouse, a brick boiler house, and a nitric acid restoring plant previously existed on the Site and were demolished prior to the Bayonne Bridge construction in the late 1920s. There are six piers located on the property supporting the access to the Bayonne Bridge. A Site Map is provided as Figure 2.

The western portion of the Site, measuring approximately 0.2 acres, is leased by Williams Industries, Inc. (Williams). The Williams site itself is located immediately to the west of the Port Authority Site. This leased parcel has continued to support industrial operations as summarized in the following sections of this RIR/RAW.

Surrounding properties include residences to the east, small industrial companies to the north, and a Little League Baseball field to the south, which separates the Site from the Kill Van Kull. The Site is currently fenced with limited access.

1.2 Geology and Hydrogeology

The Site is relatively flat and the elevation of the site is approximately 9 to 10 feet above mean sea level (AMSL). According to the data collected during the installation of borings and monitoring wells at the Site, there is an upper layer of fill consisting of brown course to fine sand containing cinders, little gravel, and trace cobbles. The fill layer is generally five to eight feet thick although in some locations it extends deeper than eight feet below ground surface (bgs). Beneath the fill layer is an organic clay layer with peat fibers that is approximately one to two feet thick; the organic clay was not observed at some locations. As documented in previous reports for the Williams

site, there is a silty sand stratum with layers of silt and sand below the organic layer, extending to bedrock, which was previously encountered at depths of eight to 11 feet bgs. In summary, the Site consists primarily of fill soils placed over organic clays/peat underlain by a relatively thin alluvial layer and shallow bedrock.

During the most recent monitoring well gauging event (January 2012), groundwater was encountered at depths ranging from 0.58 feet to 2.80 feet below top of casing. The monitoring well locations are shown on Figure 3. Groundwater contour maps for August 2008, November 2008, April 2011, and January 2012 are presented as Figures 4 through 7, respectively. Groundwater gauging measurements are presented on Table 1. Groundwater elevation measurements indicate that groundwater movement is westerly towards Newark Bay, though minor groundwater mounding appears to be occurring in the vicinity of PA-MW-2. According to Woodward-Clyde Consultants, groundwater elevation monitoring conducted between August 11, 1995 and September 13, 1995 indicate no significant influence on the groundwater elevation from the tidal changes in the Kill Van Kull or Newark Bay; however, it is unclear if tidal influences are present during winter and summer peak tides.

The Site is situated approximately 0.15 miles north of the Kill Van Kull, 0.75 miles east of Newark Bay, and 3 miles west of Upper New York Bay. All three water bodies are tidally influenced.

1.3 Receptor Summary

Well Search

A search of the NJDEP i-MapNJ program indicates that the nearest commercial public water supply wells to the Site are in the City of Roselle, approximately 5.8 miles west, and outside the hydraulic region of the Site. A NJDEP Data Minter's XY Well Search was conducted and the results indicated no potable well within a ½ mile radius of the site.

Site Ecological Evaluation

The Port Authority Site is unpaved and visual observation of the Site indicated that no stressed vegetation is present. The closest water body to the Site is the Kill Van Kull located 0.15 miles south of the site. The Site and the surrounding area appear to have no sensitive ecological receptors.

The Site was mapped on the NJDEP i-MapNJ program; however, since the Site is located in an urban area, sensitive receptors were not detected in the immediate vicinity of the Site.

All sensitive ecological receptors were inspected in i-MapNJ including: public community water supply wells, Coastal Area Facility Review Act (CAFRA) boundary, state open space, category 1 waters, landscape projects, and well head protection areas. Only one sensitive receptor (wetlands) was detected on i-MapNJ in the area of the Site, but this sensitive receptor is approximately 0.19 miles to the southeast of the Site and will not be negatively impacted by remedial actions completed at the Site.

The initial NJDEP Receptor Evaluation (RE) Form was submitted to the NJDEP on March 14, 2011. A copy of the initial RE submission is included as Appendix A. There have been no changes to the original submission.

1.4 Proposed Site Redevelopment

The Bayonne Bridge connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull. Construction began in September 1928 and was completed in 1931. The primary purpose of the bridge was to allow vehicular traffic from Staten Island to reach Manhattan via the Holland Tunnel. Today, the 151-foot air draft restriction beneath the Bayonne Bridge is an obstacle for larger ships doing business with marine terminals west of the Bridge, such as the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey, and at Howland Hook on Staten Island, New York.

On December 29, 2010, the Port Authority announced the "Raise the Roadway" alternative to provide the most effective solution to the Bayonne Bridge clearance issue; raising the bridge's roadway to approximately 215 feet to increase the existing 151-foot navigational clearance restrictions. The proposed Bayonne Bridge redevelopment construction activities will result in the relocation of the bridge support piers and construction of a stormwater retention basin on the Site.

1.5 Purpose and Scope

The purpose of this RIR/RAW is to summarize the remedial investigation completed at the Site and propose a remedial action strategy. This report includes a summary of

soil and groundwater investigation results, a discussion of the extent of the arsenic impacts to soil and groundwater, and proposes remedial actions.

2 Previous Investigation History

2.1 Offsite Investigation History at the Williams Site

2.1.1 Abbey Enterprises, Inc. Investigations (Williams Site)

Investigations of four underground tanks and other areas of environmental concern under jurisdiction of the New Jersey Environmental Cleanup Responsibility Act (ECRA Case #85434) were conducted by Williams tenant Abbey Enterprises, Inc., between 1986 and 1988. During the installation of soil borings on the Williams Site (Block 373, Lot 2), a 5,000-gallon concrete vault was discovered. The location of the former vault is shown on Figure 2. Sediment samples collected from the vault and soils surrounding the vault indicated the presence of arsenic in the vault; the actual use of the vault (storage or drainage) was not ascertained. A liquid sediment sample collected from the vault in 1988 contained arsenic at 74.3 micrograms per liter (ug/L). A soil sample collected from a soil boring located immediately downgradient of the vault had an arsenic concentration of 14,200 milligrams per kilogram (mg/kg).

2.1.2 January 1992 Remedial Investigation (Williams Site)

Initially, the Williams Site was placed into the ECRA program based on a pending sale. The ECRA application was withdrawn due to termination of a sales contract and Williams entered into an MOA dated September 17, 1993, under the Voluntary Cleanup Program of the Industrial Site Recovery Act (ISRA). The NJDEP Case Number is 91-03-13-SP02.

In accordance with the MOA, a remedial investigation (RI) was performed in 1992 and 1993 by Paulus, Sokolowski, and Sartor, LLC (PS&S) and an RI Report was submitted in January 1995. A summary of the RI Report is presented below.

2.1.2.1 Soil Investigation

Thirteen soil borings were installed and two soil samples were collected from each boring between one and two feet and between four and six feet bgs. Four samples were analyzed for the United States Environmental Protection Agency (USEPA) priority pollutants (PP+40) and total petroleum hydrocarbons (TPH). Samples from nine borings were analyzed for priority pollutant metals (PP metals) and TPH. In addition, Toxicity Characteristic Leaching Procedure (TCLP) metals analyses were conducted on four surface soil samples.

Arsenic concentrations in surface soil samples ranged from 62.8 to 17,200 mg/kg and in subsurface soil samples from non-detect to 1,440 mg/kg. The NJDEP Soil Remediation Standards for arsenic are currently 19 mg/kg (former Soil Cleanup Criteria was 20 mg/kg). TCLP arsenic concentrations ranged from 5.64 to 52 milligrams per liter (mg/L), which is greater than the 5.0 mg/L Resource Conservation and Recovery Act (RCRA) hazardous waste criterion. Certain other inorganic compounds and base neutral compounds were detected in soil in exceedance of their respective soil cleanup criteria. Arsenic concentrations were significantly higher in the surface soil samples (11 of 13 sampling locations) and in soil samples containing cinders.

2.1.2.2 Groundwater Investigation

Four monitoring wells were installed to bedrock and four groundwater samples were collected and analyzed for PP+40. Arsenic concentrations in groundwater ranged from 321 to 55,800 ug/L, which is greater than the NJDEP Groundwater Quality Standard (GWQS) of 3 ug/L. Lead was detected in at concentrations greater than its GWQS. Concentrations of all other compounds were non-detected or detected below their respective GWQS.

2.1.2.3 Concrete Vault

The vault was estimated to be 18 feet long, 8 feet wide, and 6 feet deep and the contents inside were estimated to be 4,320 gallons. One composite sample of sediment and one composite sample of liquid were collected and analyzed for PP and TCLP metals.

TCLP arsenic concentrations were 829 mg/L in the liquid sample and 578 mg/L in the sediment sample, which is greater than the 5.0 mg/L limit for the RCRA hazardous toxicity characteristic. All other results indicate the sediment and liquid to be non-hazardous. TPH concentrations were 270 mg/L in the liquid sample and 1,500 mg/L in the sediment sample.

Arsenic concentrations in groundwater immediately downgradient of the vault were two orders of magnitude higher than in the other groundwater samples collected in 1992. Therefore, the vault was determined to be the source of arsenic contamination of greatest concern.

2.1.3 January 1995 Remedial Action Work Plan (Williams Site)

On behalf of Williams, Woodward Clyde Consultants prepared a Remedial Action Work Plan (RAWP) to address the soil and groundwater contamination at the Williams Site. Although other PP metals and organic compounds were detected at the Williams Site, the remedial approach was focused on minimizing direct contact with arsenic contaminated soil and groundwater and mitigating the leaching of arsenic from soil into groundwater.

The arsenic sources were reported to be a buried concrete vault containing arsenic-rich sediment and liquid. The arsenic-impacted soil was also attributed partly to historic fill. Up to eight feet of industrial fill containing cinders were placed on the Williams Site in the past. Leaching of arsenic from the soils was described as the source of the arsenic detected in groundwater.

The described remedial approach included removing the buried concrete vault and any associated piping, and installing a low permeability cap on the Site not occupied by buildings to minimize infiltration. Based on transport modeling, potential receptors, presence of historic fill, and groundwater uses, natural attenuation was selected as the proposed remedy for arsenic-containing groundwater. Natural attenuation (via adsorption, dispersion and diffusion) would be verified through groundwater monitoring for a period of five years. Institutional controls would also be implemented and inspection and maintenance performed.

A groundwater monitoring program, which included modeling arsenic migration, concluded the following:

- There are no significant uses of the groundwater in the vicinity of the Williams Site;
- The nearest significant potential receptor of contaminated groundwater flow from the Williams Site is the Kill Van Kull;
- Based on arsenic mass calculations, flow rate calculation, and infiltration rates, historic fill will load groundwater beneath the Williams Site with arsenic concentration in the 1,000 ug/L range; and
- Transport modeling analysis indicated that, depending on the retardation factor selected for arsenic transport in the groundwater, the time for arsenic to reach the river would be 750 years or more.

The RAWP also detailed necessary permits and approvals, monitoring, health and safety, site restoration, cost estimate, and reporting requirements.

2.1.4 July 28, 1995 Preliminary Assessment (Williams Site)

Woodward-Clyde Consultants submitted a letter report describing Phase I Environmental Site Assessment activities to the NJDEP. This Preliminary Assessment was completed as required by the NJDEP in their response to the 1995 RAWP and follows requirements listed in New Jersey Administrative Code (N.J.A.C.) 7:26E-3.1.

The Preliminary Assessment provided a description of the Williams Site, a summary of a historical information review, and a summary of findings. Sanborn Fire Insurance Maps, the Industrial Directory of New Jersey, title and deed searches, and a review of government files were used to gather historical information for the Williams Site. The findings of the Preliminary Assessment are described below.

The Williams Site was undeveloped until 1920. From 1920 to 1929, the Williams Site was owned by Nitrate Agencies Company, an agricultural insecticide manufacturer. The Port Authority owned the Williams Site from 1929 to 1938. Fanda Corporation owned the Williams Site from 1938 to 1965. Dunbar Sales Company owned the Williams Site from 1965 to 1966. Williams Industries has owned the Williams Site since 1966 and has used it as a distribution facility.

Sanborn maps indicated the presence of underground storage tanks (USTs). Five USTs were removed as part of an ECRA investigation in 1988 by J.M. Sorge, Inc. During the UST investigations, an underground concrete vault and an abandoned “wooden drainage sluiceway” were identified. The vault was likely related to the Nitrate Agencies operations, which manufactured arsenic acid.

A review of NJDEP case files for the Texaco Refining and Marketing Company Site was conducted on June 12, 1995. This site has been divided into three sections (the former Pirelli Cable Company property, The Bayonne Terminal, and the plant II area). The Texaco Sites are located along the Newark Bay and the Kill Von Kull at the corner of West First Street and Avenue A (northwest of Williams and Port Authority Sites). The descriptions of the fill throughout the former Pirelli Cable Company property and Texaco Bayonne Terminal are similar to the historical fill that was used at the Williams and Port Authority Sites. Arsenic concentrations in the historic fill located at the Texaco sites ranged from non-detect to 2,440 mg/kg. Thirty-nine of the 123 soil samples exceeded the previous NJDEP soil cleanup criteria of 20 mg/kg.

2.1.5 December 28, 1995 Supplemental Investigation of Groundwater Flow and Quality (Williams Site)

As requested by the NJDEP, Woodward-Clyde Consultants prepared a Supplemental Investigation of Groundwater Flow and Quality at the Williams Site on behalf of Williams Industries. The purpose of this investigation was to:

- Re-evaluate the groundwater flow at the Williams Site using transducers to be monitored continuously for a period no less than 30 days to evaluate the possible influence that tidal fluctuations may have on the groundwater flow at the Williams Site;
- Re-sample all monitoring wells; and
- Re-calculate the arsenic migration model provided in the January 1995 RAWP, if appropriate.

The results of this investigation indicated that groundwater quality was not significantly different than the data collected three years prior, and as a result, recalculation of the arsenic migration model using the new data was not necessary. The data collected from the continuous groundwater elevation monitoring indicated the there is no significant influence on the groundwater elevation from the tidal changes in the Kill Van Kull or Newark Bay and that the principal direction of migration of dissolved arsenic is in a south/southeast direction towards Kill Van Kull. Therefore, Woodward-Clyde concluded that the results of the previous arsenic migration model provided in the January 1995 RAWP continue to be a valid representation of arsenic transport from the Williams Site.

2.1.6 April 22, 1998 Groundwater Sampling Baseline (Williams Site)

The NJDEP requested that Williams Industries obtain a groundwater sampling baseline, which included the installation of two additional monitoring wells and one additional round of groundwater gauging and sampling. One new monitoring well was installed on the most western side of the Williams Site and the other well was installed on the land leased from the Port Authority.

The groundwater sampling results indicate that groundwater quality is similar to the results of the previous investigations and has not degraded further since the 1992 and 1995 sampling events. The groundwater flow is generally towards the south based on groundwater gauging data.

Woodward-Clyde proposed to obtain grab groundwater samples on the Port Authority property to determine the limit of arsenic impacts associated with the vault and to provide adequate data to support a request of NJDEP to establish a Classification Exception Area (CEA). The results would be used to identify suitable future locations of monitoring wells for evaluating groundwater quality while the proposed CEA is in effect.

2.1.7 February 2002 Remedial Action Report (Williams Site)

On behalf of Williams Industries, Remedium Group, Inc. prepared a Remedial Action Report (RAR) that summarized the remedial actions that occurred on the Williams Site and the Port Authority leasehold. The remedial actions included removal of a concrete vault containing elevated concentrations of arsenic, installation of a concrete/asphalt cap over non-building areas of the Williams Site, and implementation of a natural attenuation and monitoring program for groundwater.

Preconstruction activities included the preparation of a site-specific Health and Safety Plan (HASP) that detailed the protection of workers as well as extensive air monitoring and sampling procedures for the protection of the public. Appropriate permits were obtained from the Bayonne Building Department.

The contractor mobilized to the Williams Site and setup the site support equipment and installed work area barriers. Remedial activities began with the cleaning and removal of the concrete vault. Concrete vault cleaning and associated soil removal resulted in the disposal of 160,547 gallons of wastewater and 1,837.18 tons of non-wastewater. Two soil samples were collected from the sidewalls of the excavation and their results indicated the presence of arsenic at concentrations consistent with subsurface site conditions. The vault excavation was then backfilled with compacted aggregate.

Prior to the installation of the cap, the parking area and loading docks were demolished. Soil materials were excavated to achieve appropriate subgrade for proposed footings and slabs, and transported and disposed of as hazardous waste. The non-building areas were capped with a six-inch thick, reinforced-concrete layer overlain by a three-inch thick asphalt layer. A four-inch thick layer of compacted aggregate was installed under the cap to provide a suitable base. This subgrade was compacted to a minimum of 95 percent maximum density.

Air monitoring results indicated that airborne chemicals were not detected above applicable standards. Proposed institutional controls included a Declaration of Environmental Restriction (DER) with the Port Authority for the Port Authority leasehold

portion of the Williams Site and a deed restriction. A Site Inspection and Maintenance Plan included groundwater monitoring under the nNatural Remediation Compliance Program (NRCP) and periodic inspection of the cap. A request for "No Further Action" was made for the site.

2.2 Port Authority Subsurface Investigations

In February 1999, Port Authority collected six grab soil samples and two composite soil samples and analyzed them for TCLP arsenic. Results ranged from 28 mg/L to 1,800 mg/L (these concentrations are greater than the RCRA characteristic toxicity limit of 5 mg/L). The Port Authority notified the NJDEP of the impacts. The Port Authority also notified W.R. Grace & Company and requested that they assume responsibility for full delineation and remediation of the impacts on the portion of the Port Authority owned property leased to Williams, as well as the remainder of the adjacent portion of the Port Authority owned property not leased by Williams.

2.2.1 2003 Port Authority Remedial Investigation

In 2003, the Port Authority voluntarily began investigating soil and groundwater conditions beneath the Port Authority owned parcel.

Port Authority conducted an RI in November and December 2003 to determine the extent of arsenic impacts on the Port Authority Site. Six soil borings were installed and completed as groundwater monitoring wells, and a total of 12 soil samples and six groundwater samples were collected between November 26 and December 16, 2003. The soil boring and monitoring well installations were performed by Aquifer Drilling & Testing, Inc (ADT). The samples were sent to Test America Laboratories, Inc. (Test America) located at New Durham Road, Edison, NJ 08817, and analyzed for arsenic (USEPA Method 200.7/SW846 6010B). Boring logs and monitoring well construction logs are provided in Appendix B, and survey information (including Form Bs) is included in Appendix C.

Arsenic concentrations ranged from 29.8 mg/kg to 10,400 mg/kg, which are greater than the Soil Remediation Standard (SRS) of 19 mg/kg. Arsenic was found in all six groundwater samples at concentrations greater than the GWQS of 3 ug/L. The arsenic concentrations found in the six monitoring wells ranged from 325 ug/L to 116,000 ug/L. The location of the soil borings and the 2003 soil sampling results are shown on Figure 8. The location of the monitoring wells and the 2003 groundwater sampling results are shown on Figure 9.

The soil sample collected from PA-MW-2 at 2.0 to 3.0 ft bgs (10,400 mg/kg) and the associated groundwater sample (116,000 ug/L) indicated the presence of a source in the immediate area of PA-MW-2. Additional delineation was completed to determine the extent of arsenic in the area adjacent to PA-MW-2.

2.2.2 2004 Port Authority Remedial Investigation

Five additional soil borings were installed and completed as groundwater monitoring wells between May 20 and June 28, 2004 to delineate arsenic in the vicinity of PA-MW-2. The soil boring and monitoring well installations were performed by Testwell Craig Drillers. The samples were sent to Test America and analyzed for arsenic (USEPA Method 200.7/SW846 6010B). Boring logs and monitoring well construction logs are provided in Appendix B and survey information including Form Bs are included in Appendix C.

Arsenic concentrations ranged from 216 mg/kg to 3,490 mg/kg in the 10 soil samples that were collected. Groundwater samples were collected from 7 monitoring wells and arsenic concentrations ranged from 2,270 ug/L to 91,700 ug/L. Arsenic was found in the groundwater sample collected from PA-MW-2 at similar levels to the December 2003 sampling event (116,000 ug/L in 2003 and 91,700 ug/L in 2004). The location of the borings and the 2004 soil sampling results are shown on Figure 8. The location of the monitoring wells and the 2004 groundwater sampling results are shown on Figure 9.

It was concluded that a soil source area in the immediate vicinity of PA-MW-2 potentially exists; however, the nature and historical cause of the potential source was not determined.

2.2.3 2008 Port Authority Remedial Investigation

Port Authority installed four additional monitoring wells (WP-MW-12 through WP-MW-15) on the Williams Site between July 19 and 21, 2008, and gauged and sampled all wells located on the Williams Site and Port Authority Site between August 6 and 15, 2008. The soil boring and monitoring well installations were performed by Testwell Craig Drillers. Groundwater samples were sent to Brook Rand Labs, WA, and analyzed for inorganic arsenic, arsenite, and arsenate (USEPA Method 1632). Boring logs and monitoring well construction logs are provided in Appendix B and survey information including Form Bs are included in Appendix C. A Groundwater Contour Map based on the August 2008 elevation data is included as Figure 4.

2.2.3.1 Port Authority Site

Eleven existing monitoring wells on the Port Authority Site were gauged and sampled and a total of 12 groundwater samples were collected, one of which served as a duplicate sample.

Laboratory analysis of the groundwater on the Port Authority Site indicated that the extent of arsenic remained similar to that found in the 2004 Port Authority investigation. Concentrations of arsenic in groundwater samples collected from the Port Authority Site were greater than the GWQS of 3 ug/L. Arsenic concentrations ranged from 269 ug/L (PA-MW-06) to 183,000 ug/L (PA-MW-02). The location of the monitoring wells and the 2008 groundwater sampling results are shown on Figure 9.

2.2.3.2 Williams Site

Arsenic in the groundwater on the Williams Site was found at greater concentrations in 2008 than in previous groundwater events (See Figure 6). WP-MW-14 was installed immediately downgradient from the previously removed vault in the location of Williams former monitoring well MW-1. The August 2008 sampling event concluded that arsenic concentrations have increased on-site since the removal of the vault (15,400 mg/kg in February 1998 and 73,300 mg/kg in November 2008).

Since the results were higher after vault removal, a confirmatory round of groundwater sampling was conducted between November 12 and 26, 2008. The confirmatory sampling event included the four monitoring wells on the William's Site and 11 Port Authority monitoring wells. The samples were sent to Test America and analyzed for total arsenic (USEPA Method 200.7/SW846 6010B).

The November 2008 sampling results are consistent with the results of the August 2008 sampling event (Figure 9). A Groundwater Contour Map based on the November 2008 elevation data is included as Figure 5.

Based on the results of the 2008 RI, it was concluded that:

- Source material still exists on the Williams Site;
- The extent of arsenic in groundwater is not fully delineated on the Williams Site; and
- Groundwater with arsenic concentrations greater than GWQS has probably migrated off the Williams Site.

In August 2009, the Port Authority, in discussions with the NJDEP, decided to handle the Port Authority Site separately from the Williams Site. It was also decided that a CEA could not be obtained for the Williams Site since there was an apparent arsenic source remaining. Therefore, this RIR/RAW addresses only the activities conducted on the Port Authority Site under an existing Bayonne Bridge MOA (PI#G000021830).

2.2.4 2009 Port Authority Remedial Investigation

The objectives of the RI conducted in November and December 2009 were as follows:

- Delineate the horizontal and vertical extent of arsenic in soil;
- Delineate the horizontal extent of arsenic in groundwater; and
- Propose remedial actions for soil and groundwater at the Site.

Findings and recommendations of the RI are summarized below.

2.2.4.1 Soil

Arsenic concentrations were detected in soils at concentrations greater than the SRS of 19 mg/kg in all but one of the 12 soil samples collected during the December 2009 RI. The arsenic concentrations ranged from 18.3 mg/kg to 9,760 mg/kg with the highest arsenic concentration found in the center of the source area (PA-SB-15) in the 2.0-4.0 foot interval.

Arsenic concentrations are two orders of magnitude higher in soils surrounding PA-MW-2 than found in other areas of the Site to date. Based on the elevated arsenic concentrations surrounding PA-MW-2, this area has been identified as a source of arsenic contamination in soil. The location of the borings and the 2009 soil sampling results are shown on Figure 8.

Historic fill placed beneath the Site (generally five to eight feet thick) is a contributing source of arsenic to groundwater at the Site. Arsenic concentrations in the historic fill located at the nearby Pirelli Cable Company and Texaco Bayonne Terminal properties ranged from non-detect to 2,440 mg/kg. The impact at the Texaco site was identified during an ECRA investigation and it was determined that Texaco was not responsible for this impact. The descriptions of the fill throughout these properties are similar to the historical fill that was used on the Port Authority Site (consisting of sand, gravel, clay, cobbles, wood, bricks, and cinders).

2.2.4.2 Groundwater

The location of the monitoring wells and the 2009 groundwater sampling results are shown on Figure 9.

2.2.5 2011 and 2012 Port Authority Remedial Investigation

To document groundwater conditions at the Site and the adjacent Williams property, and to provide supplemental data to refine the remedial action design, additional groundwater sampling was conducted in April 2011, and additional soil and groundwater sampling was conducted in January 2012.

In April 2011 fourteen groundwater samples were collected, and in January 2012 eleven soil borings were advanced, three of which were completed as groundwater monitoring wells. A total of 58 soil samples (including duplicates) and 23 groundwater samples were collected. The soil boring and monitoring well installations were performed by ADT. The samples were sent to Test America and analyzed for arsenic (USEPA Method 200.7/SW846 6010B). Boring logs and monitoring well construction logs are provided in Appendix B and survey information including Form Bs are included in Appendix C. The findings of the 2011 groundwater sampling and the 2012 soil and groundwater investigations are summarized below.

2.2.5.1 Soil

Arsenic was detected at concentrations greater than the SRS of 19 mg/kg in 46 of the 58 soil samples collected during the January 2012 investigation. The arsenic concentrations ranged from 1.6 mg/kg to 24,100 mg/kg.

Five additional borings (PA-SB-22 through PA-SB-26) were advanced and 26 additional soil samples were collected to delineate the previously identified soil source area near PA-MW-2. Soil sample depths ranged from 0-0.5 feet bgs to 9.5-10 feet bgs. The location of the borings and the 2012 soil sampling results are shown on Figure 8.

Soil sampling results at PA-MW-17 ranged from 108 mg/kg to 5,220 mg/kg with the highest arsenic concentration found in the 2.0 to 2.5 foot interval. Based on the elevated arsenic concentrations at PA-MW-17, an undelineated source of arsenic in soil is present in the vicinity of PA-MW-17.

Arsenic concentrations are two orders of magnitude higher in soils surrounding WP-MW-12 than in other areas of the Site. Four additional soil delineation borings (PA-

MW-16, and PA-SB-19 through PA-SB-21) were advanced, one of which was completed as a monitoring well. The concentrations ranged from 1.6 mg/kg to 24,100 mg/kg with the highest arsenic concentration at PA-MW-16 in the 2.0-2.5 foot interval. Arsenic concentrations at PA-SB-20 measured 2,700 mg/kg in the 7.0-7.5 foot interval. In addition, arsenic concentrations at PA–SB-21 measured 3,110 mg/kg and 3,204 mg/kg in the 5.0-5.5 foot interval and the 6.0-6.5 foot interval, respectively. Based on the elevated arsenic concentrations at WP-MW-12, PA-MW-16, and PA-SB-19 through PA-SB-21, an undelineated source of arsenic in soil is present in the vicinity of WP-MW-12.

2.2.5.2 Groundwater

The location of the monitoring wells and the 2011-2012 groundwater sampling results are shown on Figure 9. Groundwater elevation measurements from January 2012 indicate that groundwater movement is westerly towards Newark Bay. A Groundwater Contour Map utilizing the January 2012 data is included as Figure 7.

In January 2012, samples collected from monitoring wells adjacent to PA-MW-2 contained arsenic ranging from 1,150 ug/L to 306,000 ug/L. The arsenic concentrations in PA-MW-2 and PA-MW-8 increased in January 2012 from previous events. These results suggest that the suspected soil source in the immediate vicinity of PA-MW-2 is a continuing source of groundwater impacts.

Samples collected to the south and east of PA-MW-2 (PA-MW-3 through PA-MW-6, PA-MW-11, and PA-MW-14) are upgradient and side gradient from the identified soil source. Arsenic concentrations ranged from 5.2 ug/L to 372 ug/L, all of which are below the 1,000 ug/L loading range calculated for the fill by Woodward Clyde Consultants in the Williams 1995 RAWP.

Arsenic concentrations in samples collected immediately downgradient of PA-MW-2 (PA-MW-13 and PA-MW-18) were 1,150 ug/L and 4,370 ug/L respectively, and can be attributed to arsenic loading from the delineated soil source near PA-MW-2.

Arsenic concentrations in samples collected from WP-MW-15 and PA-MW-17 were 15,700 ug/L and 8,910 ug/L, respectively. The groundwater impacts at PA-MW-17 are likely attributable to a potential soil source near PA-MW-17, discussed in the previous section. Additionally, the downgradient sample collected from WP-MW-13 (6,950 ug/L) may also be attributed to the potential source near PA-MW-17.

Arsenic concentrations in samples collected from PA-MW-16 and WP-MW-12 were 9,340 ug/L and 23,100 ug/L respectively. The groundwater impacts in this area are likely attributable to the above referenced potential soil source at WP-MW-12.

Lastly, a sample was collected at WP-MW-14 (19,800 ug/L), which was installed immediately downgradient from the previously removed vault in the location of Williams former monitoring well MW-1. The January 2012 sampling event shows that arsenic concentrations in groundwater have decreased since 2008 (Figure 9).

3 Data Reliability and Quality Control

Laboratory analytical data produced as part of the Port Authority Bayonne Bridge Arsenic Site investigation and remediation activities were reviewed for completeness and technical compliance to ensure the results met the quality assurance specifications in N.J.A.C. 7:26E-2.1. If any data were determined not to be complete and/or technically compliant, the data reviewer referred to the NJDEP data validation documents for assistance. Inorganic results were reviewed using the criteria specified in the NJDEP Standard Operating Procedure (SOP) 5.A.2 and the United States Environmental Protection Agency Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 540-R-04-004, October 2003). Where applicable, the review of the data packages included checking the following:

- Chain-of-custody (COC) forms
- Holding times
- Blank contamination
- Spike recoveries
- Calibrations within quality control (QC) limits
- Interference check recoveries and serial dilution check samples
- Precision of duplicate analyses
- Laboratory control samples and duplicates (LCS/LCSD)

All soil and groundwater samples collected from the Port Authority Bayonne Bridge Arsenic Site were submitted for analysis for arsenic under proper COC to a New Jersey certified laboratory for analysis. In addition, all samples were collected in accordance with the site-specific Quality Assurance Project Plan (QAPP); a copy of the QAPP is included as Appendix D. Samples were analyzed by either TestAmerica Laboratories, Inc. (TestAmerica, formerly STL Edison) in Edison, New Jersey (NJDEP lab certification #12028) or Analytical Laboratory Services (ALS) in Middletown, Pennsylvania (NJDEP lab certification #PA010). For groundwater samples collected in 2008, arsenic speciation analysis was subcontracted to Brooks Rand Labs of Seattle, Washington (NJDEP lab certification #WA010).Electronic data deliverables and an electronic copy of the laboratory reports (including data review summaries) included in this review are provided in Attachment 1.

Soil Samples

Laboratory reports were reviewed for soil samples submitted for arsenic analysis as sample delivery groups (SDGs) U182 (2003), E284, E339, and G529 (2004), 9820929 (2009), 460-35415-1, 460-35525-1, 460-35549-1, 460-35620-1, and 460-35682-1 (2012). Review of the laboratory reports revealed no need for qualification of the results; however, the following items were noted.

Review of the laboratory report for SDG G529 showed that the percent difference between the results of the initial and serial dilution check sample analyzed with metals batch 16562 was greater than the QC criteria. However, since the concentration of arsenic in both the initial and diluted samples were less than 50 times the method detection limit (MDL), the QC criteria for percent difference does not apply. Therefore, the results are not qualified.

In metals batch 12049-3051, which included samples from Port Authority SDG 9820929, the recoveries of arsenic in the matrix spike (MS) and matrix spike duplicate (MSD) analyses were acceptable. However, the percent difference between the MS and MSD results was 26.6% which is greater than the allowable difference of 20%. However, due to the customary laboratory practice of sub-sampling of the soil sample for the duplicate analysis which may lead to non-homogeneity and the conformance of the individual MS and MSD results as well as the LCS and other laboratory QC samples, the results are not qualified despite the high percent difference between the MS and MSD results.

In metals batch 460-98568, which included samples from Port Authority SDG 460-35549-1, the relative percent difference (RPD) between the results for the initial and duplicate analysis of sample 460-35549-6 (Port Authority sample AS-PA-SB22-010912SO5) exceeded the QC limit (27%). The MS and post-digestion spike (PDS) analyses and all other QC parameters were in compliance, so the results are not qualified. Due to the customary laboratory practice of sub-sampling of the soil sample for the duplicate analysis which may lead to non-homogeneity and the conformance of the individual MS, PDS, LCS, and other laboratory QC samples, the results are not qualified despite the high RPD between the duplicate results.

Similarly, the percent difference was greater than 20% between the initial and duplicate sample analyses performed with metals batches 460-98944 which included samples from Port Authority SDG 460-35620-1 and 460-99031 and 460-99118 which included samples from Port Authority SDG 460-35682-1. However, the samples used for the

duplicate analyses in these batches were not from any Port Authority SDG. All other QC parameters were in compliance. Therefore, the data are not qualified.

The case narrative for SDG 460-35682-1 states that the recovery failed low for the MS analysis of sample 460-35682-3 (Port Authority sample AS-PA-SB20-011112S3P). However, the concentration of arsenic in the field sample was greater than four times the spike concentration, so the QC limit does not apply and the data are not qualified. It should also be noted that the COC provided with SDG 460-35682-1 lists a sample AS-PA-SB-20-011112SO3 but this sample was not received by the laboratory with this SDG.

Groundwater Samples

Laboratory reports were reviewed for groundwater samples collected from the Port Authority Site and submitted for arsenic analysis as sample delivery groups (SDGs) V171 (2003), H306 (2004), C016, C410, C481, and Y348 (2008), 9823817, 9823818, and 9823819 (2009), 460-25236-1 (2011), and 460-35951-1 and 460-36122-1 (2012). In addition, the reports for SDGs 0833059 and 0834020 which included the subcontracted arsenic speciation analysis performed by Brooks Rand Labs were reviewed. Review of the laboratory reports revealed no need for qualification of the results; however, the following items were noted.

Samples identified as WP-WPMW-03-112608WG1 and WP-WPMW-02-112608WG1 were listed on the COC included with Port Authority SDG C481, yet no sample bottles with these sample names were received by the laboratory. Meanwhile, two samples identified as WP-WPMW-12-112608WG1 and WP-WPMW-13-112608WG1 were received by the laboratory but were not listed on the COC. By matching the sample dates and times, the samples received by the laboratory were matched to the samples listed as WP-WPMW-03-112608WG1 and WP-WPMW-02-112608WG1 on the COC and analyzed with the remainder of the SDG.

In the report for subcontract SDG 0833059, the case narrative indicated that the recovery of one continuing calibration verification (CCV) sample in Total Arsenic analysis batch 0800805 was higher than the QC acceptance criteria. The high recovery was attributed to carryover from high concentration samples analyzed just prior to this CCV. Since the subsequent CCV samples were in compliance, two successful rinses were performed following the high recovery CCV, and the high concentration samples were identified, the results are not qualified.

The analysis of samples 0833059-04 (PA-MW-11-080608WG01) and 0833059-08 (PA-MW-01-080708WG01) for Inorganic Arsenic in batch 0800776 produced higher concentrations than the total Arsenic results for the same samples. Since the RPD between the total and inorganic arsenic results was greater than the acceptance criteria of 35%, the samples were reanalyzed for inorganic arsenic and the initial results were confirmed.

The fifth and highest concentration calibration standard analyzed with Inorganic Arsenic batch 0800776 failed recovery low and was omitted from the calibration curve. All samples with inorganic arsenic concentrations identified above the fourth calibration standard concentration (30 nanograms) were reanalyzed at a higher level of dilution. No qualification of the results was necessary due to the dilution and reanalysis of the samples. The second calibration standard analyzed with Trivalent Arsenic batch 0800783 produced an abnormal peak and so was reanalyzed as a sixth calibration standard. The reanalysis met acceptance criteria and no qualification of results was necessary.

The case narrative for the Brooks Rand Labs subcontract laboratory report 0834020 states that one groundwater sample received from TestAmerica Laboratories was listed as WP-FB-01-081508WQ01 on the COC but the corresponding sample container was identified as PA-MW-01-081508WQ01. The Port Authority was contacted and confirmed that the sample was a field blank and should be logged in as PA-MW-01-081508WQ01.

The initial analysis of the fourth calibration standard in Total Arsenic batch 0800838, which included samples from SDG 0834020, produced a non-detectable result for all analytes due to an auto sampler error. This standard was reanalyzed as the CAL9 standard, and the resulting calibration met all acceptance criteria. Therefore, no qualification of the results was necessary.

The analysis of the initial calibration verification (ICV) analyzed with Inorganic Arsenic batch 0800845 produced a recovery below the acceptance criteria. The standard was remade and reanalyzed producing a passing recovery. Furthermore, all CCV standards met the acceptance criteria, suggesting that the initial low recovery resulted from a problem with the initial ICV solution spike solution and was not indicative of calibration issues. Therefore no results have been qualified and the reanalyzed ICV standard was reported (0800845-ICV2).

With exception of sample PA-MW-01-081508WQ01 (0834020-04), all the samples in SDG 0834020 were reanalyzed for Inorganic Arsenic due to discrepancies relative to

the Total Arsenic concentration. The initial analysis of these samples produced Inorganic Arsenic results significantly greater than the Total Arsenic results. The reanalysis, performed in sequence 0800845, produced results less than the Total Arsenic result and therefore, all samples are reported from the reanalysis. The original discrepancy between the total and inorganic arsenic results was most likely a product of an incorrect dilution during preparation of the samples. All the samples in this batch were reanalyzed after the holding time for this method had expired. All reanalyzed sample results were qualified with an “H” flag and should be considered estimated.

The fifth and highest concentration calibration standard analyzed with Trivalent Arsenic batch 0800852, identified as CAL5, produced a recovery below the acceptance criteria. The standard was not reanalyzed and was rejected from the calibration; as a result, the highest standard in the calibration was 30 ng (CAL4). All samples produced results less than the 30 ng standard, so no reanalysis or qualification was necessary.

The results for samples PA-MW-04-081508WG01/943292 (0834020-01), PA-MW-05-081508WG01/943293 (0834020-02), and PA-MW-06-081508WG01/943294 (0834020-03) produced discrepancies between the original Trivalent Arsenic, the reanalysis of the Inorganic Arsenic, and the Total Arsenic analysis. All three samples were reanalyzed for Trivalent Arsenic and produced results that compared well with the reanalysis of the Inorganic and Total Arsenic results. Therefore, the sample results produced from the reanalysis were reported. The original discrepancy between the total and inorganic arsenic results was most likely a product of an incorrect dilution during preparation of the samples. Samples PA-MW-04-081508WG01/943292 (0834020-01), PA-MW-05-081508WG01/943293 (0834020-02), and PA-MW-06-081508WG01/943294 (0834020-03) were reanalyzed after the holding time had expired (28 days); therefore, the results were qualified with an “H” flag and should be considered estimated.

In TestAmerica metals batch 460-100484, which included samples from Port Authority SDG 460-35951-1, the recovery of the matrix spike analysis of sample 460-35951-23 (AS-WP-MW15-011912WG1) was higher than the QC acceptance criteria. However, the concentration of arsenic in the field sample was much greater than four times the concentration of the spike, so the criteria do not apply. The recovery of matrix spikes performed on other samples analyzed with this batch and all LCS samples were in compliance. Therefore, the data are not qualified.

The final laboratory reports listed in the table below for data results provided by the Port Authority were not available for review at the time of writing of this report. Therefore, no final statement regarding the reliability of the data or need for

qualification can be made beyond what the analyzing laboratory has indicated with the results.

Date of Data	Matrix	Laboratory SDG	Analytical Laboratory
August 2008	Groundwater	X923/0833059	TestAmerica/Brooks Rand Labs
August 2008	Groundwater	X989/0833059	TestAmerica/Brooks Rand Labs
August 2008	Groundwater	Y041/0883059	TestAmerica/Brooks Rand Labs

In addition, Electronic Data Deliverables (EDDs) were not available for the following Port Authority SDGs at the time of writing of this report.

Date of Data	Matrix	Laboratory SDG	Analytical Laboratory
December 2003	Soil	U182	STL Edison (TestAmerica)
December 2003	Groundwater	V171	STL Edison (TestAmerica)
May 2004	Soil	E284	STL Edison (TestAmerica)
May 2004	Soil	E339	STL Edison (TestAmerica)
June 2004	Soil	G529	STL Edison (TestAmerica)
July 2004	Groundwater	H306	STL Edison (TestAmerica)

In summary, with the exception of the variations noted above, the analytical results generated for the remedial investigation of the Port Authority Bayonne Bridge Arsenic Site are valid and usable for site characterization without qualification beyond what the analyzing laboratories have noted.

4 Applicable Remediation Standards

The following major regulations are applicable to the proposed remediation program:

- N.J.A.C. 7:9C – Groundwater Quality Standards
- N.J.A.C 7:26C – Administrative Requirements for the Remediation of Contaminated Sites
- N.J.A.C 7:26D – Remediation Standards
- N.J.A.C. 7:26E – Technical Requirements for Site Remediation
- N.J.A.C 7:26G – Solid & Hazardous Waste Rules
- Occupational Safety and Health (OSHA) for worker health and safety

In accordance with N.J.A.C. 7:26E – Notification and Public Outreach, a sign has been posted at the Site and will be maintained so that it is visible at all times until a final remediation document is issued for the Site. A photograph of the sign is included in Appendix E. Site information required under 7:26E was submitted to the NJDEP Case Manager, the City Clerk, and the Health Department in September 2009, including an electronic and hardcopy photograph of the sign showing its location and content.

As stated above, due to the local widespread presence of arsenic in the soil and groundwater, arsenic is believed to be at least partially a characteristic of historic fill material. Arsenic concentrations in historic fill at proximate sites have measured up to 2,440 mg/kg.

5 Remedial Action Workplan

The proposed remedial actions were selected based on the previous investigations discussed above, previous remedial actions at the Williams Site, and discussions between Port Authority and the NJDEP.

The objectives of the remedial action are:

- Protection of human health and receptors by eliminating exposure pathways to arsenic that will remain in-place at the Site at concentrations greater than the most stringent SRS and GWQS by using engineering and institutional controls, and site security;
- Protection of groundwater quality by attempting to eliminate known sources of impacts to groundwater, and
- Protection of surface water quality by preventing contact of storm water run-off with impacted soils using engineering controls.

5.1 Soil Source Removal

The arsenic-impacted soils in the three areas outlined on Figure 10 are proposed for excavation and disposal offsite. Removal of the source and limited dewatering activities will mitigate the impacts of the source area soil on groundwater. For the purposes of this RIR/RAW, it is estimated that the source material will be removed to a depth of 3 feet bgs in the area of PA-MW-2, 5 feet bgs in the area of PA-MW-17, and 8 feet bgs in the area of WP-MW-12, as practicable, using standard construction techniques.

As previously discussed, the Bayonne Bridge Redevelopment project will result in the relocation of the existing support piers currently located at the Site. There are currently four new piers proposed within the Site boundaries. The installation of the proposed piers will require additional remedial excavation and dewatering to complete their installation. Source removal excavations are proposed in conjunction with the pier construction/excavating for the Bayonne Bridge.

For the purposes of this RIR/RAW, it is assumed that the excavations will be sheeted. Excavation activities will commence following as-needed dewatering, and the materials excavated will be stockpiled onsite on plastic, with appurtenant containment to control pore water drainage. The materials stockpiled will be sampled and disposed of offsite.

The excavations will be backfilled as needed to support bridge construction requirements.

5.2 Engineering Control

5.2.1 Cap

The surficial soils may also represent a potential pathway for direct contact and fugitive dust. Therefore, it is proposed that the Site be covered with a 1-foot cap to eliminate the direct contact pathway and fugitive dust pathways. Excavation may or may not be required to place the cap depending on final design grade.

Areas of the cap will consist of 4 inches of compacted crushed stone, covered by 3 to 4 inches of asphalt pavement. Some areas of the cap will include 12 inches of certified clean. The cap will prevent contact with the contaminants that will remain on-site at concentrations greater than the NJDEP SRS. Final as-built drawings for the cap will be submitted in a Remedial Action Report after construction and excavation activities are completed.

In addition, a retention basin is proposed for the Site and will act as a cap for this area (Figure 11). The retention basin will be lined with a geosynthetic clay liner designed to resist groundwater uplift pressures.

The retention basin will be designed to prevent groundwater infiltration into the subsurface. A specific quality assurance plan and monitoring plan will be developed to confirm that the liner is installed to specifications that will prevent groundwater infiltration.

5.3 Institutional Controls

5.3.1 Deed Notice

After the source removal and the Bayonne Bridge Redevelopment project are completed, a Deed Notice will be prepared and filed to address the presence of historic fill materials following the source removal and completion of the Bayonne Bridge Redevelopment project. The Deed Notice will serve to restrict future development of the property and to prevent inadvertent disruption of the cap and potential exposure to contaminants that will remain in-place at the Site. A draft Deed Notice is presented in Appendix F.

As part of the establishment of the Deed Notice, the Port Authority proposes the following:

- The Deed Notice will be properly filed with the Office of the Hudson County Recording Officer;
- The Port Authority will ensure that the current land use is consistent with the restrictions established in the Deed Notice;
- The Port Authority will ensure that any changes in land use will not create an unacceptable exposure;
- Any changes in current land use following the establishment of the Deed Notice and before the issuance of a final remediation document will be documented and reported; and
- Biennial Certifications (including dates of inspection, name of inspector, results of the inspection, conditions of engineering controls, etc.) will be submitted. The certification submittal will also alert the NJDEP of any disturbance activities in the restricted area including names of the persons causing the disturbance and their affiliation, dates of disturbance, amounts of soil generated due to the disturbance, final disposition of the soils generated, and the methods used to control exposure due to the disturbance.

5.3.2 Classification Exception Area

Concentrations of arsenic are present onsite at concentrations greater than the NJDEP GWQS of 3 ug/L. Therefore, a NJDEP CEA/Well Restriction Fact Sheet Form for groundwater impacts associated with the historic fill onsite is included with this report. A copy of the proposed CEA is provided in Appendix G.

Based on existing NJDEP GeoWeb Geographic Information Systems (GIS) data, a CEA has previously been established over a portion of the site (Appendix G, Exhibit F-1). This CEA (#1346) was established by Texaco Refining and Marketing Co. and includes arsenic as a contaminant of concern.

5.4 Inspection, Maintenance and Monitoring

5.4.1 Inspection and Maintenance

There are limited maintenance and inspections required for the remedial activities selected at the Site. The maintenance and inspection activities will include:

- Maintaining all engineering (i.e., the cap and fence) and institutional controls (i.e., the Deed Notice and the CEA) to ensure that these measures continue to be protective of human health and the environment;
- Performing annual and semi-annual inspections of the engineering controls to determine that the controls are operating as designed and intended including their integrity, operability, and effectiveness;
- Performing annual inspections of the site to determine that the land use does not violate the terms and conditions of the institutional control(s);
- Submitting monitoring reports documenting and certifying compliance with the above every two years; and
- Inspecting and maintaining the retention basin, as required, to prevent groundwater infiltration.

5.4.2 Groundwater Monitoring

Groundwater monitoring will be conducted to determine the effectiveness of the remedial action. Following the completion of the excavation activities and Site redevelopment, monitoring well replacement locations will be provided for approval by the LSRP. The monitoring wells will be sampled quarterly for 2 years and annually thereafter for 8 years (total 10 years). Groundwater samples will be analyzed for total arsenic.

The data collected will be analyzed to establish trends. If after 10 years of monitoring, the statistical analysis indicates that arsenic concentrations are decreasing; the CEA will be evaluated for removal.

The results will be submitted to the LSRP in letter report format within 60 days of each sampling event.

6 Required Permits

The following permits will be required for the proposed remedial approach:

- Well Abandonment Permit and Report

It is assumed that all of the existing Site monitoring wells will be abandoned during the remedial excavation, capping, and Bayonne Bridge Redevelopment construction activities. Well Abandonment Reports shall be submitted to the State by a licensed well driller within 90 days of sealing the wells.

All other required permits associated with the excavation and dewatering activities shall be obtained as part of the proposed Bayonne Bridge Redevelopment activities prior to initiating the remedial actions at the Site.

Following LSRP approval of the proposed monitoring well replacement locations, Well Certification Form Bs shall be obtained as new monitoring wells are installed at the Site following construction.

7 Construction of Remediation Structures

The remedial actions described in this RIR/RAW will not result in the construction of structures (i.e., permanent and/or temporary), remedial units, and/or equipment to complete the proposed remedial actions. The construction activities will be limited to monitoring well installation, excavation, and site restoration activities.

8 Erosion, Dust, and Odor Control

8.1 Soil Erosion and Sediment Control

A Soil Erosion and Sediment Control Plan (SESC Plan), for the performance of the Bayonne Bridge construction activities will be submitted to the Hudson-Essex-Passaic Soil Conservation District for their review, consideration, and concurrence. The proposed remedial activities will be included as part of the contract documents for the Bayonne Bridge development activities and will be included as part of the SESC Plan for the overall construction project.

8.2 Dust Control

During construction activities, airborne dust will be monitored in accordance with the site-specific HASP requirements to minimize the migration of arsenic particulate dust. Measurements will be used to determine if additional dust control measures will be required.

8.3 Odor Control

Based on Site conditions, odor is not anticipated to be a problem; however, vapor contaminant concentrations in work areas may be monitored as part of the HASP.

9 Site Restoration

The active remedial actions proposed for the Site, as described in this RIR/RAW, include excavation. A cap is being installed as an engineering control to eliminate the direct contact exposure pathway to impacted soils that will remain on-site. The six existing piers (Figure 2) currently located at the Site will be replaced with four piers (Figure 11) that will be installed as part of the Bayonne Bridge Redevelopment construction activities. Additionally, a stormwater management basin is proposed for the eastern boundary of the Site. The proposed Site conditions following construction are shown on Figure 11.

The existing Site monitoring wells are anticipated to be abandoned during the remedial excavation, capping, and Bayonne Bridge Redevelopment construction activities. Replacement monitoring well locations will be proposed to the LSRP following completion of the Bayonne Bridge Redevelopment activities at the Site.

As part of the Site restoration following construction, fencing around the Site will be inspected and repaired if needed and any debris will be removed and disposed of properly.

10 Remedial Action Schedule

The remedial actions will be completed concurrent with the Bayonne Bridge Redevelopment construction activities at the Site. The current Bayonne Bridge Redevelopment construction schedule estimates construction will occur between 2013 and 2017. The proposed Site remedial action work is tentatively scheduled for 2014.

ARCADIS

Table

Table 1
Monitoring Well Construction and Groundwater Gauging Data
Bayonne Bridge
Bayonne, New Jersey

Well ID	Installation Date	Installed Depth (ft bgs)	Screened Interval (ft bgs)	Survey Data		TOC Elevation (ft AMSL)	December 2003			July 2004			August 2008			November 2008		
				Northing	Easting		DTW (ft bTOC)	DTB (ft bTOC)	GW Elevation (ft AMSL)	DTW (ft bTOC)	DTB (ft bTOC)	GW Elevation (ft AMSL)	DTW (ft bTOC)	DTB (ft bTOC)	GW Elevation (ft AMSL)	DTW (ft bTOC)	DTB (ft bTOC)	GW Elevation (ft AMSL)
PA-MW-1	12/1/2003	12.0	NA	661082	592095	10.06	2.00	NA	8.06	2.49	NA	7.57	3.70	NA	6.36	3.35	NA	6.71
PA-MW-2	12/1/2003	8.0	NA	661043	592078	10.33	0.60	NA	9.73	1.98	NA	8.35	2.14	NA	8.19	1.42	NA	8.91
PA-MW-3	12/1/2003	16.0	NA	660999	592100	10.52	2.40	NA	8.12	NG	NA	NA	4.27	NA	6.25	3.21	NA	7.31
PA-MW-4	11/26/2003	8.0	NA	660959	592068	9.48	1.00	NA	8.48	NG	NA	NA	2.57	NA	6.91	0.67	NA	8.81
PA-MW-5	11/26/2003	8.0	NA	660873	592072	8.87	0.00	NA	8.87	NG	NA	NA	1.44	NA	7.43	0.62	NA	8.25
PA-MW-6	12/1/2003	10.0	NA	660862	592008	6.85	1.00	NA	5.85	NG	NA	NA	3.21	NA	3.64	1.49	NA	5.36
PA-MW-7	6/28/2004	12.0	NA	661054	592071	10.03	NI	NI	NI	1.80	NA	8.23	2.49	NA	7.54	1.17	NA	8.86
PA-MW-8	5/20/2004	9.0	NA	661053	592086	9.99	NI	NI	NI	1.70	NA	8.29	2.64	NA	7.35	1.29	NA	8.70
PA-MW-9	5/21/2004	10.0	NA	661037	592084	10.21	NI	NI	NI	0.32	NA	9.89	2.11	NA	8.10	1.21	NA	9.00
PA-MW-10	5/20/2004	10.0	NA	661034	592073	9.80	NI	NI	NI	1.48	NA	8.32	1.67	NA	8.13	0.86	NA	8.94
PA-MW-11	5/21/2004	10.0	NA	661024	592079	10.02	NI	NI	NI	1.11	NA	8.91	2.04	NA	7.98	1.28	NA	8.74
PA-MW-12	11/24/2009	10.0	2-10	661081	592074	9.09	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
PA-MW-13	11/24/2009	10.0	2-10	661044	592050	9.22	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
PA-MW-14	11/24/2009	10.0	2-10	661029	592139	9.66	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
PA-MW-16	1/9/2012	10.0	4-8	660923	591961	6.73	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
PA-MW-17	1/3/2012	8.2	4-8	660972	592050	8.26	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
PA-MW-18	1/5/2012	10.0	4-8	661030	592063	8.79	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
WP-MW-12	7/21/2008	8.0	NA	660895	591966	6.72	NI	NI	NI	NI	NI	NI	1.21	NA	5.51	0.98	NA	5.74
WP-MW-13	7/18/2008	8.0	NA	660964	591943	7.05	NI	NI	NI	NI	NI	NI	1.57	NA	5.48	1.69	NA	5.36
WP-MW-14	7/18/2008	8.0	NA	661005	591952	7.39	NI	NI	NI	NI	NI	NI	1.99	NA	5.40	1.87	NA	5.52
WP-MW-15	7/21/2008	8.0	NA	660980	591999	7.32	NI	NI	NI	NI	NI	NI	1.78	NA	5.54	1.58	NA	5.74

Notes:
ft bgs - feet below ground surface
TOC - top of casing
AMSL - above mean sea level
ft bTOC - feet below top of casing
Survey data in North American Datum of 1983 (NAD83)

DTW - depth to water
DTB - depth to bottom
NA - not available

NI - not installed
NG - not gauged
GW - groundwater

Table 1
Monitoring Well Construction and Groundwater Gauging Data
Bayonne Bridge
Bayonne, New Jersey

	December 2009			January 2010			March 2010			April 2011			January 2012		
Well ID	**DTW (ft bTOC)**	**DTB (ft bTOC)**	**GW Elevation (ft AMSL)**	**DTW (ft bTOC)**	**DTB (ft bTOC)**	**GW Elevation (ft AMSL)**	**DTW (ft bTOC)**	**DTB (ft bTOC)**	**GW Elevation (ft AMSL)**	**DTW (ft bTOC)**	**DTB (ft bTOC)**	**GW Elevation (ft AMSL)**	**DTW (ft bTOC)**	**DTB (ft bTOC)**	**GW Elevation (ft AMSL)**
PA-MW-1	1.93	NG	8.13	2.26	NA	7.80	1.62	10.40	8.44	2.25	10.40	7.81	2.45	10.64	7.61
PA-MW-2	0.77	NG	9.56	1.14	NA	9.19	1.20	5.90	9.13	1.34	5.92	8.99	1.11	6.16	9.22
PA-MW-3	1.78	NG	8.74	3.02	NA	7.50	2.37	11.94	8.15	3.06	12.15	7.46	2.80	12.21	7.72
PA-MW-4	0.22	NG	9.26	NG	NA	NA	0.67	6.42	8.81	0.87	6.45	8.61	0.62	6.45	8.86
PA-MW-5	0.42	NG	8.45	NG	NA	NA	0.08	6.28	8.79	0.63	NA	8.24	0.81	6.32	8.06
PA-MW-6	0.68	NG	6.17	NG	NA	NA	0.81	7.81	6.04	0.64	7.85	6.21	0.77	7.87	6.08
PA-MW-7	0.48	NG	9.55	1.14	NA	8.89	0.64	10.65	9.39	1.05	10.80	8.98	0.82	10.85	9.21
PA-MW-8	0.58	NG	9.41	1.26	NA	8.73	0.61	6.18	9.38	1.07	6.45	8.92	1.06	6.46	8.93
PA-MW-9	0.74	NG	9.47	1.30	NA	8.91	1.14	7.15	9.07	1.23	7.42	8.98	0.98	7.41	9.23
PA-MW-10	0.38	NG	9.42	NG	NA	NA	0.71	7.11	9.09	0.89	7.34	8.91	0.60	7.56	9.20
PA-MW-11	1.03	NG	8.99	1.36	NA	8.66	1.09	8.15	8.93	0.94	8.15	9.08	1.02	8.42	9.00
PA-MW-12	1.83	NG	7.26	2.07	NA	7.02	1.51	9.62	7.58	1.91	9.67	7.18	2.03	9.63	7.06
PA-MW-13	0.93	NG	8.29	1.58	NA	7.64	1.38	9.63	7.84	1.51	9.67	7.71	0.75	9.66	8.47
PA-MW-14	2.73	NG	6.93	3.10	NA	6.56	2.46	9.28	7.20	2.48	9.35	7.18	2.20	9.35	7.46
PA-MW-16	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0.60	5.55	6.13
PA-MW-17	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	1.92	8.10	6.34
PA-MW-18	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	1.22	8.12	7.57
WP-MW-12	NG	NA	NA	NG	NA	NA	NG	NA	NA	NG	NA	NA	0.58	4.35	6.14
WP-MW-13	NG	NA	NA	NG	NA	NA	NG	NA	NA	NG	NA	NA	1.12	5.44	5.93
WP-MW-14	NG	NA	NA	NG	NA	NA	NG	NA	NA	NG	NA	NA	1.45	6.22	5.94
WP-MW-15	NG	NA	NA	NG	NA	NA	NG	NA	NA	NG	NA	NA	1.20	5.20	6.12

Notes:
ft bgs - feet below ground surface
TOC - top of casing
AMSL - above mean sea level
ft bTOC - feet below top of casing
Survey data in North American Datum of 1983 (NAD83)

DTW - depth to water
DTB - depth to bottom
NA - not available

NI - not installed
NG - not gauged
GW - groundwater

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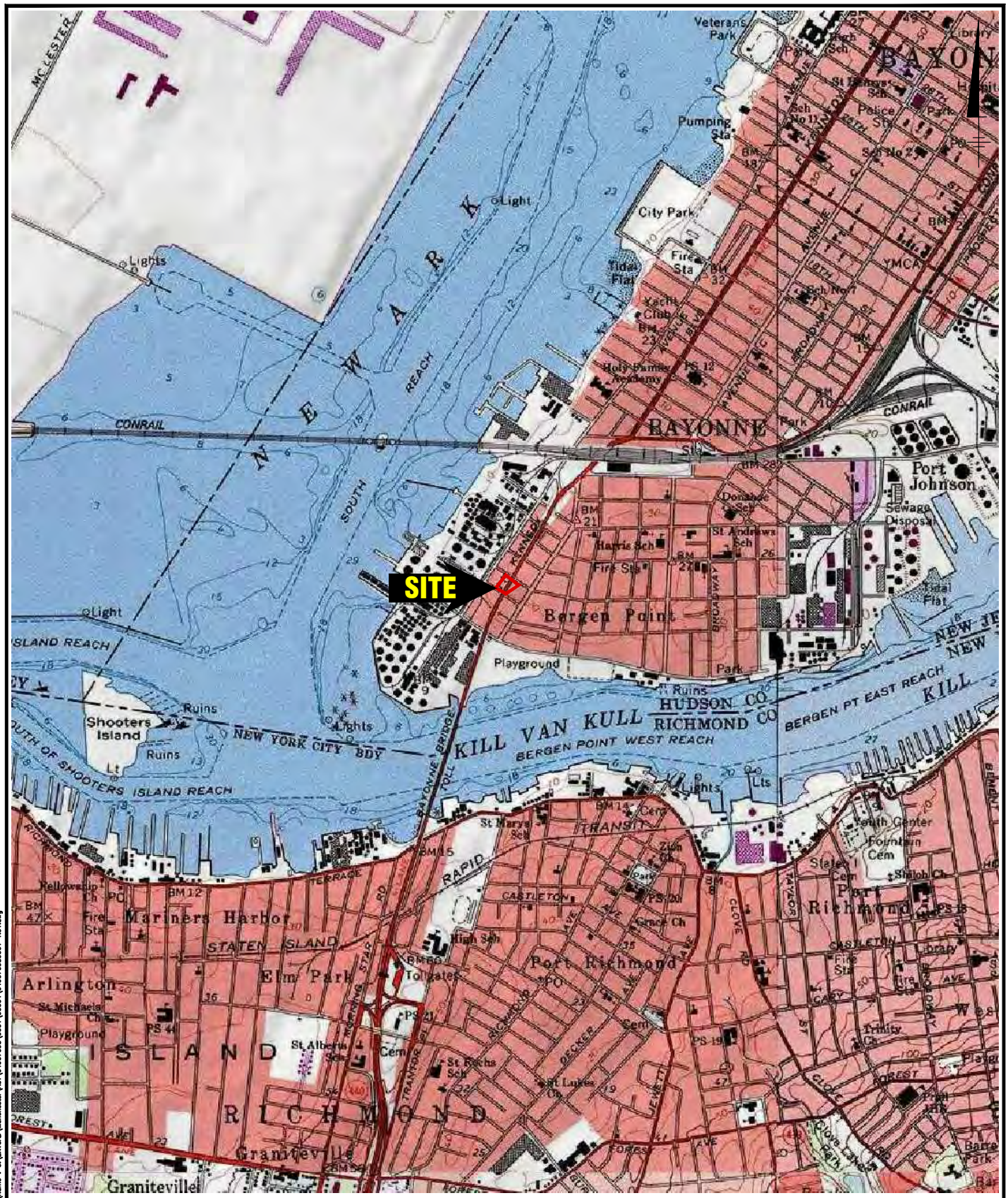
Figures



SOURCE: TOPO!
QUAD: ELIZABETH, NJ
DATE: 1995

LEGEND:

APPROXIMATE SITE BOUNDARY

0 2000' 4000'

GRAPHIC SCALE

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REMEDIAL ACTION WORKPLAN

PROJECT MANAGER: CLINT CATANIA	DEPARTMENT MANAGER	LEAD DESIGN PROF.: J. FREDERICK	CHECKED BY: G. JEAN-PIERRE
SHEET TITLE: SITE LOCATION MAP		TASK/PHASE NUMBER	DRAWN BY: B. SMALL
		PROJECT NUMBER: 04907098.0001	DRAWING NUMBER: FIGURE 1
			SHEET OF

REV.	ISSUED	DATE	DESCRIPTION
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CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
SITE MAP			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 2
			SHEET OF

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CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
MONITORING WELL & SOIL BORING LOCATIONS			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 3
			SHEET OF

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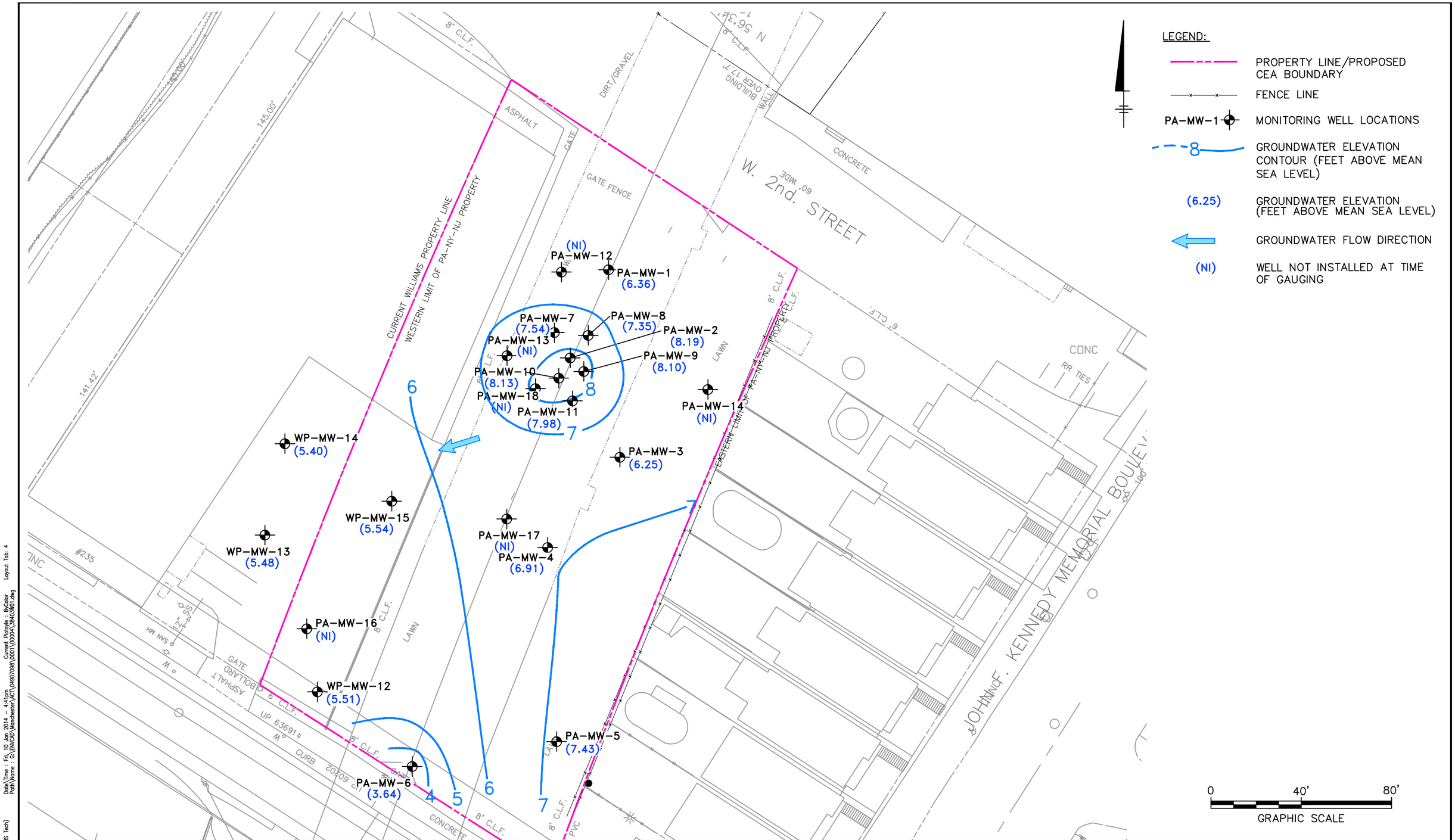

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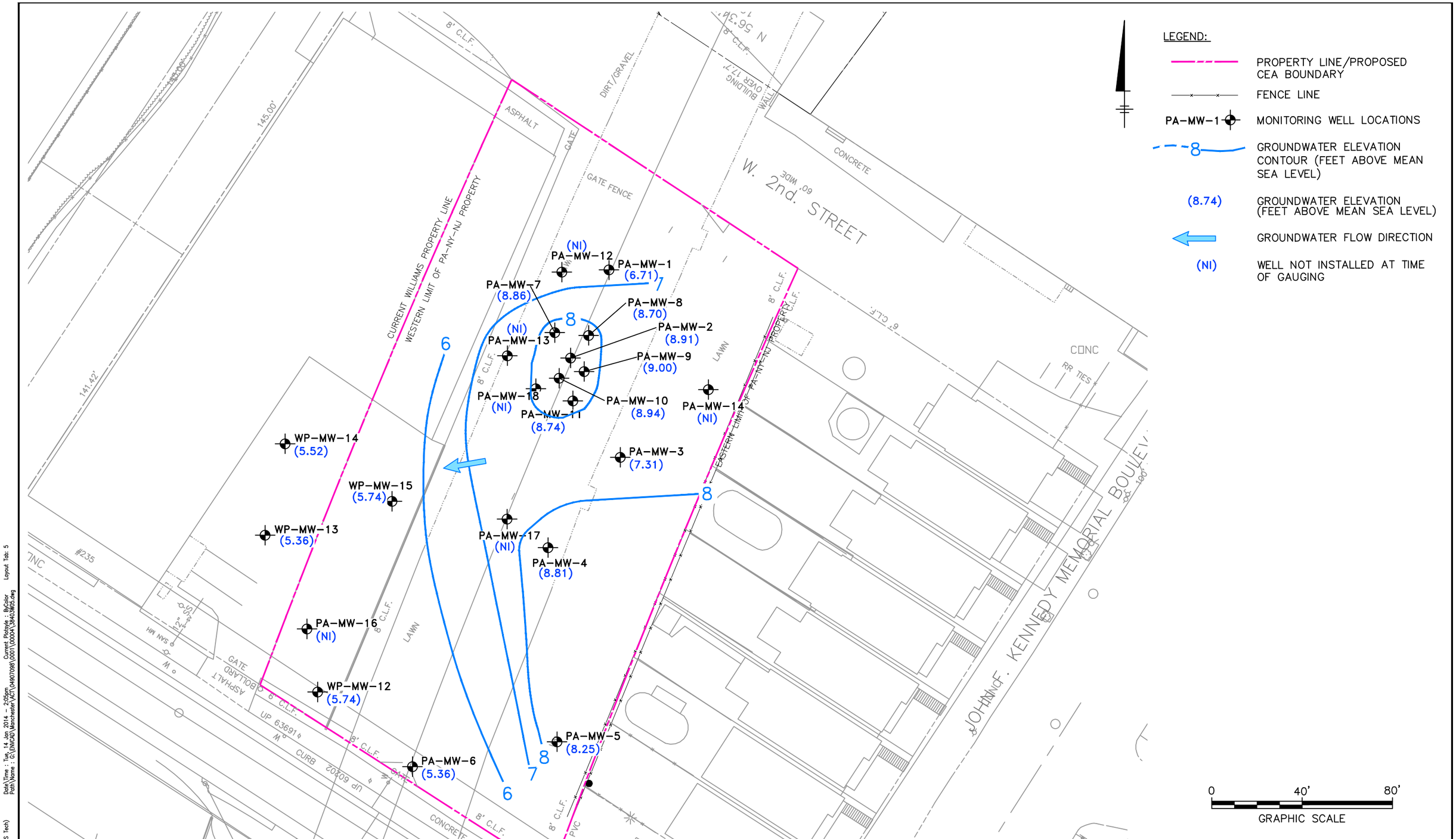
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
GROUNDWATER ELEVATION CONTOUR MAP – AUGUST 2008			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 4
			SHEET OF



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CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE: GROUNDWATER ELEVATION CONTOUR MAP – NOVEMBER 2008		TASK/PHASE NUMBER	DRAWN BY: K. IAMICELLI
		PROJECT NUMBER: 04907098.0001	DRAWING NUMBER: FIGURE 5
			SHEET OF

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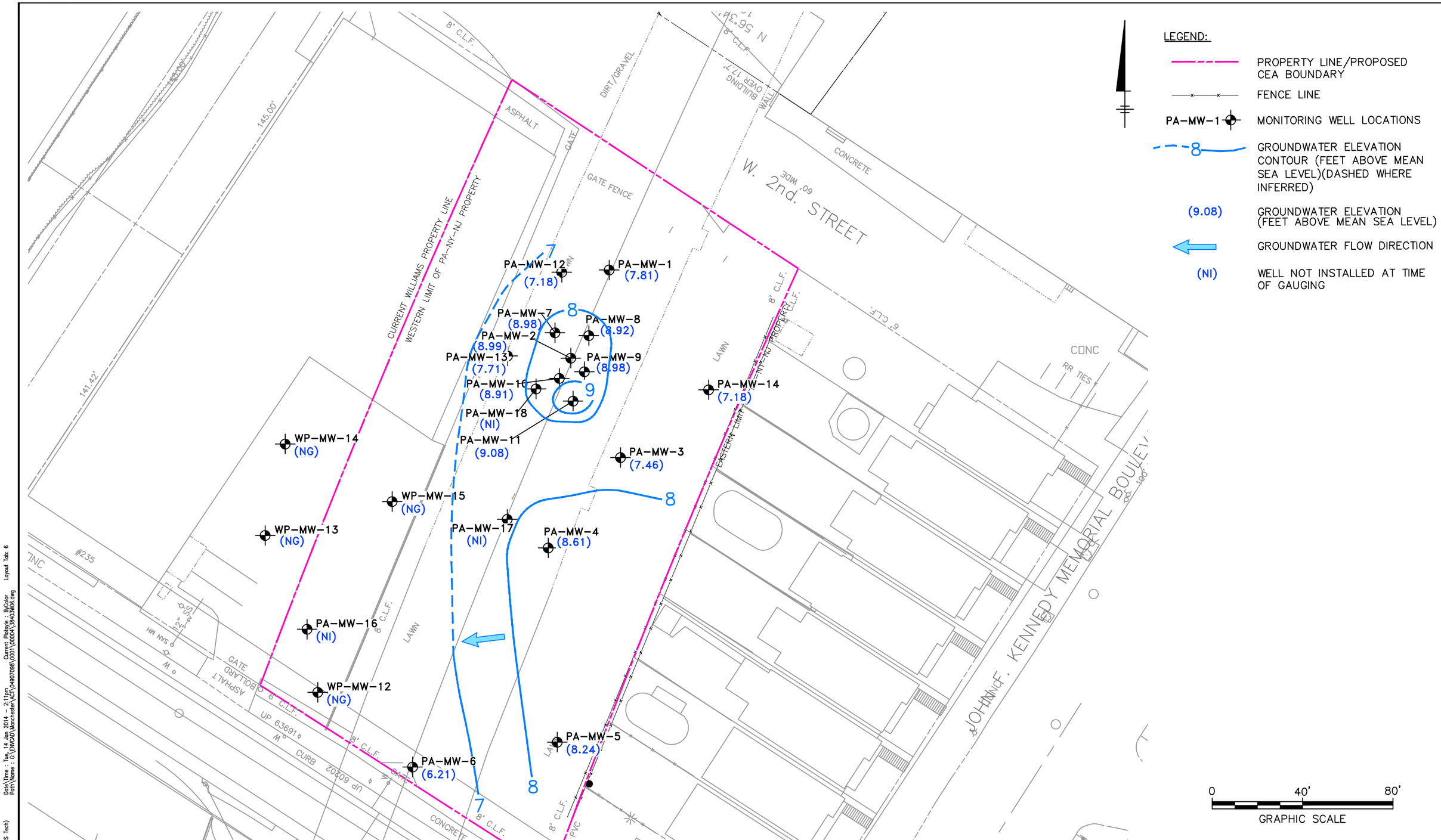
Current Plotstyle : ByColor
Layout Tab: 5



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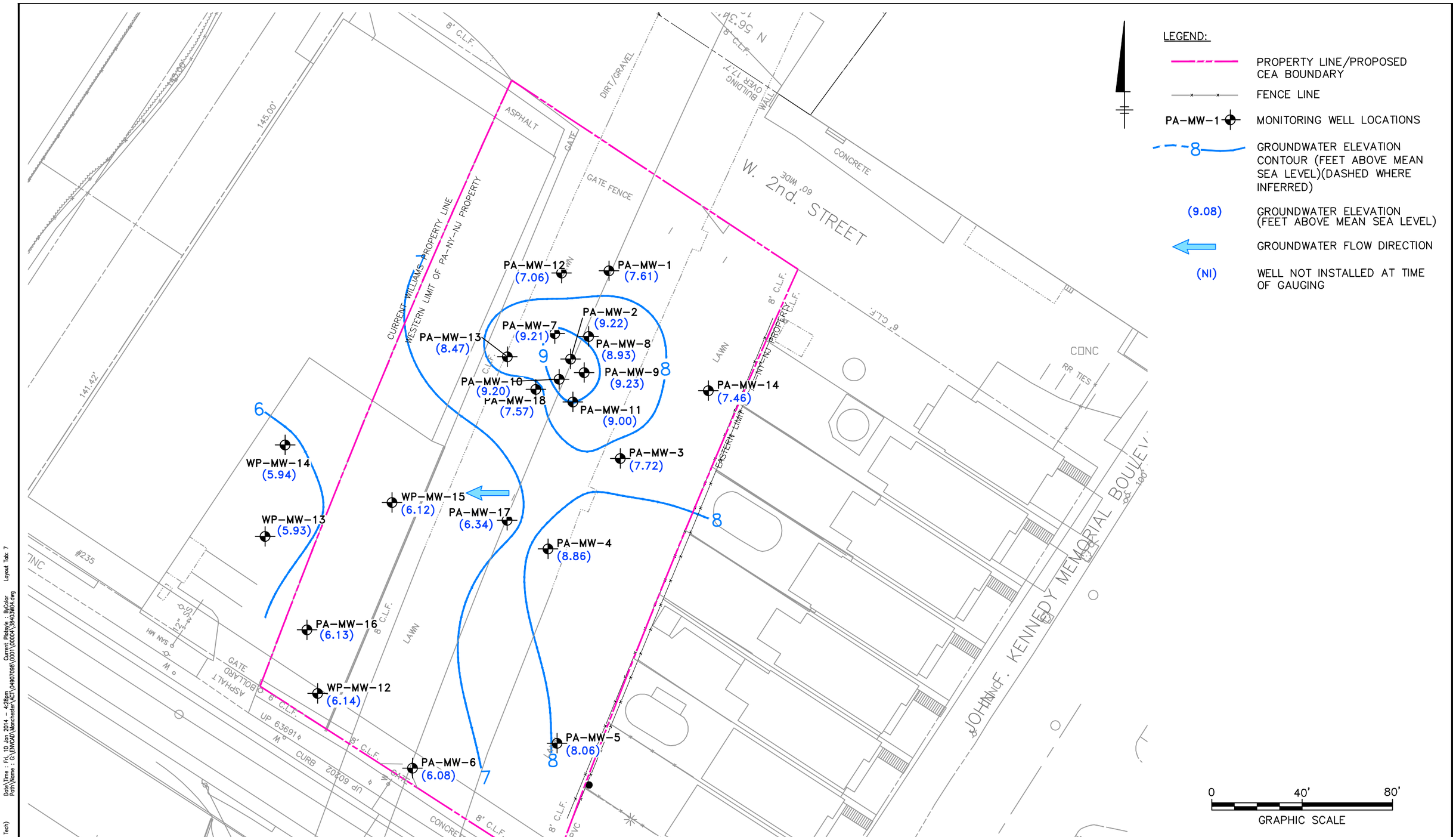
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
GROUNDWATER ELEVATION CONTOUR MAP – APRIL 2011		PROJECT NUMBER	K. IAMICELLI
		04907098.0001	DRAWING NUMBER
			FIGURE 6
			SHEET OF



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CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
GROUNDWATER ELEVATION CONTOUR MAP – JANUARY 2012			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 7
			SHEET OF

Williams' Site Soil Results
August 2008

Depth	WP-MW-12	WP-MW-13	WP-MW-14	WP-MW-15
0.0-2	1600	644	131	240
2.0-4.0	10800	1040	129	366

All results in mg/kg.

Table 2
Bayonne Bridge
Remedial Investigation
Arsenic Results Found in Site Soils

Sample ID	Sampling Depth	Sampling Date	Result (mg/kg)
PA-MW-1	0.0-2.0	12/1/2003	100
PA-MW-1	2.0-4.0	12/1/2003	128
PA-MW-2	0.0-2.0	12/1/2003	176
PA-MW-2	2.0-3.0	12/1/2003	10,400
PA-MW-3	0.0-2.0	12/1/2003	29.8
PA-MW-3	6.0-8.0	12/1/2003	40.7
PA-MW-4	0.0-2.0	12/1/2003	283
PA-MW-4	2.0-4.0	12/1/2003	88.1
PA-MW-5	0.0-2.0	12/1/2003	25.7
PA-MW-5	2.0-4.0	12/1/2003	48.6
PA-MW-6	0.0-2.0	12/1/2003	182
PA-MW-6	2.0-4.0	12/1/2003	80.8
PA-MW-7	0.0-0.5	06/28/04	264
PA-MW-7	1.5-2.0	06/28/04	813
PA-MW-8	0.0-0.5	05/20/04	594
PA-MW-8	0.5-1.0	05/20/04	960
PA-MW-9	0.0-0.5	5/21/2004	360
PA-MW-9	2.0-2.5	5/21/2004	3,490
PA-MW-10	0.0-0.5	05/20/04	404
PA-MW-10	1.5-2.0	05/20/04	2,890
PA-MW-11	0.0-0.5	5/21/2004	216
PA-MW-11	2.0-2.5	5/21/2004	1,560
PA-MW-12	0.0-0.5	11/24/2009	24.5
PA-MW-12	3.0-3.5	11/24/2009	358
PA-MW-13	0.0-0.5	11/24/2009	673
PA-MW-13	3.0-4.0	11/24/2009	195
PA-MW-14	0.0-0.5	11/24/2009	27.8
PA-MW-14	0.5-1.0	11/24/2009	18.3
PA-SB-15*	0.0-2.0	11/24/2009	190
PA-SB-15*	2.0-4.0	11/24/2009	9,760
PA-SB-15*	4.0-6.0	11/24/2009	3,830
PA-SB-15*	6.0-8.0	11/24/2009	1,710
PA-SB-15*	8.0-10	11/24/2009	441
PA-SB-15*	10-12	11/24/2009	41.8
PA-MW-16-01	0.0-0.5	1/9/2012	52.3
PA-MW-16-02	2.0-2.5	1/9/2012	4,380
PA-MW-16-2P (DUP)	2-2.5	1/9/2012	24,100
PA-MW-16-03	4.0-4.5	1/9/2012	1,560
PA-MW-16-04	6.0-8.0	1/9/2012	14.3
PA-MW-16-05	8.0-10	1/9/2012	1.6
PA-MW-17-01	0.0-0.5	1/3/2012	231
PA-MW-17-02	2.0-2.5	1/3/2012	5,220
PA-MW-17-03	4.0-4.5	1/3/2012	2,920
PA-MW-17-04	6.0-6.5	1/3/2012	135
PA-MW-17-05	8.0-8.2	1/3/2012	108
PA-MW-18-01	0.0-0.5	1/5/2012	334
PA-MW-18-02	2.0-2.5	1/5/2012	860
PA-MW-18-03	4.0-4.5	1/5/2012	50.0
PA-MW-18-04	6.0-8.0	1/5/2012	85.7
PA-MW-18-05	8.0-10	1/5/2012	322
PA-SB-19-01	0.0-0.5	1/10/2012	1,500
PA-SB-19-02	2.0-2.5	1/10/2012	346
PA-SB-19-03	4.0-4.5	1/10/2012	648
PA-SB-19-04	7.0-7.5	1/10/2012	1,200
PA-SB-19-05	9.0-9.5	1/10/2012	669
PA-SB-20-01	0.0-0.5	1/10/2012	547
PA-SB-20-02	2.0-2.5	1/10/2012	273
PA-SB-20-03	4.0-4.5	1/10/2012	929
PA-SB-20-3P (DUP)	4-4.5	1/10/2012	1,080
PA-SB-20-04	7.0-7.5	1/10/2012	2,700
PA-SB-20-05	9.0-9.5	1/10/2012	1,090
PA-SB-21-01	0.0-0.5	1/10/2012	29.4
PA-SB-21-02	2.0-2.5	1/10/2012	371
PA-SB-21-03	4.0-4.6	1/10/2012	585
PA-SB-21-04	5.0-5.5	1/10/2012	3,110
PA-SB-21-05	6.0-6.5	1/10/2012	3,204
PA-SB-22-01	0.0-0.5	1/9/2012	184
PA-SB-22-1P (DUP)	0-0.5	1/9/2012	53.6
PA-SB-22-02	2.0-2.5	1/9/2012	36.3
PA-SB-22-03	4.0-4.5	1/9/2012	7.4
PA-SB-22-04	6.0-8.0	1/9/2012	6.8
PA-SB-22-05	8.0-10	1/9/2012	5.7
PA-SB-23-01	0.0-0.5	1/11/2012	286
PA-SB-23-02	2.0-2.5	1/11/2012	45.9
PA-SB-23-03	4.0-4.5	1/11/2012	42.9
PA-SB-23-04	7.0-7.5	1/11/2012	6.0
PA-SB-23-05	9.0-9.5	1/11/2012	2.7
PA-SB-24-01	0.0-0.5	1/11/2012	269
PA-SB-24-02	2.0-2.5	1/11/2012	29.6
PA-SB-24-03	4.0-4.5	1/11/2012	4.7
PA-SB-24-04	7.0-7.5	1/11/2012	5.1
PA-SB-24-05	9.0-9.5	1/11/2012	2.3
PA-SB-25-01	0.0-0.5	1/5/2012	219
PA-SB-25-02	2.0-2.5	1/5/2012	323
PA-SB-25-03	4.0-4.5	1/5/2012	73.1
PA-SB-25-04	6.0-8.0	1/5/2012	116
PA-SB-25-05	8.0-10	1/5/2012	242
PA-SB-26-01	0.0-0.5	1/11/2012	37.4
PA-SB-26-02	2.0-2.5	1/11/2012	143
PA-SB-26-03	4.0-4.5	1/11/2012	5.6
PA-SB-26-04	7.0-7.5	1/11/2012	3.2
PA-SB-26-05	9.0-9.5	1/11/2012	1.8

Notes:
* - Samples denoted as "PA-MW-15" in November 2009 lab report
mg/kg - miligram per kilogram
NJDEP RDCSRS, NRDCSRS, and default IGWSRS - 19 mg/kg
Highlighted values indicate exceedance of 2,440 mg/kg

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CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
SOIL RESULTS			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 8
			SHEET OF

LEGEND:

- FENCE LINE
- PROPERTY LINE
- PA-SB-15 SOIL BORING LOCATIONS
- PA-MW-16 MONITORING WELL LOCATIONS
- PORTION FORMERLY LEASED TO WILLIAMS

Bayonne Bridge
Remedial Investigation
Arsenic Results - Groundwater

Sample ID	NJDEP PQL/GWQC	Units	December 2003	July 2004	August 2008	November 2008	December 2009	April 2011	January 2012
PA-MW-1	3	ug/L	**989**	**31,300**	**8,260**	**351**	**1,600**	**149**	**615**
PA-MW-2	3	ug/L	**116,000**	**91,700**	**183,000**	**224,000**	**144,000**	**2,190**	**244,000**
PA-MW-3	3	ug/L	**325**	NS	**321**	**163**	**260**	**87**	**80.1**
PA-MW-4	3	ug/L	**556**	NS	**438**	**192**	**140**	**239**	**160**
PA-MW-5	3	ug/L	**1,830**	NS	**360**	**331**	**320**	**172**	**329**
PA-MW-6	3	ug/L	**2,080**	NS	**269**	**328**	**430**	**467**	**372**
PA-MW-7	3	ug/L	--	**2,270**	**11,200**	**2,420**	**1,600**	**725**	**2,640**
PA-MW-8	3	ug/L	--	**43,700**	**39,500**	**126,000**	**68,500**	**69,000**	**306,000**
PA-MW-9	3	ug/L	--	**54,300**	**34,600**	**5,360**	**2,000**	**44,200**	**3,630**
PA-MW-10	3	ug/L	--	**16,000**	**19,000**	**11,200**	**10,600**	**11,000**	**12,200**
PA-MW-11	3	ug/L	--	**5,810**	**2,940**	**557**	**440**	**233**	**287**
PA-MW-12	3	ug/L	--	--	--	--	**280**	**986**	**1,430**
PA-MW-13	3	ug/L	--	--	--	--	**1,500**	**773**	**1,150**
PA-MW-14	3	ug/L	--	--	--	--	**230**	**6.4**	**5.2**
PA-MW-16	3	ug/L	--	--	--	--	--	--	**9,340**
PA-MW-17	3	ug/L	--	--	--	--	--	--	**8,910**
PA-MW-18	3	ug/L	--	--	--	--	--	--	**4,370**

Notes:
ug/L - micrograms per liter
NJDEP PQL/GWQC - New Jersey Department of Environmental Protection Practical Quantitation Level/Groundwater Quality Criteria
(standard shown is the higher of either the NJDEP GWQC or the PQL)
NS - not sampled
Bolded values indicate an exceedance of the NJDEP PQL/GWQC

Bayonne Bridge
Williams' Site
Arsenic Results - Groundwater (Williams Site)

Sample ID	NJDEP PQL/GWQC	Units	1992	1995	February 1998	March 1998	December 2003	July 2004	August 2008	November 2008	January 2012
WP-MW-12	3	ug/L	--	--	--	--	--	--	**15,800**	**13,300**	**23,200**
WP-MW-13	3	ug/L	--	--	--	--	--	--	**17,300**	**6,630**	**6,950**
WP-MW-14	3	ug/L	--	--	--	--	--	--	**141,000**	**73,300**	**19,800**
WP-MW-15	3	ug/L	--	--	--	--	--	--	**19,200**	**13,700**	**15,700**
MW-1	3	ug/L	**55,800**	**31,600**	**15,400**	NS	NS	NS	NS	NS	NS
MW-2	3	ug/L	**1,360**	**1,630**	**2,620**	NS	NS	NS	NS	NS	NS
MW-3	3	ug/L	**386**	**898**	**644**	NS	NS	NS	NS	NS	NS
MW-4	3	ug/L	**321**	**403**	**113**	NS	NS	NS	NS	**159**	**47.2**
MW-5	3	ug/L	NS	NS	**9,370**	**7,940**	NS	NS	NS	NS	NS
MW-6A	3	ug/L	NS	NS	**90**	NS	NS	NS	NS	NS	NS

Notes:
ug/L - micrograms per liter
NJDEP PQL/GWQC - New Jersey Department of Environmental Protection Practical Quantitation Level/Groundwater Quality Criteria
(standard shown is the higher of either the NJDEP GWQC or the PQL)
NS - not sampled
Bolded values indicate an exceedance of the NJDEP PQL/GWQC
WP-MW-14 same location as previous MW-1
WP-MW-15 same location as previous MW-5
Vault removed September/October 1998

0 20 40
SCALE IN FEET

Date\Time : Wed, 06 Aug 2014 - 3:30pm Current Plotsyle : ByColor Layout Tab: 9
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Acad Version : R18.1s (LMS Tech)
User Name : BSSmall

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REV.	ISSUED	DATE	DESCRIPTION
-	-	-	-
-	-	-	-

KEYPLAN | SEAL | SEAL

ARCADIS
ARCADIS U.S., Inc.
6723 Towpath Road
Syracuse, New York 13214
T: 315.446.9120
F: 315.449.0017
www.arcadis-us.com

THE PORT AUTHORITY
OF NY & NJ
BAYONNE BRIDGE
REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
GROUNDWATER RESULTS			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 9
			SHEET OF

REV.	ISSUED	DATE	DESCRIPTION
-	-	-	-
-	-	-	-

KEYPLAN

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THE PORT AUTHORITY
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REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
PROPOSED REMEDIAL EXCAVATIONS			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 10
			SHEET OF

Acad Version : R18.1s (LMS Tech)
User Name : BSSmall
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Current Plotstyle : ByColor
Layout Tab: 10

Acad Version : R18.1s (LMS Tech)
User Name : BSSmoll

Date\Time : Thu, 19 Jun 2014 - 3:47pm
Path\Name : G:\ENVCAD\Manchester\ACT\04907981\0001\00004\04907098001.dwg

Current Plotstyle : ByColor
Layout Tab: 12

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REV.	ISSUED	DATE	DESCRIPTION
-	-	-	-
-	-	-	-

KEYPLAN

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www.arcadis-us.com

THE PORT AUTHORITY
OF NY & NJ
BAYONNE BRIDGE
REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
PROPOSED SITE RESTORATION			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	FIGURE 11
			SHEET OF

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Appendices

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Appendix A

March 2011 Initial Receptor Evaluation Submission

UPS Next Day Air Delivery

March 14, 2011

Mr. Gary Greulich, Section Chief
New Jersey Department of Environmental Protection
Division of Remediation Management & Response
Northern Bureau of Field Operations
7 Ridgedale Ave
Cedar Knolls, NJ 07927

RE: Bayonne Bridge (PI # G000021830)
235 West First St., Bayonne, NJ 07002
Receptor Evaluation Form

Dear Mr. Greulich:

As per N.J.A.C. 7:26E-1.15, the Port Authority of New York and New Jersey is submitting the enclosed receptor evaluation form for the Bayonne Bridge, 235 West First St., Bayonne, NJ 07002. Copies of the enclosed information have also been forwarded to the designated local health official and municipal clerk in which the remediation site is located.

Should you have any questions or comments, please contact Bruce Walch of my staff at 973-565-7579.

Sincerely,

Robert Pruno, P.E.
Chief Environmental Engineer

Enclosures:
1) Receptor Evaluation Form
2) Site Descriptions
3) Sensitive Populations Map

CC: Bayonne City Clerk
City of Bayonne Health Dept.
K. Kovach, PANYNJ

New Jersey Department of Environmental Protection
Site Remediation Program

RECEPTOR EVALUATION FORM

☒ Non-LSRP (Existing Cases) ☐ LSRP ☐ Subsurface Evaluator

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Bayonne Bridge

List all AKAs:

Street Address: 235 West 1st Street

Municipality: Bayonne (Township, Borough or City)

County: Hudson Zip Code: 07002

Mailing Address if different than street address:

Program Interest (PI) Number(s): G000021830 Case Tracking Number(s):

The purpose of this form is to document the existence of receptors and the actions taken to protect receptors and is required unless an unrestricted remedial action is completed before the due date of the **initial** Receptor Evaluation. At the time of the initial or interim Receptor Evaluation the Department acknowledges that the remedial investigation may not be fully complete. The Receptor Evaluation should be completed in accordance with requirements and timeframes in the Technical Requirements for Site Remediation and is an ongoing process as the extent of contamination is defined. The Receptor Evaluation should be submitted within the Mandatory Timeframes.

☒ Initial Submission ☐ Interim Submission
☐ No Change (if no change, indicate last RE date and skip to Section G: _____)

SECTION B. ON SITE AND SURROUNDING PROPERTY USE

1. Identify any sensitive populations/uses that are currently on-site or surrounding property usage within 200 feet of the site boundary (check all that apply):

	On-site	Off-site
None of the following	☒	☐
Residences or residential property	☐	☒
Public or Private Schools grades K-12	☐	☐
Child care centers	☐	☐
Public parks, playgrounds or other recreation areas	☐	☒
Other sensitive population use(s) Explain _____	☐	☐

If any of the above applies, attach a list of addresses, facility names, type of use, and a map depicting each location relative to the site.

2. Current site uses (check all that apply):
☒ Industrial ☐ Residential ☐ Commercial ☐ Agricultural
☐ School or child care ☐ Government ☐ Park or recreational use
☐ Vacant ☐ Other _____

3. Planned future site uses and offsite use within 200 ft of site boundary (check all that apply):
☒ Industrial ☐ Residential ☐ Commercial ☐ Agricultural
☐ School or child care ☐ Government ☐ Park or recreational use
☐ Vacant ☐ Other _____

Provide a map depicting the location of the proposed changes in land use.

☒ Initial Submission ☐ Interim Submission
☐ No Change (if no change, indicate last RE date and skip to Section G: _____)

SECTION C. DESCRIPTION OF CONTAMINATION

1. Identify if any of the following exist at the site (check all that apply):
   - ☐ Free product [N.J.A.C. 7:26E-1.8]
   - ☐ Residual product [N.J.A.C. 7:26E-1.8]
   - ☐ Other high concentration source materials not identified above (e.g., buried drums, containers, unsecured friable asbestos)

   Explain _____

2. If this evaluation is submitted with a technical document that includes this information, proceed to Section D. Otherwise attach a brief summary of all currently available data and information to be included in the site investigation or remedial investigation report.

   ☒ Initial Submission ☐ Interim Submission
   ☐ No Change (if no change, indicate last RE date and skip to Section G: _____)

SECTION D. GROUND WATER USE

1. The requirement for ground water sampling has been triggered. If "No," proceed to Section F..... ☒ Yes ☐ No
2. Ground water is contaminated above the Ground Water Remediation Standards [N.J.A.C.7:9C]..... ☒ Yes ☐ No

   Or ☐ Awaiting laboratory data with the expected due date: _____

   If "Yes," provide the date that the laboratory data were available and contamination exists above the Ground Water Remediation Standards. Date 12/31/2003

   If "No," or awaiting laboratory data proceed to Section F.

3. Identify if any of the following conditions exist based on the well search [N.J.A.C.7:26E-1.17(a)] (check all that apply):
   - ☐ Potable wells located within 1000 feet from the downgradient edge of the currently known extent of contamination.
   - ☐ Potable well located 250 feet upgradient or 500 feet side gradient of the currently known extent of contamination.
   - ☐ Ground water contamination is located within a wellhead protection area Tier 1 or Tier 2 (WHPA).
     Tier: Identify if **Tier 1** ☐ or **Tier 2** ☐.
4. Complete and attach the Well Search spreadsheet.
5. Potable use wells have been identified in the well search and the area has been canvassed for additional ground water use (potable and irrigation wells, etc.). ..... ☐ Yes ☒ No
6. Potable wells and non-potable use wells were identified and ☐ potable well and /or ☐ non-potable use well sampling has been conducted. ..... ☐ Yes ☒ No
7. Contamination identified above Ground Water Remediation Standards but not suspected to be from the site (if "Yes," provide justification)..... ☐ Yes ☒ No
8. Potable wells were sampled and results were above State or Federal Drinking Water Standard..... ☐ Yes ☒ No

   Date _____, Or ☐ Awaiting laboratory data with the expected due date _____

   If "Yes" to #8 for potable well contamination not attributable to background follow the IEC Guidance Document at http://www.nj.gov/dep/srp/guidance/srra/iec_guidance_draft.pdf.

   IEC was abated ..... ☐ Yes ☐ No

   Date _____ NJDEP Case Manager _____

9. Receptors abated as part of mitigation (provide a brief narrative description)..... ☐ Yes ☐ No
10. Non-potable use wells were sampled and results were above GWQS.

    Date _____ Or ☐ Awaiting laboratory data and the expected due date: _____

    ☒ Initial Submission ☐ Interim Submission
    ☐ No Change (if no change, indicate last RE date and skip to Section G: _____)

SECTION E. VAPOR INTRUSION (VI)

1. Contaminants present in ground water exceed vapor intrusion ground water screening levels (see NJDEP Vapor Intrusion Guidance) that trigger a VI evaluation. ..... ☐ Yes ☒ No

Or ☐ Awaiting laboratory data and the expected due date: _____

Provide the date that the laboratory data was available and confirmed contamination above the Vapor Intrusion trigger levels. _____

If "No," or awaiting laboratory data, proceed to Section F.

1. Identify and locate on scaled map any structures/sensitive populations that exist within the following distances from ground water contamination with concentrations above the Ground Water Screening Levels for Vapor Intrusion or specific threats (check all that apply):

   ☐ 30 feet of dissolved petroleum hydrocarbon contamination in ground water.
   ☐ 100 feet of any free product or any non-petroleum dissolved volatile organic ground water contamination.
   ☐ No structures exist within the specified distances
   ☐ Unsaturated zone contamination
   ☐ Landfills on or adjacent to site
   ☐ Elemental mercury
   ☐ Other_____
   ☐ Methanogenic conditions
   ☐ Elevated soil gas or indoor vapors
   ☐ Basement or sump contains contaminated ground water or product

3. A VI evaluation has been conducted of the structures to address threats identified ..... ☐ Yes ☐ No
4. The vapor intrusion pathway is not a concern at or adjacent to the site (if "yes", attach justification) ..... ☐ Yes ☐ No
5. Contamination identified but not suspected to be from the site (if "Yes," attach justification) ..... ☐ Yes ☐ No
6. Indoor air sampling was conducted and results were above the Department's proposed vapor intrusion Rapid Action Levels. ..... ☐ Yes ☐ No

   Or ☐ Awaiting laboratory data

   Provide the date that the laboratory data was received and detected contamination above the proposed vapor intrusion Rapid Action Levels. _____

   If "Yes" to #6 above, required actions for contamination follow the IEC Guidance Document at http://www.nj.gov/dep/srp/guidance/srra/iec_guidance_draft.pdf.

   The IEC receptor engineering system response for receptor control was implemented for all identified structures..... ☐ Yes ☐ No

   Date _____ NJDEP Case Manager _____

7. Indoor air sampling was conducted and results were above the Department's Indoor Air Screening Levels but at or below the proposed vapor intrusion Rapid Action Levels..... ☐ Yes ☐ No

   Or ☐ Awaiting laboratory data

   If "Yes" to #7 above, required actions are:

   Vapor Concern Response Action Form notification of the exceedances of the data has been completed (date _____) ..... ☐ Yes ☐ No

   A plan to mitigate and monitor the exposure has been submitted (date _____)..... ☐ Yes ☐ No

   The mitigation response action report has been submitted (date _____) ..... ☐ Yes ☐ No

8. The vapor intrusion investigation is being completed and stepping out as part of the site investigation or remedial investigation (if "No" attach justification) ..... ☐ Yes ☐ No

   ☐ Initial Submission ☐ Interim Submission
   ☐ No Change (if no change, indicate last RE date and skip to Section G: _____)

SECTION F. ECOLOGICAL RECEPTORS

1. Identify any of the following conditions that exist based on the investigations conducted to date (check all that apply):

   The results of a baseline ecological evaluation [N.J.A.C.7:26E- 3.11] required that a remedial investigation of ecological receptors [N.J.A.C.7:26E-4.7] is conducted..... ☐ Yes ☒ No

   Provide the name(s) of any surface water body on or within 200 feet of the site._____

   _____

Free product or residual product is located within 100 feet from an ecological receptor..... ☐ Yes ☒ No

2. Available data indicates an impact on ecological receptor(s), surface water or sediment. ..... ☐ Yes ☒ No

☒ Initial Submission ☐ Interim Submission

☐ No Change (if no change, indicate last RE date and skip to Section G: _____)

SECTION G. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Kathy Kovach

Representative First Name: Kathy Representative Last Name: Kovach

Title: Principal Environmental Program Specialist

Phone Number: (212) 435-4824 Ext: _____ Fax: _____

Mailing Address: 1 Madison Avenue, 5th Floor

City/Town: New York State: NY Zip Code: 10010

Email Address: kkovach@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Kathy Kovach By Agent PANYNJ Date: 3/11/11

Name/Title: Kathy Kovach, Principal Environmental Program Specialist **No Changes Since Last Submittal** ☐

SECTION H. NON-LSRP SITE REMEDIATION PROFESSIONAL STATEMENT

First Name: Robert Last Name: Pruon

Phone Number: (973) 565-7620 Ext: Fax:

Mailing Address: 2 Gateway Center, 14th Floor - Environmental

City/Town: Newark State: NJ Zip Code: 07102

Email Address: rpruno@panynj.gov

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

Signature: Date: 3/4/11

Name/Title: Robert Pruno / Chief Environmental Engineer **No Changes Since Last Submittal** ☐

Company Name: Port Authority of New York & New Jersey

Submit this form to the assigned case manager, municipal clerk and designate health department. If there is no assigned case manager, submit this form to:

Bureau of Case Assignment & Initial Notice
New Jersey Department of Environmental Protection
Site Remediation Program
401 East State Street, PO Box 434
Trenton, NJ 08625

SENSITIVE POPULATIONS WITHIN 200 FEET OF:

BAYONNE BRIDGE
WEST 1ST STREET
BAYONNE, NJ 07002

SITE

200 FT FROM SITE BOUNDARY

SENSITIVE POPULATIONS

RESIDENCES

1 KENNEDY BLVD.
BAYONNE, NJ 07002

3 KENNEDY BLVD.
BAYONNE, NJ 07002

5 KENNEDY BLVD.
BAYONNE, NJ 07002

7 KENNEDY BLVD.
BAYONNE, NJ 07002

9 KENNEDY BLVD.
BAYONNE, NJ 07002

11 KENNEDY BLVD.
BAYONNE, NJ 07002

13 KENNEDY BLVD.
BAYONNE, NJ 07002

15 KENNEDY BLVD.
BAYONNE, NJ 07002

1 KENNEDY BLVD.
BAYONNE, NJ 07002

PARKS

MAYOR DENNIS P. COLLINS PARK
200 WEST 1ST STREET
BAYONNE, NJ 07002

THE PORT AUTHORITY OF NY & NJ	BAYONNE BRIDGE	09-08-2009 Date
D. McGRATH Designed by Drawn by Checked by	235 WEST 1ST STREET BAYONNE, NJ 07002 SENSITIVE POPULATION MAP	FIGURE 1

BAYONNE BRIDGE
235 WEST 1ST STREET PROPERTY
BAYONNE, NJ 07002

Tax Block: 373
Lot: 3
NJDEP Preferred ID: G000021830

This Port Authority-owned property is located at 235 West 1st Street in Bayonne, Hudson County, New Jersey (Site) directly beneath the Bayonne Bridge. The Site is currently unpaved and is used for jersey traffic barrier storage. From 1920-1929, the Site was owned by the Nitrate Agencies Company (a subsidiary of W.R. Grace & Company) who manufactured arsenical pesticides. There are currently no buildings on the property. A one-story warehouse, a brick boiler house, and a nitric acid restoring plant previously existed on the site and were demolished prior to the Bayonne Bridge construction.

Contamination at the Site has been identified and delineated. Specifically, soil and groundwater are contaminated with arsenic. Soil and groundwater contamination present at the Site are believed to be associated with historical operations conducted by the previous property owner.

Evidence of arsenic contamination was identified during subsurface investigations conducted on the adjacent property (239 West First Street, Bayonne, NJ) by the adjacent property owner between 1986 and 1988. During the installation of soil borings, a 5,000-gallon concrete vault was discovered. The adjacent property owner collected sediment samples from the vault and samples of the soils surrounding the vault, which indicated relatively high levels of arsenic. The vault was removed in September 1998.

In February 1999, Port Authority collected soil samples from their property and analyzed them for arsenic. The results all exceeded the Environmental Protection Agency's (EPA) regulatory levels. The Port Authority notified the New Jersey Department of Environmental Protection (NJDEP) of the contamination and notified W.R. Grace & Company to request that they undertake the responsibility of full delineation and remediation of the contamination on the Site. Grace subsequently entered into bankruptcy and the Port Authority eventually filed claim (Claim No. 9563) for the cleanup of the Port Authority Site.

Between 2003 and 2008, the Port Authority conducted additional subsurface investigations on their Site, which concluded additional (other than the previously removed vault on adjacent property) arsenic contamination exists on their Site. The Port Authority delineated the extent of arsenic contamination in the soil and groundwater on their Site and concluded the contamination has not migrated off site. The Port Authority will be preparing a Remedial Investigation Report to discuss the findings of the previous subsurface investigations. Concurrently, the Port Authority will develop a Remedial Action Work Plan proposing the remedial actions to be taken at the Site.

SENSITIVE POPULATIONS WITHIN 200 FEET OF:

BAYONNE BRIDGE
WEST 1ST STREET
BAYONNE, NJ 07002

SITE

200 FT FROM SITE BOUNDARY

SENSITIVE POPULATIONS

RESIDENCES

1 KENNEDY BLVD.
BAYONNE, NJ 07002

3 KENNEDY BLVD.
BAYONNE, NJ 07002

5 KENNEDY BLVD.
BAYONNE, NJ 07002

7 KENNEDY BLVD.
BAYONNE, NJ 07002

9 KENNEDY BLVD.
BAYONNE, NJ 07002

11 KENNEDY BLVD.
BAYONNE, NJ 07002

13 KENNEDY BLVD.
BAYONNE, NJ 07002

15 KENNEDY BLVD.
BAYONNE, NJ 07002

1 KENNEDY BLVD.
BAYONNE, NJ 07002

PARKS

MAYOR DENNIS P. COLLINS PARK
200 WEST 1ST STREET
BAYONNE, NJ 07002

THE PORT AUTHORITY OF NY & NJ	BAYONNE BRIDGE	09-08-2009 Date
D. McGRATH Designed by Drawn by Checked by	235 WEST 1ST STREET BAYONNE, NJ 07002 SENSITIVE POPULATION MAP	FIGURE 1

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Appendix B

Soil Boring and Monitoring Well Construction Logs

SL 100
1/06

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Materials Engineering

Boring Report

Project	Bayonne Bridge Arsenic Site Investigation	**Contractor**	Craig	**Boring No.**	PA-SB 15	**Date**	11/25/09
Location	Adjacent to existing monitoring well PA-MW-2(Within 5')	**Contract No.**	426-09-014	**Surface Elev.**			
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**	2	Date	Time	Depth (ft)	Remarks
Inspector	J. Zarks			11/25/09	9:00AM	4.0	In sample # 02
Driller	D. Osuch						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill drk gray C-F Sand & Gravel,some Cocrete ,Brick,little Silt
02	2.0	4.0	HA	Hand Auger	Full	0.0	Filll Red-brown C-F Sand & Gravel,Brick ,tr.Silt.
	4.0						Change in Strata
03	4.0	6.0	HA	Hand Auger	Full	0.0	Red brown Clayey Silt ,some F.Sand
04	6.0	8.0	SS	1-1-1-8	24"	0.0	Gray Clayey Silt some Peat Fibers
	8.0						Change in Strata
05	8.0	10.0	SS	10-12-8-10	24"		Gray M-F Sand some Silty Clay
06	10.0	12.0	SS	8-10-13-16	24"		Same
	12.0						Bottom of Boring.
							Note: All samples were screened with PID-meter & saved.

SL 100
1/06

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Materials Engineering

Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-SB-19	**Date** 1/10/12
Location	PA-SB-19			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**		Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/10/12	11:40am	3.2	Observed during hand augering
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: light grey tan f Gravel and c-f Sand (CONCRETE FRAGMENTS), trace Silt, w/ organic fibers
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: dark grey c-f SAND, some f Gravel, little Silt w/ cinders, w/ sheen
	4.0						Change in Strata
03	4.0	6.0	HA	Hand Auger	Full	0.0	dark grey c-f Sand and Silt, little f Gravel, w/ Peat
04	6.0	8.0	SS	5-3-6-10	18"	0.0	tan - light grey c-f Sand, some Silt, trace f Gravel
05A	8.0	8.5	SS	8	6"	0.0	Same
	8.5						Change in Strata
05B	8.5	8.8	SS	50/3"		0.0	grey Clayey Silt, some f Sand, mottled, layered
	8.8						Bottom of Boring
							Note: Concrete to 1.0' reinforced w/ rebar, with stabilization fabric at 1.5'

SL 100
1/06

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Materials Engineering

Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-SB-20	**Date** 1/10/12
Location	PA-SB-20			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**		Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/10/12	1:47pm	2.5	Observed during hand augering
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: grey c-f Sand and f Gravel, little Silt, w/ organic fibers
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: brown red f Gravel and c-f Sand, little Silt w/ brick particles
03	4.0	6.0	HA	Hand Auger	Full	0.0	Fill: brown c-f Sand and f Gravel, trace Silt, w/ brick particles
	6.0						Change in strata
04	6.0	8.0	SS	3-5-7-9	16"	0.0	grey Clayey Silt, little c-f Sand, trace f Gravel, w/ organic fibers, mottled
	8.0						Change in strata
05	8.0	10.0	SS	10-16-22-29	18"	0.0	grey c-f Sand, some Silt, trace f Gravel
	10.0						Bottom of Boring

SL 100
1/06

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Materials Engineering

Boring Report

Project	Bayonne Bridge Arsenic Site	**Contractor**	Craig	**Boring No.**	PA-SB-21	**Date**	1/10/12
Location	As proposed	**Contract No.**	426-11-014	**Surface Elev.**			
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Auto	**Hole Type**	1	Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/10/12	9:30am	2.5	Observed during Hand Auger
Driller	M. Gorski			1/10/12	10:08am	2.3	Before backfilled
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: light grey f Gravel and c-f Sand (CONCRETE FRAGMENTS), trace Silt
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: brown grey f Gravel, and c-f Sand, little Silt w/ cinders, w/ brick particles
	4.0						Change in Strata
03	4.0	5.0	HA	Hand Auger	Full	0.0	Fill: grey c-f Sand and f Gravel, little Silt, w/ cinders
	5.0						Change in Strata
04	5.0	6.0	HA	Hand Auger	Full	0.0	grey Silty Clay, little c-f Sand, trace f Gravel, w/ Peat
05	6.0	6.5	SS	50/6"	5"	0.0	grey Silty Clay, little f Gravel, little c-f Sand. Spoon bounced at 6.5'.
	6.5						Bottom of Boring
							Note: Concrete 0.2' to 1.5' reinforced w/ rebar, with stabilization fabric at 1.5'

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Boring Report

Project	Bayonne Bridge Arsenic Site	**Contractor**	Craig	**Boring No.**	PA-SB-22	**Date**	1/9/12
Location	As proposed	**Contract No.**	426-11-014	**Surface Elev.**			
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Auto	**Hole Type**	1	Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/9/12	10:55am	6.0	Observed during sampling
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: grey brown f Gravel (with c gravel fragments), some c-f Sand, little Silt, with brick particles
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: brown grey f Gravel, and c-f Sand, little Silt w/ cinders, w/ brick particles
03	4.0	6.0	HA	Hand Auger	Full	0.0	Fill: grey brown c-f Sand and Silt, little f Gravel, w/ organic fibers
	6.0						Change in Strata
04	6.0	8.0	HA	Hand Auger	Full	0.0	grey Organic Silt, little c-f Sand, trace f Gravel, w/ Peat
05	8.0	10.0	SS	50/6	5"	0.0	grey Silty Clay, little c-f Sand, trace f Gravel, w/ organic fibers
	10.0						Bottom of Boring

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Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-SB-23	**Date** 1/11/12
Location	As laid out by Survey			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**		Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/11/12	10:45pm	Dry	Not encountered during sampling
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: c-f SAND, some Silt, trace f Gravel, w/ roots, w/ glass
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: Gy Bwn f Gravel, and Silt, little c-f Sand, w/ brick particles, w/ glass
03	4.0	6.0	HA	Hand Auger	Full	0.0	Fill: Gy c-f SAND, and Silt, little f Gravel
04	6.0	8.0	SS	4-2-4-5	18"	0.0	Rd Bwn SILTY CLAY, little c-f Sand, little f Gravel, w/ organic fibers at 7.5'
05	8.0	10.0	SS	5-4-7-13	18"	0.0	Lt Gy SILT to CLAYEY SILT, little c-f Sand, w/ organic fibers, mottled
							END OF BORING AT 10.0'
							Note: Observed concrete fragments in borehole 0' to 5'

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Boring Report

Project	Bayonne Bridge Arsenic Site	**Contractor**	Craig	**Boring No.**	PA-SB-24	**Date**	1/11/12
Location	As laid out by Survey	**Contract No.**	426-11-014	**Surface Elev.**			
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**		Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/11/12	1:30pm	Dry	Not encountered during sampling
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: Gy f Gravel, and c-f Sand, little Silt, w/ roots
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: Rd Bwn c-f SAND, and Silt,little f Gravel, w/ brick particles
03	4.0	6.0	HA	Hand Auger	Full	0.0	Fill: Bwn SILT, Some c-f Sand, little f Gravel
04	6.0	8.0	SS	4-4-4-5	18"	0.0	Rd Bwn SILTY CLAY, little c-f Sand, trace f Gravel, w/ organic fibers to 7.0', to Dk Gy ORGANIC CLAYEY SILT, little c-f Sand, trace f Gravel
05	8.0	10.0	SS	3-4-8-16	20"	0.0	Gy f SAND, Some Silt, w/ organic fibers
							END OF BORING AT 10.0'

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Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-SB-25	**Date** 1/5/12
Location	As proposed			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Auto	**Hole Type**	1	Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/5/12	2:15pm	4.2	Observed during hand augering
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: dark grey f Gravel and c-f Sand, little Silt, w/ asphalt fragments
	2.0						Change in Strata
02	2.0	4.0	HA	Hand Auger	Full	0.0	red brown Silty Clay, little f Gravel, little c-f Sand, w/ organic fibers
03	4.0	6.0	HA	Hand Auger	Full	0.0	red brown Silty Clay, little c-f Sand, trace f Gravel
04	6.0	8.0	SS	5-3-4-3	16"	0.0	red brown to grey Silty Clay to Clayey Silt, some c-f Sand, trace f Gravel, w/ organics, wood fibers
05	8.0	10.0	SS	5-5-6-5	18"	0.0	red brown Silty Clay to Clayey Silt, and c-f Sand, little f Gravel
	10.0						Bottom of Boring

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Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-SB-26	**Date** 1/11/12
Location	As laid out by Survey			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**		Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/11/12	2:10pm	Dry	Not encountered during sampling
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: Dk Gy SILT and c-f Sand, little f Gravel, w/ roots, w/ metal fragments
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: Bwn c-f SAND, Some Silt, trace f Gravel
03	4.0	6.0	HA	Hand Auger	Full	0.0	Rd Bwn SILTY CLAY, Some c-f Sand, little f Gravel
04	6.0	8.0	SS	4-4-4-3	20"	0.0	Gy SILTY CLAY, little c-f Sand, trace f Gravel, w/ organic fibers
05	8.0	10.0	SS	4-4-8-16	20"	0.0	Gy Tan f SAND, Some Silt, w/ organic fibers
							END OF BORING AT 10.0'

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Boring Report

Project	Bayonne Bridge Arsenic Site Investigation			**Contractor**	Craig	**Boring No.** PA-MW 12	**Date** 11/24/09
Location	30' east of western fence,south of PA-MW 01			**Contract No.**	426-09-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**	A Monitor Well	Date	Time	Depth (ft)	Remarks
Inspector	J. Zarks			11/24/09	10:00AM	3.6	In sample # 02
Driller	D. Osuch						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill drk gray top soil,some brown C-F Sand & Gravel.
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill Brown C-F Sand & Gravel ,tr Silt
03	4.0	6.0	HA	Hand Auger	Full	0.0	Same
04	6.0	8.0	SS	4-5-5-8	20"	0.0	Same
04	8.0	10.0	SS	7-6-7-7	20"	0.0	Same
	10.0						Bottom of Boring
							Note:All samples were screened with PID-meter,samples # 01(0.0'-0.5') & # 02 (3.0'-3.5') were saved.

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Well Installation Report

PROJECT: Bayonne Bridge Arsenic Site supplemental Remedial Investigation		**CONTRACT NO.** 426-09-014	
LOCATION: 30' east of western fence,south of PA-MW 01		**CONTRACTOR** Craig	
WELL NO. PA-MW 12	**WELL TYPE** "A" Monitoring	**DATE:** 11/24/09	
DRILLER: D.Osuch	**INSPECTOR:** J. Zarks		

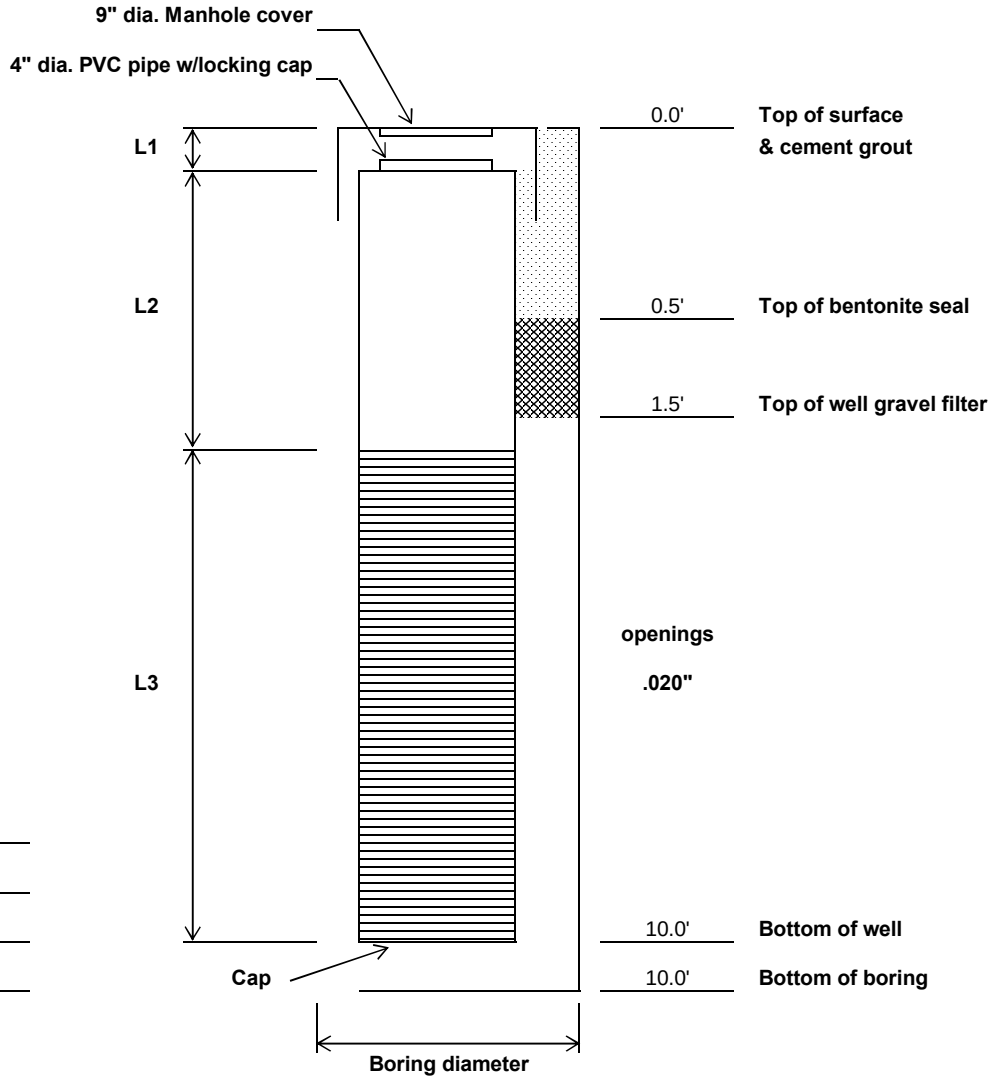
Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE:	**WATER LEVEL BEFORE:**	**WATER LEVEL AFTER:**
TAKEN	**MINUTES AFTER DEVELOPMENT**	

L1 = 0.3'

L2 = 1.7'

L3 = 8.0'



Remarks:

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Boring Report

Project	Bayonne Bridge Arsenic Site Investigation		**Contractor**	Craig	**Boring No.**	PA-MW 13	**Date** 11/24/09
Location	10' east of western fence even with PA-MW 10			**Contract No.**	426-09-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**	A Monitor Well	Date	Time	Depth (ft)	Remarks
Inspector	J. Zarks			11/24/09	12:30PM	4.0	In sample # 02
Driller	D. Osuch						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill drk gray top soil,some brown C-F Sand & Gravel.
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill Brown C-F Sand & Gravel , little Clayey Silt ,some Wood
03	4.0	6.0	HA	Hand Auger	Full	0.0	Same
04	6.0	8.0	SS	5-8-35-44	18"	0.0	Same
04	8.0	10.0	SS	6-7-5-5	20"	0.0	Same
	10.0						Bottom of Boring
							Note:All samples were screened with PID-meter,samples # 01 (0.0'-0.5') & # 02(3.5'-4.0') were saved.

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Well Installation Report

PROJECT: Bayonne Bridge Arsenite Supplemental Remedial Investigation		**CONTRACT NO.** 426-09-014	
LOCATION: 10' east of western fence even with PA-MW 10		**CONTRACTOR** Craig	
WELL NO. PA-MW 13	**WELL TYPE** "A" Monitoring	**DATE:** 11/24/2009	
DRILLER: D. Osuch	**INSPECTOR:** J. Zarks		

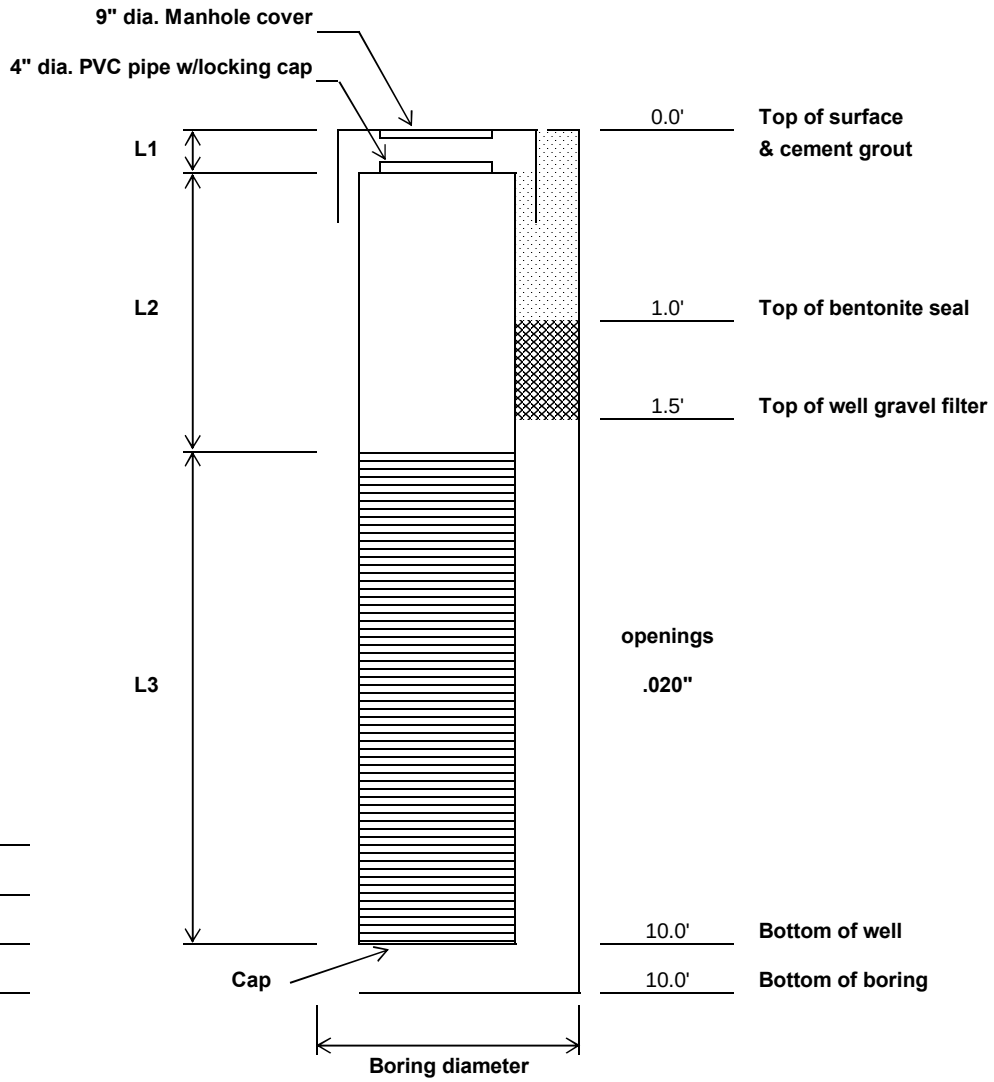
Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE:	**WATER LEVEL BEFORE:**	**WATER LEVEL AFTER:**
TAKEN	**MINUTES AFTER DEVELOPMENT**	

L1 = 0.3'

L2 = 1.7'

L3 = 8.0'



Remarks:

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Boring Report

Project	Bayonne Bridge Arsenic Site Investigation		**Contractor**	Craig	**Boring No.**	PA-MW 14	**Date** 11/24/09
Location	10' west of PA eastern fence even with PA -MW 08			**Contract No.**	426-09-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**	A Monitor Well	Date	Time	Depth (ft)	Remarks
Inspector	J. Zarks			11/24/09	1:55PM	1.0	In sample # 01
Driller	D. Osuch						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill drk gray top soil,brown Clayey Silt ,tr.Silt
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill Gray-brown Clayey Silt ,some F Sand.
03	4.0	6.0	HA	Hand Auger	Full	0.0	Same
04	6.0	8.0	SS	2-3-3-4	20"	0.0	Same
04	8.0	10.0	SS	4-5-4-6	20"	0.0	
	10.0						Bottom of Boring
							Note :All samples were screened with PID-meter,samples # 01 (0.0'-0.5') & # 02 (0.5'-1.0') were saved.

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Well Installation Report

PROJECT: Bayonne Bridge Arsenic Site Supplemental Remedial Investigation.		**CONTRACT NO.** 426-09-014	
LOCATION: 10' west of PA eastern fence even with PA -MW 08		**CONTRACTOR** Craig	
WELL NO. PA-MW 14	**WELL TYPE** **"A" Monitoring**	**DATE:** **#**	
DRILLER: D. Osuch	**INSPECTOR:** J. Zarks		

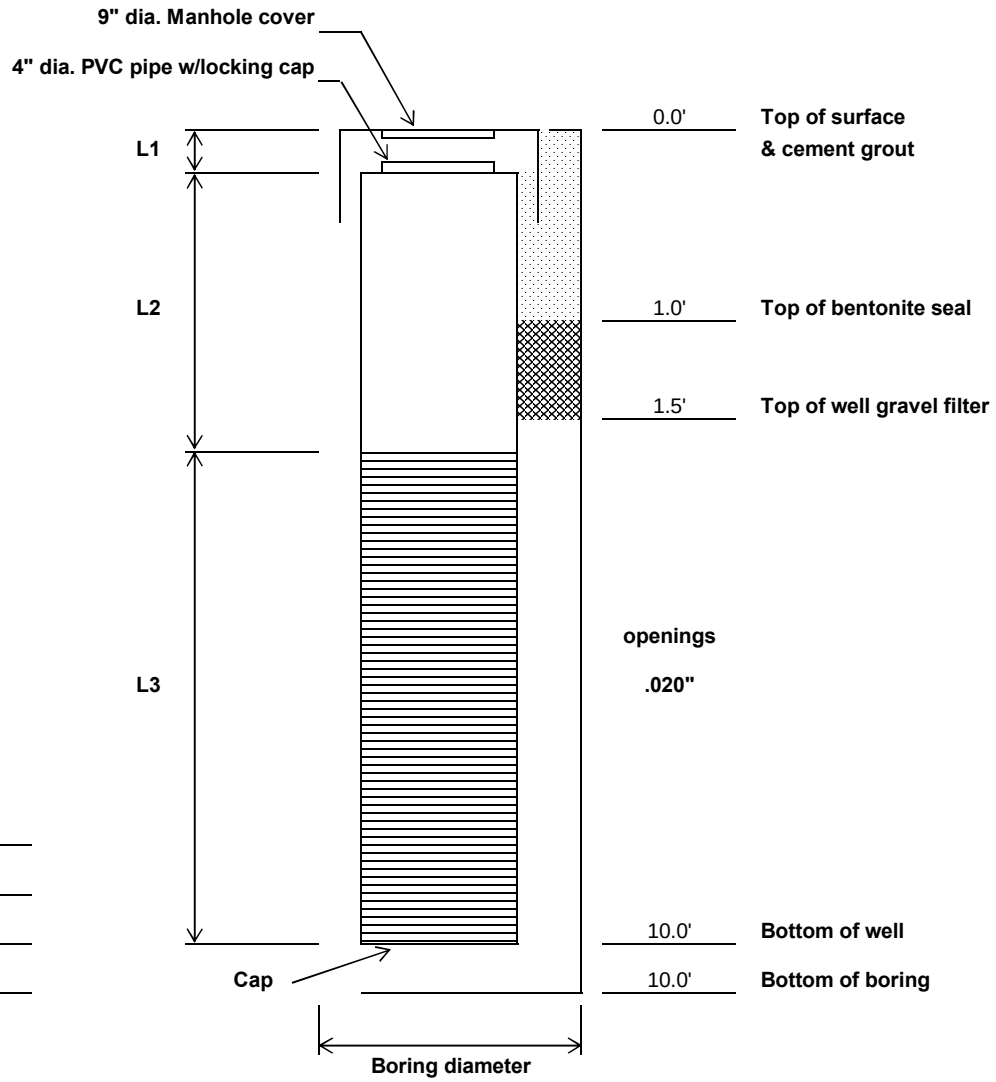
Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE:	**WATER LEVEL BEFORE:**	**WATER LEVEL AFTER:**
TAKEN	**MINUTES AFTER DEVELOPMENT**	

L1 = 0.3'

L2 = 1.7'

L3 = 8.0'



Remarks:

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Materials Engineering

Boring Report

Project	Bayonne Bridge Arsenic Site			**Contractor**	Craig	**Boring No.** PA-MW-16	**Date** 1/9/12
Location	PA-MW-16			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Safety	**Hole Type**	A Monitor Well	Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/9/12	1:55pm	2.0	
Driller	M. Gorski			1/10/12	7:25am	2.0	Before well installation
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: light grey fine Gravel and c-f Sand, trace Silt
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: brown c-f Sand and fine Gravel, little Silt, with sheen
03	4.0	6.0	HA	Hand Auger	Full	0.0	Fill: brown grey c-f Sand and Silt, little f Gravel, with wood fibers
	6.0						Change of Strata
04	6.0	8.0	SS	4-5-8-8	14"	0.0	Fill: grey brown Silty Clay, some c-f Sand, little f Gravel
05	8.0	10.0	SS	19-20-13-16	16"	0.0	Fill: light grey Silt, little f Sand, trace f Gravel, mottled
	10.0						Bottom of Boring
							Monitoring well installed to 8.0 feet
							Note: Concrete to 1.0 feet re-enforced with rebar

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Well Installation Report

PROJECT: Bayonne Bridge Arsenic Site		**CONTRACT NO.** 426-11-014	
LOCATION: PA-MW-16		**CONTRACTOR** Craig	
WELL NO. PA-MW-16	**WELL TYPE** A		**DATE:** 1/10/12
DRILLER: M. Gorski		**INSPECTOR:** B. Ouimet	

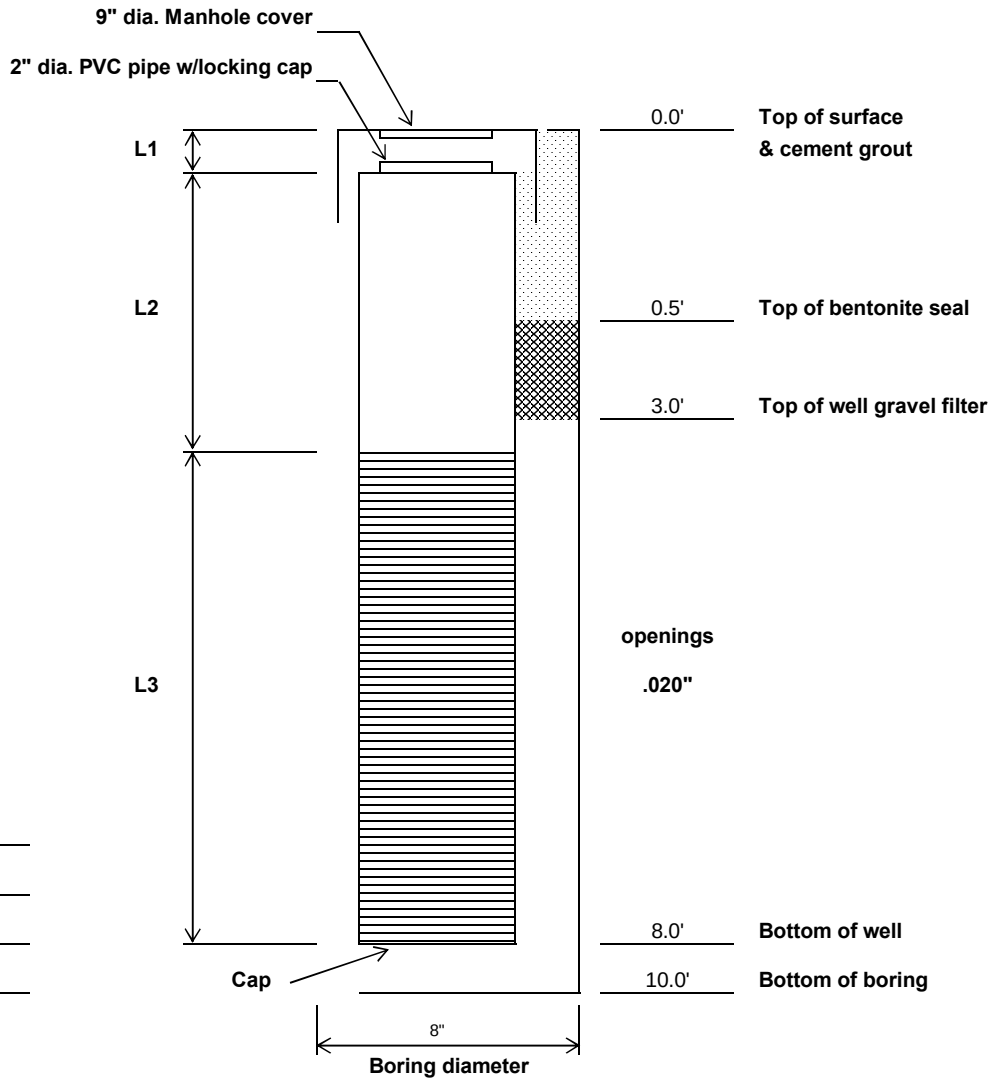
Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE: 1/10/12	**WATER LEVEL BEFORE:** 2.0'	**WATER LEVEL AFTER:**
TAKEN	**MINUTES AFTER DEVELOPMENT**	

L1 = 0.5'

L2 = 3.5'

L3 = 4.0'



Remarks:

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Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-MW-17	**Date** 1/3/12
Location				**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Auto	**Hole Type**	A Monitor Well	Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/3/12	9:30 AM	4.0	Observed during hand augering
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	brown c-f Sand, little Silt, little Gravel (Topsoil - partially grass covered)
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: grey brown c-f Sand, some fine Gravel, little Silt, with Concrete fragments
03	4.0	6.0	HA	Hand Auger	Full	0.0	Fill: brown Silty Clay, some c-f Sand, little fine Gravel
04	6.0	8.0	SS	2-3-7-50/0"	12"	0.0	Fill: brown c-f Sand (layered) and Silt, with Organic fibers. Concrete obstruction was encountered at 6.5' from surface.
05	8.0	8.2	SS	100/2"	2"	0.0	Fill: brown c-f Sand and fine Gravel (Course gravel fragments)
	8.2						Bottom of Boring

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Well Installation Report

PROJECT: Bayonne Bridge Arsenic Site		**CONTRACT NO.** 426-11-014	
LOCATION:		**CONTRACTOR** Craig	
WELL NO. PA-MW-17	**WELL TYPE** A		**DATE:** 1/3/12
DRILLER: M. Gorski		**INSPECTOR:** B. Ouimet	

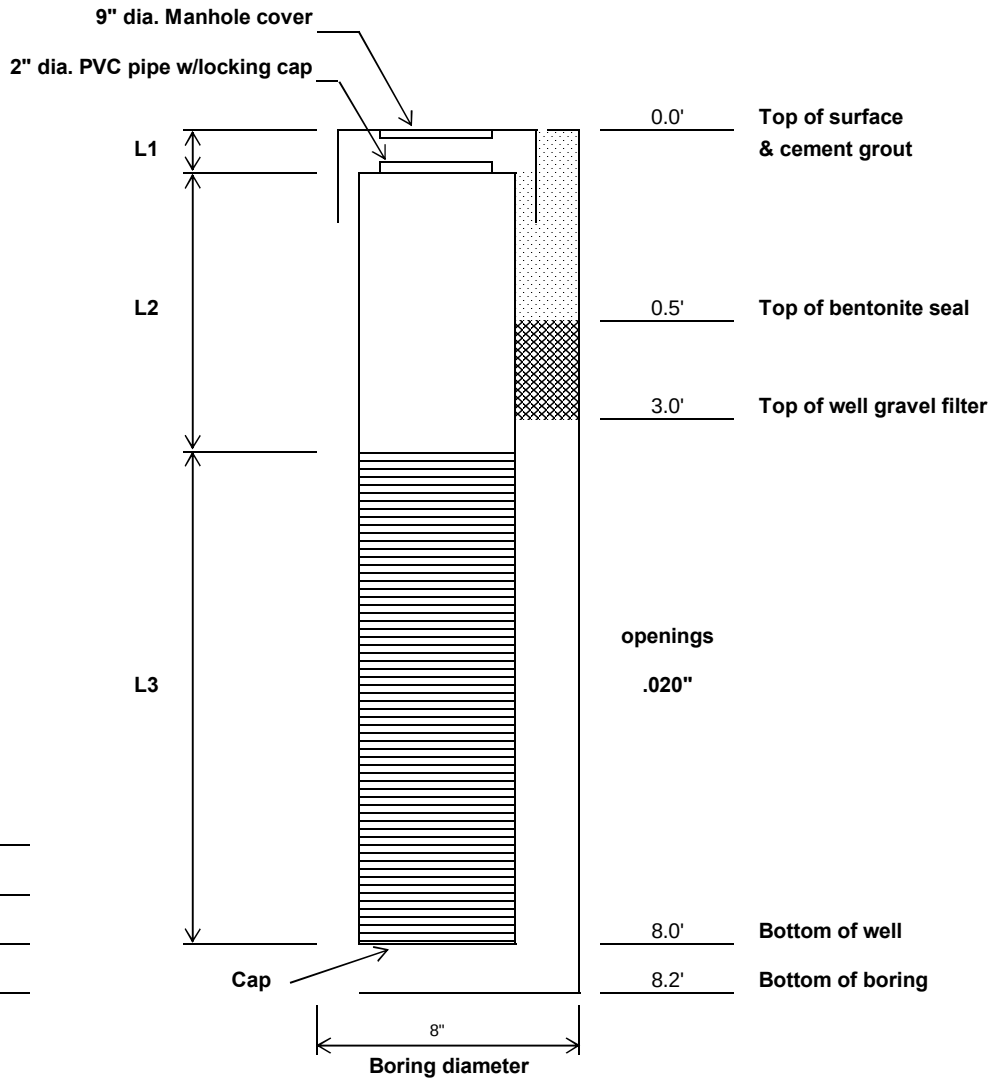
Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE:	**WATER LEVEL BEFORE:**	**WATER LEVEL AFTER:**
TAKEN	**MINUTES AFTER DEVELOPMENT**	

L1 = 0.5'

L2 = 3.5'

L3 = 4.0'



Remarks:

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Boring Report

Project	Bayonne Bridge Arsenic Site		**Contractor**	Craig	**Boring No.**	PA-MW-18	**Date** 1/5/12
Location	PA-MW-18			**Contract No.**	426-11-014	**Surface Elev.**	
Spoon	2" O.D. 1.375" I.D.	**Hammer/ Fall (in.)**	140 lbs./30"	**Ground Water Level**			
Hammer Type	Auto	**Hole Type**	A Monitor Well	Date	Time	Depth (ft)	Remarks
Inspector	B. Ouimet			1/5/12	12:38pm	7.4	Observed during well installation
Driller	M. Gorski						
site_code							

Sample No.	Start Depth (ft)	End Depth (ft)	Method	Spoon Blows/6"	Re-cov'd	PID Reading	Sample Description and Remarks
01	0.0	2.0	HA	Hand Auger	Full	0.0	Fill: grey c-f Sand, some f Gravel, little Silt, w/ organic fibers
	2.0						Change of Strata
02	2.0	4.0	HA	Hand Auger	Full	0.0	Fill: grey to red brown Silty Clay, some c-f Sand, trace f Gravel w/ brick particles
03	4.0	6.0	HA	Hand Auger	Full	0.0	red brown Silty Clay, little c-f Sand, trace f Gravel
04	6.0	8.0	SS	4-4-7-4	12"	0.0	red brown Silty Clay and f Gravel (w/ c Gravel fragments), little c-f Sand
05	8.0	10.0	SS	5-6-18-9	14"	0.0	red brown Silty Clay, some c-f Sand, little f Gravel
	10.0						Bottom of Boring
							Monitoring well installed to 10 feet

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Well Installation Report

PROJECT: Bayonne Bridge Arsenic Site		**CONTRACT NO.** 426-11-014	
LOCATION: PA-MW-18		**CONTRACTOR** Craig	
WELL NO. PA-MW-18	**WELL TYPE** A		**DATE:** 1/5/12
DRILLER: M. Gorski		**INSPECTOR:** B. Ouimet	

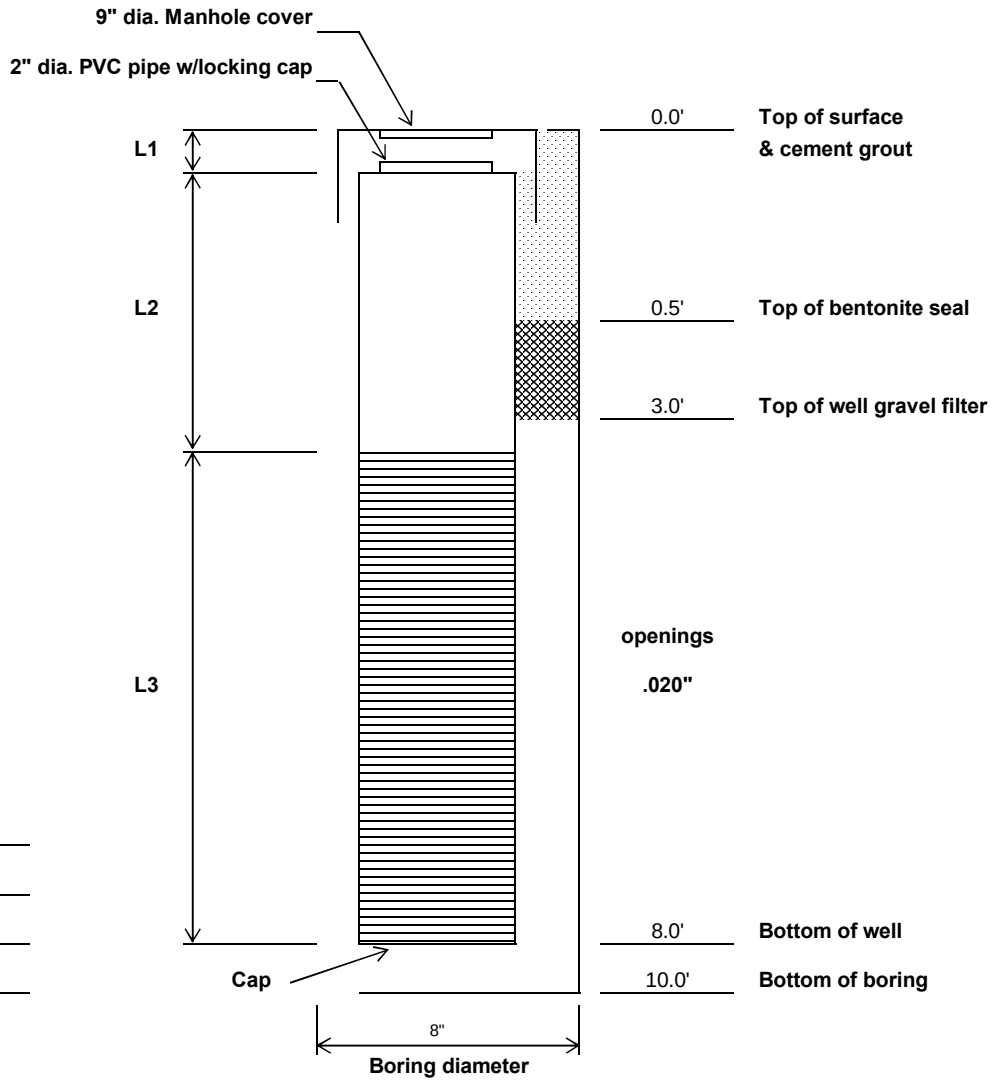
Well Development Report (NOTE: WATER LEVEL READINGS FROM TOP OF PVC)

DATE:	**WATER LEVEL BEFORE:**	**WATER LEVEL AFTER:**
TAKEN	**MINUTES AFTER DEVELOPMENT**	

L1 = 0.5'

L2 = 3.5'

L3 = 4.0'



Remarks:

ARCADIS

Appendix C

Well Survey Data

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: Under Bayonne Bridge, north of West Street, in New Jersey .

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number: 2600069647
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-1
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 22.96 Latitude: North 40 38 51.96

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661,082 East 592,095

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 10.06 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

LEVEL RUN MEETS OR EXCEEDS THIRD ORDER SPECS. ORIGINATING AT NGS DISK F38 RESET 1989 .

Significant observations and notes: 35.59' (NGVD29 FT) .

Authentication

I certify under penalty of law that I have personally examined and am familiar With the information submitted in this document and all attachments and that, Based on my inquiry of those individuals immediately responsible for obtaining The information, I believe the submitted information is true, accurate and Complete. I am aware that there are significant penalties for submitting false Information including the possibility of fine and imprisonment.

Seal

Professional Land Surveyor's Signature

Date March 24, 2004

Professional Land Surveyor's Name and License Number (Print)
William A. Rogers Jr. No. 22254 .

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: Under Bayonne Bridge, north of West Street, in New Jersey .

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number: 2600069648
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-2
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.17 Latitude: North 40 38 51.58

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661,043 East 592,078

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 10.33 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

LEVEL RUN MEETS OR EXCEEDS THIRD ORDER SPECS. ORIGINATING AT NGS DISK F38 RESET 1989 .

Significant observations and notes: 35.59' (NGVD29 FT) .

Authentication

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Seal

Professional Land Surveyor's Signature William A. Rogers

Date March 24, 2004

Professional Land Surveyor's Name and License Number (Print)
William A. Rogers Jr. No. 22254 .

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: Under Bayonne Bridge, north of West Street, in New Jersey .

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number: 2600069649
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-3
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 22.90 Latitude: North 40 38 51.14

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 660,999 East 592,100

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 10.52 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

LEVEL RUN MEETS OR EXCEEDS THIRD ORDER SPECS. ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

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Seal

Professional Land Surveyor's Signature

Date March 24, 2004

Professional Land Surveyor's Name and License Number (Print)
William A. Rogers Jr. No. 22254.

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: Under Bayonne Bridge, north of West Street, in New Jersey .

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number: 2600069650
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-4
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.30 Latitude: North 40 38 50.74

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 660,959 East 592,069

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 9.48 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

LEVEL RUN MEETS OR EXCEEDS THIRD ORDER SPECS. ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD 29 FT).

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Seal

Professional Land Surveyor's Signature

Date March 24, 2004

Professional Land Surveyor's Name and License Number (Print)
William A. Rogers Jr. No. 22254.

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: Under Bayonne Bridge, north of West Street, in New Jersey .

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number: 2600069651
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-5
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.26 Latitude: North 40 38 49.89

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 660,873 East 592,072

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 8.87 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

LEVEL RUN MEETS OR EXCEEDS THIRD ORDER SPECS. ORIGINATING AT NGS DISK F38 RESET 1989 .

Significant observations and notes: 35.59' (NGVD29 FT) .

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Seal

Professional Land Surveyor's Signature William A. Rogers

Date March 24, 2004

Professional Land Surveyor's Name and License Number (Print)
William A. Rogers Jr. No. 22254

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: Under Bayonne Bridge, north of West Street, in New Jersey .

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number: 2600069652
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-6
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 24.10 Latitude: North 40 38 49.79

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 660,862 East 592,008

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 6.85 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

LEVEL RUN MEETS OR EXCEEDS THIRD ORDER SPECS. ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

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Seal

Professional Land Surveyor's Signature

Date March 24, 2004

Professional Land Surveyor's Name and License Number (Print)
William A. Rogers Jr. No. 22254.

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: HUDSON BLVD.& WEST FIRST STREET BAYONNE BRIDGE.

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number 2600071650
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-7
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.27 Latitude: North 40 38 51.69

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661054 East 592071

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 10.03 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

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Seal

Professional Land Surveyor's Signature

Date August 19, 2004

Professional Land Surveyor's Name and License Number (Print)
JOSEPH COASCIO
050207460

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: HUDSON BLVD & WEST FIRST STREET BAYONNE BRIDGE SITE.

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number 2600071408
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-8
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.07 Latitude: North 40 38 51.68

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661053 East 592086

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 9.99 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

Authentication

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Seal

Professional Land Surveyor's Signature

Date August 20, 2004

Professional Land Surveyor's Name and License Number (Print)
JOSEPH LOCASCIO
49037440

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: HUDSON BLVD.& WEST FIRST STREET BAYONNE BRIDGE SITE.

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number 2600071409
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-9
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.09 Latitude: North 40 38 51.52

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661037 East 592084

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 10.21 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

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Seal

Professional Land Surveyor's Signature

Date August 20, 2004

Professional Land Surveyor's Name and License Number (Print)
JOSEPH CERASO
35030 4100

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: HUDSON BLVD.& WEST FIRST STREET BAYONNE BRIDGE SITE.

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number 2600071410
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-10
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.24 Latitude: North 40 38 51.48

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661034 East 592073

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 9.80 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

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Seal

Professional Land Surveyor's Signature

Date August 20, 2004

Professional Land Surveyor's Name and License Number (Print)
JOSEPH COCASCIO
03026748 00

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION -'FORM B'- LOCATION CERTIFICATION

Name of Owner: The Port Authority of NY & NJ .

Name of Facility: Bayonne Bridge.

Location: HUDSON BLVD.& WEST FIRST STREET BAYONNE BRIDGE SITE.

Case Number(s): N/A (UST#, ISRA #, Incident #, or EPA#)

Land Surveyor's Certification
Well Permit Number 2600071411
(This number must be permanently affixed to the well casing.)
Owners Well Number (As shown on application or plans): MW-11
Geographic Coordinate NAD 83 (To nearest 1/10 of second):
Longitude: West 74 08 23.17 Latitude: North 40 38 51.39

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:
North 661024 East 592079

Elevation of Top of Inner Casing (cap off) at
Reference mark (nearest 0.01'): 10.02 (NGVD'29 FT.)

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give Approximated actual elevation.

ORIGINATING AT NGS DISK F38 RESET 1989.

Significant observations and notes: 35.59' (NGVD29 FT).

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Seal

Professional Land Surveyor's Signature

Date August 20, 2004

Professional Land Surveyor's Name and License Number (Print)
JOSEPH LECASCIO
45 0307400

Professional Land Surveyor's Address and Phone Number
1632 Richmond Terrace, Staten Island, NY 10310.

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: The Port Authority of New York & New Jersey
Name of Facility: Bayonne Bridge
Location: W. 2nd. St. and W. 1st. St.
Case Number(s): --

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: E201203142
(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): MW-16

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74° 08' 24.7" Latitude: North 40° 38' 50.4"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 660923.17 East 591961.31

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): NAVD1988 6.73

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

Significant observations and notes:

AUTHENTICATION

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SEAL

3/12/12

PROFESSIONAL LAND SURVEYOR'S SIGNATURE **DATE**

Peter J. Moore 24GS03760200

PROFESSIONAL LAND SURVEYOR'S NAME AND LICENSE NUMBER
(Please print or type)

KS Engineers, P.C. 494 Broad Street, 4th. Floor, NJ 071023 973-623-2999

PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: The Port Authority of New York & New Jersey
Name of Facility: Bayonne Bridge
Location: W. 2nd. St. and W. 1st. St.
Case Number(s): --

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: E201203143
(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): MW-17

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74° 08' 23.5" Latitude: North 40° 38' 50.9"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 660971.63 East 592049.88

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): NAVD1988 8.26

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

Significant observations and notes:

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PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: The Port Authority of New York & New Jersey
Name of Facility: Bayonne Bridge
Location: W. 2nd. St. and W. 1st. St.
Case Number(s): --

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: E201203144
(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): MW-18

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74° 08' 23.4" Latitude: North 40° 38' 51.4"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 661029.56 East 592062.64

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): NAVD1988 8.79

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

Significant observations and notes:

AUTHENTICATION

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Peter J. Moore 24GS03760200

PROFESSIONAL LAND SURVEYOR'S NAME AND LICENSE NUMBER
(Please print or type)

KS Engineers, P.C. 494 Broad Street, 4th. Floor, NJ 071023 973-623-2999

PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

New Jersey Department of Environmental Protection
Bureau of Water Allocation

Well Permit Number 2600069647

MONITORING WELL RECORD

Atlas Sheet Coordinates 2622991

OWNER IDENTIFICATION PORT AUTHORITY OF NY & NJ

Address 241 ERIE ST RM 234

City Jersey City State New Jersey Zip Code 07310

WELL LOCATION - If not the same as owner please give address **Owner's Well No** MW-1

County Hudson Municipality Bayonne City Lot No 1-2 Block No 529

Address 221 W 1ST ST FORMER J M HUBER PROPERTY

WELL USE Monitoring

DATE WELL STARTED 12/1/03

DATE WELL COMPLETED 12/1/03

WELL CONSTRUCTION

Total Depth Drilled 12.2 ft

Finished Well Depth 12 ft

Borehole Diameter

Top 10 in

Bottom 10 in

Well was finished ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface — ft

Steel protective casing installed? ☐ Yes ☒ No

Static Water Level after drilling 4 ft

Water Level was Measured Using Water Level meter

Well was developed for — hours

at — gpm

Method of development —

Pump Capacity — gpm

Pump Type —

Drilling Fluid — Type of Rig CME 55

Health and Safety Plan Submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

Note Measure all depths from land surface	Depth to Top (ft)	Depth to Bottom (ft)	Diameter (inches)	Material	Wgt /Rating (lbs/sch no)
Single/Inner Casing	0	2	4"	PVC	Sch 40
Middle Casing (for triple cased wells only)	—	—	—	—	—
Outer Casing (largest diameter)	—	—	—	—	—
Open Hole or Screen (No Used .020)	2	12	4"	PVC	Sch 40
Blank Casings (No Used)	—	—	—	—	—
Tail Piece	—	—	—	—	—
Gravel Pack	1.5	12 2	10	Morie #2	250 lbs
Grout	0	1.5	10	Neat Cement Bentonite	50 lbs 5 lbs

Grouting Method Tremie

Drilling Method HSA

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0 Fill - Black/Grey Silty Sand + Gr

4 5 Red Brown Silty Clay w/ Sand

9 10 Lt Grey Silty Sand

12 EOH 12' 3"

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations

Drilling Company AQUIFER DRILLING & TESTING

Well Driller (Print) Steve Wolf

Driller's Signature Steve Wolf

Registration No 1579 Date 1/15/04

ORIGINAL DEP ***COPIES*** ***DRILLER*** ***OWNER*** ***HEALTH DEPARTMENT***

New Jersey Department of Environmental Protection
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit Number 2600069648

Atlas Sheet Coordinates 2622991

OWNER IDENTIFICATION PORT AUTHORITY OF NY & NJ

Address 241 ERIE ST RM 234

City Jersey City State New Jersey Zip Code 07310

WELL LOCATION - If not the same as owner please give address **Owner's Well No** MW-2

County Hudson Municipality Bayonne City Lot No 1-2 Block No 529

Address 221 W 1ST ST FORMER J M HUBER PROPERTY

WELL USE Monitoring

DATE WELL STARTED 12/1/03

DATE WELL COMPLETED 12/1/03

WELL CONSTRUCTION

Total Depth Drilled 8 ft

Finished Well Depth 8 ft

Borehole Diameter

Top 10 in

Bottom 10 in

Well was finished ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface — ft

Steel protective casing installed? ☐ Yes ☒ No

Static Water Level after drilling 3 ft

Water Level was Measured Using Tape

Well was developed for — hours

at — gpm

Method of development —

Pump Capacity — gpm

Pump Type —

Drilling Fluid — Type of Rig CME 55

Health and Safety Plan Submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

Note Measure all depths from land surface	Depth to Top (ft)	Depth to Bottom (ft)	Diameter (inches)	Material	Wgt /Rating (lbs/sch no)
Single/Inner Casing	0	2	4	PVC	Sch 40
Middle Casing (for triple cased wells only)	—	—	—	—	—
Outer Casing (largest diameter)	—	—	—	—	—
Open Hole or Screen (No Used 020)	2	8	4	PVC	Sch 40
Blank Casings (No Used)	—	—	—	—	—
Tail Piece	—	—	—	—	—
Gravel Pack	1	8	10	Morie #2	200 lbs
Grout	0	1	10	Neat Cement Bentonite	25 lbs 2 lbs

Grouting Method Tremie

Drilling Method HSA

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0 Fill - Black Grey Sand + gravel

4 5 Red Brown Silty Clay and Sand

8 EOH 8'

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations

Drilling Company AQUIFER DRILLING & TESTING

Well Driller (Print) Steve Wolf

Driller's Signature Steve Wolf

Registration No 1579 Date 1/15/04

ORIGINAL DEP *COPIES* *DRILLER* *OWNER* *HEALTH DEPARTMENT*

New Jersey Department of Environmental Protection
Bureau of Water Allocation

Well Permit Number 2600069649

MONITORING WELL RECORD

Atlas Sheet Coordinates 2622991

OWNER IDENTIFICATION PORT AUTHORITY OF NY & NJ

Address 241 ERIE ST RM 234

City Jersey City State New Jersey Zip Code 07310

WELL LOCATION - If not the same as owner please give address **Owner's Well No** MW-3

County Hudson Municipality Bayonne City Lot No 1-2 Block No 529

Address 221 W 1ST ST FORMER J M HUBER PROPERTY

WELL USE Monitoring **DATE WELL STARTED** 12/1/03

DATE WELL COMPLETED 12/1/03

WELL CONSTRUCTION

Total Depth Drilled 16 ft

Finished Well Depth 16 ft

Borehole Diameter

Top 10 in

Bottom 10 in

Well was finished ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface — ft

Steel protective casing installed? ☐ Yes ☒ No

Static Water Level after drilling 8' ft

Water Level was Measured Using Water Meter

Well was developed for — hours

at — gpm

Method of development —

Pump Capacity — gpm

Pump Type —

Drilling Fluid — Type of Rig CME 55

Health and Safety Plan Submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

Note Measure all depths from land surface	Depth to Top (ft)	Depth to Bottom (ft)	Diameter (inches)	Material	Wgt /Rating (lbs/sch no)
Single/Inner Casing	0	6	4	PVC	Sch 40
Middle Casing (for triple cased wells only)	—	—	—	—	—
Outer Casing (largest diameter)	—	—	—	—	—
Open Hole or Screen (No Used .020)	6	16	4	PVC	Sch 40
Blank Casings (No Used)	—	—	—	—	—
Tail Piece	—	—	—	—	—
Gravel Pack	4	16	10	Morie #2	
Grout	0	4	10	Neat Cement Bentonite	94 lbs 5 lbs

Grouting Method Tremie

Drilling Method HSA

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0 Fill - Black Grey Sand & Gravel

3 Red Brown Silty Clay

5 Tr Sand

10

12 Grey Silty Sand

15

16 EOH 16'

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations

Drilling Company AQUIFER DRILLING & TESTING

Well Driller (Print) Steve Wolf

Driller's Signature Steve Wolf

Registration No 1579 Date 1/15/04

ORIGINAL. DEP ***COPIES*** ***DRILLER*** ***OWNER*** ***HEALTH DEPARTMENT***

New Jersey Department of Environmental Protection
Bureau of Water Allocation

Well Permit Number 2600069650

MONITORING WELL RECORD

Atlas Sheet Coordinates 2622991

OWNER IDENTIFICATION PORT AUTHORITY OF NY & NJ

Address 241 ERIE ST RM 234

City Jersey City State New Jersey Zip Code 07310

WELL LOCATION - If not the same as owner please give address **Owner's Well No** MW-4

County Hudson Municipality Bayonne City Lot No 1-2 Block No 529

Address 221 W 1ST ST FORMER J M HUBER PROPERTY

WELL USE Monitoring **DATE WELL STARTED** 11/26/03

DATE WELL COMPLETED 11/26/03

WELL CONSTRUCTION

Total Depth Drilled 8 ft

Finished Well Depth 8 ft

Borehole Diameter

Top 10 in

Bottom 10 in

Well was finished ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface — ft

Steel protective casing installed? ☐ Yes ☒ No

Static Water Level after drilling 6.5 ft

Water Level was Measured Using Tape

Well was developed for — hours

at — gpm

Method of development —

Pump Capacity — gpm

Pump Type —

Drilling Fluid — Type of Rig CME 55

Health and Safety Plan Submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

Note Measure all depths from land surface	Depth to Top (ft)	Depth to Bottom (ft)	Diameter (inches)	Material	Wgt /Rating (lbs/sch no)
Single/Inner Casing	0	2	4	PVC	Sch 40
Middle Casing (for triple cased wells only)	—	—	—	—	—
Outer Casing (largest diameter)	—	—	—	—	—
Open Hole or Screen (No Used .020)	2	8	4	PVC	Sch 40
Blank Casings (No Used)	—	—	—	—	—
Tail Piece	—	—	—	—	—
Gravel Pack	1	8	10	Morie #2	200 lbs
Grout	0	1	10	Neat Cement Bentonite	20 lbs 2 lbs

Grouting Method Tremie

Drilling Method HSA

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0 Fill Black Grey Sand + Gr

2 Red Brown Silty Sand + Clay

5

8 EOH 8'

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations

Drilling Company AQUIFER DRILLING & TESTING

Well Driller (Print) Steve Wolf

Driller's Signature Steve Wolf

Registration No 1579 Date 1/15/04

ORIGINAL DEP ***COPIES*** ***DRILLER*** ***OWNER*** ***HEALTH DEPARTMENT***

New Jersey Department of Environmental Protection
Bureau of Water Allocation

Well Permit Number
2600069651

MONITORING WELL RECORD

Atlas Sheet Coordinates
2622991

OWNER IDENTIFICATION PORT AUTHORITY OF NY & NJ

Address 241 ERIE ST RM 234

City Jersey City State New Jersey Zip Code 07310

WELL LOCATION - If not the same as owner please give address **Owner's Well No** MW-5

County Hudson Municipality Bayonne City Lot No 1-2 Block No 529

Address 221 W 1ST ST FORMER J M HUBER PROPERTY

WELL USE Monitoring

DATE WELL STARTED 11/26/03

DATE WELL COMPLETED 11/26/03

WELL CONSTRUCTION

Total Depth Drilled 7 ft

Finished Well Depth 7 ft

Borehole Diameter

Top 10 in

Bottom 10 in

Well was finished ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface — ft

Steel protective casing installed? ☐ Yes ☒ No

Static Water Level after drilling 7 ft

Water Level was Measured Using Tape

Well was developed for — hours

at — gpm

Method of development —

Pump Capacity — gpm

Pump Type —

Drilling Fluid — Type of Rig CME 55

Health and Safety Plan Submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

Note Measure all depths from land surface	Depth to Top (ft)	Depth to Bottom (ft)	Diameter (inches)	Material	Wgt /Rating (lbs/sch no)
Single/Inner Casing	0	1.5	4	PVC	Sch 40
Middle Casing (for triple cased wells only)	—	—	—	—	—
Outer Casing (largest diameter)	—	—	—	—	—
Open Hole or Screen (No Used .020)	1.5	7	4	PVC	Sch 40
Blank Casings (No Used)	—	—	—	—	—
Tail Piece	—	—	—	—	—
Gravel Pack	1	7	10	Morie #2	200 lbs
Grout	0	1	10	Neat Cement Bentonite	25 lbs 2 lbs

Grouting Method Tremie

Drilling Method HSA

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0 Fill - Black Grey Silty Sand & Gravel

2

4 Red Brown Silty Sand w/ Clay

7 EOH 7'

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations

Drilling Company AQUIFER DRILLING & TESTING

Well Driller (Print) Steve Wolf

Driller's Signature Steve Wolf

Registration No 1579 Date 1/15/04

ORIGINAL DEP ***COPIES*** ***DRILLER*** ***OWNER*** ***HEALTH DEPARTMENT***

New Jersey Department of Environmental Protection
Bureau of Water Allocation

Well Permit Number
2600069652

MONITORING WELL RECORD

Atlas Sheet Coordinates
2622991

OWNER IDENTIFICATION PORT AUTHORITY OF NY & NJ

Address 241 ERIE ST RM 234

City Jersey City State New Jersey Zip Code 07310

WELL LOCATION - If not the same as owner please give address **Owner's Well No** MW-6

County Hudson Municipality Bayonne City Lot No 1-2 Block No 529

Address 221 W 1ST ST FORMER J M HUBER PROPERTY

WELL USE Monitoring **DATE WELL STARTED** 12/1/03

DATE WELL COMPLETED 12/1/03

WELL CONSTRUCTION

Total Depth Drilled 10 ft

Finished Well Depth 10 ft

Borehole Diameter

Top 10 in

Bottom 10 in

Well was finished ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface — ft

Steel protective casing installed? ☐ Yes ☒ No

Static Water Level after drilling 3 ft

Water Level was Measured Using Water Meter

Well was developed for — hours

at — gpm

Method of development —

Pump Capacity — gpm

Pump Type —

Drilling Fluid — Type of Rig CME 55

Health and Safety Plan Submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

Note Measure all depths from land surface	Depth to Top (ft)	Depth to Bottom (ft)	Diameter (inches)	Material	Wgt /Rating (lbs/sch no)
Single/Inner Casing	0	2	4	PVC	Sch 40
Middle Casing (for triple cased wells only)	—	—	—	—	—
Outer Casing (largest diameter)	—	—	—	—	—
Open Hole or Screen (No Used .020)	2	10	4	PVC	Sch 40
Blank Casings (No Used)	—	—	—	—	—
Tail Piece	—	—	—	—	—
Gravel Pack	1	10	10	Morie #2	300
Grout	0	1	10	Neat Cement Bentonite	25 lbs 2 lbs

Grouting Method Tremie

Drilling Method HSA

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0 Fill Black Grey Sand + Silt W/ Gravel

3 Red Brown Silty Clay w/ Trace Sand

5

10 EOH 10'

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations

Drilling Company AQUIFER DRILLING & TESTING

Well Driller (Print) Steve Wolf

Driller's Signature Steve Wolf

Registration No 1579 Date 1/15/04

ORIGINAL DEP *COPIES* *DRILLER* *OWNER* *HEALFILE*

New Jersey State Department of Environmental Protection
Bureau of Water Systems and Well Permitting
PO BOX 426 Trenton, NJ 08625-0426 Tel: 609-984-6831

Well Permit Number
E201000520

WELL PERMIT

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit

Certifying Driller: BEN THIES, JOURNEYMAN LICENSE # 0023179

Permit Issued to: CRAIG TEST BORING CO INC

Company Address: BOX 427 MAYS LANDING, NJ 08330

PROPERTY OWNER

Name: THE PORT AUTHORITY OF NY & NJ THE PORT AUTHORITY OF NY & NJ

Organization: The Port Authority of NY & NJ

Address: 241 Erie Street

City: Jersey City State: New Jersey Zip Code: 07310

PROPOSED WELL LOCATION

Facility Name: Bayonne Bridge

Address: West Front Street, Bayonne, NJ

County: Hudson Municipality: Bayonne City Lot: 2 Block: 373

Easting (X): 592074 Northing (Y): 661081
Coordinate System: NJ State Plane (NAD83) - USFEET

Local ID: PA MW-12

SITE CHARACTERISTICS

PROPOSED CONSTRUCTION

WELL USE: MONITORING

Other Use(s):

Diameter (in.): 4

Regulatory Program Requiring Wells/Borings:

Depth (ft.): 10

Case ID Number:

Pump Capacity (gpm): 0

Deviation Requested: N

Drilling Method: Mud Rotary

Attachments:

SPECIFIC CONDITIONS/REQUIREMENTS

Approval Date: January 21, 2010
Expiration Date: January 21, 2011

Approved by the authority of:
Mark Mauriello
Acting Commissioner

John Fields, Acting Bureau Chief
Bureau of Water Systems and Well Permitting

WELL PERMIT

DEVIATION INFORMATION	
Purpose:	
Unusual Conditions:	
Reason for Deviation:	
Proposed Well Construction	

GENERAL CONDITIONS/REQUIREMENTS
A copy of this permit shall be kept at the worksite / on the property and shall be exhibited upon request.
All well drilling/pump installation activities shall comply with N.J.A.C. 7:9D-1 et seq.
For this permit to remain valid, the well approved in this permit shall be constructed within one year of the effective date of the permit.
If the pump capacity applied for is less than 70 gpm, no subsequent increase to 70 gpm or more shall be made without prior approval of the Bureau of Water Systems and Well Permitting.
If the use of the well is to be changed a well permit for the proposed use of the well shall be submitted for review and approval.
If you or a future property owner intend to redesignate this well as a Category 1 well (domestic, non-public, community water supply or public non-community water supply wells), the well must be constructed as a Category 1 well per the Well Construction and Abandonment Regulations at N.J.A.C. 7:0D-1.1 et seq. In addition, if the current or future property owner intends to have this well redesignated as a community water supply well, the well must be constructed by a Master well driller, which would include having a Master well driller on-site at all times during construction of the well, as specified in the Well Construction and Abandonment Regulations. Otherwise, the New Jersey Department of Environmental Protection will not allow the well to be redesignated, and a new well would have to be installed.
In accepting this permit the Property Owner and Driller agree to abide by the following terms and conditions
In the event this well is abandoned, the Owner or Well driller shall assume full responsibility for having the well decommissioned in a manner satisfactory to the New Jersey Department of Environmental Protection in accordance with the provisions of N.J.A.C. 7:9D-1 et seq.
The granting of this permit shall not be construed in any way to affect the title or ownership of property, and shall not make the New Jersey Department of Environmental Protection or the State a party in any suit or question of ownership of property.
The issuance of this permit shall not be deemed to affect in any way action by the New Jersey Department of Environmental Protection on any future application.
This permit conveys no rights, either expressed, or implied to divert water.
This permit does not waive the obtaining of Federal or other State or local Government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits have been obtained.
This permit is NONTRANSFERABLE
This well shall not be used for the supply of potable / drinking water.

New Jersey State Department of Environmental Protection
Bureau of Water Systems and Well Permitting
PO BOX 426 Trenton, NJ 08625-0426 Tel: 609-984-6831

Well Permit Number
E201000521

WELL PERMIT

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit

Certifying Driller: BEN THIES, JOURNEYMAN LICENSE # 0023179

Permit Issued to: CRAIG TEST BORING CO INC

Company Address: BOX 427 MAYS LANDING, NJ 08330

PROPERTY OWNER

Name: THE PORT AUTHORITY OF NY & NJ THE PORT AUTHORITY OF NY & NJ

Organization: The Port Authority of NY & NJ

Address: 241 Erie Street

City: Jersey City State: New Jersey Zip Code: 07310

PROPOSED WELL LOCATION

Facility Name: Bayonne Bridge

Address: West Front Street, Bayonne, NJ

County: Hudson Municipality: Bayonne City Lot: 2 Block: 373

Easting (X): 592050 Northing (Y): 661044
Coordinate System: NJ State Plane (NAD83) - USFEET

Local ID: PA MW-13

SITE CHARACTERISTICS

PROPOSED CONSTRUCTION

WELL USE: MONITORING

Other Use(s):

Diameter (in.): 4

Regulatory Program Requiring Wells/Borings:

Depth (ft.): 10

Case ID Number:

Pump Capacity (gpm): 0

Deviation Requested: N

Drilling Method: Mud Rotary

Attachments:

SPECIFIC CONDITIONS/REQUIREMENTS

Approval Date: January 21, 2010
Expiration Date: January 21, 2011

Approved by the authority of:
Mark Mauriello
Acting Commissioner

John Fields, Acting Bureau Chief
Bureau of Water Systems and Well Permitting

WELL PERMIT

DEVIATION INFORMATION	
Purpose:	
Unusual Conditions:	
Reason for Deviation:	
Proposed Well Construction	

GENERAL CONDITIONS/REQUIREMENTS
A copy of this permit shall be kept at the worksite / on the property and shall be exhibited upon request.
All well drilling/pump installation activities shall comply with N.J.A.C. 7:9D-1 et seq.
For this permit to remain valid, the well approved in this permit shall be constructed within one year of the effective date of the permit.
If the pump capacity applied for is less than 70 gpm, no subsequent increase to 70 gpm or more shall be made without prior approval of the Bureau of Water Systems and Well Permitting.
If the use of the well is to be changed a well permit for the proposed use of the well shall be submitted for review and approval.
If you or a future property owner intend to redesignate this well as a Category 1 well (domestic, non-public, community water supply or public non-community water supply wells), the well must be constructed as a Category 1 well per the Well Construction and Abandonment Regulations at N.J.A.C. 7:0D-1.1 et seq. In addition, if the current or future property owner intends to have this well redesignated as a community water supply well, the well must be constructed by a Master well driller, which would include having a Master well driller on-site at all times during construction of the well, as specified in the Well Construction and Abandonment Regulations. Otherwise, the New Jersey Department of Environmental Protection will not allow the well to be redesignated, and a new well would have to be installed.
In accepting this permit the Property Owner and Driller agree to abide by the following terms and conditions
In the event this well is abandoned, the Owner or Well driller shall assume full responsibility for having the well decommissioned in a manner satisfactory to the New Jersey Department of Environmental Protection in accordance with the provisions of N.J.A.C. 7:9D-1 et seq.
The granting of this permit shall not be construed in any way to affect the title or ownership of property, and shall not make the New Jersey Department of Environmental Protection or the State a party in any suit or question of ownership of property.
The issuance of this permit shall not be deemed to affect in any way action by the New Jersey Department of Environmental Protection on any future application.
This permit conveys no rights, either expressed, or implied to divert water.
This permit does not waive the obtaining of Federal or other State or local Government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits have been obtained.
This permit is NONTRANSFERABLE
This well shall not be used for the supply of potable / drinking water.

New Jersey State Department of Environmental Protection
Bureau of Water Systems and Well Permitting
PO BOX 426 Trenton, NJ 08625-0426 Tel: 609-984-6831

Well Permit Number
E201000519

WELL PERMIT

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit

Certifying Driller: BEN THIES, JOURNEYMAN LICENSE # 0023179

Permit Issued to: CRAIG TEST BORING CO INC

Company Address: BOX 427 MAYS LANDING, NJ 08330

PROPERTY OWNER

Name: THE PORT AUTHORITY OF NY & NJ THE PORT AUTHORITY OF NY & NJ

Organization: The Port Authority of NY & NJ

Address: 241 Erie Street

City: Jersey City State: New Jersey Zip Code: 07310

PROPOSED WELL LOCATION

Facility Name: Bayonne Bridge

Address: West Front Street, Bayonne, NJ

County: Hudson Municipality: Bayonne City Lot: 2 Block: 373

Easting (X): 592139 Northing (Y): 661029
Coordinate System: NJ State Plane (NAD83) - USFEET

Local ID: PA MW-14

SITE CHARACTERISTICS

PROPOSED CONSTRUCTION

WELL USE: MONITORING

Other Use(s):

Diameter (in.): 4

Regulatory Program Requiring Wells/Borings:

Depth (ft.): 10

Case ID Number:

Pump Capacity (gpm): 0

Deviation Requested: N

Drilling Method: Mud Rotary

Attachments:

SPECIFIC CONDITIONS/REQUIREMENTS

Approval Date: January 21, 2010
Expiration Date: January 21, 2011

Approved by the authority of:
Mark Mauriello
Acting Commissioner

John Fields, Acting Bureau Chief
Bureau of Water Systems and Well Permitting

WELL PERMIT

DEVIATION INFORMATION	
Purpose:	
Unusual Conditions:	
Reason for Deviation:	
Proposed Well Construction	

GENERAL CONDITIONS/REQUIREMENTS
A copy of this permit shall be kept at the worksite / on the property and shall be exhibited upon request.
All well drilling/pump installation activities shall comply with N.J.A.C. 7:9D-1 et seq.
For this permit to remain valid, the well approved in this permit shall be constructed within one year of the effective date of the permit.
If the pump capacity applied for is less than 70 gpm, no subsequent increase to 70 gpm or more shall be made without prior approval of the Bureau of Water Systems and Well Permitting.
If the use of the well is to be changed a well permit for the proposed use of the well shall be submitted for review and approval.
If you or a future property owner intend to redesignate this well as a Category 1 well (domestic, non-public, community water supply or public non-community water supply wells), the well must be constructed as a Category 1 well per the Well Construction and Abandonment Regulations at N.J.A.C. 7:0D-1.1 et seq. In addition, if the current or future property owner intends to have this well redesignated as a community water supply well, the well must be constructed by a Master well driller, which would include having a Master well driller on-site at all times during construction of the well, as specified in the Well Construction and Abandonment Regulations. Otherwise, the New Jersey Department of Environmental Protection will not allow the well to be redesignated, and a new well would have to be installed.
In accepting this permit the Property Owner and Driller agree to abide by the following terms and conditions
In the event this well is abandoned, the Owner or Well driller shall assume full responsibility for having the well decommissioned in a manner satisfactory to the New Jersey Department of Environmental Protection in accordance with the provisions of N.J.A.C. 7:9D-1 et seq.
The granting of this permit shall not be construed in any way to affect the title or ownership of property, and shall not make the New Jersey Department of Environmental Protection or the State a party in any suit or question of ownership of property.
The issuance of this permit shall not be deemed to affect in any way action by the New Jersey Department of Environmental Protection on any future application.
This permit conveys no rights, either expressed, or implied to divert water.
This permit does not waive the obtaining of Federal or other State or local Government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits have been obtained.
This permit is NONTRANSFERABLE
This well shall not be used for the supply of potable / drinking water.

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-03 PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201203142

MONITORING WELL RECORD

PROPERTY OWNER: THE PORT AUTHORITY OF NY & NJ THE PORT AUTHORITY OF NY & NJ

Company/Organization: The Port Authority of NY & NJ

Address: 241 Erie Street Jersey City, New Jersey 07310

WELL LOCATION: W. 2nd & 1st Street

Address: W. 2nd & 1st Streets

County: Hudson Municipality: Bayonne City Lot: 3 Block: 373

Easting (X): 591961 Northing (Y): 660923
Coordinate System: NJ State Plane (NAD83) - USFEET

DATE WELL STARTED: March 5, 2012
DATE WELL COMPLETED: March 5, 2012

WELL USE: MONITORING

Other Use(s):

Local ID: MW-16

WELL CONSTRUCTION

Total Depth Drilled (ft.): 10 Finished Well Depth (ft.): 8 Well Surface: Flush Mount

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt/Rating/Screen # Used (lbs/ch no.)
Borehole	0	10	7		
Casing	0	4	2	PVC	Sch40
Screen	4	8	2	Pvc	.020 slot

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in.)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	2	7	2		28	1.5
Gravel Pack	2	10	7	2	# 1 Well Gravel		

Grouting Method: Gravity method Drilling Method: Hollow Stem Augers

ADDITIONAL INFORMATION

Protective Casing: No
Static Water Level: 4 ft. below land surface
Water Level Measure Tool: tape measure
Well Development Period: .25 hrs.
Method of Development: 2" whale pump
Pump Type:

Pump Capacity: _ gpm
Total Design Head: _ ft.
Drilling Fluid:
Drill Rig: cme-75
Health and Safety Plan Submitted? No

ATTACHMENTS:

GEOLOGIC LOG

0 - 10: brown SP - Poorly graded sands and gravelly sands, little or no fines

ADDITIONAL INFORMATION:

Driller of Record: Tom Ward, JOURNEYMAN LICENSE # 0001106 Company: CRAIG TEST BORING CO INC

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-03 PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201203143

MONITORING WELL RECORD

PROPERTY OWNER: THE PORT AUTHORITY OF NY & NJ THE PORT AUTHORITY OF NY & NJ

Company/Organization: The Port Authority of NY & NJ

Address: 241 Erie Street Jersey City, New Jersey 07310

WELL LOCATION: W. 2nd & 1st Street

Address: W. 2nd & 1st Streets

County: Hudson Municipality: Bayonne City Lot: 3 Block: 373

Easting (X): 592049 Northing (Y): 660971
Coordinate System: NJ State Plane (NAD83) - USFEET

DATE WELL STARTED: March 5, 2012
DATE WELL COMPLETED: March 5, 2012

WELL USE: MONITORING

Other Use(s):

Local ID: MW-17

WELL CONSTRUCTION

Total Depth Drilled (ft.): 8.2 Finished Well Depth (ft.): 8 Well Surface: Flush Mount

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt/Rating/Screen # Used (lbs/ch no.)
Borehole	0	8.2	7		
Casing	0	4	2	PVC	sch40
Screen	4	8	2	Pvc	.020 slot

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in.)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	2	7	2		28	1.5
Gravel Pack	2	8.2	7	2	# 1 Well Gravel		

Grouting Method: Gravity method Drilling Method: Hollow Stem Augers

ADDITIONAL INFORMATION

Protective Casing: No
Static Water Level: 4 ft. below land surface
Water Level Measure Tool: tape measure
Well Development Period: .25 hrs.
Method of Development: 2" whale pump
Pump Type:

Pump Capacity: _ gpm
Total Design Head: _ ft.
Drilling Fluid:
Drill Rig: cme-75
Health and Safety Plan Submitted? No

ATTACHMENTS:

GEOLOGIC LOG

0 - 8.2: brown SP - Poorly graded sands and gravelly sands, little or no fines

ADDITIONAL INFORMATION:

Driller of Record: Tom Ward, JOURNEYMAN LICENSE # 0001106 Company: CRAIG TEST BORING CO INC

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-03 PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201203144

MONITORING WELL RECORD

PROPERTY OWNER: THE PORT AUTHORITY OF NY & NJ THE PORT AUTHORITY OF NY & NJ

Company/Organization: The Port Authority of NY & NJ

Address: 241 Erie Street Jersey City, New Jersey 07310

WELL LOCATION: W. 2nd & 1st Street

Address: W. 2nd & 1st Street

County: Hudson Municipality: Bayonne City Lot: 3 Block: 373

Easting (X): 592062 Northing (Y): 661029
Coordinate System: NJ State Plane (NAD83) - USFEET

DATE WELL STARTED: March 5, 2012
DATE WELL COMPLETED: March 5, 2012

WELL USE: MONITORING

Other Use(s):

Local ID: MW-18

WELL CONSTRUCTION

Total Depth Drilled (ft.): 10 Finished Well Depth (ft.): 8 Well Surface: Flush Mount

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt/Rating/Screen # Used (lbs/ch no.)
Borehole	0	10	7		
Casing	0	4	2	PVC	sch40
Screen	4	8	2	Pvc	.020 slot

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in.)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	2	7	2		28	1.5
Gravel Pack	2	10	7	2	# 1 Well Gravel		

Grouting Method: Gravity method Drilling Method: Hollow Stem Augers

ADDITIONAL INFORMATION

Protective Casing: No
Static Water Level: 4 ft. below land surface
Water Level Measure Tool: tape measure
Well Development Period: .25 hrs.
Method of Development: 2" whale pump
Pump Type:

Pump Capacity: _ gpm
Total Design Head: _ ft.
Drilling Fluid:
Drill Rig: cme-75
Health and Safety Plan Submitted? No

ATTACHMENTS:

GEOLOGIC LOG

0 - 10: brown SP - Poorly graded sands and gravelly sands, little or no fines

ADDITIONAL INFORMATION:

Driller of Record: Tom Ward, JOURNEYMAN LICENSE # 0001106 Company: CRAIG TEST BORING CO INC

ARCADIS

Appendix D

Quality Assurance Project Plan

Quality Assurance Project Plan (QAPP)

This Quality Assurance Project Plan (QAPP) has been developed for the implementation of remedial activities associated with arsenic impacts in the soil and groundwater at 235 West First Street, Bayonne, New Jersey, under the existing Bayonne Bridge. It has been developed in accordance with N.J.A.C. 7:26E – Technical Requirements for Site Remediation, the New Jersey Department of Environmental Protection (NJDEP) Field Sampling Procedures Manual (August 2005), and the Port Authority of New York and New Jersey (PANYNJ) Materials Engineering Division, Standard Operating Procedures for Environmental Field Sampling and Testing (Attachment 1).

Project Scope

The project scope for investigation and remediation of arsenic impacts in soil and groundwater is summarized in Section 1.5 of the RIR/RAW. The procedures outlined in this QAPP have been developed in order to provide confidence that the remedial actions are carried out effectively and meet project specifications and present industry standards.

Project Roles and Responsibilities

The following New Jersey Certified Laboratories perform the analyses of soil and groundwater samples:

TestAmerica Edison
777 New Durham Road
Edison, NJ 08817
NJ Certification #12028
Laboratory Contact: Omayra Penas

Analytical Laboratory Services
34 Dogwood Lane
Middletown, PA 17057
NJ Certification #PA010
Laboratory Contact: Anna Milliken

The laboratories follow their own QAPP for sample handling and analytical procedures within the laboratory. A copy of each laboratory's QAPP is included as Attachment 2. The laboratories must adhere to the personnel, certification, and analytical requirements listed in the NJDEP Technical Requirements for Site Remediation. The laboratories must produce data that meets NJDEP Reduced Deliverable requirements, and supporting data must remain on file for five years.

The contact person for the overall project coordination and sampling activities is Gerald Jean-Pierre (PANYNJ) (973) 565-7559. The LSRP assigned to the case is Clint P. Catania (201) 403-7738.

ARCADIS

Attachments

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Attachment 1

PANYNJ Materials Engineering Division Standard Operating Procedures

Environmental Field Sampling and Testing

THE PORT AUTHORITY OF NY & NJ

Materials Engineering Division

STANDARD OPERATING PROCEDURES

ENVIRONMENTAL FIELD SAMPLING AND TESTING

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1 INTRODUCTION

This manual presents the Standard Operating Procedures (SOPs) for environmental sampling projects conducted by The Port Authority of New York and New Jersey (PANY/NJ).

The objective of this manual is to provide guidance to PANY/NJ personnel who perform or review projects which include environmental sampling conducted for PANY/NJ, and to assure that quality data is obtained during PANY/NJ environmental field investigations. For most projects, a Site-Specific Field Sampling Plan will be needed to address specific requirements contained within other control documents (i.e., permits, Administrative Consent Orders, Health & Safety Plans, regulatory agency comments, etc.) which prescribe certain sampling activities or methods unique to a particular program, site or project. The Environmental Engineering Unit, which is directed by Robert Pruno, will provide any background information that is available on the project. This document should also be used as a technical guidance document when developing Site-specific Field Sampling Plans for PANY/NJ projects. The SOPs provided in this manual can also be used in absence of a site specific Field sampling plan to define generic sampling protocols for the site.

The procedures in this manual were prepared to comply, in most cases with New Jersey Department of Environmental Protection (NJDEP), and New York State Department of Environmental Conservation (NYSDEC) guidelines and requirements for completion of environmental investigations. Sampling monitoring well installation protocols were developed based on NJDEP's Field Sampling Procedures Manual (May, 1992), and were modified when necessary to conform to generally accepted by NYSDEC and U.S. Environmental Protection Agency procedures if applicable.

In most cases, the field SOP will be supplemented by the site-specific Field Sampling Plan (FSP) or Health and Safety Plan (HASP) for a particular project. The following topics may need to be addressed in the Site-specific Field Sampling Plan for each project:

- The history and background conditions of the site will be documented, to aid in the design and implementation of environmental sampling events.
- Sample locations and sample identification protocols specific to each site will be determined.
- Analytical method requirements will be determined for all proposed samples to be collected at the site.
- Information on underground utilities, and other issues related to access at the site will be addressed.

2 GROUNDWATER MONITORING

The following procedures are generic SOPs for the implementation of groundwater monitoring programs at PANY/NJ sites. The procedures should in most cases comply with guidelines and/or regulations that may be required by NYSDEC and NJDEPE; however, modifications or additions to these procedures may be required on a site-by-site basis by appropriate involved state agencies.

All personnel who will be on site during groundwater monitoring activities must be provided with copies of the site-specific FSP and HASP. An equipment checklist for completion of groundwater monitoring procedures is provided in Appendix A.

2.1 MONITORING WELL INSTALLATION

The following procedures for groundwater monitoring well installation should be followed in the absence of project-specific protocols in the project FSP. The procedures described herein are also intended to provide minimum requirements for most projects; however, because the conditions encountered and project objectives at each site vary, the FSP will detail modifications to this protocol (if any) that should be used for a particular project.

If monitoring wells are to be installed in the State of New Jersey or on Long Island (and the boroughs of Brooklyn and Queens), a well permit must be obtained for each well prior to mobilization. The permit(s) will usually be obtained by the driller, and copies of the permits will be provided to the PANY/NJ inspector prior to drilling each well. If monitoring wells are completed in the State of New Jersey, a licensed driller will be used. If monitoring wells are completed in the State of New Jersey and the work involves underground storage tanks (USTs), a geologist/engineer licensed in the State of New Jersey in accordance with the regulatory requirements of N.J.S.A. 58:10A-24.1-8 shall be present at each operating drill rig. The PANY/NJ inspector will be responsible for logging samples, monitoring drilling operations, recording water losses/gains, documenting screen/casing depths, and other pertinent data.

All drilling equipment used for the installation of monitoring wells must first be decontaminated in accordance with the procedures outlined in Chapter 8. All well construction materials (e.g., well screen, casing, caps) will also be decontaminated.

2.1.1 Unconsolidated Monitoring Well Installation Procedures

Prior to the installation of a monitoring well in unconsolidated materials, a boring will be completed from ground surface to the bottom of the selected screened interval using the protocols for split-spoon sampling as presented in Chapter 3. If a boring has been previously installed at the same location as the monitoring well, additional split-spoon sampling does not need to be completed.

All bits, augers, well screens, and casings will be placed on clean polyethylene sheeting when not in use to avoid contact with the ground.

2.1.1.1 Unconfined, Unconsolidated Monitoring Well Installation Procedures

Generic guidelines for the completion of unconfined, unconsolidated monitoring wells are provided on Figure 2-1. The following procedures will be used when installing a monitoring well in borings drilled through an unconfined and unconsolidated aquifer:

- The monitoring well will be installed using, at minimum, 4.25-in. hollow-stem augers for 2-in. inside diameter (I.D.) monitoring wells and 6.25-in. hollow-stem augers for 4-in. I.D. monitoring wells. The annular space between the innermost casing and the borehole must be at least 2 in.

- Monitoring wells will be completed using commercially fabricated, machine- slotted, flush-joint PVC or stainless steel well screen, with appropriate length of riser to extend to ground surface. The screen will not exceed 25 ft in length, and will be fitted with a PVC or stainless steel bottom plug of appropriate size. The riser casing will be fitted with a PVC or stainless steel cap of appropriate size. Under no circumstances should well casings, caps, or plug materials be joined using glues or adhesives.

- When backfilling the annular space between the hollow-stem augers and the installed screen, the auger flights should be removed in 1-ft intervals, as clean No. 1 grade sand (appropriate size to retain most of the formation material as outlined in Table 2-1) is placed in the screened interval. The sand (filter pack) around the screen will not extend more than 3 ft below or 5 ft above the top of the screened interval. Additionally, the filter pack will not extend into a confining layer.

- A bentonite seal at least 2 ft thick will be installed above the filter pack. All bentonite pellets used to install the seal shall be crushed before placing in the hole and shall be hydrated for at least 15 minutes before continuing.

- The remainder of the annular space will be filled with tremie-grouted or pressure-installed cement-bentonite grout mixture to the ground surface. The blend will be proportional to mixing 94 lb of portland cement and 5 lb bentonite with 8.3 gal of potable water from a treated municipal supply. The bentonite will be added after the required amount of cement is mixed with potable water. No additives or borehole cuttings will be mixed with the seal.

- A protective steel security casing or flush-mounted curb box will be installed. A locking cap will be installed on each monitoring well. Locks for all monitoring wells located on a specific site will be keyed alike.

- If monitoring wells are completed in the State of New Jersey, the site monitoring well identification number and State well permit number will be affixed to each well.

- Record all monitoring well installation data in field notebook. A well installation report (Figure 2-2) will be completed showing relative depths, intervals of screen, casing, filter pack, and seals.

- Following completion of each monitoring well, the innermost casing will be surveyed using a state licensed surveyor to the nearest 0.01 ft. The survey point will be marked on each well.

Table 2-1
Slot Sizes/Standard Grades (Morie Well Gravel)

Screen Slot	Nominal Mesh Size	Grade
90	4-10	#4
60	6-12	#3
50	8-16	#2
30	12-20	#1
20	16-35	#0
15	20-40	#00N
10	30-50	#00

Figure 2-1
Typical Unconsolidated Well

Figure 2-2
Well Installation Report

Figure 2-3
Typical Confined Unconsolidated Aquifer Well

Figure 2-4
Typical Bedrock Monitoring Well

2.1.1.2 Confined, Unconsolidated Monitoring Well Installation Procedures

Generic guidelines for the completion of confined, unconsolidated monitoring wells are provided as Figure 2-3. The following procedures will be used when installing a monitoring well in a boring drilled through a confined and unconsolidated aquifer:

- Drill a borehole using hollow-stem augers through unconsolidated material to a minimum of 1 ft into the confining layer. The borehole must be a minimum of 4 in. greater in diameter than the diameter of the outer steel casing to be installed inside the boring.

- Install appropriate length of stainless steel or PVC outer casing of length to extend from ground surface to at least 1 ft below the drilled borehole in the confining layer. The outer casing must be a minimum of 4 in. greater in diameter than that of the inner casing.

- The annular space between the borehole and the casing will be filled with tremie-srouted or pressure-installed cement-bentonite grout mixture to the ground surface. The blend will be proportional to mixing 94 lb of Portland cement and 5 lb of bentonite with 8.3 gal of potable municipal supply water. The bentonite will be added after the required amount of cement is mixed with potable water. No additives or borehole cuttings will be mixed with the seal. Where necessary or appropriate, fast curing or quick setting specialty grout materials may be used.

- Following sufficient time for grout to cure (i.e., 24 hrs or manufacturer's instructions), the borehole will be drilled through the in-place casing to the desired depth using spin casing or air or water rotary methods.

- Install screen and casing materials in the borehole using the procedures outlined for installation of unconfined, unconsolidated monitoring wells in Section 2.1.1.1.

- If monitoring wells are completed in the State of New Jersey, the site monitoring well identification number and state well permit number will be affixed to each monitoring well.

- Following completion of each monitoring well, the innermost casing will be surveyed using a state licensed surveyor to the nearest 0.01 ft. The survey point will be marked on each well.

2.1.2 Bedrock Monitoring Well Installation Procedures

The following procedures will be used for the completion of groundwater monitoring wells in bedrock. Prior agency approval should be obtained before installing any monitoring well with the screened interval partially in unconsolidated and consolidated material (bedrock).

Figure 2-4 shows a generic well construction diagram for bedrock monitoring wells. The following procedures should be used when installing a monitoring well in bedrock:

- Drill a borehole or boring using hollow-stem auger or air or water rotary methods through the unconsolidated material until bedrock is encountered. The borehole must be a minimum of 4 in. larger than the casing to be installed. If air rotary is used, an in-line oil filter will be placed between the air compressor and the borehole. If water rotary is used, an approved potable water source from a treated municipal supply will be used.

- Continue drilling the borehole using air rotary or water rotary to 5 ft below the competent bedrock surface. Install appropriate length of stainless steel or PVC casing of length to extend from ground surface to 5 ft below competent bedrock. If the monitoring well is installed in the State of New Jersey, the surface casing must be installed to a depth of at least 10 ft below competent bedrock.

- The annular space between the borehole and the casing will be filled with tremie-grouted or pressure-installed cement-bentonite grout mixture to the ground surface. The blend will be proportional to mixing 94 lb of portland cement and 5 lb of bentonite with 8.3 gal of potable water from a treated municipal supply. The bentonite will be added after the required amount of cement is mixed with potable water. No additives or borehole cuttings will be mixed with the seal. Where necessary or appropriate, fast cutting of quick setting specialty grout materials may be used.

- Following sufficient time for grout to cure (i.e., 24 hrs or manufacturer's instructions), the borehole will be drilled through the in-place casing to the desired depth using air rotary or rock coring methods. The open borehole interval will not exceed 25 ft without prior written approval. If screen and riser casing are to be installed in the bedrock borehole, the procedures outlined for the installation, filter packing, and sealing of screen and riser casing for unconsolidated wells will be followed.

- If monitoring wells are completed in the State of New Jersey, the site monitoring well identification number and State well permit number will be affixed to each monitoring well.

- Following completion of each monitoring well, the innermost casing will be surveyed using a state licensed surveyor to the nearest 0.01 ft. The survey point will be marked on each well.

Figure 2-5
FORM – A
Monitoring Well As-Built Certification

Name of Permittee:_____
Name of Facility: :_____
Location: :_____
NJPDES Permit No. NJOO or
ECRA case No.: _____

CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation:
_____

Owner's Well Number (As shown on the application or plans):
_____

Well Completion Date:
_____

Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot):
_____

Total Depth of Well to the nearest 1/2 foot:
_____

Depth to Top of Screen From Top of Casing
(one-hundredth of a foot):
_____

Screen Length (of length of open hole) in feet:
_____

Screen or Slot Size:
_____

Screen or Slot Material:
_____

Casing Material: (PVC, Steel or Other - Specify):
_____

Casing Diameter (inches):
_____

Static Water Level From top of Casing at the Time
of Installation (one-hundreth of a foot):
_____

Yield (gallons per minute):
_____

Development Technique (specify)
_____

Length of Time Well is Developed/
_____

Pumped or Bailed
_____

Lithologic Log:
_____

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

_____Name (Type or Print)
_____Signature
_____Certification or License No. **Seal**

Certification by Executive Officer or Duly Authorized Representative

_____
Name (Type or Print) Signature

_____
Title Date

Figure 2-6
FORM – B
Location Certification

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

Name of Permittee:_____
Name of Facility:_____
Location: _____
NJPDES Number:_____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation:_____
This number must be permanently affixed to the well casing:
Datum NAD 1927
Longitude (one-tenth of a second): West _____
Latitude (one-tenth of a second): North _____
Elevation of Top of Casing (cap off) (one-hundreth of a foot): WC=_____/PVC=_____ /GRD=_____
Owners Well Number (As shown on application or plans):_____

BENCHMARK -_____ **ELEVATION** - _____
GEOGRAPHIC POSITION - _____
DATE OF SURVEY - _____

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information the possibility of fine and imprisonment.

_____
PROFESSIONAL LAND SURVEYOR'S SIGNATURE

_____
PROFESSIONAL LAND SURVEYOR'S NAME **SEAL**
(Please print or type)

_____
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be surveyed to an accuracy of one-hundreth of a second latitude and longitude. This shall not be considered to be a major modification of the N.J.P.D.E.S. permit.

2.1.3 Monitoring Well Development

Following sufficient time for grout to cure (e.g., 24 hrs), each monitoring well will be developed by pumping and surging. Purging will be accomplished by removing standing water using either a centrifugal pump, submersible pump, or bailer and length of new dedicated polyethylene tubing to extend to ground surface. All equipment lowered into a monitoring well must first be decontaminated as described in Chapter 8.

Pumping rates should be adjusted to avoid purging the well dry, if possible. Purging will be continued until the discharge water is visibly clear, or for a maximum 1 hr, whichever comes first. All information obtained during development will be recorded in the field on the Monitoring Well Development Data Sheet (Figure 2-7).

Prior to development the static water level and depth to petroleum hydrocarbons (if present) will be measured using the procedures described later in the groundwater sampling section of this document. If petroleum hydrocarbons are detected in a monitoring well, that well will not be developed.

Figure 2-7/2-8
Monitoring Well Purging & Sampling Data Sheet

2.1.3.1 Development With a Peristaltic Pump

A peristaltic pump may be used to develop monitoring wells with depths of 25 ft below grade or less. New dedicated polyethylene tubing will be used inside the well to surge and remove the groundwater. Prior to insertion of the polyethylene tubing into the well, it must be cleaned with deionized water. When priming the pump, only potable municipal supply water will be used.

2.1.3.2 Development With Submersible Pump

A stainless steel submersible pump may be used on any depth wells. The pump should be decontaminated in accordance with the procedure outlined in Chapter 8. The discharge line for the pump will be composed of new dedicated polyethylene tubing cleaned with deionized water prior to placing into the well.

2.1.3.3 Development With Bailer

A bailer can be used to develop a well if the use of a pump is not practical. If a bailer is to be used during development, prior approval by the project manager must be obtained. Regulatory approval may also be required for some projects. Development is achieved by lowering the bailer into the screened interval of the water column and rapidly surging up and down throughout the screened interval to create suction in the column. The outside diameter of the bailer will be nominally the same size as the diameter of the well screen. Occasionally, water in the bailer will be discharged from the well to remove fines from the filter pack.

2.2 PIEZOMETER INSTALLATION PROCEDURES

Piezometers, or observation wells installed for determination of water levels, will be completed using the same procedures as those for monitoring wells; however, modifications to the monitoring well protocols may be implemented if approved by appropriate regulatory agencies involved. If piezometers are installed in the State of New York, protective casings and well development may not be necessary.

2.3 GROUNDWATER SAMPLING PROCEDURES

The following is the SOP for purging and collecting groundwater samples from monitoring wells. Unless otherwise specified by the site-specific FSP, no modifications to this protocol should be made without approval of the PANY/NJ project manager. Groundwater sampling will be performed at least two weeks after installation and development of the monitoring well has been completed. If groundwater sampling is performed in the State of New Jersey, then all information obtained during static water level measurement, monitoring well purging, and groundwater sample collection for each well will be recorded on the Monitoring Well Purging and Sampling Sheet (Figure 2-8). Prior to initiation of groundwater sampling activities, the condition of each monitoring well will be visually inspected for signs of damage or tampering and any findings will be noted on the groundwater sampling field record sheet. The monitoring well cap will be unlocked and removed, and a portable photoionization detector (PID) or

organic vapor analyzer (OVA) reading will be obtained from the casing annulus and recorded on Figure 2-8.

2.3.1 Monitoring Well Gauging

Prior to commencing any groundwater purging activities and sample collection, the depth to static water, depth to petroleum product (if present), and depth to the bottom of each monitoring well located at the site must be obtained. The information should be recorded on the Monitoring Well Purging and Sampling Sheet.

2.3.1.1 Static Water Level Measurement

Unless non-aqueous petroleum hydrocarbons (product) are suspected to be present, or elevated PID readings are detected in the well casing annulus, water levels will be obtained using an electronic sounder accurate to the nearest 0.01 ft. The water level will be determined as a depth below a marked reference point (usually the top of casing). The depth to water is then measured by lowering the probe until the electronic sounder is activated (usually indicated by an audible tone).

2.3.1.2 Monitoring for Non-Aqueous Phase Petroleum Hydrocarbons

If petroleum hydrocarbons (product) or other non-aqueous phase liquids (NAPLs) are suspected to be present, or elevated PID readings are detected in the casing annulus of the monitoring wells, the static depth to petroleum hydrocarbons (if present) and depth to water will be measured to the nearest 0.01 ft using an oil-water interface probe. The depth to petroleum hydrocarbons (if present) will be measured by slowly lowering the probe into the well until the hydrocarbon phase indicator is activated (usually a continuous audible tone). The depth to hydrocarbons is then recorded relative to the reference point of the well. The depth to water is then measured by lowering the probe quickly through the liquid hydrocarbon layer until the water phase indicator is activated (usually indicated by an intermittent audible tone). The probe will then be slowly raised until the water indicator is deactivated, and the depth to water is recorded. If petroleum hydrocarbons are detected in a monitoring well for the first time, or at a thickness of 0.01 ft or less, a new disposable Teflon or polyethylene bailer will be lowered into the monitoring well to the hydrocarbon interface and removed and visually examined in order to confirm the presence of petroleum product in the well. The depth to hydrocarbons and depth to water will be recorded on the Monitoring Well Purging and Sampling Sheet. If petroleum hydrocarbons are detected in a monitoring well, that well will not be purged and sampled for groundwater, unless otherwise indicated by the project manager. Any petroleum hydrocarbons and water removed from the well will be containerized.

2.3.1.3 Monitoring Well Depth

Upon completion of the water level/hydrocarbon measurements, the depth of each monitoring well will be determined by lowering a decontaminated steel weighted tape until the bottom of the well is reached. The depth to the bottom of the well relative to the reference point will then be recorded on the Monitoring Well Purging and Sampling Sheet. The screened interval will also be determined recorded, if known.

2.3.2 Monitoring Well Purging

Prior to groundwater sample collection, each monitoring well will be purged. Purging will be accomplished by removing a predetermined volume of standing water using either a peristaltic pump or a submersible pump and length of new dedicated polyethylene tubing to extend to ground surface, or a bailer. All equipment lowered into a monitoring well must first be decontaminated using the procedures described in Chapter 8.

The volume of water removed from each well during purging will be the equivalent of four well casing volumes. A casing volume (V) is calculated using the following formula:

$$V(l) = HC * 28.32\ l/\ ft^3$$

where:

V = Casing volume (l)
C = area of casing (ft^2)
H = height of water column (ft)

The capacities of common casing (c) diameters are listed in Table 2-2. The resulting number of liters per foot for a particular casing diameter are then multiplied by the height of the water column to obtain one casing volume.

Table 2-2
Well Volume Factors

Well Screen Diameter	C (l/ft)
2	0.618
4	2.471
6	5.56
8	9.88
10	15.44
12	22.26

The rate of purging of the well will depend on the yield of the well, and should not exceed the rate of discharge during development of the well. Pumping rates should be kept as low as is reasonably possible in order to avoid pumping the well dry. If the well is pumped at a rate of 0.5 gpm or less, and is purged to dryness, no additional purging is necessary and the well should be allowed to recover until sufficient quantity of water is present in the well to collect the groundwater sample. All purge water will be discharged to the ground surface in the vicinity of the well or stored in U.S. Department of Transportation (DOT)-approved 55-gal drums and labeled, for subsequent disposal at a later date.

At the beginning and end of the purging process and after each purge volume is removed, the discharge water will be monitored for pH, salinity (when requested), temperature, and specific conductivity using portable field instruments. A description of operation procedures for use of pH, salinity, temperature, and specific conductivity meters are provided in Chapter 11.

The following methods can be used to purge monitoring wells prior to groundwater sampling.

2.3.2.1 Peristaltic Pump

A peristaltic pump may be used on monitoring wells with depths of 25 ft below grade or less. New dedicated Teflon or polyethylene tubing will be used inside the well to remove the groundwater. Prior to insertion of the polyethylene tubing into the well, it must be cleaned with deionized water. When priming the pump, only potable water may be used.

2.3.2.2 Submersible Pump

A stainless steel submersible pump may be used on any depth wells. The pump should be decontaminated in accordance with the procedure outlined in Chapter 8. The discharge line for the pump will be composed of new dedicated polyethylene tubing cleaned with deionized water prior to placing into the well when using a submersible pump.

2.3.2.3 Bailer

The use of a bailer to purge a well is not recommended unless a pump is not practical. If a bailer is to be used during purging, prior approval by the project manager must be obtained. Regulatory approval may also be required for some projects. Purging will be accomplished by lowering the bailer into the well using a line and removing water from the well. Care should be taken to minimize splashing of the water in the well casing.

2.3.3 Groundwater Sample Collection

After purging of the well has been completed, but not later than 1 hr after purging, a groundwater sample will be collected from the monitoring well for chemical analysis. Groundwater samples will be collected no later than 2 hrs after purging is complete at each well and the well has recovered to a volume sufficient for sampling. The 2-hr sampling limit may be exceeded if sufficient recovery volume in the well is not achieved after 2 hrs of recovery; however, the sampling time should never exceed 24 hrs after purging. The following methods may be used to collect groundwater samples.

2.3.3.1 Groundwater Sampling With a Bailer

Unless directed by the project manager, all groundwater samples analyzed for volatile organic compounds (VOCs) and/or base neutral/acid (BNA) extractables will be collected with a laboratory-decontaminated, bottom-filling, disposable Teflon bailer. New disposable latex or nitrile surgical gloves will be used when

collecting groundwater samples for chemical analysis. The bailer will be attached to a new clean dedicated piece of monofilament line to lower it into each well. Groundwater samples are collected by slowly lowering the bailer into the well until the bailer is in the screened interval to the water table. The bailer is allowed to fill and then retrieved. The groundwater from the bailer is then carefully transferred by slowly pouring from the top of the bailer into the appropriate laboratory containers while minimizing aeration. Aeration can be further minimized with the use of a valve inserted into the bottom of the bailer to slowly transfer the sample aliquot to the volatile organic analysis container. The following is the preferred order in which specific sample aliquots should be collected from each monitoring well:

- VOCs
- BNAs
- Total petroleum hydrocarbons and/or oil and grease
- Pesticides/PCBs
- Total metals
- Dissolved metals
- Phenols
- Cyanide
- Sulfate and chloride
- Turbidity
- Other analyses

2.3.3.2 Groundwater Sampling With Pumps

Peristaltic or dedicated submersible pumps may be used to collect groundwater samples if the samples are not to be analyzed for VOCs or BNA extractable compounds. A groundwater sample will be collected by placing the pump at the mid-water column in the well and slowly pumping through new dedicated Teflon or polyethylene tubing using either a peristaltic or bladder pump or by manually pumping using inertia and a check valve. If the pump comes in contact with the groundwater, it must be decontaminated in accordance with the procedure described in Chapter 8.

2.3.3.3 Filtering Groundwater Samples

For some projects, it may be necessary to filter selected sample aliquots after collection of the sample. Sample analyses filtered in the field, however, should not be substituted for unfiltered analyses but may be collected in addition to unfiltered analyses. In most cases, filtration of sample aliquots (if required) will be performed for metals and pesticide/PCB analyses if unfiltered concentrations exceeded applicable groundwater standards in a previous sampling round. Groundwater sample aliquots are usually filtered through a laboratory-prepared disposable 0.45-μ filter cartridge. The sample aliquot is passed through the cartridge using decontaminated glassware and a vacuum air pump system. Sample preservatives (if required) will be added after the sample aliquots have passed through the filter.

In filtering samples for metal analyses, the following procedures must be followed to preserve the integrity of the sample and allow consistent reproduction of technique:

- For new investigations, samples must be unfiltered for initial round of samples. Unfiltered samples will represent the "worst case" with respect to metal content.

- If metal concentrations significantly above groundwater standards are confirmed, two samples may then be collected from each well: one sample filtered according to the applicable regulatory procedures and a second unfiltered sample.

- Unfiltered sample results should be reported as total metals.

- By analyzing the two fractions separately, differences between dissolved and total metals can be compared.

- When filtration is performed, it must be done immediately upon sample collection and prior to preservation. The sample should be collected, filtered, preserved, placed on ice, and shipped to the laboratory for analysis.

- After filtration, the samples must be preserved immediately with nitric acid to a pH less than 2.

2.4 SAMPLING NON-AQUEOUS PHASE PETROLEUM HYDROCARBONS (PRODUCT)

Prior to collecting a petroleum product sample, the depth to petroleum hydrocarbons and depth to water will be measured as described in Section 2.3.1. Petroleum product present in a monitoring well will be collected for analysis by lowering a Teflon bailer to the depth of the product layer (usually the petroleum product will be floating on top of the water table). The bailer will then be slowly removed from the well and the petroleum product present in the bailer will be slowly poured into a 40-ml VOC vial. The vial should be completely filled. An attempt should be made to minimize the amount of groundwater collected along with the petroleum product in the vial.

3 SOIL SAMPLING

This chapter describes generic SOPs for the collection and logging of soil samples by PANY/NJ. Modifications to this protocol must be approved by the PANY/NJ project manager and included in the site-specific FSP for the project. The soil sampling equipment selected for a particular sampling task will depend on the sample collection depth and the matrices to be analyzed for. Additionally, site-specific soil sampling equipment may be required, if requested by the project manager.

All personnel who will be present on site in the field during soil sampling will be provided with copies of the site-specific FSP and HASP prior to mobilization. An equipment checklist for soil sampling procedures is provided in Appendix A.

3.1 SUBSURFACE SOIL SAMPLING

Most subsurface soil sampling will be conducted using the procedures outlined below for test boring installation. Test borings will sometimes be installed in conjunction with groundwater monitoring wells, as described previously in Chapter 2.

3.1.1 Test Boring Installation Procedures

Test borings are a commonly used and accepted protocol for collection of subsurface soil samples for visual, geotechnical, and/or chemical analysis. The following SOP for test boring installations should be used in absence of site-specific protocols for a particular project.

If test borings are completed in the State of New Jersey, a licensed driller will be used. If a test boring is to be drilled to a depth of 25 ft below grade or deeper in the State of New Jersey, a permit will be obtained subject to regulatory requirements pursuant to the Subsurface and Percolating Water Act, N.J.S.A. 58:4A-4.1 et seq. Some counties in the State of New York may also require permits to be obtained prior to drilling. If test borings are completed in the State of New Jersey and the work involves USTs, a geologist/engineer licensed in the State of New Jersey, in accordance with the regulatory requirements of N.J.S.A. 58:10A-24.1-8, shall be present at each operating drill rig. The PANY/NJ inspector will be responsible for the logging of samples, monitoring of drilling operations, recording of water losses/gains, and other relevant data.

Unless otherwise directed by the project manager, test borings will be installed using a truck-mounted drill rig equipped with minimum 4.25-in. hollow stem augers and 2-in.-diameter split spoons. Prior to using soil sampling equipment, the equipment will be decontaminated according to the procedures outlined in Chapter 8 of this document. Split-spoon soil sampling procedures are provided below.

3.1.1.1 Split-Spoon Sampling Procedures

Soil samples collected during the installation of test borings will be installed in accordance with ASTM D 1586-84, Standard Method for Penetration Test and Split-Barrel Sampling of Soils. The following procedure is used for collection of continuous soil samples during test boring installation:

- Drive 2-in. I.D. decontaminated split-spoon sampler with a 140-lb hammer falling 30 in. until 2 ft has been penetrated. The number of blows required for 6 in. of penetration or fraction thereof will be recorded by the Port Authority Geotechnical Inspector. The sampler will then be removed from the borehole, carefully opened, and visually classified. The sample will then be scanned with a portable PID (e.g., HNU), and the result recorded on the HNU Readings Sheet (Figure 3-1).

- If a sample is to be collected for chemical analysis, the soil will be carefully transferred to appropriate laboratory containers using a stainless steel spatula or spoon. Sample aliquots collected for VOC analysis will be immediately removed from a discrete 0.5-ft interval of the split spoon and placed in laboratory-cleaned containers. The remaining aliquots for parameters other than VOCs should be homogenized in a stainless steel mixing bowl or tray and transferred using a stainless steel trowel to appropriate laboratory containers. New disposable latex or nitrile gloves will be used when collecting samples for chemical analysis.

- Advance auger hole 2 ft using decontaminated hollow-stem augers with a minimum I.D. for split-spoon sampling. Repeat the above sampling procedure until final depth or bedrock is encountered.

- Upon completion of each test boring, the abandoned borehole will be tremie-grouted or pressure-installed with a cement-bentonite mixture to the ground surface. The blend will be proportional to mixing 94 lb of portland cement and 5 lb of bentonite with 8.3 gal of potable water. The bentonite will be added after the required amount of cement is mixed with water. No additives or borehole cuttings will be mixed with the seal. Where necessary or apppropriate, fast curing or quick setting specialty grout materials may be used. If cuttings are to be placed back in any boreholes, prior agency approval shall be obtained. Any cuttings not placed in the boreholes will be properly disposed of on-site or containerized. The need for containerization will be determined on a case-by-case basis.

Figure 3-1
HNU Readings

3.1.1.2 Boring Log Completion

The Port Authority Geotechnical Inspector will prepare a boring log for each completed test boring. Figure 3-2 illustrates the standard form for completion of soil boring logs in the field. Information on each boring log should be recorded directly on the standard boring log form in the field and should not be transcribed from other field notes or documents. A classification of each collected soil sample will be included on each boring log, as well as other descriptive data that will provide pertinent information of subsurface conditions. Each soil sample will be visually classified using the Burmeister classification system, a copy of which is provided in Appendix A.

3.1.2 Hand Augering

A stainless steel hand auger can be used to collect shallow subsurface soil samples if geotechnical or visual classification of the soils at depth is not required. A soil sample is collected using a decontaminated hand auger by rotating the auger manually until the top of the desired interval is obtained. A decontaminated hand auger is then inserted into the borehole to collect a sample for chemical analysis. The hand auger should not be used for the collection of an undisturbed soil sample for VOCs. The contents of the soil sample will be visually described using the Burmeister classification system, a copy of which is provided in Appendix A.

3.1.3 Other Subsurface Soil Sampling Equipment

Several new soil sampling methods have recently been used for subsurface evaluation utilizing equipment (e.g., Geoprobe). Procedures for use of this equipment, and its applicability to a particular sampling project, should be determined on a case-by-case basis, with appropriate approvals for its use to be provided by the regulatory agencies involved. Alternative soil sampling procedures should be described in the site-specific FSP.

Figure 3-2
Boring Report

3.2 TEST PIT EXCAVATION PROCEDURES

Test pits are useful for identifying waste material or other buried debris at the site. Test pits, however, do not provide the sampler with undisturbed soil or waste samples. The depth of a test pit is limited by health and safety concerns and the type of equipment used.

Prior to commencing of test pit activities, the entire excavator or backhoe will be thoroughly steam cleaned upon arrival at the site. In addition, the excavator or backhoe bucket will be steam cleaned prior to excavating each test pit as outlined in Chapter 8. Due to the increased health and safety hazard associated with test pit excavations, all personnel must be prepared for the potential for a release of toxic gas from the excavation. Test pits and/or test trenches will be excavated in accordance with Occupational Safety & Health Administration (OSHA) requirements set forth in 29 CFR Part 1926.650. Refer to the HASP for additional information on health and safety procedures for test pit excavation activities.

Test pits will be excavated using a backhoe or excavator until the desired depth is reached. The following procedures will be used during test pit excavations:

- The operator will remove the topsoil (if present) at the site using the excavator or backhoe and place the material adjacent to the test pit on plastic sheeting.

- The excavated material removed from below the topsoil will be placed on the opposite side of the excavation as the topsoil on polyethylene plastic sheeting. If containers are found in the excavation, care should be taken not to damage or penetrate the containers. If damaged or leaking containers or drums are found, the drums may be removed from the excavation and overpacked.

- The sampler will then direct the operator to collect soil from the desired location in the test pit using the bucket of the backhoe. The sample will be collected using a stainless steel trowel from a portion of the material that is not in contact with bucket. New disposable latex or nitrile gloves will be used when collecting samples for chemical analysis. Sample aliquots submitted for VOC analysis should be immediately transferred from the bucket to appropriate laboratory containers. The remaining aliquots for parameters other than VOCs should be homogenized in a stainless steel mixing bowl or tray and transferred using a stainless steel trowel to appropriate laboratory containers. One sample aliquot will be scanned with a portable PID and the result recorded on the HNU Readings Sheet (Figure 3-1).

- After completion of the test pit excavation and any sampling activities, the excavation will be photographed, and the exposed material will be described and shown in a hand-sketched map.

3.3 SURFACE SOIL SAMPLING

The following is a description of accepted sampling procedures for collection of shallow surface soil and waste samples for chemical analysis by the PANY/NJ, subject to the modification specified in the site-specific FSP.

Prior use of soil sampling equipment, the equipment will be decontaminated according to the procedures outlined in Chapter 8 of this document.

3.3.1 Surface Soil Sampling Procedures

Surface soil samples will be collected using the following procedures:

- New disposable latex or nitrile gloves will be used when collecting samples for chemical analysis.

- The selected sampler will be utilized to collect a soil or waste sample. The sample aliquot to be analyzed for VOCs will immediately be transferred from the sampler to appropriate laboratory containers without homogenizing the sample aliquot. The remaining sample will be placed in a stainless steel mixing bowl or tray, homogenized, and transferred to appropriate laboratory containers for chemical analysis. One of the sample aliquots will be screened with a portable PID and the result recorded on the HNU Readings Sheet (Figure 3-1).

The following are accepted methods for collecting surface soil samples.

3.3.1.1 Stainless Steel Scoop/Trowel

A stainless steel scoop, trowel, spoon, or spatula is used to collect surficial soil/waste samples for chemical analysis, or to transfer soil sample aliquots from the sample collection equipment to laboratory containers.

3.3.1.2 Split-Spoon Sampler

The split-spoon sampler method is used to collect soil samples at depth; however, the sampler may be used to collect undisturbed surface samples. When collecting surface soil samples with a split-spoon sampler, refer to Section 3.1.1 for guidance.

3.3.1.3 Other Surface Soil Sampling Equipment

Although the above soil/waste sampling equipment will be adequate for most sampling tasks, other sampling equipment may be acceptable for some projects, if approved by the project manager. The sampling equipment may need to be approved by state and/or local environmental agencies prior to commencing the work. All surface soil sampling equipment must be chemically inert, ideally Teflon or stainless steel.

4 SURFACE WATER AND SEDIMENT SAMPLING

The following are generic SOPs for collecting surface water and sediment samples from rivers, streams, lakes, ponds, lagoons, and discharge lines. Samples may be collected using the procedures described below for both aqueous and non-aqueous liquids, as well as solid samples collected from beneath a surface water body.

All personnel who will be on site during field activities will be provided with copies of the site-specific FSP and HASP. Decontamination procedures for surface water and sediment sampling equipment are described in Chapter 8. An equipment checklist for surface water and sediment sampling procedures is provided in Appendix A.

4.1 SURFACE WATER SAMPLING

Surface water samples are collected using the following procedures to obtain representative liquid samples for chemical analysis both at depth or at the surface of a water body. If sediment samples are to be collected from the same location, surface water sampling should always be performed first.

4.1.1 Surface Water Sample Collection Procedures

The following procedures will be used when collecting surface water samples:

- New disposable latex or nitrile surgical gloves will be used when collecting samples for chemical analysis.
- A stainless steel or Teflon dipper or bacon bomb sampler will be submerged into the water to be sampled. Alternately, a laboratory-cleaned glass container may be used to collect the sample. If the sample is to be collected from a flowing surface water body, the sample collector should always be positioned downstream of the collection site.
- The sampler will be slowly filled, with a minimum of disturbance. The sample aliquot to be analyzed for VOCs will be collected first.

Several samplers can be used when collecting surface water samples for chemical analysis. The following samplers will be used for a majority of the sampling situations that may occur.

4.1.1.1 Dipper Sampler

A stainless steel or Teflon dipper or a laboratory-cleaned sample bottle may be used when collecting samples at the surface of the water body or from a discharge pipe. The decontaminated sampler is lowered into the surface water body at the desired location to slowly fill the water.

4.1.1.2 Bacon Bomb Sampler

Bacon bomb samplers may be more appropriate when a sample is to be collected from a depth below the surface (e.g., at the bottom of a river bed). The bacon bomb sampler will be constructed of stainless steel, with a spring-loaded trigger activated by pulling a line to allow the sampler to fill at the desired depth.

4.2 SEDIMENT SAMPLING

Surface water sediment sampling is the collection of solid matrix samples from below a surface water body.

4.2.1 Generic Sediment Sample Collection Procedures

The following procedures will be used when collecting surface water samples:

- New disposable latex or nitrile surgical gloves will be used when collecting samples for chemical analysis.

- A stainless steel coring device will be used to obtain a soil sample from below the aqueous layer by driving and rotating the device to the desired depth. If use of a coring device is not possible due to shallow sediment depth, a stainless steel trowel will be used instead to collect the sample.

- The sample will be removed from the core barrel and placed in a decontaminated stainless steel mixing bowl or tray. Sample aliquots submitted for VOC analysis will be immediately transferred from the bucket to appropriate laboratory containers. The remaining sample will be homogenized in the mixing bowl and transferred using a stainless steel spoon to appropriate laboratory containers.

5 SURFICIAL SAMPLING

Surficial sampling is a method of collecting residue or dust from surfaces. The methods described below are used to determine whether the analytes selected for analysis are present, and the extent of their presence on the surficial area to be sampled. The results of this method are usually qualitative, not quantitative, and are reported in units of mass/mass or mass/area. Surficial sampling is not recommended for VOCs.

All personnel who will be on site during field activities will be provided with copies of the site-specific FSP and HASP. Decontamination procedures for surface water and sediment sampling equipment are described in Chapter 8. An equipment checklist for surface water and sediment sampling procedures is provided in Appendix A.

5.1 WIPE SAMPLING

Wipe sampling is a method of collecting residue from a surface area for analysis. Wipe samples are most appropriate for collection of residue on nonporous surfaces.

5.1.1 Wipe Sample Collection Procedures

The following procedures should be used when collecting wipe samples for chemical analysis:

- The area to be sampled will be marked and measured with a ruler. A 10 x 10 in.^{2} template can be used to accomplish this.

- New disposable latex or nitrile surgical gloves will be used when collecting samples for chemical analysis.

- A sterile gauze pad will be submerged in a solvent for which the containments to be analyzed for are the most soluble (e.g., acetone, hexane, methanol).

- The entire marked area will then be firmly wiped, once in the horizontal direction and once in the vertical direction to ensure that the entire sample material is collected.

- The gauze pad will then be placed into a volatile organics analysis (VOA) vial and capped, for laboratory analysis. Each sample will be collected in a separate VOA vial.

- A wipe blank should be collected during each sampling event. The blank will be collected using a new pair of gloves and soaking a sterile gauze pad with the selected solvent and placing the gauze pad directly into a laboratory-cleaned VOA vial for analysis. The samples should be kept out of direct sunlight to avoid photodegradation.

5.2 CHIP SAMPLING

Chip sampling is a method of collecting samples of surficial contamination that is not readily wiped off. Chip sampling is not recommended for VOCs. Chip samples are most appropriate for collection on porous surfaces. Chip samples are collected by chipping off portions of floors, storage tanks, concrete, etc.

5.2.1 Chip Sampling Procedures

The following procedures should be used when collecting chip samples for chemical analysis:

- The area to be sampled will be measured with a ruler. The selected area should be less than 0.25 in.^{2} of sufficient area to obtain the amount of sample required by the laboratory.

- New disposable latex or nitrile surgical gloves will be used to collect samples.

- A decontaminated borosilicate chisel or hammer will be used to chip small portions of the sampling media. All chips removed from the measured area will be collected. The depth of the chips should be recorded.

- The chipped sample pieces will be collected in a decontaminated stainless steel bowl or pan with a dedicated natural bristle brush.

- Transfer all the sample pieces from the bowl or pan into appropriate laboratory- cleaned sample bottles using a stainless steel spoon or spatula for analysis using the sample handling procedures described in Chapter 10 of this document.

5.3 SWEEP SAMPLING

Sweep sampling is a method of collecting samples of dust from a nonporous surface area for analysis. This sampling method is usually used on surfaces such as floors, vessels, storage tanks, and in ventilation systems.

5.3.1 Sweep Sample Collection Procedures

The following procedures should be used when collecting sweep samples for chemical analysis:

- New disposable latex or nitrile surgical gloves will be used to collect samples.
- A dedicated natural bristle brush will be used to sweep the material from the selected sample area into a decontaminated stainless steel bowl or pan lined with aluminum foil for analysis.
- Transfer the sample from the bowl or pan into appropriate laboratory-cleaned sample bottles using a stainless steel spoon or spatula for analysis using the sample handling procedures described in Chapter 10.

6 SOIL GAS SAMPLING

Soil gas analysis is used to obtain a preliminary understanding of the subsurface presence, extent, and concentration of selected VOCs in the unsaturated (vadose) zone above the groundwater table. Soil gas analysis is also used to screen selected areas for the presence of groundwater contamination by analyzing the soil gas vapors at a depth of just above the water table.

All personnel who will be on site during field activities will be provided with copies of the site-specific FSP and HASP. Decontamination procedures for soil gas sampling equipment are described in Chapter 8. An equipment checklist for soil gas sampling is provided in Appendix A.

6.1 SOIL GAS METHODOLOGY

Soil gas samples are typically collected by establishing a grid over the site property. The required dimension of the grid will be site specific, based on the size of the site and type of information; however, grid spacing is usually approximately 30 ft. Soil gas samples are collected using either a passive sampler, which is inserted into a borehole and buried, or active samplers, which are probes driven down to the desired depth and have vacuum sources applied, allowing soil gas to be withdrawn through the probe to the surface and collected. If analysis of the soil gas is to be performed on site using a mobile laboratory, active soil gas samplers will be used.

6.2 PASSIVE SOIL GAS SAMPLING

Passive samplers, such as a Petrex tube, are inserted into the ground and buried at a depth of between 2-4 ft below grade. Prior to placing the sampler into the ground, the tube is activated by opening it and then placing it upside down in a hole cored to the desired depth. The holes are then backfilled around the tube and the locations are flagged for easy retrieval. Shallow, screened PVC pipes can be installed in the ground to a desired depth and the tubes can be lowered into the casing. The casing top can be capped, and at the desired time the tubes can be removed for analysis. This method allows for repeatable sampling to be performed. The tubes are left in the field for several days or weeks. Once the tubes have reached equilibrium, they are retrieved from the field and shipped overnight to the laboratory for thermal desorption/mass spectrometry (TD/MS) analysis, or other approved methodologies.

6.3 ACTIVE SOIL GAS SAMPLING

The following procedure should be used when collecting active soil gas samples:

- If surficial asphalt or concrete is present, drill a hole through the material until soil is encountered.

- A stainless steel point probe equipped with a slotted screen at the probe base is then installed into the ground to the selected depth (usually just above the capillary fringe) using a pneumatic hammer. Special care will be taken to ensure that the sampler is firmly seated such that ambient air is precluded from the soil gas sample. Modeling clay will be placed at the ground surface around the probe to further seal the probe from ambient air.

- After the probe is driven and seated (generally to a depth of 2-5 ft), a vacuum source is applied to the top of the probe to purge ambient air from the probe and draw soil gas to the sampling port. The flow rate will be measured during purging to ensure that soil gas is withdrawn from the vadose zone. The soil gas probe will be purged to allow removal of air in the point and tubing. Generally, 1 to 3 liters of air is sufficient. Portable PID and/or OVA readings will be obtained for the discharge vapors during purging.

- After the probe has been sufficiently purged, the valve between the pump and the probe will be closed, and the vacuum pump will be turned off. A soil gas sample will collected using a clean gastight syringe from a septum port in the top of the probe for on-site analysis using a mobile gas chromatograph (GC) or off-site solvent desorption analysis.

- All soil gas samples will be analyzed as soon as possible, and no later than 48 hrs after collection.

A discussion of the standard procedures for operating a mobile GC are provided in Chapter 11 of this document.

7 AIR SAMPLING

Generally, air sampling is performed to determine whether ambient air quality has been impacted. A majority of the procedures and protocols discussed in this chapter, used to measure contaminants regulated under state and Federal laws, are taken from the "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume II, Ambient Air Specific Methods," EPA/600/4-77/027a (December 1986), for monitoring ambient air for sulfur dioxide (SO_2), total suspended particulates (TSP), nitrogen

dioxide (NO_2), carbon monoxide (CO), ozone (O_3), lead in suspended particulate matter, and suspended particulates less than approximately 10 microns in diameter (PM_{10}). Additional procedures are provided by protocol from the National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Procedures, 3rd edition, 1984, for monitoring air quality in the workplace for a wide variety of potentially toxic gases and airborne particulates. The remaining procedures discussed are used to screen for contaminants as part of health and safety requirements. These procedures are based on manufacturers' operating specifications and are provided in detail in Chapter 11.

7.1 HIGH-VOLUME SAMPLING

The specific procedures for operating high-volume samplers used to monitor for TSP and PM_{10} suspended particulates are presented in Sections 2.2 and 2.11, respectively, of the EPA Quality Assurance Handbook. The general approach to particulate monitoring is presented below.

Two types of high-volume samplers are used to monitor ambient air for suspended particulates. TSP samplers are used to collect airborne particulates less than approximately 40 microns in diameter. PM_{10} samplers are used to collect airborne particulates less than approximately 10 microns in diameter.

As the sampling procedures required for each type of high volume sampler (TSP and PM_{10}) are similar, they are presented below as the same procedure, with specific differences noted where appropriate.

After TSP and PM_{10} samplers are set up at the selected locations they are calibrated to ensure appropriate air sample flow rates. Each time the samplers are moved to a different location they are recalibrated. The calibration procedures for TSP and PM_{10} samplers are discussed in detail in the EPA Quality Assurance Handbook, and are summarized in Appendix C-1. When necessary, sampler flow rates are adjusted so they remain within appropriate flow ranges established for both types of samplers during calibration.

New filters are inserted into TSP and PM_{10} samplers prior to each sampling event. Before inserting a new filter, each sampler is inspected for particulate accumulation, especially around the sample inlet area, filter holder, and filter holder platform. If particulates are present they are removed with a clean cloth or paper towel. The PM_{10} samplers use a filter cartridge secured to the support screen, while the TSP filters are placed directly on the support screen. A new, preweighed and numbered 8-in. x 10-in. filter is carefully centered in the filter cartridge or on the support screen. Glass microfiber filters are used in TSP samplers, quartz microfiber filters in PM_{10} samplers. Both types of filters should conform to the dioctyl phthalate penetration (DOP) test with >99% retention of 0.3-µm particles (ANSI 1986). Before use, the filters are carefully examined for missing pieces, tears, holes, or accumulated particulates that would alter the weight from the preweighed condition. The filters are handled with clean stainless-steel forceps and spatulas to avoid contamination. Filters are positioned rough side up with the faceplate carefully positioned over the filter or filter cartridge such that the gasket forms an airtight seal on the outer edges of the filter. The faceplate is tightened with sufficient pressure to avoid air leakage at the edges of the filter.

The air tubing to the recorders is examined to ensure connections are tight and tubing is not constricted, especially when the sampler's shelter door is closed. The rotameter-type TSPs are inspected to make sure the rotameters are in an upright position with a freely moving ball and the tubing properly connected without any constrictions.

Wherever possible, electricity supplied from standard receptacles is used as the power supply for the samplers. At sample locations where electricity is not available, portable generators are used.

Before samplers are started, all electrical connections are inspected to verify that the connections are made in the proper sequence. The samplers are allowed to warm up for 3 to 5 min to allow the airflow rate to stabilize. The flow rates are checked and adjusted if necessary to comply with the most recent calibration calculation.

Upon initiation of sampling, start-up information (including initial flow rate, temperature, pressure, start time, date, etc.) are recorded. Each sample unit is routinely inspected. After sampling, final recordings of flow rates, temperature, barometric pressure, time, and date are made at each high-volume sampler. Filters are removed as soon as possible to avoid additional deposition of windborne particulate matter. The exposed filter from the supporting screen or filter cassette is carefully removed with clean stainless-steel forceps and spatulas and folded lengthwise with the particulate layers inside. The folded filter is immediately placed in a clean manila envelope and sealed under chain-of-custody. The sample filters are shipped via overnight courier to the laboratory for analysis. An equipment checklist for high volume air sampling is provided in Appendix A.

7.2 TOXIC ORGANIC SAMPLING

Air sampling methods for toxic organic compounds generally rely on air drawn through a tube or chamber filled with a material that will adsorb organic compounds and hold them until laboratory analysis is performed. For most methods, a pump is used to draw air through a tube packed with adsorbent. For EPA Method TO-15, a SUMMA® canister is used to collect an air sample. The canister is evacuated prior to sampling, then a needle valve is opened to allow air to flow into the canister at a carefully controlled rate. SUMMA® canisters can also be externally pumped to force air into the canisters. In all cases, when the sampling period is over tubes or canisters are sealed and sent to the laboratory for analysis. A description of the sampling procedures can be found in "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air," EPA/600/4-89/017, June 1988.

The following is a general description of the procedures used for collecting air quality samples for VOC analysis:

> A portable personal air sampling pump is used to pull air through a Tenax™ or charcoal tube. Sampling is conducted over a predetermined time and flow rate, e.g., 8-24 hrs and 10-50 cc/min. The volume of air pulled through the pumps is measured and recorded. After sampling has been completed, the tubes are capped and placed on ice. Chain-of-custody and request-for-analyses forms are filled out as needed. Labels for tubes and chain-of-custody and request-for-analyses forms will include the station name, lab I.D. number, job number, and date and time of sample collection and preservation. Samples are sent to an analytical laboratory for analysis.

7.3 PERSONAL AIR MONITORS

A wide variety of personal air monitoring methods exist, each one suitable for specific applications. Method choice involves many factors, including sampling objectives, sample type, contaminant(s) of concern, sampling durations, and concentration ranges of contaminant(s). Sampling methods and strategies are in accordance with the NIOSH "Manual of Analytical Methods," 3rd edition, 1984.

Two types of personal air monitors are commonly used to monitor for airborne contaminants: (1) pump system (Dupont/Ametek low flow or high flow), and (2) direct-reading/data logger (National Draeger or equivalent).

7.3.1 Pump System

The pump system is used primarily in areas where there is concern for worker exposure. The low-flow system is used mainly to detect vapors; the high-flow system is used to detect total particulates, metals, and oil mists.

The sampler must be calibrated to a flow rate specified by the NIOSH method for the constituent to be monitored.

The sampler is attached with a belt to the worker's body or by placing the unit in a rear pocket. A PVC tube is then used to attach the pump to the sampling medium. The sampling medium is then placed as close to the worker's breathing zone as possible by clipping the tube to his/her lapel. The tube is laid flush against the body so that it will not interfere with moving machinery. The pump is then turned on for the entire shift (removed only during lunch). For an accurate sample the sampler must be in place and operational for at least 7 hrs.

The sampling medium used for the low-flow system is a carbon-filled glass tube; the high flow system is a PVC cassette with a mesh filter. Once the sampling is completed the glass tube or cassette is packed and shipped to a laboratory for analysis.

7.3.2 Direct-Reading/Data Logger Unit

The direct-reading unit is used simultaneously as a real-time monitor and as a data logger primarily for gases such as CO_2, CO, NO_2, and aerosols. It can be used as a personal or general area monitor. The unit is small enough to be placed in a front shirt pocket or clipped to a belt. Direct-reading units also come with software and hardware that enable the data to be downloaded to a computer for graphic outputs. The specific operating procedures depend on the monitoring device employed and the manufacturer of the device. The operating manual for the instrument is followed during each use.

7.4 HEALTH AND SAFETY AIR MONITORING

The following field instruments are used to monitor air quality for health and safety: HNU photoionization detector, (PID), organic vapor analyzer, (OVA), and combustible gas indicator (CGI). These instruments are used to determine the presence or absence and the potential concentration range of organic contaminants. The resulting data may be used to determine which areas require samples to be

submitted for confirmatory analysis and to determine the proper health and safety protocols for on-site workers. These instruments are discussed in more detail in Chapter 11.

8 DECONTAMINATION

All equipment used in field sampling activities will be decontaminated before and after use. Equipment used for aqueous sampling must be laboratory decontaminated prior to mobilization to the field. Any modifications to the procedures outlined below should be detailed in the site-specific FSP and/or approved by the appropriate regulatory agencies involved. If laboratory decontamination of aqueous field sampling equipment is not feasible, field decontamination may be performed if prior approval is obtained from the appropriate regulatory agency.

8.1 LABORATORY/FIELD DECONTAMINATION OF AQUEOUS FIELD SAMPLING EQUIPMENT

All aqueous sampling equipment, such as bailers will be laboratory decontaminated prior to mobilization to each site using the procedures specified below. If decontamination of aqueous sampling equipment must be performed in the field, prior approval must be obtained from the project manager and appropriate regulatory agencies.

8.1.1 Laboratory/Field Decontamination Procedures for Aqueous Field Sampling Equipment

The following procedures should be used on aqueous sample collection equipment prior to use:

- Wash equipment with potable water and laboratory-grade Alconox detergent and rinse with potable tap water.
- Rinse equipment with distilled or deionized water from a laboratory-provided approved potable water source.
- If the equipment is to be used to sample for metals analysis, rinse equipment with a 10% solution of laboratory grade nitric acid.
- If the equipment is to be used to sample for organic analysis, rinse equipment with pesticide-grade methanol. Other solvents may be used if approved by the project manager and appropriate regulatory agencies.
- Completely air dry the equipment.
- Rinse equipment with distilled or deionized water from an approved source.
- Wrap equipment in aluminum foil, shiny side out.
- Whenever possible, sampling devices should be numbered in a manner that will not affect their integrity and wrapped in a material (i.e., aluminum foil) that has been cleaned and oven baked at 105°C or cleaned in the same manner as the equipment. Equipment should

be custody-sealed and information concerning decontamination methodology, data, time, and personnel should be recorded in the field logbook.

- When analysis for metals is required, it is necessary to use carbon steel split-spoon sampling devices. In this case when an acid rinse is used for removal of visible contamination, the nitric acid rinse may be lowered to a concentration of 1% instead of 10% so as to reduce the possibility of leaching metals from the spoon itself.

- Decontamination should be carried out over a container and the material must be disposed of properly. Decontamination wastes must be disposed of properly.

8.2 LABORATORY/FIELD DECONTAMINATION OF NON-AQUEOUS FIELD SAMPLING EQUIPMENT

If field decontamination of non-aqueous sampling equipment is more practical, the procedures outlined below will be used to decontaminate non-aqueous sampling equipment that comes in contact with the sample. While it is preferred that all non-aqueous field sampling equipment be laboratory cleaned, wrapped, and dedicated to a particular sampling point or location during a sampling episode, field cleaning may be more practical.

8.2.1 Laboratory/Field Decontamination Procedures for Non-Aqueous Field Sampling Equipment

The following procedures should be used to decontaminate non-aqueous field sampling equipment, field measurement equipment, and other equipment that comes in contact with subsurface materials to be sampled:

- Laboratory-grade glassware detergent and tap water scrub to remove visible contamination.

- General tap water rinse.

- Distilled and deionized water rinse.

- If visible contamination persists, or gross contamination is suspected, then the decontamination procedures described in Section 8.1.1 will be used instead.

- Whenever possible, sampling devices should be numbered in a manner that will not affect their integrity and wrapped in a material (i.e., aluminum foil) that has been cleaned and oven baked at 105°C or cleaned in the same manner as the equipment. Equipment should be custody-sealed and information concerning decontamination methodology, date, time, and personnel should be recorded in the field logbook.

- When analysis for metals is required, it may be necessary to use carbon steel split-spoon sampling devices instead of stainless steel. If this is the case and it is necessary to use acid rinse for removal of visible contamination, the nitric acid rinse may be lowered to a concentration of 1% instead of 10% so as to reduce the possibility of leaching metals from the spoon itself.

- Decontamination should be carried out over a container and the material must be properly disposed of. Decontamination wastes must be disposed of properly.

8.3 HEAVY EQUIPMENT DECONTAMINATION

All equipment used to advance sampling equipment (i.e., drill rigs, augers, drill rods, etc.) will be decontaminated upon arrival at the site, between each subsurface sampling location, and upon leaving the site. When the means are provided by the facility, this decontamination will be performed in a designated area and the fluids collected accordingly. All personnel must wear appropriate protective equipment and follow appropriate procedures outlined in the site-specific HASP.

8.3.1 Heavy Equipment, Casing, and Well Screen Decontamination Procedures

The following procedures will be used to decontaminate heavy equipment used to advance sampling equipment, casing, and well screens before and after use at each sample location and to decontaminate casing and well screens:

- If required, a decontamination area as provided by the facility where the work is being performed shall be utilized. Collection and disposal of decontaminated water will be carried out as supported by the facility.
- Place the equipment on metal stands (off the ground).
- Clean the equipment thoroughly using a high-pressure steam cleaner and potable water from an approved source.
- After decontamination, the equipment should be kept in a clean location prior to use.

8.4 FIELD MEASUREMENT AND PURGING EQUIPMENT

Prior to and after using field measurement equipment (i.e., static water level indicator, pH meter, or conductivity meter) or a submersible pump, the equipment will be decontaminated as follows:

- Wash equipment with potable water and laboratory grade Alconox detergent.
- Submersible pumps will be placed in a decontamination tube filled with tap water and pumped to remove any potential contaminants from inside the pump.
- Rinse equipment with deionized water.
- Thoroughly air dry equipment.

9 FIELD QA/QC SAMPLES

QA/QC samples are used to provide performance information with regard to accuracy, precision, sensitivity, representativeness, completeness, and comparability associated with the sampling and analysis of environmental media. For example, field QA/QC samples are used to ensure that samples collected from a site are representative of the actual conditions of the site, and do not contain contaminants introduced either from the field activities themselves or from sample transit. Some of the QA/QC samples are used to demonstrate whether analytical results have been biased either by interfering compounds present in the sample matrix or by laboratory techniques that may have introduced systematic or random errors to the analytical process. A summary of relevant QA/QC samples and frequencies of collection is shown in Table 9-1. A description of these samples is given below.

9.1 FIELD BLANKS

A field blank consists of two sets of identical, laboratory-cleaned sample containers. The first set is filled at the laboratory with deionized (DI) laboratory-grade water. The second set consists of empty bottles. The water used is from the same source as that used for the laboratory method blank. In the field this water is passed through the field sampling equipment into an additional second set of containers and preserved in the same way as other aqueous matrix samples. The field blank containers are then taken back to the laboratory to be analyzed for all parameters that environmental samples will be analyzed for. The purpose of a field blank is to determine whether the field sampling equipment is cross-contaminating samples. A field blank will be associated with each matrix on each day of sampling or for each decontamination batch, whichever is more frequent. In New Jersey a field blank is required for VOC analysis only. In New York a field blank is recommended for all analyses for each matrix or as required on a project-specific basis by NYSDEC.

9.2 TRIP BLANKS

Trip blanks are required for VOC analysis during aqueous sampling events, and not required for non-aqueous sampling events unless specifically requested by Special Analytical Services (SAS), or by the regulatory agencies or project manager.

Trip blanks consist of a single set of sample containers filled at the laboratory with DI laboratory-grade water. The water used is from the same source as that used for the laboratory method blank. The containers are carried into the field and handled and transported in the same way as the aqueous samples collected that day.

Analysis of the trip blank for volatile organics is used to identify the presence of cross-contamination as a result of sample shipment, e.g., contaminated from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks are not opened during this procedure.) A separate trip blank will accompany each shipping container containing aqueous samples.

9.3 MATRIX DUPLICATES

Matrix duplicates are two or more field samples obtained from the same source at a given point in time. Matrix duplicates provide a measure of sample homogeneity and provide a means through which

intralaboratory precision of the entire analytical process can be measured. Non-aqueous matrix duplicate sample aliquots submitted for VOC analysis will be obtained by collecting two successive collocated samples from the same location without homogenizing each aliquot. Non-aqueous matrix duplicate sample aliquots submitted for analyses other than VOCs are collected by delivering the field sample to a mixing container and homogenizing the sample before splitting it into two separate sample jars. Aqueous matrix duplicates are obtained from collecting two successive samples from the same location, or from delivering the contents of a bailer to two separate sample containers. Matrix duplicates will be collected at a frequency of one for every 20 samples.

9.4 SPLIT SAMPLES

Split samples are collected when more than one interested party desires a sample from a particular location. Split samples are collected in exactly the same manner as matrix duplicates, but are sent to two different laboratories for analysis, offering a measure of interlaboratory precision. Split samples are collected as often as desired by interested parties in charge of the project.

In order to maintain the integrity of any sample "split" between interested parties, the following procedures shall be used:

- If the interested party is a regulatory agency, the agency may prefer to use their own personnel to obtain all sample aliquots.
- Other interested parties other than regulatory agencies must provide their own sample containers, blank samples, preservatives, samples shuttles, chain-of- custody forms, etc.
- Duplicate samples, trip blanks, and field blanks must be included as part of those samples that are split between the two or more parties involved.

9.5 DRILLING BLANKS

A drilling blank is used to ensure that water used during drilling procedures (to cool the auger and promote the removal of the cuttings) is not a source of contamination. A sample of this water is sent to the laboratory for analysis of all parameters of interest. Drilling blanks will be collected at a frequency determined on a project-specific basis.

9.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

MS/MSD analyses are performed to evaluate the matrix effect of the sample upon the analytical methodology. Field procedures for MS/MSDs involve collecting two to three times the normal amount of sample for a given analysis the laboratory is responsible for spiking and analyzing each aliquot. The laboratory is required to provide percent recoveries on the MS and MSD portions of the sample used to assess analytical accuracy. The relative percent difference (RPD), calculated from the difference between the MS and MSD, provides an assessment of analytical precision. The MS/MSD will be analyzed for each group of samples of a similar matrix, at a frequency determined for each specific project.

9.7 BACKGROUND SAMPLES

Background samples are collected to compare the levels of contamination in areas known to be impacted against areas that have not been impacted in order to evaluate the significance of the contamination detected. In the case of air monitoring, background samples are collected upwind of contamination sources or far enough away so as to be unaffected by site conditions. Aqueous matrix background samples are collected upgradient (if possible) from contamination sources. Aqueous and nonaqueous background samples can be collected as long as the distance between the area of concern and the background sample location is great enough that the sample will be representative of an unaffected area. The frequency with which background samples are collected will vary from project to project.

Table 9-1
Port Authority Field Q/QC Samples

QA/QC Sample	Frequency of Collection Based on Total No. Of Field Samples	
	Solids	***Aqueous***
Field Blank	1:decon event per day	1:decon event per day
Trip Blank	None	Daily
Matrix Duplicate	1:20	1:20
Split Samples	Project Specific	Project Specific
Drilling Blanks	Project Specific	Project Specific
MS/MSDs	Project Specific	Project Specific
Background Samples	Project Specific	Project Specific

10 SAMPLE HANDLING AND ASSOCIATED DOCUMENTS

10.1 SAMPLE HANDLING

Specific sample handling protocols have been developed based on the analyses to be performed. Sample volume requirements have been developed to ensure that the amount of sample submitted to the analytical laboratory is sufficient to allow the specified analytical method to be performed according to protocol, and to provide sufficient sample for reanalysis if it should prove to be necessary. Sample preservation techniques ensure that samples analyzed by the laboratory have not changed from the time the sample was collected in the field, with regard to the parameters specified for analysis. Sample preservation techniques include cold temperature storage, addition of preservation chemicals, pH adjustments, and specific sample bottling techniques.

Samples collected for VOC analysis are bottled with zero headspace to prevent premature loss of VOCs from diffusion into existing airspaces above the sample; these VOCs will be lost when the sample bottle is opened. For this reason, field personnel must be careful to avoid trapping bubbles at the top of VOC vials used to collect aqueous samples, and must pack solid matrix samples to the top of vials or containers when the samples are designated for VOC analysis.

When soil samples are collected (for any type of analysis), rocks, sticks, leaves, and any other debris should be removed before the sample is put into the sample container.

Sample container materials are important with regard to sample preservation; as metals tend to be adsorbed to glass surfaces, aqueous samples destined for metals analysis are shipped in plastic containers. Because plasticizers and other compounds inherent in plastic containers may contaminate samples requiring organic analysis, glass containers are used for these samples.

If a sample aliquot for a particular sample is to be submitted for in-house geotechnical analyses and environmental contamination is suspected for that particular sample, that aliquot will be marked with a stick-on red dot marker.

Because sample-handling plays an important role in maintaining sample integrity, sample handling requirements are detailed enough to vary somewhat with differing protocol. Table 10-1 shows sample container, volume, preservation, and holding time requirements for analyses conducted under the protocols for wastewater analysis listed in 40 CFR 136 and soil samples analyzed via SW-846.

Sample compositing is performed whenever an average concentration of contaminants is desired for two or more discrete samples. Compositing is accomplished by combining two or more discrete samples together and completely homogenizing the mixture, which is then analyzed as a single sample. Due to the nature of VOCs, compositing is never performed on samples that are to be analyzed for volatiles. Contaminants in a discrete sample may be diluted when combined with another sample whose concentration of the same contaminants is lower or nonexistent. Conversely, contaminants in a discrete sample may be increased by combination with another sample whose concentration of the same contaminants is higher. When compositing samples, concentration changes must be taken into account

with regard to the project's data quality objectives (DQOs). A maximum of five discrete samples may be combined to form a composite sample.

10.2 SAMPLE CUSTODY

Sample handling in the field and in the laboratory must conform to appropriate sample custody procedures. Field custody procedures involve proper sample identification, chain-of-custody forms, and packaging and shipping procedures. Laboratory custody begins with the receipt of samples at the laboratory and continues through sample storage, analysis, data reporting, and data archiving.

10.2.1 Field Custody Procedures

The following elements are important for maintaining the field custody of samples: sample identification, sample labels, custody records, shipping records, and packaging procedures.

Sample labels are attached to all sampling bottles before field activities begin; each label contains a number that includes a suffix identifying the site and the sample's location.

Approximate sampling locations are marked on a map with a description of the sample location. The number, type of sample, and sample identification are entered into a field logbook.

After each sample is collected and appropriately identified, entries are made on the chain-of-custody form, which include:

- Site name and address
- Samplers' names and signatures
- Names and signatures of persons involved in chain of possession
- Sample number
- Number of containers
- Sampling station identification
- Date and time of collection
- Type of sample and the analyses requested
- Preservation used (if any)
- Pertinent field data (pH, temperature, turbidity, etc.)

The sampler signs and dates the "Relinquished" blank space and delivers the samples to the laboratory. One copy of the custody form remains in the field and the remaining copies accompany the samples to the laboratory. An example of a chain-of-custody form used by the Port Authority of New York and New Jersey is shown in Figure 10-1.

10.2.2 Laboratory Custody Procedures

All samples will be received by a laboratory certified for the analytes of interest by a New York/New Jersey Department of Health (DOH) within 48 hrs of collection unless special circumstances exist, e.g., fecal coliform analyses. Samples are received by the laboratory personnel, who assume custody of the samples and sign and date the next "Received" blank. At this time sample logs are developed that give to

each sample a laboratory-designated alphanumeric sample name, which is used by the laboratory to distinguish each sample from all others. The laboratory continues to use detailed custody procedures for each step of the analytical process. At the time that samples undergo extraction, laboratory extraction logs are prepared for each sample. When samples are refrigerated, refrigeration logs are prepared. Laboratory sample custody begins when samples are received by the laboratory and continues through delivery of the data package and archiving of sample data and extracts.

Table 10-1
Sample Handling Procedures and Holding Times

Analysis	Holding Time	Preservation	Notes
Alkalinity	14 days	Cool to 4°C	
Ammonia NH3	28 days	Cool to 4°C - H2SO4 to pH<2	
Asbestos	1 year	None	
BOD 5	48 hours	Cool to 4°C	
BOD 5 Inhibited	48 hours	Cool to 4°C	
BTEX	14 days	Cool to 4°C; HCl	
Chloride	28 days	Cool to 4°C	
Chlorophyll	24 hrs to filtration - 28 days after filtration	Freeze filters in 90% acetone	
Chromium VI (Hexavalent) in water	24 hours	Cool to 4°C	
COD	28 days	Cool to 4°C - H2SO4 to pH<2	
Coliform (fecal and total)	6 hours	Cool to 4°C; 0.008% Sodium Thiosulfate	If chlorinated
Conductivity	28 days	Cool to 4°C	
Cyanide in Soil	14 days	Cool to 4°C	
Cyanide in Water	14 days	Cool to 4°C NaOH to pH>12; 0.6 g ascorbic acid	
Fecal Streptococcus	6 hours	Cool to 4°C; 0.008% Sodium Thiosulfate	If chlorinated
Fluoride in Soil	28 days	Cool to 4°C	
Fluoride in Water	28 days	Cool to 4°C	
Grain Size Sediment	6 months	None required	
Phenols	30 days	Cool to 4°C; H2SO4 to pH<2	
Halogenated Hydrocarbons	7 days water/14 days soil	Cool to 4°C	
Hardness	6 months	HNO3 to pH<2	
Herbicides	7 days water/14 days soil	Cool to 4°C	
Hydrocarbon chlorinated	7 days water/14 days soil	Cool to 4°C Ascorbic acid	
Ignitability	None	Cool to 4°C	

Analysis	Holding Time	Preservation	Notes
Iron and sulfur bacteria	6 hours	Cool to 4°C; 0.008% Sodium Thiosulfate	Reagent used only in the presence of residual chlorine, always cool to 4°C.
Mercury in Water	28 days	Cool to 4°C; HNO3 to pH<2	
Metals -- Except Cr(6) and Hg	180 days	HNO3 to pH <2	
Metals dissolved	6 months	Filter - then add HNO3 to pH<2	
Nitrate NO3-	48 hours	Cool to 4°C	
Nitrate-Nitrite	28 days	Cool to 4°C; H2SO4 to pH<2	
Nitrite NO2-	48 hours	Cool to 4°C	
Nitrogen Pesticides	7 days water/14 days soil	Cool to 4°C	
Oil & Grease in Water	28 days	Cool to 4°C; HCl to pH<2	
Oil and Grease in Soil	28 days	Cool to 4°C	
Organic Screen (PAH Phenolics Creosote etc.)	7 days water/14 days soil	Cool to 4°C	
Organophosphorus pesticides	7 days water/14 days soil	Cool to 4°C	
Ortho Phosphate PO43-	48 hours	Filter; Cool to 4°C	
PAH Polynuclear Aromatic Hydrocarbons	7 days water/14 days soil	Cool to 4°C	
PCB's only	7 days water/14 days soil	Cool to 4°C	
Percent Solids Soil/Tissue	7 days	Cool to 4°C	
Pesticides/PCBs	7 days water/14 days soil	Cool to 4°C	
pH	24 hours	Cool to 4°C	
Semivolatiles BNA	7 days water/14 days soil	Cool to 4°C	
Settleable Solids(SS)	48 hours	Cool to 4°C	
Specific conductance	28 days	Cool to 4°C	
Sulfate	28 days	Cool to 4°C	

Analysis	Holding Time	Preservation	Notes
Sulfide	7 days	Zinc acetate; NaOH to pH>9	
TOC in Water	28 days	Cool to 4°C; H2SO4 to pH<2	
Total Dissolved Solids(TDS)	7 days	Cool to 4°C	
Total Kjeldahl Nitrogen (TKN)	28 days	Cool to 4°C; H2SO4 to pH<2	
Total Non-Volatile Solids(TNVS)	7 days	Cool to 4°C	
Total Non-Volatile Suspended Solids(TNVSS)	7 days	Cool to 4°C	
Total Phosphorus (TP)	28 days	Cool to 4°C; H2SO4 to pH<2	
Total Solids (TS)	7 days	Cool to 4°C	
Total Suspended (TSS)	7 days	Cool to 4°C	
Total Volatile Solids(TVS)	7 days	Cool to 4°C	
Tributyl tin	7 days water/14 days soil	Cool to 4°C	
Turbidity	48 hours	Cool to 4°C	
Volatile Organics/VOA	7 days water/14 days soil	Cool to 4°C HCl -- ascorbic acid	Preservation acid additions and pH adjustments apply only to water samples.

Figure 10-1
Chain of Custody Report

11 FIELD ANALYTICAL PROCEDURES

A number of field instruments are used to measure various physical/chemical conditions of environmental samples at the time they are collected. These measures can play an important role in understanding the overall nature of the site being investigated and can also help in interpretation of analytical laboratory data resulting from chemical analysis of the environmental samples.

Operating procedures for each type of field instrument are provided as attachments to this manual. A complete listing of routinely used field analytical equipment is provided in Table 11-1. Additional detail on operating procures, including calibration, maintenance are provided in the manufacturer's' literature for each piece of equipment.

Table 11-1
Field Analytical Equipment Inventory and SOP Attachment Cross-Reference Information

Equipment Type	SOP Attachment ID
PID/Mini Rae	
Horiba Multi meter (pH, Turbidity, Conductivity,	
Water/Product Level Indicators	
pH Meters	
Conductivity Meters	
Dissolved Oxygen Meter	
Turbidity Meter	

12 HANDLING OF INVESTIGATION-DERIVED WASTES

The following are generic SOPs for the disposal or storage of soil cuttings, water, and disposable equipment during environmental site investigation field tasks. Additional disposal procedures are described in PANY/NJ's generic HASP. Wastes from different locations and/or matrices generated during field activities will be stored separately (e.g., decontamination water and development purge water will not be combined).

12.1 SOIL

If soil from borings, test pits, or samples generated during fieldwork is suspected of containing environmental contamination, the soil will be disposed of in DOT-approved 55-gal drums. The drums will be labeled and stored on the site until further sampling of the drums is performed. The label will include a description and source of the contents of each drum. Soil removed during the excavation of test pits will be backfilled into the excavation.

12.2 GROUNDWATER

Groundwater suspected of containing NAPLs or other environmental contaminants will be discharged into DOT-approved 55-gal labeled drums and stored on site until future sampling and disposal of the drums can be performed. The label will include a description and source of the contents of each drum. Based on the results of the drum sampling, the wastewater will be disposed of in accordance with applicable regulations.

12.3 DECONTAMINATION WATER

Water generated during the steam cleaning of heavy equipment will generally be collected and disposed of at the on-site decontamination area, as provided for and supported by the facility where the work is being performed. If a decontamination pad is required for the project and provided by the facility, the collected water will be disposed of in DOT-approved 55-gal drums, labeled as such, and stored on-site until sampling can be performed. Decontamination water containing solvents used as part of the decontamination process will be collected and disposed of in DOT-approved 55-gal drums, labeled as such, and stored on site until sampling can be performed. If only a minimal amount of decontamination water is generated containing decontamination solvents, the water may be brought back to the PANY/NJ laboratory for proper disposal off site. Based on the results of the drum sampling, the wastewater will be disposed of in accordance with applicable regulations. The label will include a description and source of the contents of each drum.

12.4 DISPOSABLE EQUIPMENT

All disposable sampling equipment (e.g., sampling gloves, disposable bailers, Tyvek clothing, paper towels, etc.) will be collected and returned to the PANY/NJ base laboratory for proper disposal.

12.5 LABORATORY ENVIRONMENTAL SAMPLES

Environmental samples collected for laboratory analysis are exempted from Resource Conservation and Recovery Act (RCRA) requirements during shipment to the laboratory. The U.S. Department of Transportation (DOT) does, however, regulate shipments of small quantities of waste samples (e.g., samples collected from solid or hazardous waste material). In most cases, environmental samples will be transported by PANY/NJ field personnel directly from the site to the analytical laboratory. If a commercial overnight courier is used, the specific packaging, classification, and labeling requirements for the selected courier will be followed when shipping environmental samples. A copy of the specific shipping requirements can be obtained from most local overnight courier offices in the area.

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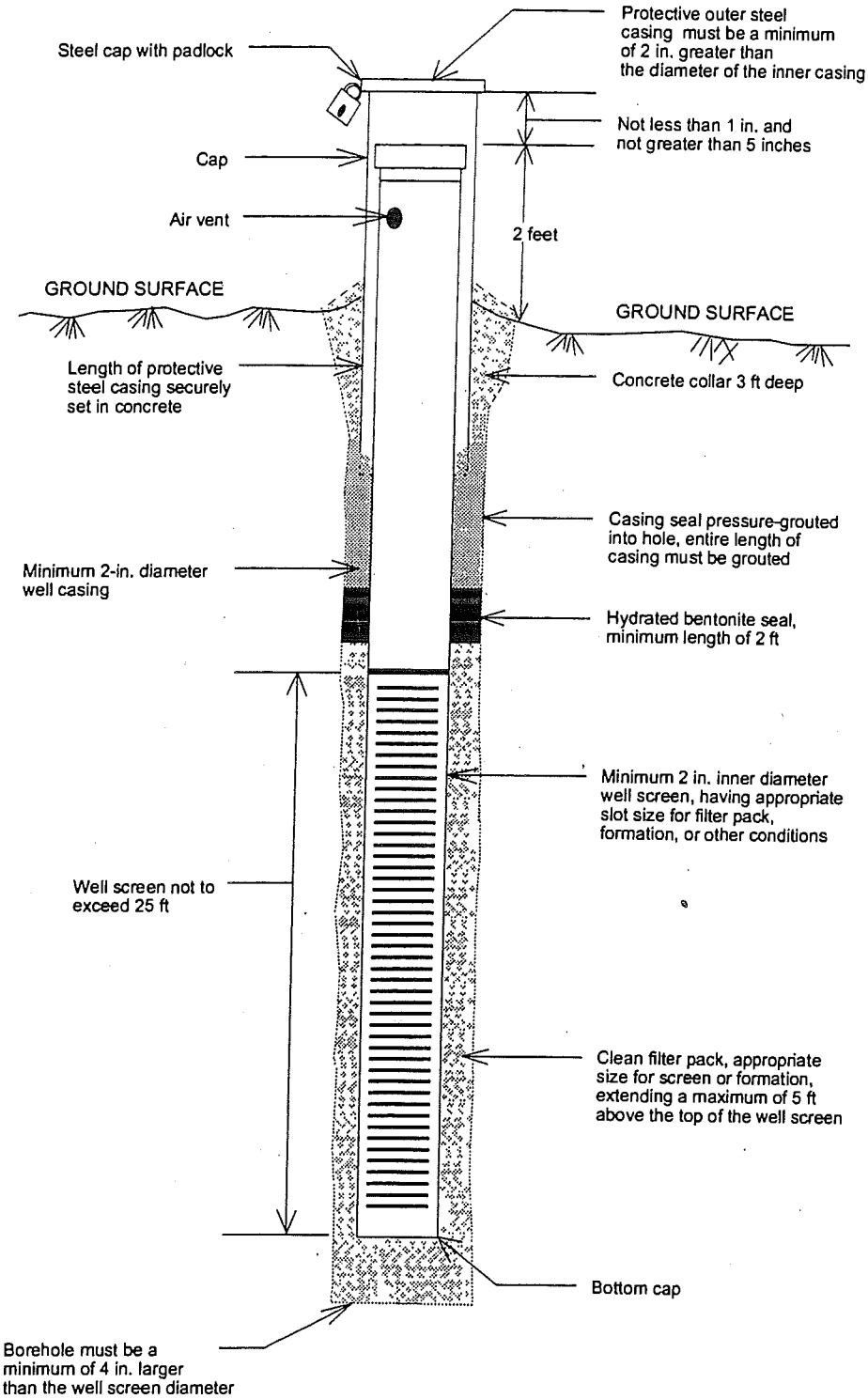


FIGURE 2-1

TYPICAL UNCONSOLIDATED MONITORING WELL

Source: NJDEPE Field Sampling Procedures Manual, May 1992.

THE PORT AUTHORITY OF NY/NJ

\459\037WELL.DS4

THE PORT AUTHORITY OF N.Y. & N.J.

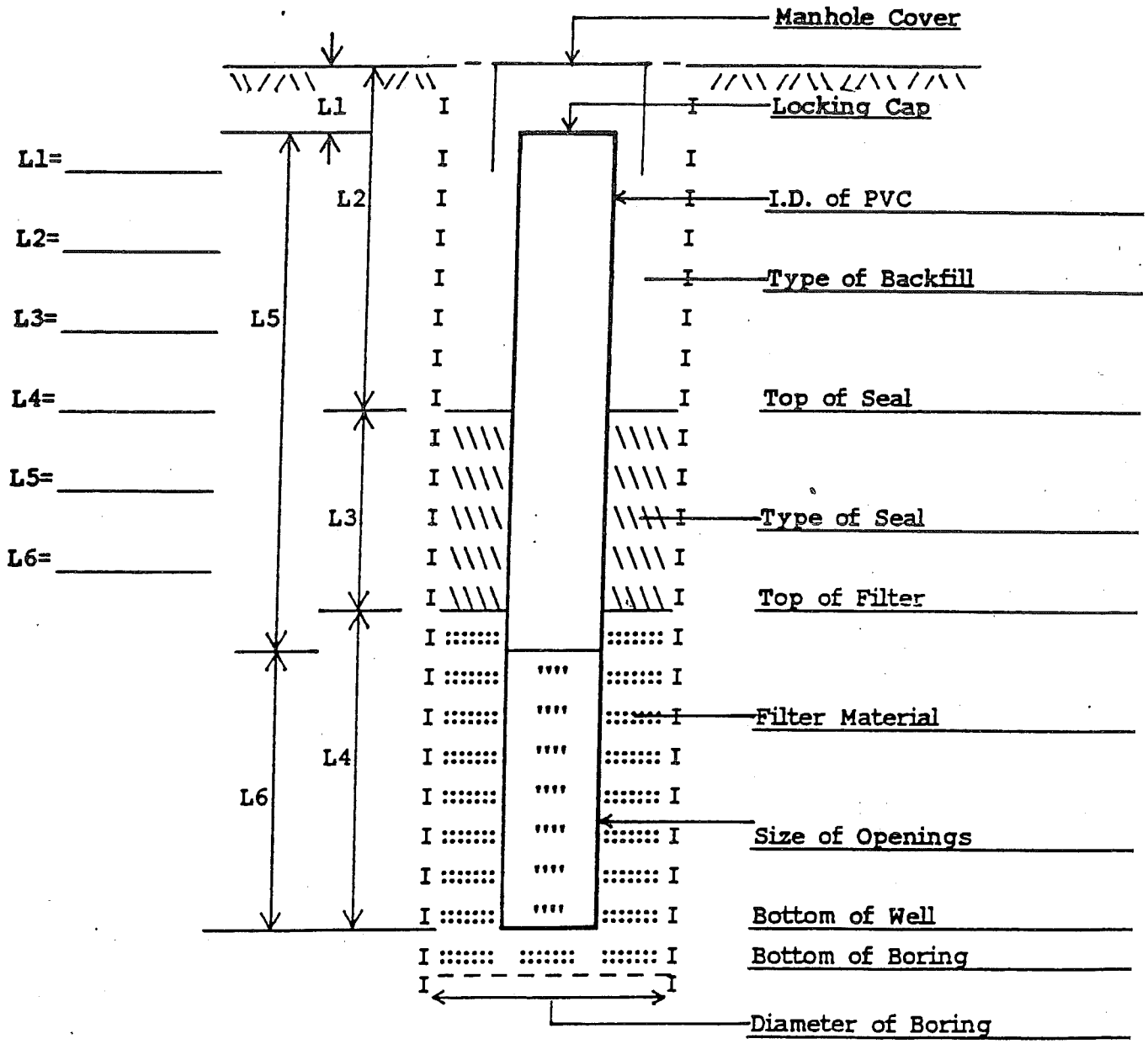
ENGINEERING DEPARTMENT
MATERIALS ENGINEERING DIVISION
WELL INSTALLATION REPORT

Sheet of

Project:		Contract No.:
Location:		Contractor:
Driller:	Inspector:	
Well No.:	Type of Well:	Date:

Well Development

Date:	Water Level Before:	Water Level After:
Note: Water level readings from top of PVC	Taken	min. After Developm



Remarks:

Figu

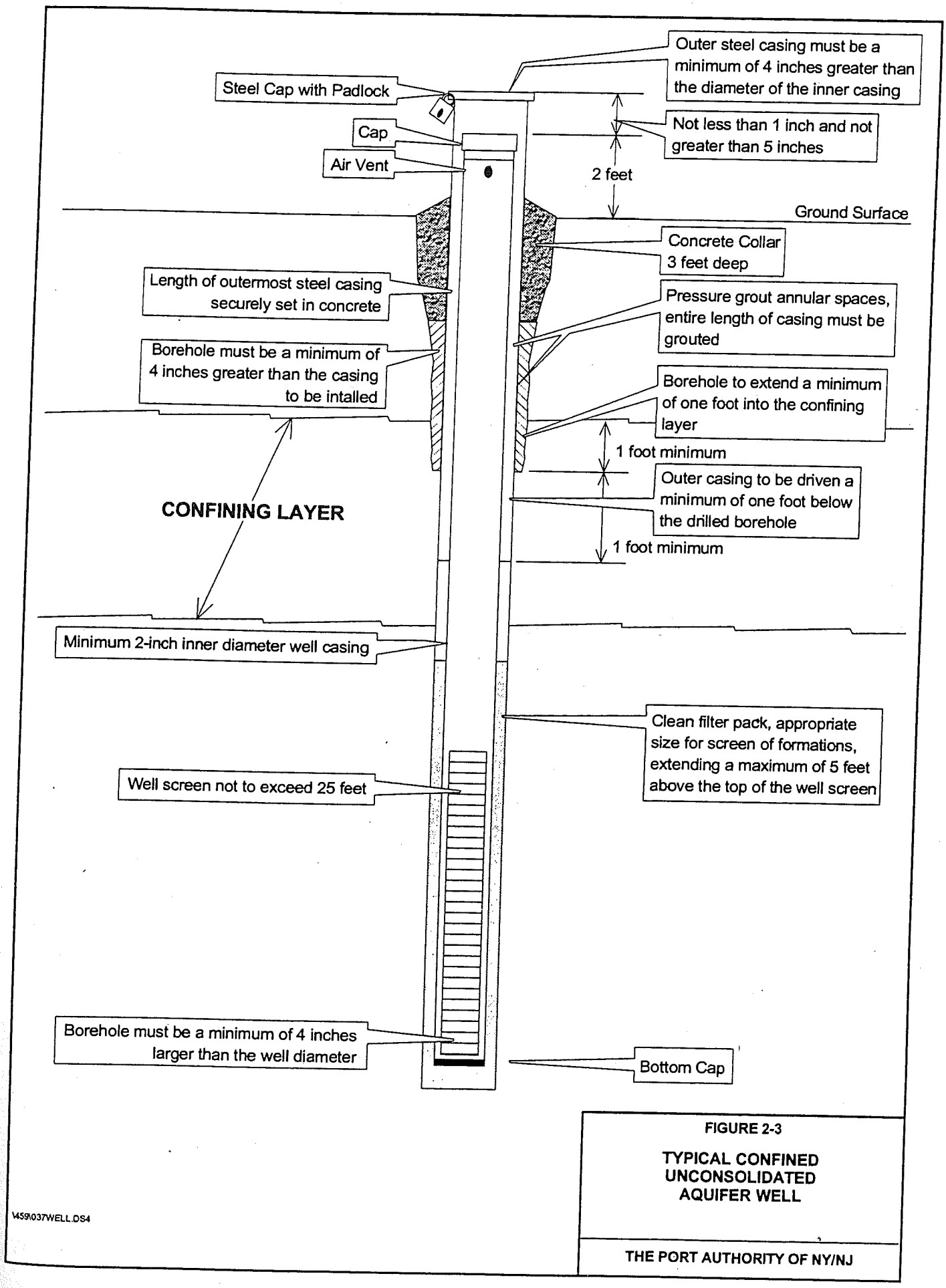


FIGURE 2-3

TYPICAL CONFINED UNCONSOLIDATED AQUIFER WELL

\459\037WELL.DS4

THE PORT AUTHORITY OF NY/NJ

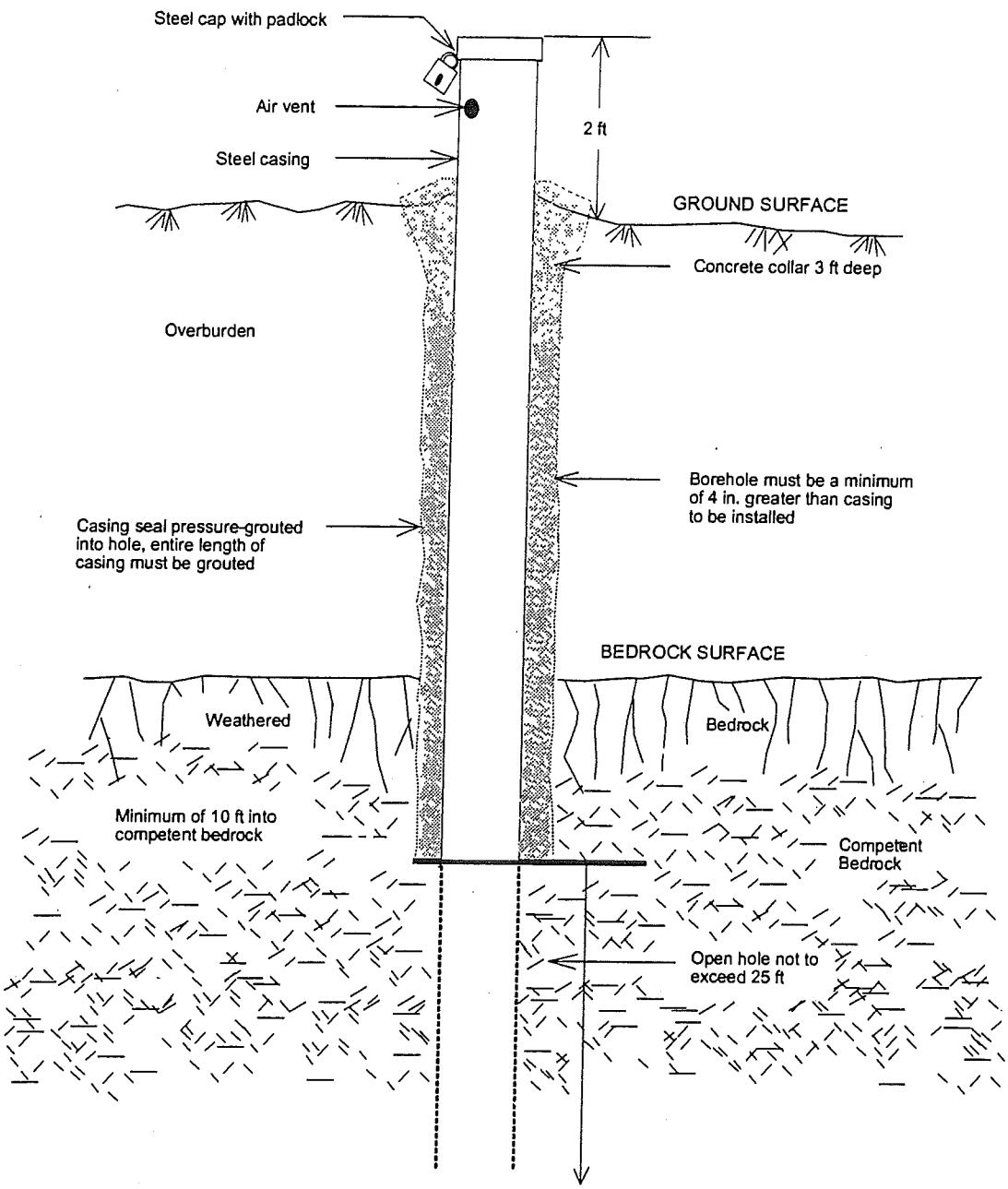


FIGURE 2-4

TYPICAL BEDROCK MONITORING WELL

Source: NJDEPE Field Sampling Procedures Manual, May 1992.

THE PORT AUTORITY OF NY/NJ

459\037WELL.DS4

MONITORING WELL CERTIFICATION - FORM A - AS BUILT CERTIFICATION

(one form must be completed for each well)

Name of Permittee:
Name of Facility:
Location:
NJPDES Permit No. NJOO or ECRA case No.: _____

CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation: _____
Owner's Well Number (As shown on the application or plans): _____
Well Completion Date: _____
Distance from Top of Casing (cap off) to ground surface (one-hundredth of a foot): _____
Total Depth of Well to the nearest 1/2 foot: _____
Depth to Top of Screen From Top of Casing (one-hundreth of a foot): _____
Screen Length (of length of open hole) in feet: _____
Screen or Slot Size: _____
Screen or Slot Material: _____
Casing Material: (PVC, Steel or Other - Specify): _____
Casing Diameter (inches): _____
Static Water Level From top of Casing at the Time of Installation (one-hundreth of a foot): _____
Yield (gallons per minute): _____
Development Technique (specify) _____
Length of Time Well is Developed/ Pumped or Bailed _____
Lihologic Log: _____

Authentication

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

_____ Name (Type or Print)

_____ Signature

_____ Certification or License No.

Seal

Certification by Executive Officer or Duly Authorized Representive

_____ Name (Type or Print)

_____ Signature

_____ Title

_____ Date

forma.doc

Figure 2-5

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: _____
Name of Facility: _____
Location: _____
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation: _____
This number must be permanently affixed to the well casing:
Datum NAD 1927
Longitude (one-tenth of a second): West _____
Latitude (one-tenth of a second): North _____
Elevation of Top of Casing (cap off) (one-hundreth of a foot): WC=_____/PVC=_____ /GRD=_____
Owners Well Number (As shown on application or plans): _____

BENCHMARK - _____ **ELEVATION** - _____
GEOGRAPHIC POSITION - _____
_____

DATE OF SURVEY - _____

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information the possibility of fine and imprisonment.

_____
PROFESSIONAL LAND SURVEYOR'S SIGNATURE

_____
PROFESSIONAL LAND SURVEYOR'S NAME **SEAL**
(Please print or type)

_____
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be surveyed to an accuracy of one-hundreth of a second latitude and longitude. This shall not be considered to be a major modification of the N.J.P.D.E.S. permit.

FIGURE 2- 7

THE PORT AUTHORITY OF N.Y & N.J.

ENGINEERING DEPARTMENT

MATERIALS ENGINEERING DIVISION

MONITOR WELL DEVELOPMENT DATA SHEET

LOCATION:

WELLPOINT No.: DATE:

STICK-UP DISTANCE: feet CASING DIAMETER:

DEPTH OF WELL FROM TOP OF PIPE:

WELLPOINT DEPTH:

	TIME	DISTANCE FROM TOP OF PIPE TO: WATER, feet	OIL, feet
BEFORE DEVELOPMENT			
AFTER DEVELOPMENT			

VOLUME TO BE REMOVED:

DEPTH OF WELL		feet
DEPTH TO WATER	-	feet
DEPTH OF WATER COLUMN		feet
FACTOR *	X	liters / feet
VOLUME TO BE REMOVED		liters

WELL DEVELOPMENT:

NUMBER OF VOLUMES	TIME	pH	TEMP. degrees C	CONDUCTIVITY umohs / cm	SALINIT 0 / 00
1					
2					
3					
4					
5					

SIGNATURES OF ALL PERSONS PRESENT:

REMARKS:

* FACTOR = 0.618 FOR 2 INCH DIAMETER WELL CASING

* FACTOR = 2.471 FOR 4 INCH DIAMETER WELL CASING

GROUNDWATER PURGE DATA SHEET

Project Name: _____ Project Number: _____
Date: _____ Weather: _____
Field Personnel: _____ Equipment Serial Number: _____
Monitoring Well Number: _____ Permit Number: -
PID Reading: _____ Free Product Thickness: -

Temperature Correction Factor: 0.0° C

LOW-FLOW

Well Diameter: _____ inches
Total Depth of Well: _____ feet (from top of casing)
Depth to Water: _____ feet (from top of casing)

Groundwater Parameters	Pre-Purge	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Time													
Depth to Water (ft)													
Color													
Clarity													
Cumulative Volume (liters)													
± 0.10 pH													
± 3% Specific Cond. (mS/cm)													
± 10% for values>1 Turbidity NTU													
± 10% DO (mg/L)													
± 3% Temperature (°C)													
± 10 mV ORP (mV)													
Salinity(ppt)													
TDS (g/L)													

Purge Start Time: _____ Purge End Time: _____
Total Purge Volume: _____ liters Total Purge Time: _____ min
Purge Method: _____ Purge Rate: _____ ml/min

Sample Start Time: _____ Sample End Time: _____
Sampling Method: _____ Total Sampling Time: _____ min

Observations:

Sampling Technician: _____ _____
Printed Name Signature

HNu2

FIGURE 3-1

THE PORT AUTHORITY OF N.Y & N.J.

ENGINEERING DEPARTMENT

MATERIALS ENGINEERING DIVISION

HNU READINGS

Sheet of

PROJECT:	
BORING No.	DATE:
FIELD READINGS BY:	HNu Model:

TIME	SAMPLE No.	IN-SITU Split Spoon Reading	HEAD-Space Reading	BREATHING Zone Reading	REMARKS

PA 547
1-93

THE PORT AUTHORITY OF NY & NJ

Engineering Department
Materials Engineering Division

BORING REPORT

PROJECT	NAME OF CONTRACTOR	BORING NO.	SHEET OF
			SURFACE ELEV.
LOCATION		CONTRACT NO.	DATE

SPOON	CASING SIZE	HOLE TYPE
"O.D. "I.D.		
HAMMER # FALL "	HAMMER # FALL "	
DRILLER		
INSPECTOR		

GROUND WATER LEVEL

Date	Time	Depth	Remarks

CASING BLOWS/FT.	DEPTH	SPOON BLOWS/6"	RE-COV'D [1]	SAMP.[2] NO.	[3]SAMPLE DESCRIPTION AND REMARKS _____ LINE LOCATES CHANGE OF PROFILE

NOTES: 1 — Length recovered; 0"—Loss of Sample.
2 — U = undisturbed.
3 — Log depth of change in color of wash water, loss of water, artesian water, sand heave in casing, etc.

Figure 3-2

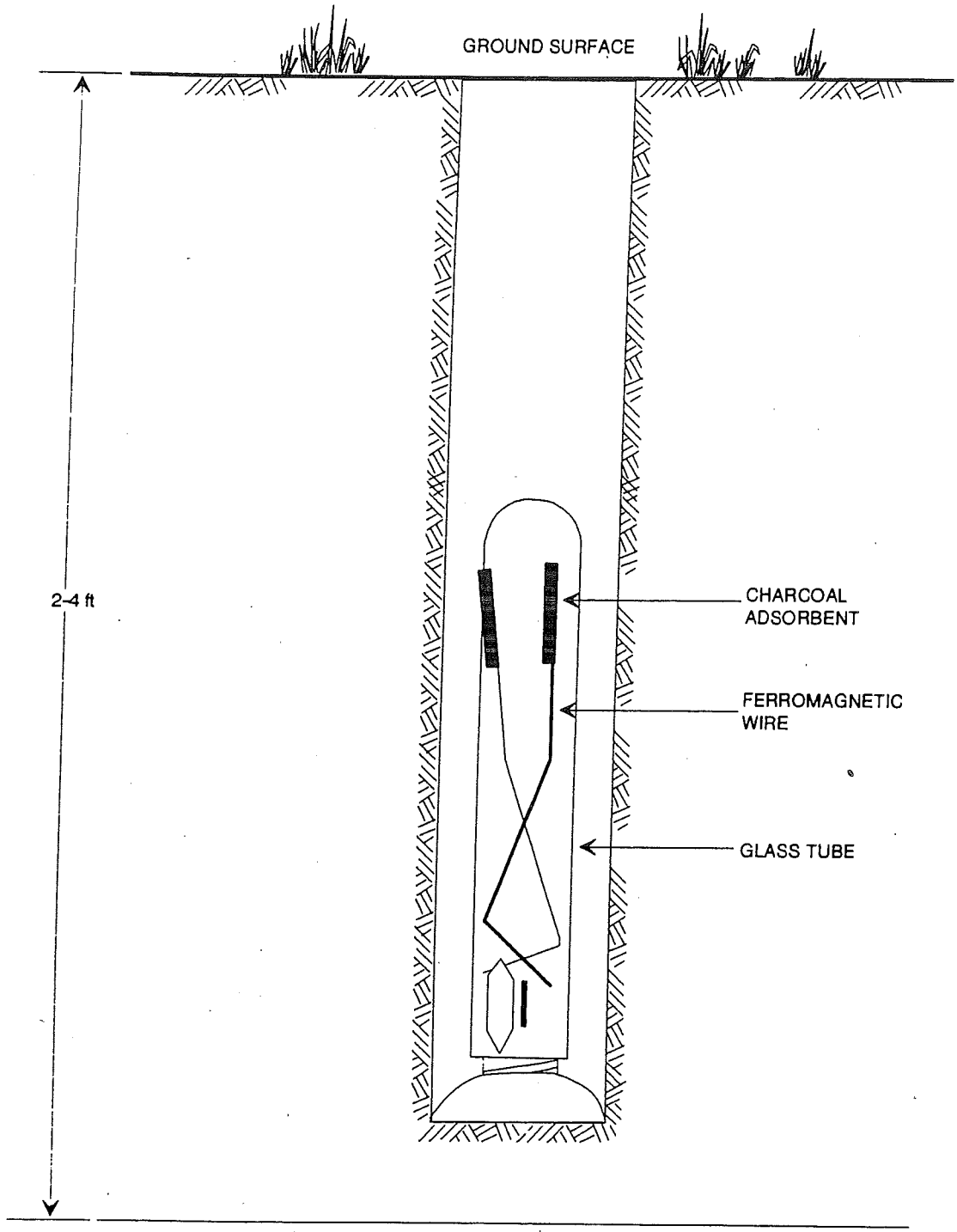
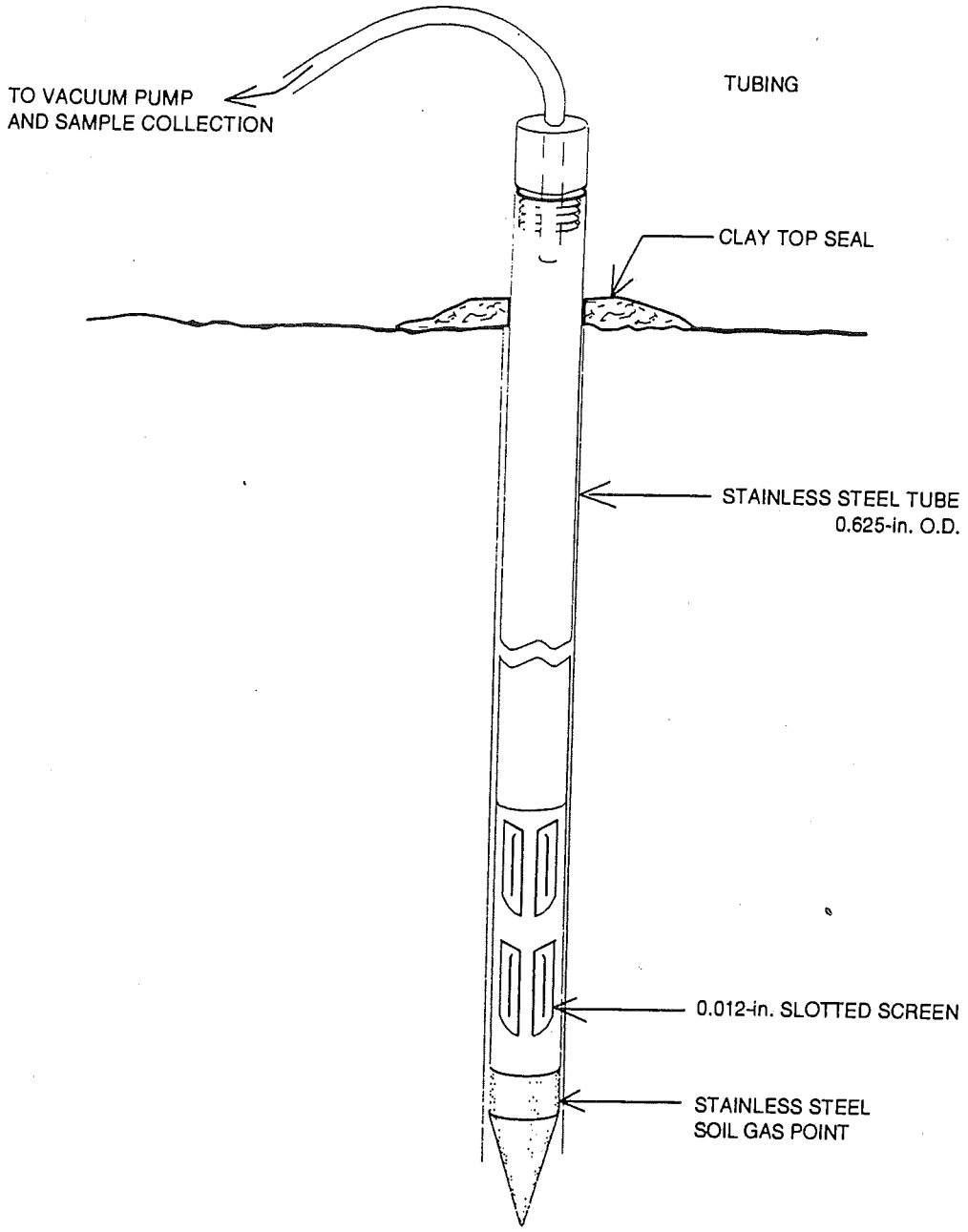


FIGURE 6-1

TYPICAL PETREX PASSIVE SOIL GAS COLLECTION TUBE

THE PORT AUTHORITY OF NY/NJ

\459\037SOILG.DRW



NOT TO SCALE

FIGURE 6-2

TYPICAL SOIL GAS POINT CONSTRUCTION

\459\037SGP.DRW

THE PORT AUTHORITY OF NY/NJ

FIGURE 10-1

THE PORT AUTHORITY OF N.Y. & N.J.
ENGINEERING DEPARTMENT
MATERIALS ENGINEERING DIVISION
CHAIN OF CUSTODY REPORT

LABORATORY DESTINATION:

PAGE OF

BILLING INFORMATION		PROJECT INFORMATION	
BILL TO:	PA NY & NJ	PROJECT:	
ADDRESS:	241 Erie Street	JOB#:	
	Jersey City, NJ 07310-1397	LOCATION:	
ATTENTION:	V. Berndt	CONTACT:	
TELEPHONE:	201-216-2963	SAMPLED BY:	
FAX:	201-216-2949	ANALYTICAL PROTOCOL:	

SAMPLE ID	DATE	TIME	SAMPLE TYPE		SAMPLE MATRIX	#OF BOTTLES	ANALYSIS (METHOD)											PRESERVATIVES				
			COMPOSITE	GRAB														H2SO4	HCL	HNO3	NAOH	NON-PRES

TURNAROUND (INDICATE IN CALENDAR DAYS): FAX: HARD COPY:

RELINQUISHED BY:	DATE: TIME:	DELIVERABLES/ (CIRCLE ONE): DATA SUM NY/ASP RED/DELIV CLP OTHER:
RECEIVED BY:	DATE: TIME:	
RELINQUISHED BY:	DATE: TIME:	COMMENTS:
RECEIVED BY:	DATE: TIME:	

ARCADIS

Attachment 2

Laboratory QAPPs

- TestAmerica Edison
- Analytical Laboratory Services

Quality Assurance Manual

TestAmerica Edison
777 New Durham Road
Edison, NJ 08817
Phone No. 732-549-3900
Fax No. 732-549-3679

www.testamericainc.com

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Title Page:

Quality Assurance Manual
Approval Signatures

	11/29/2013
Laboratory Director – Ann Gladwell	Date
	11/29/2013
Quality Assurance Manager - Carl Armbruster	Date
	11/29/2013
Operations Manager – Mark Acierno	Date

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REFERENCED CORPORATE SOPs AND POLICIES

SOP / Policy Reference	Title
CA-Q-S-001	Solvent and Acid Lot Testing and Approval
CA-Q-S-002	Acceptable Manual Integration Practices
CA-Q-S-004	Method Compliance & Data Authenticity Audits
CA-Q-S-006	Detection Limits
CA-Q-S-008	Management Systems Review
CW-Q-S-001	Corporate Document Control and Archiving
CW-Q-S-002	Writing a Standard Operating Procedure (SOPs)
CW-L-S-002	Internal Investigation of Potential Data Discrepancies and Determination for Data Recall
CA-L-S-002	Subcontracting Procedures
CW-L-P-004	Ethics Policy
CA-L-P-002	Contract Compliance Policy
CW-F-P-002	Authorization Matrix
CW-F-P-004	Procurement and Contracts Policy
CA-C-S-001	Work Sharing Process
CA-T-P-001	Qualified Products List
CW-F-S-007	Controlled Purchases Policy
CW-F-S-018	Vendor Selection
CA-Q-M-002	Corporate Quality Management Plan
CW-E-M-001	Corporate Environmental Health & Safety Manual

REFERENCED LABORATORY SOPs

SOP Reference	Title
ED-GEN-002	Document Control
ED-GEN-003	Control of Non-Conformances and Corrective Action
ED-GEN-022	Training
ED-GEN-024	Record Storage and Retention
ED-GEN-001	Data Management and Handling
ED-GEN-021	Data Review
ED-GEN-007	Subsampling
ED-SPM-001	Sample Receipt, Login, Identification, And Storage
ED-RP-001	Reports Production
ED-GEN-011	Calibration and Use of Pipettes
ED-FLD-008, -009	Groundwater Sampling and Flow Monitoring
ED-FLD-014	Wastewater Sampling
ED-FLD-001 thru -010	Field Analytical Parameters
ED-SPM-006	Acceptance and Handling of Regulated Domestic & Foreign Soils
ED-SPM-007	Disposal of Samples and Associated Laboratory Waste

SECTION 3. INTRODUCTION, SCOPE AND APPLICABILITY

3.1 Introduction and Compliance References

TestAmerica Edison's Quality Assurance Manual (QAM) is a document prepared to define the overall policies, organization objectives and functional responsibilities for achieving TestAmerica's data quality goals. The laboratory maintains a local perspective in its scope of services and client relations and maintains a national perspective in terms of quality.

The QAM has been prepared to assure compliance with The NELAC Institute (TNI) Standard, dated 2009, Volume 1 Modules 2 and 4, and ISO/IEC Guide 17025:2005(E). In addition, the policies and procedures outlined in this manual are compliant with TestAmerica's Corporate Quality Management Plan (CQMP) and the various accreditation and certification programs listed in Appendix 3. The CQMP provides a summary of TestAmerica's quality and data integrity system. It contains requirements and general guidelines under which all TestAmerica facilities shall conduct their operations.

The QAM has been prepared to be consistent with the requirements of the following documents:

- EPA 600/4-88/039, *Methods for the Determination of Organic Compounds in Drinking Water,* EPA, Revised July 1991.
- EPA 600/R-95/131, *Methods for the Determination of Organic Compounds in Drinking Water,* Supplement III, EPA, August 1995.
- EPA 600/4-79-019, *Handbook for Analytical Quality Control in Water and Wastewater Laboratories,* EPA, March 1979.
- *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), Third Edition, September 1986, Final Update I, July 1992, Final Update IIA, August 1993, Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996; Final Update IV, January 2008.*
- Federal Register, 40 CFR Parts 136, 141, 172, 173, 178, 179 and 261.
- *Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-R-05-004, January 2005) (DW labs only)*
- *Statement of Work for Inorganics & Organics Analysis, SOM and ISM, current versions, USEPA Contract Laboratory Program Multi-media, Multi-concentration.*
- APHA, *Standard Methods for the Examination of Water and Wastewater,* 18th Edition, 19th, 20th, 21st and on-line Editions.
- Toxic Substances Control Act (TSCA).

3.2 Terms and Definitions

A Quality Assurance Program is a company-wide system designed to ensure that data produced by the laboratory conforms to the standards set by state and/or federal regulations. The program functions at the management level through company goals and management policies, and at the analytical level through Standard Operating Procedures (SOPs) and quality control. The TestAmerica program is designed to minimize systematic error, encourage

constructive, documented problem solving, and provide a framework for continuous improvement within the organization.

Refer to Appendix 2 for the Glossary/Acronyms.

3.3 Scope / Fields of Testing

The laboratory analyzes a broad range of environmental and industrial samples every month. Sample matrices vary among drinking water, effluent water, groundwater, hazardous waste, sludge and soils. The Quality Assurance Program contains specific procedures and methods to test samples of differing matrices for chemical, physical and biological parameters. The Program also contains guidelines on maintaining documentation of analytical processes, reviewing results, servicing clients and tracking samples through the laboratory. The technical and service requirements of all analytical requests are thoroughly evaluated before commitments are made to accept the work. Measurements are made using published reference methods or methods developed and validated by the laboratory.

The methods covered by this manual include the most frequently requested methodologies needed to provide analytical services in the United States and its territories. The specific list of test methods used by the laboratory can be found in TestAmerica Edison Work Instruction No. EDS-WI-009 (Analytical Capabilities). The approach of this manual is to define the minimum level of quality assurance and quality control necessary to meet these requirements. All methods performed by the laboratory shall meet these criteria as appropriate. In some instances, quality assurance project plans (QAPPs), project specific data quality objectives (DQOs) or local regulations may require criteria other than those contained in this manual. In these cases, the laboratory will abide by the requested criteria following review and acceptance of the requirements by the Laboratory Director and the Quality Assurance (QA) Manager. In some cases, QAPPs and DQOs may specify less stringent requirements. The Laboratory Director and the QA Manager must determine if it is in the lab's best interest to follow the less stringent requirements.

3.4 Management of the Manual

3.4.1 Review Process

The template on which this manual is based is reviewed annually by Corporate Quality Management Personnel to assure that it remains in compliance with Section 3.1. This manual itself is reviewed every two years by senior laboratory management to assure that it reflects current practices and meets the requirements of the laboratory's clients and regulators as well as the CQMP. Occasionally, the manual may need changes in order to meet new or changing regulations and operations. The QA Manager will review the changes in the normal course of business and incorporate changes into revised sections of the document. All updates will be reviewed by the senior laboratory management staff. The laboratory updates and approves such changes according to our Document Control & Updating procedures (refer to SOP No. ED-GEN-002, Document Control).

SECTION 4. MANAGEMENT REQUIREMENTS

4.1 Overview

TestAmerica Edison is a local operating unit of TestAmerica Laboratories, Inc... The organizational structure, responsibilities and authorities of the corporate staff of TestAmerica Laboratories, Inc. are presented in the CQMP. The laboratory has day-to-day independent operational authority overseen by corporate officers (e.g., President, Chief Executive Officer, and Corporate Quality). The laboratory operational and support staff work under the direction of the Laboratory Director. The organizational structure for both Corporate & TestAmerica Edison is presented in Figure 4-1.

4.2 Roles and Responsibilities

In order for the Quality Assurance Program to function properly, all members of the staff must clearly understand and meet their individual responsibilities as they relate to the quality program. The following descriptions briefly define each role in its relationship to the Quality Assurance Program.

4.2.1 Additional Requirements for Laboratories

The responsibility for quality resides with every employee of the laboratory. All employees have access to the QAM, are trained to this manual, and are responsible for upholding the standards therein. Each person carries out his/her daily tasks in a manner consistent with the goals and in accordance with the procedures in this manual and the laboratory's SOPs. Role descriptions for Corporate personnel are defined in the CQMP. This manual is specific to the operations of TestAmerica's Edison laboratory.

4.2.2 Laboratory Director/Lead Technical Director

TestAmerica Edison's Laboratory Director is responsible for the overall quality, safety, financial, technical, human resource and service performance of the whole laboratory and reports to the

General Manager (GM). The Laboratory Director provides the resources necessary to implement and maintain an effective and comprehensive Quality Assurance and Data Integrity Program.

Specific responsibilities include, but are not limited to:

- Serves as lead technical director for all fields of testing.
- Ensures that all analysts and supervisors have the appropriate education and training to properly carry out the duties assigned to them and ensures that this training has been documented.
- Ensures that personnel are free from any commercial, financial and other undue pressures which might adversely affect the quality of their work.
- Ensures TestAmerica's human resource policies are adhered to and maintained.
- Ensures that sufficient numbers of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs may be temporarily suspended by the Laboratory Director.
- Monitors standards of performance in quality control and quality assurance.
- Monitors the validity of analyses performed and data generated in the lab to assure reliable data.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Interfaces with Project Management and Customer Service to forecast receipts, provide quality analytical data to clients and meet on-time delivery dates.
- Ensures that the facility has appropriate Information Technology resources and that they are used effectively to support operational requirements.
- Actively participates in the process of sharing and adopting best practices within TestAmerica. Provides technical assistance to other TestAmerica laboratories as needed to improve productivity and customer service.
- Ensures client specific reporting and quality control requirements are met.
- Captains the management team, consisting of the QA Manager, the Operations Manager, the Project Management Director, the Client Services Manager, the Service Center Manager, the Environmental, Health and Safety Manager and the Support Services Manager as direct reports.

4.2.3 Quality Assurance (QA) Manager

The QA Manager has responsibility and authority to ensure the continuous implementation of the quality system.

The QA Manager reports directly to the Laboratory Director and has access to Corporate QA for advice and resources. This position is able to evaluate data objectively and perform

assessments without outside (e.g., managerial) influence. Corporate QA may be used as a resource in dealing with regulatory requirements, certifications and other quality assurance related items. The QA Manager directs the activities of the QA officers to accomplish specific responsibilities, which include, but are not limited to:

- Serves as the focal point for QA/QC in the laboratory.
- Having functions independent from laboratory operations for which he/she has quality assurance oversight.
- Maintaining and updating the QAM.
- Monitoring and evaluating laboratory certifications; scheduling proficiency testing samples.
- Monitoring and communicating regulatory changes that may affect the laboratory to management.
- Training and advising the laboratory staff on quality assurance/quality control procedures that are pertinent to their daily activities.
- Have documented training and/or experience in QA/QC procedures and the laboratory's Quality System.
- Having a general knowledge of the analytical test methods for which data audit/review is performed (and/or having the means of getting this information when needed).
- Arranging for or conducting internal audits on quality systems and the technical operation.
- The laboratory QA Manager will maintain records of all ethics-related training, including the type and proof of attendance.
- Maintain, improve, and evaluate the corrective action database and the corrective and preventive action systems.
- Notifying laboratory management of deficiencies in the quality system and ensuring corrective action is taken. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs shall be investigated following procedures outlined in Section 12 and if deemed necessary may be temporarily suspended during the investigation.
- Objectively monitor standards of performance in quality control and quality assurance without outside (e.g., managerial) influence.
- Coordinating of document control of SOPs, MDLs, control limits, and miscellaneous forms and information.
- Review a percentage of all final data reports for internal consistency. Review of Chain of Custody (COC), correspondence with the analytical request, batch QC status, completeness of any corrective action statements, 5% of calculations, format, holding time, sensibility and completeness of the project file contents.
- Review of external audit reports and data validation requests.
- Follow-up with audits to ensure client QAPP requirements are met.

- Establishment of reporting schedule and preparation of various quality reports for the Laboratory Director, clients and/or Corporate QA.
- Development of suggestions and recommendations to improve quality systems.
- Research of current state and federal requirements and guidelines.
- Captains the QA team to enable communication and to distribute duties and responsibilities.

- Ensuring Communication & monitoring standards of performance to ensure that systems are in place to produce the level of quality as defined in this document.
- Notifying laboratory management of deficiencies in the quality system and ensuring corrective action is taken. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs are temporarily suspended following the procedures outlined in Section 12.
- Evaluation of the thoroughness and effectiveness of training.

4.2.4 Quality Assurance (QA) Specialist

The Quality Assurance (QA) Specialist is responsible for performing data audits, special audits, assisting with external and systems audits, overseeing the maintenance of QC records, certifications, Standard Operating Procedures (SOPs), training records, DOCs, arranging and managing PT samples. Additional responsibilities may include assisting with systematic problems within the laboratory, assisting in reviewing and/or writing of Quality Assurance Project Plans, and technical and QC specifications in contracts and other functions in support of the QA Manager's responsibilities as assigned.

- Assist QA Manager in conducting QA training courses, including ethics training.
- Performs data audits.
- Assist in performing special audits as deemed necessary by data audits, client inquiries, etc.
- Assisting in, conducting and responding to external audits conducted by clients and regulatory agencies.
- Assisting in reviewing and/or writing of Quality Assurance Project Plans, and technical and QC specifications in contracts.
- Maintaining all necessary laboratory certifications.
- Arranging and managing PT samples.
- Reviewing laboratory SOPs. Writing SOPs as needed.
- Maintaining historical indices of all technical records including SOPs, QC records, laboratory data, etc.
- Ensuring maintenance of records archives.
- Assisting in and monitoring laboratory’s method compliance.
- Ensuring maintenance of DOCs for all analysts.
- Ensuring maintenance of training records for all employees.

- Assisting in identification of systematic problems within laboratories.
- Recommends resolutions for ongoing or recurring nonconformance.
- Providing statistical feedback to Departments on error rates, and assisting in identifying systematic improvements to minimize errors.
- Assists in tracking of customer complaints, providing statistical feedback to the laboratory, and assisting in identifying improvements.
- Overseeing and reviewing MDL studies.
- Ensuring control charts are generated; oversees and approves setting of control limits.
- Assists in monitoring new regulations and communicating them to the laboratory.

4.2.5 LAN Analyst

The LAN Analyst reports directly to the Regional Desktop Support Supervisor. Responsibilities include:

- Works with Corporate IT to solve information systems problems and to standardize laboratory IT equipment and processes.
- Monitors and supports office automation so that LAN is operational for internal and external communications.
- Troubleshoots problems throughout laboratory relating to computers, software, telephones and other electronic equipment.
- Responsible for new user setup on network, LIMS, telephone and voice mail.
- Installs or upgrades computers and other equipment.
- Maintains tape backups for multiple computer servers including LIMS.
- Maintains historical files of software, software operating procedures (manuals), software changes/modifications (Change Log) and software version numbers.
- Maintains log of repairs and service performed on LIMS hardware.
- Maintains awareness of any environmental conditions of the facility housing the LIMS that may compromise LIMS raw data and informs management.

4.2.6 Operations Manager

The Operations Manager manages and directs the analytical and reports production sections of the laboratory. He/She reports directly to the Laboratory Director. Specific responsibilities include:

- Maintains awareness of any environmental conditions of the facility housing the LIMS that may compromise LIMS raw data and informs management.
- Continuously evaluates production capacity and improves capacity utilization.
- Continuously evaluates turnaround time and addresses any problems that may hinder meeting the required and committed turnaround time from the various Departments.

- Develops and improves the training of all analysts in cooperation with the Laboratory Director and QA Manager and in compliance with regulatory requirements.
- Works with the Department (Technical) Managers to ensure that scheduled instrument maintenance is completed.
- Is responsible for efficient utilization of supplies.
- Constantly monitors and modifies the processing of samples through the Departments.
- Fully supports the quality system and, if called upon in the absence of the QA Manager, serves as his substitute in the interim.

4.2.7 Environmental, Health and Safety Manager

The Environmental, Health and Safety Manager reports directly to the Laboratory Director. The duties of this position consist of:

- Supervises the Environmental, Health and Safety/Facilities Team.
- Conduct ongoing, necessary safety training and conduct new employee safety orientation.
- Assist in developing and maintaining the Chemical Hygiene/Safety Manual.
- Administer dispersal of all Material Safety Data Sheet (MSDS) information.
- Perform regular chemical hygiene and housekeeping instruction.
- Give instruction on proper labeling and practice.
- Serve as chairman of the laboratory safety committee.
- Provide and train personnel on protective equipment.
- Oversee the inspection and maintenance of general safety equipment – fire extinguishers, safety showers, eyewash fountains, etc. and ensure prompt repairs as needed.
- Supervise and schedule fire drills and emergency evacuation drills.
- Determine what initial and subsequent exposure monitoring, if necessary to determine potential employee exposure to chemicals used in the laboratory.
- When determined necessary, conduct exposure monitoring assessments.
- Determine when a complaint of possible over-exposure is “reasonable” and should be referred for medical consultation.
- Assist in the internal and external coordination of the medical consultation/monitoring program conducted by TestAmerica’s medical consultants.
- Staying current with the hazardous waste regulations.
- Continuing training on hazardous waste issues.
- Reviewing and updating annually the Hazardous Waste Contingency Plan in the Environmental Health & Safety Manual.
- Auditing the staff with regard to compliance with the Hazardous Waste Contingency Plan.

- Contacting the hazardous waste subcontractors for review of procedures and opportunities for minimization of waste.

4.2.8 EH&S/Facilities Coordinator

The EH&S/Facilities Coordinator reports directly to the Environmental, Health and Safety Manager. The duties of this position consist of:

- Monitors laboratory for unsafe conditions or acts to keep lab in compliance with the Chemical Hygiene Plan, EH&S Procedures, and company policies.
- Ensures the proper personal protective equipment is available and personnel are properly trained in its use.
- Assists the Environmental, Health and Safety Manager in the investigation of accidents, incidents, and near misses and identifies and eliminates root cause.
- Conducts monthly facility inspections for compliance with health, safety and environmental regulations and procedures. Completes and forwards monthly inspection report to safety committee and laboratory management for corrective actions.
- Conducts safety equipment checks to ensure proper working order and sufficient inventory.
- Plans and tracks completion of monthly general awareness training sessions and compliance training, including new employee EH&S orientation.
- Coordinates emergency response team to provide prompt medical attention and stabilize emergency situation. After emergency is over, assists in determining appropriate clean up procedures.
- Conducts the monthly EH&S committee meeting.
- Participates in monthly EH&S conference call.
- Reviews and maintains MSDS's for laboratory materials.
- Coordinates the management and disposal of laboratory wastes.
- Assists in the preparation and maintenance of the laboratory Integrated Contingency Plan.
- Monitors air quality in facility, including monitoring fumehoods for proper operation and ventilation.
- Maintains overall building facilities and equipment as well as administers prevention maintenance measures.
- Contacts outside contractors as necessary to repair/maintain items outside the realm of reasonable maintenance.
- Performs miscellaneous errands, buying parts for labs, janitorial supplies.
- Oversees storage facilities, files and outside storage.

4.2.9 Technical Managers (Department Managers)

The Technical Managers (Department Managers) report directly to the Operations Manager. They are accountable for all analyses and analysts under their experienced supervision. The scope of responsibility ranges from the new-hire process and existing technology through the ongoing training and development programs for existing analysts and new instrumentation. Specific responsibilities include, but are not limited to:

- Exercises day-to-day supervision of laboratory operations for the appropriate field of accreditation and reporting of results. Coordinating, writing, and reviewing preparation of all test methods, i. e., SOPs, with regard to quality, integrity, regulatory and optimum and efficient production techniques, and subsequent analyst training and interpretation of the SOPs for implementation and unusual project samples. He/she insures that the SOPs are properly managed and adhered to at the bench. He/she develops standard costing of SOPs to include supplies, labor, overhead, and capacity (design vs. demonstrated versus first-run yield) utilization.
- Reviewing and approving, with input from the QA Manager, proposals from marketing, in accordance with an established procedure for the review of requests and contracts. This procedure addresses the adequate definition of methods to be used for analysis and any limitations, the laboratory's capability and resources, the client's expectations. Differences are resolved before the contract is signed and work begins. A system documenting any significant changes is maintained, as well as pertinent discussions with the client regarding their requirements or the results of the analyses during the performance of the contract. All work subcontracted by the laboratory must be approved by the client. Any deviations from the contract must be disclosed to the client. Once the work has begun, any amendments to the contract must be discussed with the client and so documented.
- Monitoring the validity of the analyses performed and data generated in the laboratory. This activity begins with reviewing and supporting all new business contracts, insuring data quality, analyzing internal and external non-conformances to identify root cause issues and implementing the resulting corrective and preventive actions, facilitating the data review process (training, development, and accountability at the bench), and providing technical and troubleshooting expertise on routine and unusual or complex problems.
- Providing training and development programs to applicable laboratory staff as new hires and, subsequently, on a scheduled basis. Training includes instruction on calculations, instrumentation management to include troubleshooting and preventive maintenance.
- Enhancing efficiency and improving quality through technical advances and improved LIMS utilization. Capital forecasting and instrument life cycle planning for second generation methods and instruments as well as asset inventory management.
- Coordinating sample management from "cradle to grave," insuring that no time is lost in locating samples.
- Ensures that 100% of data review undergoes two documented levels of review. Likewise ensures that all non-conformance issues are properly documented.
- Scheduling all QA/QC-related requirements for compliance, e.g., MDLs, etc..

- Captains Department personnel to communicate quality, technical, personnel, and instrumental issues for a consistent team approach.
- Responsible for the timely and accurate completion of performance evaluation samples and MDLs, for the Department.
- Ensure all logbooks are maintained, current, and properly labeled or archived.
- Report all non-conformance conditions to the QA Manager, Operations Manager, and/or Laboratory Director.
- Ensure that preventive maintenance is performed on instrumentation as detailed in the QA Manual or SOPs. He is responsible for developing and implementing a system for preventive maintenance, troubleshooting, and repairing or arranging for repair of instruments.
- Maintain adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.
- Achieve optimum turnaround time on analyses and compliance with holding times.
- Provide written responses to external and internal audit issues and coordinates audit responses with the QA Manager.

4.2.10 Laboratory Analysts and Technicians

Laboratory analysts and technicians are responsible for conducting analysis and performing all tasks assigned to them by their Department manager or supervisor. The responsibilities of the analysts are listed below:

- Perform analyses by adhering to analytical and quality control protocols prescribed by current SOPs, this QA Manual, and project-specific plans honestly, accurately, timely, safely, and in the most cost-effective manner.
- Document standard and sample preparation, instrument calibration and maintenance, data calculations, sample matrix effects, and any observed non-conformance on worklists, benchsheets, lab notebooks and/or the Non-Conformance Database by means of Non-Conformance Memos (NCMs).
- Report all non-conformance situations, instrument problems, matrix problems and QC failures, which might affect the reliability of the data, to their Department (Technical) Manager, the Laboratory Director, and/or the QA Manager or member of QA staff.
- Perform 100% review of the data generated and document the review in the raw data and on the review checklist prior to entering and submitting for secondary level review.
- Suggest method improvements to the Department (Technical) Manager, the Laboratory Director, and the QA Manager. These improvements, if approved, will be incorporated within the constraints of the consensus reference methods.
- Work cohesively as a team in their Department to achieve the goals of accurate results, optimum turnaround time, cost effectiveness, cleanliness, complete documentation, and personal knowledge of environmental analysis.
- Adhere to all environmental, health and safety protocols and attend safety meetings as required.

- Attend and participate in all staff meetings.

4.2.11 Sample Control Manager

The Sample Control Manager reports to the Laboratory Director. The responsibilities are outlined below:

- Direct the logging of incoming samples into the LIMS.
- Ensure the verification of data entry from login.
- Manages the preparation and shipment of bottle kits to clients.
- Oversees the responsibilities of all Sample Control Technicians.
- Supervises the storage and disposal of all samples.

4.2.12 Client Services Manager

The Customer Service Manager reports to the Laboratory Director and serves as the primary interface between the laboratory and the Sales and Marketing staff. Responsibilities include:

- Laboratory's primary client representative.
- Ensures client complaints are handled professionally, and resolved in a timely manner.
- Compiles and interprets receipts forecast to show near term business trends.
- Manages a minimal list of projects/programs for key client accounts. (Note: sufficient time is needed to manage the PM group and the CSM must not be overwhelmed with project management.)
- Prepares proposals for new business opportunities.
- Compiles and interprets Bid Activity Report.
- Compiles and interprets receipts forecast to show near term business trends.
- Prepares proposals for new business opportunities.
- Provides general sales support to Account Executives for business development activities started in the field.
- Develops and maintains business materials and organized information resource files that include project descriptions, resumes, original proposals, boilerplates, and company qualifications materials.

4.2.13 Director of Project Management

The Director of Project Management reports to the Laboratory Director and serves as the interface between the laboratory's technical Departments and the laboratory's clients. The staff consists of the Project Management team. With the overall goal of total client satisfaction, the functions of this position are outlined below:

- Technical training and growth of the Project Management team.
- Technical liaison for the Project Management team.

- Human resource management of the Project Management team.
- Responsible for ensuring that clients receive the proper sampling supplies, as appropriate.
- Accountable for response to client inquiries concerning sample status.
- Responsible for assistance to clients regarding the resolution of problems concerning COC.
- Ensuring that client specifications, when known, are met by communicating project and quality assurance requirements to the laboratory.
- Notifying the supervisors of incoming projects and sample delivery schedules.
- Accountable to clients for communicating sample progress in daily status meeting with agreed-upon due dates.
- Responsible for discussing with client any project-related problems, resolving service issues, and coordinating technical details with the laboratory staff.
- Responsible for staff familiarization with specific quotes, sample log-in review, and final report completeness.
- Monitor the status of all data package projects in-house to ensure timely and accurate delivery of reports.
- Inform clients of data package-related problems and resolve service issues.
- Coordinate requests for sample containers and other services (data packages).

4.2.14 Project Manager

The Project Managers report directly to the Director of Project Management and serve as liaisons between the laboratory and its clients. The Project Manager's responsibilities include:

- Ensure client specifications are met by communicating project and quality assurance requirements to the laboratory.
- Notify laboratory personnel of incoming projects and sample delivery schedules.
- Monitor the status of all projects in-house to ensure timely delivery of reports.
- Inform clients of project-related problems, resolving service issues and coordinating technical issues with the laboratory staff.
- Accountable for response to client inquiries concerning sample status.
- Responsible for assistance to clients regarding the resolution of problems concerning COC.
- Ensuring that client specifications, when known, are met by communicating project and quality assurance requirements to the laboratory.
- Notifying the supervisors of incoming projects and sample delivery schedules.
- Coordinate client requests for sample containers and other services.
- Schedule sample pick-ups from client offices or project sites and notifying the laboratory staff of incoming samples.
- Coordinate subcontract work.

- Respond to client inquiries concerning sample status.
- Generates final laboratory reports and has signature authority for those reports (as designated and approved by the Laboratory Director).
- Performs final completeness review of data packages prior to release to client.

4.2.15 Project Management Assistant

The Project Management Assistant coordinates and monitors scheduling, timely completion and maintenance of project documentation files and completion of project set up and final report review, invoicing, and EDD's. Assists the Project Manager in servicing the client's needs. Specific responsibilities include:

- Reviews login confirmation reports for accuracy and corrects as needed.
- Generates diskettes for electronic data deliverables (EDD's) for electronic delivery to clients.
- Enters data that was subcontracted to other laboratories.
- Monitors report due dates for timely delivery.
- Assists Project Manager in changing compound lists, TAT, deliverables and other client specific requirements in the LIMs project and/or job database.
- Invoices completed data packages and generates credit or debit invoices to ensure proper payment.

4.2.16 Service Center Manager

The Service Center Manager (SCM) manages the service center and acts as a liaison between the laboratory and the local client base. The SCM is in charge of maintaining the Service Center facility, managing service center couriers, samplers and other personnel, and working with sales to develop, maintain and grow the client base in the area.

- Local area primary client representative for service center location.
- May head project start up meetings to ensure project objectives are successfully met and hands off project detail to assigned Project Manager(s).
- Works with the Quality Assurance Manager and Account Executives (AE) to evaluate and establish project requirements for the service center area.
- Ensures client complaints are handled professionally, and resolved in a timely manner.
- Is in charge of scheduling service center couriers and samplers, preparing bottle orders for delivery, scheduling sample pick ups and shipping samples to the designated laboratory for analysis.
- May manage a minimal list of projects/programs for key client accounts.
- Maintains the facilities at the service center and is responsible for all EH&S policies of TestAmerica at the service center.
- Responsible for all company vehicles that operate out of the service center.
- Provides general sales support to AEs for business development activities started in the field.

- Prepares proposals for new business opportunities.
- Orders supplies (bottles, coolers, etc.) for the service center

4.3 Deputies

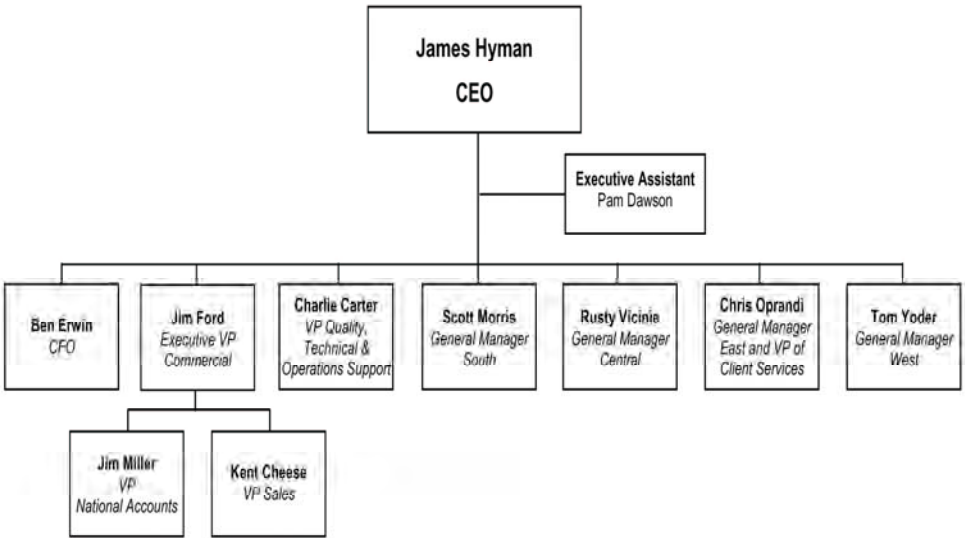
The following table defines who assumes the responsibilities of key personnel in their absence:

Key Personnel	Deputy
Ann Gladwell Laboratory Director	In the event of absence the Laboratory Director's responsibilities are shared by the Laboratory Operations Manager, the Quality Assurance Manager and the Client Services Manager, as appropriate
Carl Armbruster Quality Assurance Manager	Emmylou Digiacomo Quality Assurance Specialist Ann Gladwell Laboratory Director
Department (Technical) Managers	Mark Acierno Laboratory Operations Manager
David Lissy Client Services Manager	Ann Gladwell Laboratory Director
Kenwyn Williams Director of Project Management	Ann Gladwell Laboratory Director
Kene' Kasperek EH&S Manager	Edward Roche EH&S Coordinator
Brian Bordieri Sample Control Manager	Mark Acierno Laboratory Operations Manager
Aidan Scott Kate Harrelson Service Center Managers	Field Services Supervisor

Figure 4-1. Corporate and Laboratory Organization Charts

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

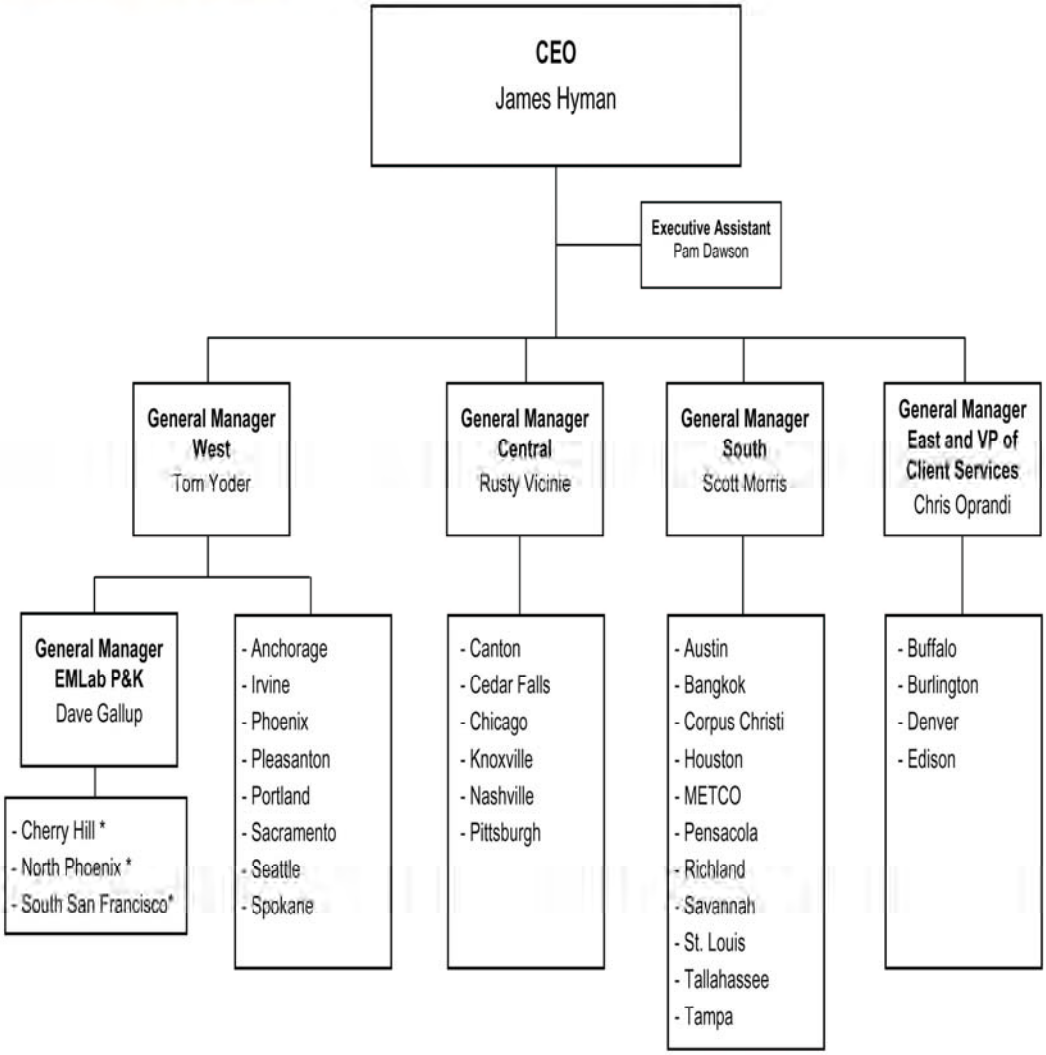
Executive Committee



1 Oct 2013

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Operations

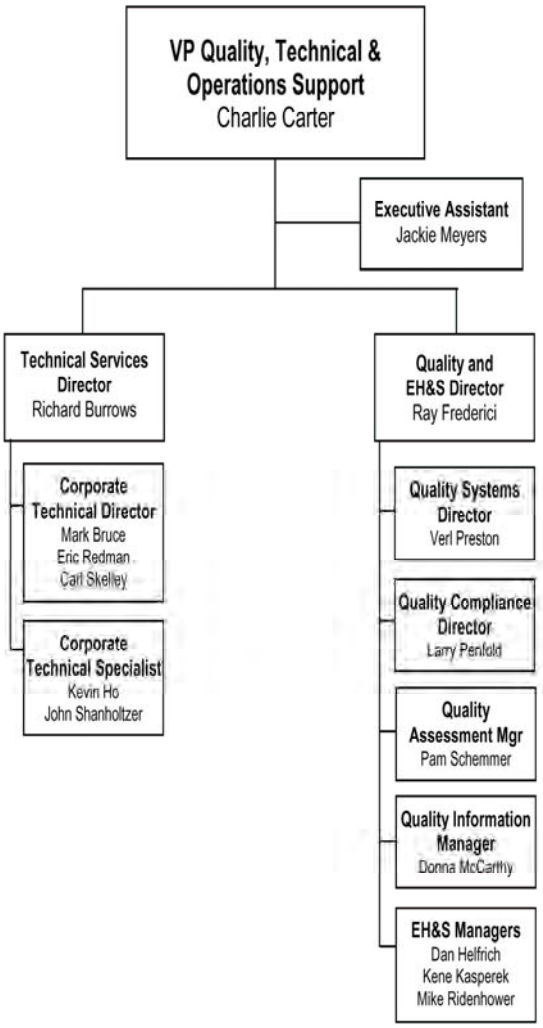


* Note: EMLab P&K microlabs report to these facilities.

3 Sept 2013

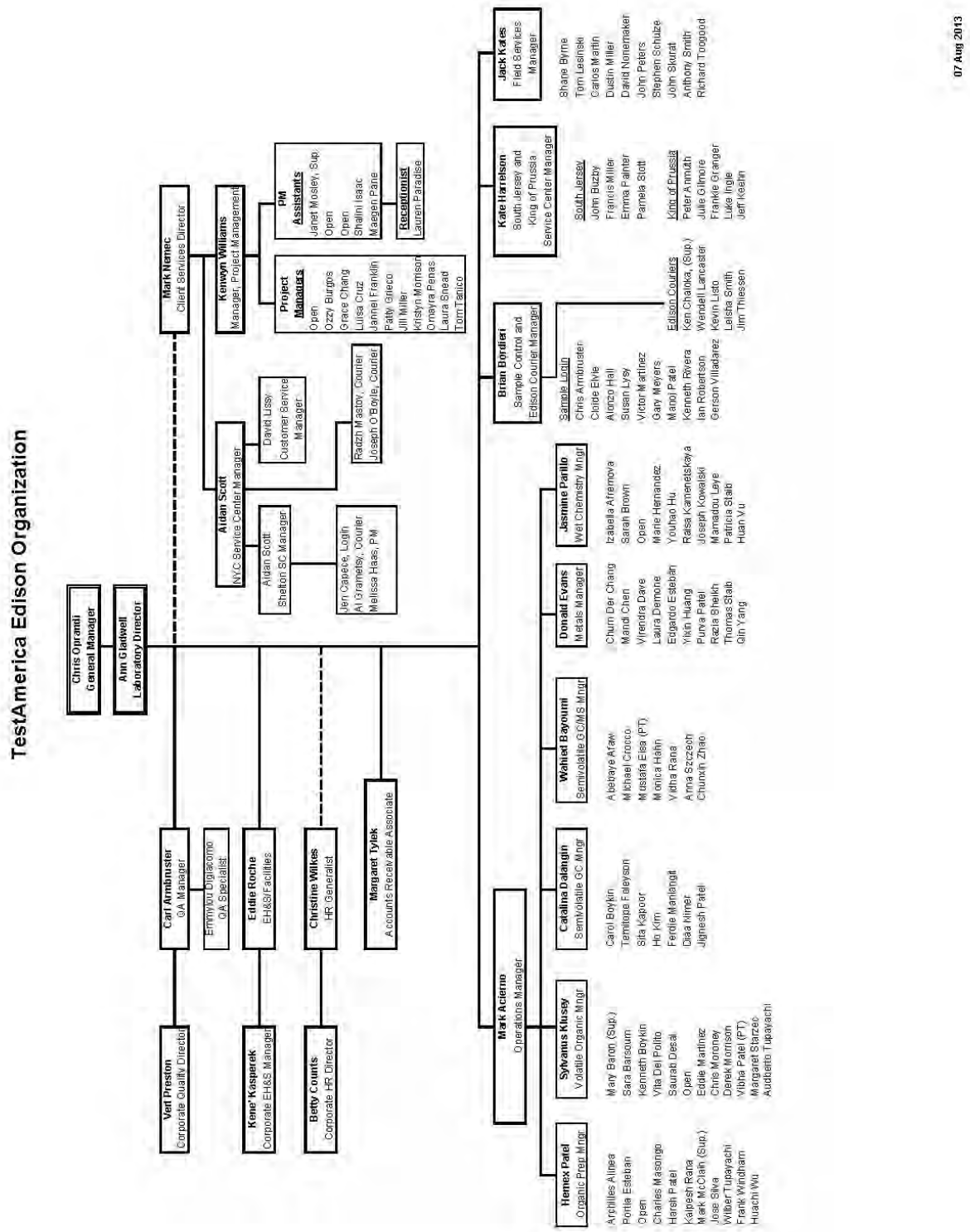
TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Quality, Technical, EH&S & Operations Support



28 Oct 2013

Note: QA Managers and EH&S Coordinators have direct reporting relationship to both operations leadership and corporate functional leadership.


TestAmerica Edison Organization
Chris Oprandi
General Manager
Ann Gladwell
Laboratory Director
Mark Nemec
Client Services Director
Vert Preston
Corporate Quality Director
Carl Ambruster
QA Manager
Emmylou Digiacomo
QA Specialist
Keneyn Williams
Manager, Project Management
Project Managers
Open
Ozzy Burgos
Grace Chang
Luisa Cruz
Jannel Franklin
Patty Grieco
Jill Miller
Kristyn Morrison
Ornayra Penas
Laura Snead
Tom Tanico
PM Assistants
Janet Mosley, Sup.
Open
Open
Shalini Isaac
Maegen Pane
Receptionist
Lauren Paradise
Aidan Scott
NYC Service Center Manager
David Lissy
Customer Service Manager
Radzh Mastoy, Courier
Joseph O'Boyle, Courier
Aidan Scott
Shelton Sc Manager
Jen Capece, Login
Al Grametsy, Courier
Melissa Haas, PM
Kene Kasperek
Corporate EH&S Manager
Eddie Roche
EH&S/Facilities
Betty Counts
Corporate HR Director
Christine Wilkes
HR Generalist
Margaret Tylek
Accounts Receivable Associate
Mark Acierno
Operations Manager
Brian Bordiari
Sample Control and Edison Courier Manager
Sample Login
Chris Armbruster
Clotde Elvie
Alonzo Hall
Susan Lysy
Victor Martinez
Gary Meyers
Manoj Patel
Kenneth Rivera
Ian Robertson
Gerson Villadarez
Edison Couriers
Ken Chalotka, (Sup.)
Wendell Lancaster
Kevin Listo
Leisha Smith
Jim Thiessen
Kate Harrelson
South Jersey and King of Prussia Service Center Manager
South Jersey
John Buzby
Francis Miller
Emma Painter
Pamela Stott
King of Prussia
Peter Annuth
Julie Gilmore
Frankie Granger
Luke Ingle
Jeff Keehn
Jack Kates
Field Services Manager
Shane Byrne
Tom Lesinski
Carlos Martin
Dustin Miller
David Nonemaker
John Peters
Stephen Schulze
John Skurat
Anthony Smith
Richard Troogood
Hemex Patel
Organic Prep Mngr
Archilles Alinea
Portia Estelan
Open
Charles Masongo
Harsh Patel
Kalpesh Rana
Mark McClain (Sup.)
Jose Silva
Wilber Tupayachi
Frank Windham
Huachi Wu
Sylvanus Klussey
Volatile Organic Mngr
Mary Baron (Sup.)
Sara Barsoum
Kenneth Boykin
Vita Del Polito
Saurabh Desai
Open
Eddie Martinez
Chris Moroney
Derek Morrison
Vibha Patel (PT)
Margaret Starzec
Audberto Tupayachi
Catalina Dalangin
Semivolatile GC Mngr
Carol Boykin
Temitope Faleyson
Sita Kapoor
Ho Kim
Ferdie Manlongat
Dilaa Kimer
Jignesh Patel
Wahiat Bayoumi
Semivolatile GC/MS Mngr
Abebraye Afaw
Michael Crocco
Mustafa Elsa (PT)
Monica Hahn
Vidha Rana
Anna Szczech
Chunxin Zhao
Donald Evans
Metals Manager
Churn Der Chang
Mandi Chen
Virendra Dave
Laura Demone
Edgardo Esteban
Yikin Huang
Punya Patel
Razia Sheikh
Thomas Stalb
Qin Yang
Jasmine Parillo
Wet Chemistry Mngr
Izabella Afremova
Sarah Brown
Open
Marie Hernandez
Youhao Hu
Raisa Kamenetskaya
Joseph Kowalski
Mamadou Laye
Patricia Stalb
Huan Vu
07 Aug 2013

SECTION 5. QUALITY SYSTEM

5.1 Quality Policy Statement

It is TestAmerica's Policy to:

- Provide data of known quality to its clients by adhering to approved methodologies, regulatory requirements and the QA/QC protocols.
- Effectively manage all aspects of the laboratory and business operations by the highest ethical standards.
- Continually improve systems and provide support to quality improvement efforts in laboratory, administrative and managerial activities. TestAmerica recognizes that the implementation of a quality assurance program requires management's commitment and support as well as the involvement of the entire staff.
- Provide clients with the highest level of professionalism and the best service practices in the industry.
- To comply with the ISO/IEC 17025:2005(E) International Standard, the 2009 TNI Standard and to continually improve the effectiveness of the management system

Every staff member at the laboratory plays an integral part in quality assurance and is held responsible and accountable for the quality of their work. It is, therefore, required that all laboratory personnel are trained and agree to comply with applicable procedures and requirements established by this document.

5.2 Ethics and Data Integrity

TestAmerica is committed to ensuring the integrity of its data and meeting the quality needs of its clients. The elements of TestAmerica's Ethics and Data Integrity Program include:

- An Ethics Policy (Corporate Policy No. CW-L-P-004) and Employee Ethics Statements.
- Ethics and Compliance Officers (ECOs).
- A Training Program.
- Self-governance through disciplinary action for violations.
- A Confidential mechanism for anonymously reporting alleged misconduct and a means for conducting internal investigations of all alleged misconduct. (Corporate SOP No. CW-L-S-002)
- Procedures and guidance for recalling data if necessary (Corporate SOP No. CW-L-S-002).
- Effective external and internal monitoring system that includes procedures for internal audits (Section 15).
- Produce results, which are accurate and include QA/QC information that meets client pre-defined Data Quality Objectives (DQOs).
- Present services in a confidential, honest and forthright manner.

- Provide employees with guidelines and an understanding of the Ethical and Quality Standards of our Industry.
- Operate our facilities in a manner that protects the environment and the health and safety of employees and the public.
- Obey all pertinent federal, state and local laws and regulations and encourage other members of our industry to do the same.
- Educate clients as to the extent and kinds of services available.
- Assert competency only for work for which adequate personnel and equipment are available and for which adequate preparation has been made.
- Promote the status of environmental laboratories, their employees, and the value of services rendered by them.

5.3 Quality System Documentation

The laboratory's Quality System is communicated through a variety of documents.

- Quality Assurance Manual – Each laboratory has a lab-specific quality assurance manual.
- Corporate SOPs and Policies – Corporate SOPs and Policies are developed for use by all relevant laboratories. They are incorporated into the laboratory's normal SOP distribution, training and tracking system. Corporate SOPs may be general or technical.
- Work Instructions – A subset of procedural steps, tasks or forms associated with an operation of a management system (e.g., checklists, preformatted bench sheets, forms).
- Laboratory SOPs – General and Technical
- Laboratory QA/QC Policy Memorandums

5.3.1 Order of Precedence

In the event of a conflict or discrepancy between policies, the order of precedence is as follows:

- Corporate Quality Management Plan (CQMP)
- Corporate SOPs and Policies
- Laboratory QA/QC Policy Memorandum
- Laboratory Quality Assurance Manual (QAM)
- Laboratory SOPs and Policies
- Other (Work Instructions (WI), memos, flow charts, etc.)

Note: The laboratory has the responsibility and authority to operate in compliance with regulatory requirements of the jurisdiction in which the work is performed. Where the CQMP conflicts with those regulatory requirements, the regulatory requirements of the jurisdiction shall hold primacy. The laboratory's QAM shall take precedence over the CQMP in those cases.

5.4 QA/QC Objectives for the Measurement of Data

Quality Assurance (QA) and Quality Control (QC) are activities undertaken to achieve the goal of producing data that accurately characterize the sites or materials that have been sampled. Quality Assurance is generally understood to be more comprehensive than Quality Control. Quality Assurance can be defined as the integrated system of activities that ensures that a product or service meets defined standards.

Quality Control is generally understood to be limited to the analyses of samples and to be synonymous with the term *"analytical quality control"*. QC refers to the routine application of statistically based procedures to evaluate and control the accuracy of results from analytical measurements. The QC program includes procedures for estimating and controlling precision and bias and for determining reporting limits.

Request for Proposals (RFPs) and Quality Assurance Project Plans (QAPP) provide a mechanism for the client and the laboratory to discuss the data quality objectives in order to ensure that analytical services closely correspond to client needs. The client is responsible for developing the QAPP. In order to ensure the ability of the laboratory to meet the Data Quality Objectives (DQOs) specified in the QAPP, clients are advised to allow time for the laboratory to review the QAPP before being finalized. Additionally, the laboratory will provide support to the client for developing the sections of the QAPP that concern laboratory activities.

Historically, laboratories have described their QC objectives in terms of precision, accuracy, representativeness, comparability, completeness, selectivity and sensitivity (PARCCSS).

5.4.1 Precision

The laboratory objective for precision is to meet the performance for precision demonstrated for the methods on similar samples and to meet data quality objectives of the EPA and/or other regulatory programs. Precision is defined as the degree of reproducibility of measurements under a given set of analytical conditions (exclusive of field sampling variability). Precision is documented on the basis of replicate analysis, usually duplicate or matrix spike (MS) duplicate samples.

5.4.2 Accuracy

The laboratory objective for accuracy is to meet the performance for accuracy demonstrated for the methods on similar samples and to meet data quality objectives of the EPA and/or other regulatory programs. Accuracy is defined as the degree of bias in a measurement system. Accuracy may be documented through the use of laboratory control samples (LCS) and/or MS. A statement of accuracy is expressed as an interval of acceptance recovery about the mean recovery.

5.4.3 Representativeness

The laboratory objective for representativeness is to provide data which is representative of the sampled medium. Representativeness is defined as the degree to which data represent a characteristic of a population or set of samples and is a measurement of both analytical and field sampling precision. The representativeness of the analytical data is a function of the procedures used in procuring and processing the samples. The representativeness can be documented by the relative percent difference between separately procured, but otherwise identical samples or sample aliquots.

The representativeness of the data from the sampling sites depends on both the sampling procedures and the analytical procedures. The laboratory may provide guidance to the client regarding proper sampling and handling methods in order to assure the integrity of the samples.

5.4.4 Comparability

The comparability objective is to provide analytical data for which the accuracy, precision, representativeness and reporting limit statistics are similar to these quality indicators generated by other laboratories for similar samples, and data generated by the laboratory over time.

The comparability objective is documented by inter-laboratory studies carried out by regulatory agencies or carried out for specific projects or contracts, by comparison of periodically generated statements of accuracy, precision and reporting limits with those of other laboratories.

5.4.5 Completeness

The completeness objective for data is 90% (or as specified by a particular project), expressed as the ratio of the valid data to the total data over the course of the project. Data will be considered valid if they are adequate for their intended use. Data usability will be defined in a QAPP, project scope or regulatory requirement. Data validation is the process for reviewing data to determine its usability and completeness. If the completeness objective is not met, actions will be taken internally and with the data user to improve performance. This may take the form of an audit to evaluate the methodology and procedures as possible sources for the difficulty or may result in a recommendation to use a different method.

5.4.6 Selectivity

Selectivity is defined as: The capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances. Target analytes are separated from non-target constituents and subsequently identified/detected through one or more of the following, depending on the analytical method: extractions (separation), digestions (separation), interelement corrections (separation), use of matrix modifiers (separation), specific retention times (separation and identification), confirmations with different columns or detectors (separation and identification), specific wavelengths (identification), specific mass spectra (identification), specific electrodes (separation and identification), etc..

5.4.7 Sensitivity

Sensitivity refers to the amount of analyte necessary to produce a detector response that can be reliably detected (Method Detection Limit) or quantified (Reporting Limit).

5.5 Criteria for Quality Indicators

The laboratory maintains Quality Control Limits within the Method Limit Group tables in TALS (the laboratory's LIMS) that contains that summarize the precision and accuracy acceptability limits for performed analyses. This summary includes an effective date, is updated each time new limits are generated and are managed by the laboratory's QA Department. Unless otherwise noted, limits within these tables are laboratory generated. Some acceptability limits are derived from US EPA methods when they are required. Where US EPA method limits are not required, the laboratory has developed limits from evaluation of data from similar matrices. Criteria for development of control limits is contained in Section 24.

5.6 Statistical Quality Control

Statistically-derived precision and accuracy limits are required by selected methods (such as SW-846) and certain regulatory programs such as the Ohio Voluntary Action Plan (VAP). The laboratory routinely utilizes statistically-derived limits to evaluate method performance and determine when corrective action is appropriate. The analysts are instructed to use the current limits in the laboratory (dated and approved by the Technical Manager and QA Manager) and entered into the Laboratory Information Management System (LIMS). The Quality Assurance Department maintains an archive of all limits used within the Method Limit Group tables in TALS (LIMS). If a method defines the QC limits, the method limits are used.

If a method requires the generation of historical limits, the lab develops such limits from recent data in the QC database of the LIMS following the guidelines described in Section 24. All calculations and limits are documented and dated when approved and effective. On occasion, a client requests contract-specified limits for a specific project.

Current QC limits are entered and maintained in the LIMS analyte database. As sample results and the related QC are entered into LIMS, the sample QC values are compared with the limits in LIMS to determine if they are within the acceptable range. The analyst then evaluates if the sample needs to be rerun or re-extracted/rerun or if a comment should be added to the report explaining the reason for the QC outlier.

5.6.1 QC Charts

The QA Manager generates QC charts using the TALS Control Chart program. In addition to their use in generating lab specific spike recovery limits and in the evaluation of MDL studies, these charts are used to determine if adjustments need to be made or for corrective actions to methods. All such findings are documented and kept on file in the QA Department.

5.7 Quality System Metrics

In addition to the QC parameters discussed above, the entire Quality System is evaluated on a monthly basis through the use of specific metrics (refer to Section 16). These metrics are used to drive continuous improvement in the laboratory's Quality System.

SECTION 6. DOCUMENT CONTROL

6.1 Overview

The QA Department is responsible for the control of documents used in the laboratory to ensure that approved, up-to-date documents are in circulation and out-of-date (obsolete) documents are archived or destroyed. The following documents, at a minimum, must be controlled:

- Laboratory Quality Assurance Manual
- Laboratory Standard Operating Procedures (SOP)
- Laboratory Policies
- Work Instructions and Forms
- Corporate Policies and Procedures distributed outside the intranet

Corporate Quality posts Corporate Manuals, SOPs, Policies, Work Instructions, White Papers and Training Materials on the company intranet site. These Corporate documents are only considered controlled when they are read on the intranet site. Printed copies are considered uncontrolled unless the laboratory physically distributes them as controlled documents. A detailed description of the procedure for issuing, authorizing, controlling, distributing, and archiving Corporate documents is found in Corporate SOP No. CW-Q-S-001, Corporate Document Control and Archiving. The laboratory's internal document control procedure is defined in SOP No. ED-GEN-002 (Document Control).

The laboratory QA Department also maintains access to various references and document sources integral to the operation of the laboratory. This includes reference methods and regulations. Instrument manuals (hard or electronic copies) are also maintained by the laboratory.

The laboratory maintains control of records for raw analytical data and supporting records such as audit reports and responses, logbooks, standard logs, training files, MDL studies, Proficiency Testing (PT) studies, certifications and related correspondence, and corrective action reports (CARs). Raw analytical data consists of bound logbooks, instrument printouts, any other notes, magnetic media, electronic data and final reports.

6.2 Document Approval and Issue

The pertinent elements of a document control system for each document include a unique document title and number, pagination, the total number of pages of the item or an 'end of document' page, the effective date, revision number and the laboratory's name. The QA personnel are responsible for the maintenance of this system.

Controlled documents are authorized by the QA Department. In order to develop a new document, a Department (Technical) Manager submits an electronic draft to the QA Department for suggestions and approval before use. Upon approval, QA personnel add the identifying version information to the document and retains that document as the official document on file. That document is then provided to all applicable operational units (may include electronic access). Controlled documents are identified as such and records of their distribution are kept by the QA Department. Document control may be achieved by either electronic or hardcopy distribution.

The QA Department maintains a list of the official versions of controlled documents.

Quality System Policies and Procedures will be reviewed at a minimum of every two years and revised as appropriate. Changes to documents occur when a procedural change warrants.

6.3 Procedures for Document Control Policy

For changes to the QA Manual, refer to SOP No. ED-GEN-002 (Document Control) Uncontrolled copies must not be used within the laboratory. Previous revisions and back-up data are stored by the QA Department. Electronic copies are stored on the Public server in the QA folder for the applicable revision.

For changes to SOPs, refer to SOP No. CW-Q-S-002, Writing a Standard Operating Procedure SOP. The SOP identified above also defines the process of changes to SOPs.

Forms, worksheets, work instructions and information are organized by department in the QA office. There is a table of contents. Electronic versions are kept on a hard drive in the QA Department; hard copies are kept in QA files. The procedure for the care of these documents is in SOP ED-GEN-002 (Document Control).

6.4 Obsolete Documents

All invalid or obsolete documents are removed, or otherwise prevented from unintended use. The laboratory has specific procedures as described above to accomplish this. In general, obsolete documents are collected from employees according to distribution lists and are marked obsolete on the cover or destroyed. At least one copy of the obsolete document is archived according to SOP No. ED-GEN-002 (Document Control).

SECTION 7. SERVICE TO THE CLIENT

7.1 Overview

The laboratory has established procedures for the review of work requests and contracts, oral or written. The procedures include evaluation of the laboratory's capability and resources to meet

the contract's requirements within the requested time period. All requirements, including the methods to be used, must be adequately defined, documented and understood. For many environmental sampling and analysis programs, testing design is site or program specific and does not necessarily "fit" into a standard laboratory service or product. It is the laboratory's intent to provide both standard and customized environmental laboratory services to our clients.

A thorough review of technical and QC requirements contained in contracts is performed to ensure project success. The appropriateness of requested methods, and the lab's capability to perform them must be established. Projects, proposals and contracts are reviewed for adequately defined requirements and the laboratory's capability to meet those requirements. Alternate test methods that are capable of meeting the clients' requirements may be proposed by the lab. A review of the lab's capability to analyze non-routine analytes is also part of this review process.

All projects, proposals and contracts are reviewed for the client's requirements in terms of compound lists, test methodology requested, sensitivity (detection and reporting levels), accuracy, and precision requirements (% Recovery and RPD). The reviewer ensures that the laboratory's test methods are suitable to achieve these requirements and that the laboratory holds the appropriate certifications and approvals to perform the work. The laboratory and any potential subcontract laboratories must be certified, as required, for all proposed tests.

The laboratory must determine if it has the necessary physical, personnel and information resources to meet the contract, and if the personnel have the expertise needed to perform the testing requested. Each proposal is checked for its impact on the capacity of the laboratory's equipment and personnel. As part of the review, the proposed turnaround time will be checked for feasibility.

Electronic or hard copy deliverable requirements are evaluated against the laboratory's capacity for production of the documentation.

If the laboratory cannot provide all services but intends to subcontract such services, whether to another TestAmerica facility or to an outside firm, this will be documented and discussed with the client prior to contract approval. (Refer to Section 8 for Subcontracting Procedures.)

The laboratory informs the client of the results of the review if it indicates any potential conflict, deficiency, lack of accreditation, or inability of the lab to complete the work satisfactorily. Any discrepancy between the client's requirements and the laboratory's capability to meet those requirements is resolved in writing before acceptance of the contract. It is necessary that the contract be acceptable to both the laboratory and the client. Amendments initiated by the client and/or TestAmerica, are documented in writing.

All contracts, QAPPs, Sampling and Analysis Plans (SAPs), contract amendments, and documented communications become part of the project record.

The same contract review process used for the initial review is repeated when there are amendments to the original contract by the client, and the participating personnel are informed of the changes.

7.2 Review Sequence and Key Personnel

Appropriate personnel will review the work request at each stage of evaluation.

For routine projects and other simple tasks, a review by the Project Manager (PM) is considered adequate. The PM confirms that the laboratory has any required certifications, that it can meet the clients' data quality and reporting requirements and that the lab has the capacity to meet the clients turn around needs. It is recommended that, where there is a sales person assigned to the account, an attempt should be made to contact that sales person to inform them of the incoming samples.

For new, complex or large projects, the proposed contract is given to the Sales Directors, who will decide which lab will receive the work based on the scope of work and other requirements, including certification, testing methodology, and available capacity to perform the work. The contract review process is outlined in TestAmerica's Corporate SOP No. CA-L-P-002**,** Contract Compliance Policy.

This review encompasses all facets of the operation. The scope of work is distributed to the appropriate personnel, as needed based on scope of contract, to evaluate all of the requirements shown above (not necessarily in the order below).

- Legal & Contracts Director
- General Manager
- The Laboratory Project Management Director
- The Laboratory Operations Manager
- Laboratory and/or Corporate Technical Managers / Directors
- Laboratory and/or Corporate Information Technology Managers/Directors
- Account Executives
- Laboratory and/or Corporate Quality
- Laboratory and/or Corporate Environmental Health and Safety Managers/Directors
- The Laboratory Director reviews the formal laboratory quote and makes final acceptance for their facility.

The Sales Director, Legal Contracts Director, Account Executive or Proposal *Coordinator* then submits the final proposal to the client.

In the event that one of the above personnel is not available to review the contract, his or her back-up will fulfill the review requirements.

The Legal & Contracts Director maintains copies of all signed contracts**.** The applicable Project Manager maintains local copies of signed contracts.

7.3 Documentation

Appropriate records are maintained for every contract or work request. All stages of the contract review process are documented and include records of any significant changes. These records are maintained in the project file by the Project Manager and/or Key Account Executive. The contract will be distributed to and maintained by the appropriate sales/marketing personnel and the Account Executive. A copy of the contract and formal quote will be filed with the laboratory PM and the Laboratory Director.

Records are maintained of pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract. The PM keeps a phone log of conversations with the client.

7.3.1 Project-Specific Quality Planning

Communication of contract specific technical and QC criteria is an essential activity in ensuring the success of site specific testing programs. To achieve this goal, the laboratory assigns a PM to each client. It is the PM's responsibility to ensure that project-specific technical and QC requirements are effectively evaluated and communicated to the laboratory personnel before and during the project. QA Department involvement may be needed to assist in the evaluation of custom QC requirements.

PM's are the primary client contact and they ensure resources are available to meet project requirements. Although PM's do not have direct reports or staff in production, they coordinate opportunities and work with laboratory management and supervisory staff to ensure available resources are sufficient to perform work for the client's project. Project management is positioned between the client and laboratory resources.

Prior to work on a new project, the dissemination of project information and/or project opening meetings may occur to discuss schedules and unique aspects of the project. Items to be discussed may include the project technical profile, turnaround times, holding times, methods, analyte lists, reporting limits, deliverables, sample hazards, or other special requirements. The PM introduces new projects to the laboratory staff through project kick-off meetings or to the supervisory staff during production meetings. These meetings provide direction to the laboratory staff in order to maximize production and client satisfaction, while maintaining quality. In addition, project notes may be associated with each sample batch as a reminder upon sample receipt and analytical processing.

During the project, any change that may occur within an active project is agreed upon between the client/regulatory agency and the PM/laboratory. These changes (e.g., use of a non-standard method or modification of a method) and approvals must be documented prior to implementation. Documentation pertains to any document, e.g., letter, e-mail, variance, contract addendum, which has been signed by both parties.

Such changes are also communicated to the laboratory during production meetings. Such changes are updated to the project notes and are introduced to the managers at these meetings. The laboratory staff is then introduced to the modified requirements via the PM or the individual laboratory Department (Technical) Manager. After the modification is implemented into the laboratory process, documentation of the modification is made in the case narrative of the data report(s).

The laboratory strongly encourages client visits to the laboratory and for formal/informal information sharing session with employees in order to effectively communicate ongoing client needs as well as project specific details for customized testing programs.

7.4 Special Services

The laboratory cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. It is the laboratory's goal to meet all client requirements in addition to statutory and regulatory requirements. The laboratory has procedures to ensure confidentiality to clients (Section 15 and 25).

The laboratory's standard procedures for reporting data are described in Section 25. Special services are also available and provided upon request. These services include:

- Reasonable access for our clients or their representatives to the relevant areas of the laboratory for the witnessing of tests performed for the client.
- Assist client-specified third party data validators as specified in the client's contract.
- Supplemental information pertaining to the analysis of their samples. Note: An additional charge may apply for additional data/information that was not requested prior to the time of sample analysis or previously agreed upon.

7.5 Client Communication

Project managers are the primary communication link to the clients. They shall inform their clients of any delays in project completion as well as any non-conformances in either sample receipt or sample analysis. Project management will maintain ongoing client communication throughout the entire client project.

Technical Managers are available to discuss any technical questions or concerns that the client may have.

7.6 Reporting

The laboratory works with our clients to produce any special communication reports required by the contract.

7.7 Client Surveys

The laboratory assesses both positive and negative client feedback. The results are used to improve overall laboratory quality and client service. TestAmerica's Sales and Marketing teams periodically develops lab and client specific surveys to assess client satisfaction.

SECTION 8. SUBCONTRACTING OF TESTS

8.1 Overview

For the purpose of this quality manual, the phrase subcontract laboratory refers to a laboratory external to the TestAmerica laboratories. The phrase "work sharing" refers to internal transfers

of samples between the TestAmerica laboratories. The term outsourcing refers to the act of subcontracting tests.

When contracting with our clients, the laboratory makes commitments regarding the services to be performed and the data quality for the results to be generated. When the need arises to outsource testing for our clients because project scope, changes in laboratory capabilities, capacity or unforeseen circumstances, we must be assured that the subcontractors or work sharing laboratories understand the requirements and will meet the same commitments we have made to the client. Refer to TestAmerica's Corporate SOP's on Subcontracting Procedures (CA-L-S-002) and the Work Sharing Process (CA-C-S-001).

When outsourcing analytical services, the laboratory will assure, to the extent necessary, that the subcontract or work sharing laboratory maintains a program consistent with the requirements of this document, the requirements specified in TNI/ISO 17025 and/or the client's Quality Assurance Project Plan (QAPP). All QC guidelines specific to the client's analytical program are transmitted to the subcontractor and agreed upon before sending the samples to the subcontract facility. Additionally, work requiring accreditation will be placed with an appropriately accredited laboratory. The laboratory performing the subcontracted work will be identified in the final report, as will non-TNI accredited work where required.

Project Managers (PMs), Customer Service Managers (CSM), or Account Executives (AE) (or others as defined by the lab) for the Export Lab are responsible for obtaining client approval prior to outsourcing any samples. The laboratory will advise the client of a subcontract or work sharing arrangement in writing and when possible approval from the client shall be retained in the project folder.

Note: In addition to the client, some regulating agencies (e.g, USDA) or contracts (e.g, certain USACE projects) may require notification prior to placing such work**.**

8.2 Qualifying and Monitoring Subcontracators

Whenever a PM, Account Executive (AE) or Customer Service Manager becomes aware of a client requirement or laboratory need where samples must be outsourced to another laboratory, the other laboratory(s) shall be selected based on the following:

- The first priority is to attempt to place the work in a qualified TestAmerica laboratory; Firms specified by the client for the task (Documentation that a subcontractor was designated by the client must be maintained with the project file. This documentation can be as simple as placing a copy of an e-mail from the client in the project folder);
- Firms listed as pre-qualified and currently under a subcontract with TestAmerica: A listing of all approved subcontracting laboratories is available on the TestAmerica intranet site. Supporting documentation is maintained by corporate offices and by the TestAmerica laboratory originally requesting approval of the subcontract lab. Verify necessary accreditation, where applicable, (e.g., on the subcontractors TNI, A2LA accreditation or State Certification).
- Firms identified in accordance with the company's Small Business Subcontracting program as small, women-owned, veteran-owned and/or minority-owned businesses;

- TNI or A2LA accredited laboratories.
- In addition, the firm must hold the appropriate certification to perform the work required.

All TestAmerica laboratories are pre-qualified for work sharing provided they hold the appropriate accreditations, can adhere to the project/program requirements, and the client approved sending samples to that laboratory. The client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented). The originating laboratory is responsible for communicating all technical, quality, and deliverable requirements as well as other contract needs. (Corporate SOP No. CA-C-S-001, Work Sharing Process).

When the potential sub-contract laboratory has not been previously approved, Account Executives or PMs may nominate a laboratory as a subcontractor based on need. The decision to nominate a laboratory must be approved by the Laboratory Director. The Laboratory Director requests that the QA Manager begin the process of approving the subcontract laboratory as outlined in Corporate SOP No. CA-L-S-002, Subcontracting Procedures. The client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented).

8.2.1 Once the appropriate accreditation and legal information is received by the laboratory, it is evaluated for acceptability (where applicable) and forwarded to Corporate Contracts for formal contracting with the laboratory. They will add the lab to the approved list on the intranet site and notify the finance group for JD Edwards.

8.2.2 The client will assume responsibility for the quality of the data generated from the use of a subcontractor they have requested the lab to use. The qualified subcontractors on the intranet site are known to meet minimal standards. TestAmerica does not certify laboratories. The subcontractor is on our approved list and can only be recommended to the extent that we would use them.

8.2.3 The status and performance of qualified subcontractors will be monitored periodically by the Corporate Contracts and/or Quality Departments. Any problems identified will be brought to the attention of TestAmerica's Corporate Finance or Corporate Quality personnel.

- Complaints shall be investigated. Documentation of the complaint, investigation and corrective action will be maintained in the subcontractor's file on the intranet site. Complaints are posted using the Vendor Performance Report.
- Information shall be updated on the intranet when new information is received from the subcontracted laboratories.
- Subcontractors in good standing will be retained on the intranet listing. The QA Manager will notify all TestAmerica laboratories, Corporate Quality and Corporate Contracts if any laboratory requires removal from the intranet site. This notification will be posted on the intranet site and e-mailed to all Laboratory Directors, QA Managers and Sales Personnel.

8.3 Oversight and Reporting

The PM must request that the selected subcontractor be presented with a subcontract, if one is not already executed between the laboratory and the subcontractor. The subcontract must include terms which flow down the requirements of our clients, either in the subcontract itself or through the mechanism of work orders relating to individual projects. A standard subcontract and the Lab Subcontractor Vendor Package (posted on the intranet) can be used to accomplish this, and the Legal & Contracts Director can tailor the document or assist with negotiations, if needed. The PM responsible for the project must advise and obtain client consent to the subcontract as appropriate, and provide the scope of work to ensure that the proper requirements are made a part of the subcontract and are made known to the subcontractor.

Prior to sending samples to the subcontracted laboratory, the PM confirms their certification status to determine if it's current and scope-inclusive. The information is documented on a Subcontracted Sample Form (Figure 8-1) and the form is retained in the project folder. For TestAmerica laboratories, certifications can be viewed on the company's TotalAccess Database.

The Sample Control Department is responsible for ensuring compliance with QA requirements and applicable shipping regulations when shipping samples to a subcontracted laboratory.

All subcontracted samples must be accompanied by a TestAmerica Chain of Custody (COC). A copy of the original COC sent by the client must also be included with all samples workshared within TestAmerica. Client CoCs are only forwarded to external subcontractors when samples are shipped directly from the project site to the subcontractor lab. Under routine circumstances, client CoCs are not provided to external subcontractors.

Through communication with the subcontracted laboratory, the PM monitors the status of the subcontracted analyses, facilitates successful execution of the work, and ensures the timeliness and completeness of the analytical report.

Non-TNI accredited work must be identified in the subcontractor's report as appropriate. If TNI accreditation is not required, the report does not need to include this information.

Reports submitted from subcontractor laboratories are not altered and are included in their original form in the final project report. This clearly identifies the data as being produced by a subcontractor facility. If subcontract laboratory data is incorporated into the laboratories EDD (i.e., imported), the report must explicitly indicate which lab produced the data for which methods and samples.

Note: The results submitted by a TestAmerica work sharing laboratory may be transferred electronically and the results reported by the TestAmerica work sharing lab are identified on the final report. The report must explicitly indicate which lab produced the data for which methods and samples. The final report must include a copy of the completed COC for all work sharing reports.

8.4 Contingency Planning

The Laboratory Director may waive the full qualification of a subcontractor process temporarily to meet emergency needs; however, this decision & justification must be documented in the

project files, and the 'Purchase Order Terms And Conditions For Subcontracted Laboratory Services' must be sent with the samples and Chain-of-Custody. In the event this provision is utilized, the laboratory (e.g., PM) will be required to verify and document the applicable accreditations of the subcontractor. All other quality and accreditation requirements will still be applicable, but the subcontractor need not have signed a subcontract with TestAmerica at this time. The comprehensive approval process must then be initiated within 30 calendar days of subcontracting.

Figure 8-1.

Example - Subcontracted Sample Form

Date/Time: _____

Subcontracted Laboratory Information:

- Subcontractor's Name: _____
- Subcontractor Point of Contact: _____
- Subcontractor's Address: _____
- Subcontractor's Phone: _____
- Analyte/Method: _____
- Certified for State of Origin: _____
- TNI Certified: Yes_____No_____
- USDA Permit (__Domestic __ Foreign) Yes_____No_____
- A2LA (or ISO 17025) Certified: Yes_____No_____
- CLP-like Required: Yes_____No_____
  (Full doc required)
- Requested Sample Due Date: _____
  (Must be put on COC)

Project Manager: _____

Laboratory Sample # Range: _____
(Only of Subcontracted Samples)

Laboratory Project Number (Billing Control #): _____

All subcontracted samples are to be sent via bonded carrier and Priority Overnight. Please attach tracking number below and maintain these records in the project files.

PM Signature_____**Date**_____

SECTION 9. PURCHASING SERVICES AND SUPPLIES

9.1 Overview

Evaluation and selection of suppliers and vendors is performed, in part, on the basis of the quality of their products, their ability to meet the demand for their products on a continuous and short term basis, the overall quality of their services, their past history, and competitive pricing. This is achieved through evaluation of objective evidence of quality furnished by the supplier, which can include certificates of analysis, recommendations, and proof of historical compliance with similar programs for other clients. To ensure that quality critical consumables and equipment conform to specified requirements, which may affect quality, all purchases from specific vendors are approved by a member of the supervisory or management staff. Capital expenditures are made in accordance with TestAmerica's Corporate Controlled Purchases Procedure, SOP No. CW-F-S-007.

Contracts will be signed in accordance with TestAmerica's Corporate Authorization Matrix Policy, Policy No. CW-F-P-002. Request for Proposals (RFP's) will be issued where more information is required from the potential vendors than just price. Process details are available in TestAmerica's Corporate Procurement and Contracts Policy (Policy No. CW-F-P-004). RFP's allow TestAmerica to determine if a vendor is capable of meeting requirements such as supplying all of the TestAmerica facilities, meeting required quality standards and adhering to necessary ethical and environmental standards. The RFP process also allows potential vendors to outline any additional capabilities they may offer.

9.2 Glassware

Glassware used for volumetric measurements must be Class A or verified for accuracy according to laboratory procedure. Pyrex (or equivalent) glass should be used where possible. For safety purposes, thick-wall glassware should be used where available.

9.3 Reagents, Standards & Supplies

Purchasing guidelines for equipment and reagents must meet the requirements of the specific method and testing procedures for which they are being purchased. Solvents and acids are pre-tested in accordance with TestAmerica's Corporate SOP on Solvent & Acid Lot Testing & Approval, SOP No. CA-Q-S-001.

9.3.1 Purchasing

Chemical reagents, solvents, glassware, and general supplies are ordered as needed to maintain sufficient quantities on hand. Materials used in the analytical process must be of a known quality. The wide variety of materials and reagents available makes it advisable to specify recommendations for the name, brand, and grade of materials to be used in any determination. This information is contained in the method SOP. The analyst may check the item out of the on-site consignment system that contains items approved for laboratory use.

If an item is not available from the on-site consignment, the analyst must provide the master item number (from the master item list that has been approved by the Technical Director), item description, package size, catalogue page number, and the quantity needed. If an item being

ordered is not the exact item requested, approval must be obtained from the Technical Director prior to placing the order. The Department (Technical) Manager or the Laboratory Operations Manager places the order.

9.3.2 Receiving

It is the responsibility of the Facilities Coordinator to receive the shipment. It is the responsibility of the analyst who ordered the materials to document the date materials where received. Once the ordered reagents or materials are received, the analyst compares the information on the label or packaging to the original order to ensure that the purchase meets the quality level specified. Material Safety Data Sheets (MSDSs) are available online through the Company's intranet website. Anyone may review these for relevant information on the safe handling and emergency precautions of on-site chemicals.

9.3.3 Specifications

Methods in use in the laboratory specify the grade of reagent that must be used in the procedure. If the quality of the reagent is not specified, analytical reagent grade will be used. It is the responsibility of the analyst to check the procedure carefully for the suitability of grade of reagent.

Chemicals must not be used past the manufacturer's expiration date and must not be used past the expiration time noted in a method SOP. If expiration dates are not provided, the laboratory may contact the manufacturer to determine an expiration date.

The laboratory assumes a five year expiration date on inorganic dry chemicals and solvents unless noted otherwise by the manufacturer or by the reference source method. Chemicals/solvents should not be used past the manufacturer's or SOPs expiration date unless 'verified' (refer to item 3 listed below).

- An expiration date cannot be extended if the dry chemical/solvent is discolored or appears otherwise physically degraded, the dry chemical/solvent must be discarded.
- Expiration dates can be extended if the dry chemical/solvent is found to be satisfactory based on acceptable performance of quality control samples (Continuing Calibration Verification (CCV), Blanks, Laboratory Control Sample (LCS), etc.).
- If the dry chemical/solvent is used for the preparation of standards, the expiration dates can be extended 6 months if the dry chemical/solvent is compared to an unexpired independent source in performing the method and the performance of the dry chemical/solvent is found to be satisfactory. The comparison must show that the dry chemical/solvent meets CCV limits. The comparison studies are maintained in the analytical Department.

Wherever possible, standards must be traceable to national or international standards of measurement or to national or international reference materials. Records to that effect are available to the user.

Compressed gases in use are checked for pressure and secure positioning daily. The minimum total pressure must be 500 psig or the tank must be replaced. To prevent a tank from going to

dryness or introducing potential impurities, the pressure should be closely watched as it decreases to approximately 15% of the original reading, at which point it should be replaced. For example, a standard sized laboratory gas cylinder containing 3,000 psig of gas should be replaced when it drops to approximately 500 psig.. The quality of the gases must meet method or manufacturer specification or be of a grade that does not cause any analytical interference.

Water used in the preparation of standards or reagents must have a specific conductivity of less than 1- µmho/cm (or specific resistivity of greater than 1.0 megaohm-cm) at 25°C. The specific conductivity is checked and recorded daily. If the water's specific conductivity is greater than the specified limit, the Facility Manager and appropriate Technical Managers must be notified immediately in order to notify all Departments, decide on cessation (based on intended use) of activities, and make arrangements for correction.

The laboratory may purchase reagent grade (or other similar quality) water for use in the laboratory. This water must be certified "clean" by the supplier for all target analytes or otherwise verified by the laboratory prior to use. This verification is documented.

Standard lots are verified before first time use if the laboratory switches manufacturers or has historically had a problem with the type of standard.

Purchased bottleware used for sampling must be certified clean and the certificates must be maintained. If uncertified sampling bottleware is purchased, all lots must be verified clean prior to use. This verification must be maintained.

Records of manufacturer's certification and traceability statements are maintained in files or binders in each laboratory section. These records include date of receipt, lot number (when applicable), and expiration date (when applicable). Incorporation of the item into the record indicates that the analyst has compared the new certificate with the previous one for the same purpose and that no difference is noted, unless approved and so documented by the Technical Director or QA Manager.

9.3.4 Storage

Reagent and chemical storage is important from the aspects of both integrity and safety. Light-sensitive reagents may be stored in brown-glass containers. Storage conditions are per the Corporate Environmental Health & Safety Manual (Corp. Doc. No. CW-E-M-001) and method SOPs or manufacturer instructions.

9.4 Purchase of Equipment / Instruments / Software

When a new piece of equipment is needed, either for additional capacity or for replacing inoperable equipment, the analyst or supervisor makes a supply request to the Technical Manager/Laboratory Operations Manager and/or the Laboratory Director. If they agree with the request, the procedures outlined in TestAmerica's Corporate Policy No. CA-T-P-001, Qualified Products List, are followed. A decision is made as to which piece of equipment can best satisfy the requirements. The appropriate written requests are completed and purchasing places the order.

Upon receipt of a new or used piece of equipment, an unique identification name is assigned and provided to the QA Department for inclusion on the laboratory master equipment list. IT must also be notified so that they can synchronize the instrument for back-ups. Its capability is assessed to determine if it is adequate or not for the specific application. For instruments, a calibration curve is generated, followed by MDLs, Demonstration of Capabilities (DOCs), and other relevant criteria (refer to Section 19). For software, its operation must be deemed reliable and evidence of instrument verification must be retained by the IT Department or QA Department. Software certificates supplied by the vendors are filed with the LIMS Administrator. The manufacturer's operation manual is retained at the bench.

9.5 Services

Service to analytical instruments (except analytical balances) is performed on an as needed basis. Routine preventative maintenance is discussed in Section 20. The need for service is determined by analysts and/or Technical Managers. The service providers that perform the services are approved by the Technical Manager and/or the Laboratory Operations Manager.

9.6 Suppliers

TestAmerica selects vendors through a competitive proposal / bid process, strategic business alliances or negotiated vendor partnerships (contracts). This process is defined in the Corporate Finance documents on Vendor Selection (SOP No. CW-F-S-018) and Procurement & Contracts Policy (Policy No. CW-F-P-004). The level of control used in the selection process is dependent on the anticipated spending amount and the potential impact on TestAmerica business. Vendors that provide test and measuring equipment, solvents, standards, certified containers, instrument related service contracts or subcontract laboratory services shall be subject to more rigorous controls than vendors that provide off-the-shelf items of defined quality that meet the end use requirements. The JD Edwards purchasing system includes all suppliers/vendors that have been approved for use.

Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality. This is documented by signing off on packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describe the services and supplies ordered.

Any issues of vendor performance are to be reported immediately by the laboratory staff to the Corporate Purchasing Group by completing a Vendor Performance Report.

The Corporate Purchasing Group will work through the appropriate channels to gather the information required to clearly identify the problem and will contact the vendor to report the problem and to make any necessary arrangements for exchange, return authorization, credit, etc.
As deemed appropriate, the Vendor Performance Reports will be summarized and reviewed to determine corrective action necessary, or service improvements required by vendors

The laboratory has access to a listing of all approved suppliers of critical consumables, supplies and services. This information is provided through the JD Edwards purchasing system.

9.6.1 New Vendor Procedure

TestAmerica employees who wish to request the addition of a new vendor must complete a J.D. Edwards Vendor Add Request Form.

New vendors are evaluated based upon criteria appropriate to the products or services provided as well as their ability to provide those products and services at a competitive cost. Vendors are also evaluated to determine if there are ethical reasons or potential conflicts of interest with TestAmerica employees that would make it prohibitive to do business with them as well as their financial stability. The QA Department and/or the Technology Director are consulted with vendor and product selection that have an impact on quality.

SECTION 10. COMPLAINTS

10.1 Overview

The laboratory considers an effective client complaint handling processes to be of significant business and strategic value. Listening to and documenting client concerns captures 'client knowledge' that enables our operations to continually improve processes and client satisfaction. An effective client complaint handling process also provides assurance to the data user that the laboratory will stand behind its data, service obligations and products.

A client complaint is any expression of dissatisfaction with any aspect of our business services (e.g., communications, responsiveness, data, reports, invoicing and other functions) expressed by any party, whether received verbally or in written form. Client inquiries, complaints or noted discrepancies are documented, communicated to management, and addressed promptly and thoroughly.

The laboratory has procedures for addressing both external and internal complaints with the goal of providing satisfactory resolution to complaints in a timely and professional manner.

The nature of the complaint is identified, documented and investigated, and an appropriate action is determined and taken. In cases where a client complaint indicates that an established policy or procedure was not followed, the QA Department must evaluate whether a special audit must be conducted to assist in resolving the issue. A written confirmation or letter to the client, outlining the issue and response taken is recommended as part of the overall action taken.

The process of complaint resolution and documentation utilizes the procedures outlined in Section 12 (Corrective Actions) and is documented following the procedures in TestAmerica Edison SOP No. ED-GEN-003 (Control of Non-Conformances and Corrective Action).

10.2 External Complaints

An employee that receives a complaint initiates the complaint resolution process by first documenting the complaint according to TestAmerica Edison SOP No. ED-GEN-003 (Control of Non-Conformances and Corrective Action.

Complaints fall into two categories: correctable and non-correctable. An example of a correctable complaint would be one where a report re-issue would resolve the complaint. An example of a non-correctable complaint would be one where a client complains that their data was repeatedly late. Non-correctable complaints should be reviewed for preventive action measures to reduce the likelihood of future occurrence and mitigation of client impact.

The general steps in the complaint handling process are:

- Receiving and Documenting Complaints
- Complaint Investigation and Service Recovery
- Process Improvement

The laboratory shall inform the initiator of the complaint of the results of the investigation and the corrective action taken, if any.

10.3 Internal Complaints

Internal complaints include, but are not limited to: errors and non-conformances, training issues, internal audit findings, and deviations from methods. Corrective actions may be initiated by any staff member who observes a nonconformance and shall follow the procedures outlined in Section 12. In addition, Corporate Management, Sales and Marketing and IT may initiate a complaint by contacting the laboratory or through the corrective action system described in Section 12.

10.4 Management Review

The number and nature of client complaints is reported by the QA Manager to the laboratory and QA Director in the QA Monthly report. Monitoring and addressing the overall level and nature of client complaints and the effectiveness of the solutions is part of the Annual Management Review (Section 16).

SECTION 11. CONTROL OF NON-CONFORMING WORK

11.1 Overview

When data discrepancies are discovered or deviations and departures from laboratory SOPs, policies and/or client requests have occurred, corrective action is taken immediately. First, the laboratory evaluates the significance of the nonconforming work. Then, a corrective action plan is initiated based on the outcome of the evaluation. If it is determined that the nonconforming work is an isolated incident, the plan could be as simple as adding a qualifier to the final results and/or making a notation in the case narrative. If it is determined that the nonconforming work is a systematic or improper practices issue, the corrective action plan could include a more in depth

investigation and a possible suspension of an analytical method. In all cases, the actions taken are documented using the laboratory's corrective action system (refer to Section 12).

Due to the frequently unique nature of environmental samples, sometimes departures from documented policies and procedures are needed. When an analyst encounters such a situation, the problem is presented to the Department (Technical) Manager for resolution. The manager may elect to discuss it with the Lab Director and/or QA Manager or have a representative contact the client to decide on a logical course of action. Once an approach is agreed upon, the analyst documents it using the laboratories corrective action system described in Section 12. This information can then be supplied to the client in the form of a footnote or a case narrative with the report.

Project Management may encounter situations where a client may request that a special procedure be applied to a sample that is not standard lab practice. Based on a technical evaluation, the lab may accept or opt to reject the request based on technical or ethical merit. An example might be the need to report a compound that the lab does not normally report. The lab would not have validated the method for this compound following the procedures in Section 19. The client may request that the compound be reported based only on the calibration. Such a request would need to be approved by the Laboratory Director and QA Manager, documented and included in the project folder. Deviations **must** also be noted on the final report with a statement that the compound is not reported in compliance with TNI (or the analytical method) requirements and the reason. Data being reported to a non-TNI state would need to note the change made to how the method is normally run.

11.2 Responsibilities and Authorities

TestAmerica's Corporate SOP entitled *Internal Investigation of Potential Data Discrepancies and Determination for Data Recall* (SOP No. CW-L-S-002, outlines the general procedures for the reporting and investigation of data discrepancies and alleged incidents of misconduct or violations of TestAmerica's data integrity policies as well as the policies and procedures related to the determination of the potential need to recall data.

Under certain circumstances, the Laboratory Director, the Lab Operations Manager, a Department (Technical) Manager, or a member of the QA team may authorize departures from documented procedures or policies. The departures may be a result of procedural changes due to the nature of the sample; a one-time procedure for a client; QC failures with insufficient sample to reanalyze, etc.. In most cases, the client will be informed of the departure prior to the reporting of the data. Any departures must be well documented using the laboratory's corrective action procedures. This information may also be documented in logbooks and/or data review checklists as appropriate. Any impacted data must be referenced in a case narrative and/or flagged with an appropriate data qualifier.

Any misrepresentation or possible misrepresentation of analytical data discovered by any laboratory staff member must be reported to facility Senior Management within 24-hours. The Senior Management staff is comprised of the Laboratory Director, Laboratory Operations Manager, the QA Manager, and the Department (Technical) Managers The reporting of issues involving alleged violations of the company's Data Integrity or Manual Integration procedures must be conveyed to an Ethics and Compliance Officer (ECO), Director of Quality & Client Advocacy and the laboratory's Quality Director within 24 hours of discovery.

Whether an inaccurate result was reported due to calculation or quantitation errors, data entry errors, improper practices, or failure to follow SOPs, the data must be evaluated to determine the possible effect.

The Laboratory Director, QA Manager, ECOs, Corporate Quality, General Managers and the Quality Directors have the authority and responsibility to halt work, withhold final reports, or suspend an analysis for due cause as well as authorize the resumption of work.

11.3 Evaluation of Significance and Actions Taken

For each nonconforming issue reported, an evaluation of its significance and the level of management involvement needed is made. This includes reviewing its impact on the final data, whether or not it is an isolated or systematic issue, and how it relates to any special client requirements.

TestAmerica's Corporate Data Investigation & Recall Procedure (SOP No. CW-L-S-002) distinguishes between situations when it would be appropriate for laboratory management to make the decision on the need for client notification (written or verbal) and data recall (report revision) and when the decision must be made with the assistance of the ECO's and Corporate Management. Laboratory level decisions are documented and approved using the laboratory's standard nonconformance/corrective action reporting in lieu of the data recall determination form contained in TestAmerica's Corporate SOP No. CW-L-S-002.

11.4 Prevention of NonConforming Work

If it is determined that the nonconforming work could recur, further corrective actions must be made following the laboratory's corrective action system. On a monthly basis, the QA Department evaluates non-conformances to determine if any nonconforming work has been repeated multiple times. If so, the laboratory's corrective action process may be followed.

11.5 Method Suspension / Restriction (Stop Work Procedures)

In some cases, it may be necessary to suspend/restrict the use of a method or target compound which constitutes significant risk and/or liability to the laboratory. Suspension/restriction procedures can be initiated by any of the persons noted in Section 11.2, Paragraph 5.

Prior to suspension/restriction, confidentiality will be respected, and the problem with the required corrective and preventive action will be stated in writing and presented to the Laboratory Director.

The Laboratory Director shall arrange for the appropriate personnel to meet with the QA Manager as needed. This meeting shall be held to confirm that there is a problem, that suspension/restriction of the method is required and will be concluded with a discussion of the steps necessary to bring the method/target or test fully back on line. In some cases, that may not be necessary if all appropriate personnel have already agreed there is a problem and there is agreement on the steps needed to bring the method, target or test fully back on line.

The QA Manager will also initiate a corrective action report as described in Section 12 if one has not already been started. A copy of any meeting notes and agreed upon steps should be faxed or e-mailed by the laboratory to the appropriate General Manager and member of Corporate QA. This fax/e-mail acts as notification of the incident.

After suspension/restriction, the lab will hold all reports to clients pending review. No faxing, mailing or distributing through electronic means may occur. The report must not be posted for viewing on the internet. It is the responsibility of the Laboratory Director to hold all reporting and to notify all relevant laboratory personnel regarding the suspension/restriction (e.g., Project Management, Log-in, etc…). Clients will NOT generally be notified at this time. Analysis may proceed in some instances depending on the non-conformance issue.

Within 72 hours, the QA Manager will determine if compliance is now met and reports can be released, OR determine the plan of action to bring work into compliance, and release work. A team, with all principals involved (Laboratory Director, Laboratory Operations Manager, QA Manager, Department Technical Manager) can devise a start-up plan to cover all steps from client notification through compliance and release of reports. Project Management, and the Directors of Client Services and Sales and Marketing must be notified if clients must be notified or if the suspension/restriction affects the laboratory's ability to accept work. The QA Manager must approve start-up or elimination of any restrictions after all corrective action is complete. This approval is given by final signature on the completed corrective action report.

SECTION 12. CORRECTIVE ACTION

12.1 Overview

A major component of TestAmerica's Quality Assurance (QA) Program is the problem investigation and feedback mechanism designed to keep the laboratory staff informed on quality related issues and to provide insight to problem resolution. When nonconforming work or departures from policies and procedures in the quality system or technical operations are identified, the corrective action procedure provides a systematic approach to assess the issues, restore the laboratory's system integrity, and prevent reoccurrence. Corrective actions are documented using Data Inquiry, Client Complaint and Corrective Action Report Form (CAR) (TestAmerica Edison Work Instruction No. EDS-WI-012) (refer to Figure 12-1).

12.2 General

Problems within the quality system or within analytical operations may be discovered in a variety of ways, such as QC sample failures, internal or external audits, proficiency testing (PT) performance, client complaints, staff observation, etc..

The purpose of a corrective action system is to:

- Identify non-conformance events and assign responsibility(s) for investigating.
- Resolve non-conformance events and assign responsibility for any required corrective action.
- Identify systematic problems before they become serious.
- Identify and track client complaints and provide resolution.

12.2.1 Non-Conformance Report (NCR) – The CAR form is used to document the following types of corrective actions:

- Deviations from an established procedure or SOP
- QC outside of limits (non-matrix related)
- Isolated reporting / calculation errors
- Client complaints
- Discrepancies in materials / goods received vs. manufacturer packing slips.

12.2.2 Corrective Action Report (CAR) – The CAR form is also used to document the following types of corrective actions:

- Questionable trends that are found in the review of NCRs.
- Issues found while reviewing NCRs that warrant further investigation.
- Internal and external audit findings
- Failed or unacceptable PT results.
- Corrective actions that cross multiple Departments in the laboratory.
- Systematic reporting / calculation errors
- Client complaints
- Data recall investigations
- Identified poor process or method performance trends
- Excessive revised reports

This will provide background documentation to enable root cause analysis and preventive action.

12.3 Closed Loop Corrective Action Process

Any employee in the company can initiate a corrective action. There are four main components to a closed-loop corrective action process once an issue has been identified: Cause Analysis, Selection and Implementation of Corrective Actions (both short and long term), Monitoring of the Corrective Actions, and Follow-up.

12.3.1 Cause Analysis

- Upon discovery of a non-conformance event, the event must be defined and documented. An CAR must be initiated, someone is assigned to investigate the issue and the event is investigated for cause. Table 12-1 provides some general guidelines on determining responsibility for assessment.
- The cause analysis step is the key to the process as a long term corrective action cannot be determined until the cause is determined.
- If the cause is not readily obvious, the Department (Technical) Manager, Laboratory Director, Laboratory Operations Manager, or QA Manager (or QA designee) is consulted.

12.3.2 Selection and Implementation of Corrective Actions

- Where corrective action is needed, the laboratory shall identify potential corrective actions. The action(s) most likely to eliminate the problem and prevent recurrence are selected and implemented. Responsibility for implementation is assigned.
- Corrective actions shall be to a degree appropriate to the magnitude of the problem identified through the cause analysis.
- Whatever corrective action is determined to be appropriate, the laboratory shall document and implement the changes. The CAR is used for this documentation.

12.3.3 Root Cause Analysis

Root Cause Analysis is a class of problem solving (investigative) methods aimed at identifying the basic or causal factor(s) that underlie variation in performance or the occurrence of a significant failure. The root cause may be buried under seemingly innocuous events, many steps preceding the perceived failure. At first glance, the immediate response is typically directed at a symptom and not the cause. Typically, root cause analysis would be best with three or more incidents to triangulate a weakness.

Systematically analyze and document the Root Causes of the more significant problems that are reported. Identify, track, and implement the corrective actions required to reduce the likelihood of recurrence of significant incidents. Trend the Root Cause data from these incidents to identify Root Causes that, when corrected, can lead to dramatic improvements in performance by eliminating entire classes of problems.

Identify the one event associated with problem and ask why this event occurred. Brainstorm the root causes of failures; for example, by asking why events occurred or conditions existed; and then why the cause occurred 5 consecutive times until you get to the root cause. For each of these sub events or causes, ask why it occurred. Repeat the process for the other events associated with the incident.

Root cause analysis does not mean the investigation is over. Look at technique, or other systems outside the normal indicators. Often creative thinking will find root causes that ordinarily would be missed, and continue to plague the laboratory or operation.

12.3.4 Monitoring of the Corrective Actions

- The Department (Technical) Manager/Supervisor and QA Manager are responsible to ensure that the corrective action taken was effective.
- Ineffective actions are documented and re-evaluated until acceptable resolution is achieved. Department (Technical) Managers are accountable to the Laboratory Director to ensure final acceptable resolution is achieved and documented appropriately.
- Each CAR is entered into an Excel spreadsheet for tracking purposes and a monthly summary of all corrective actions is printed out for review to aid in ensuring that the corrective actions have taken effect.
- The QA Manager reviews monthly CARs for trends. Highlights are included in the QA monthly report (refer to Section 16). If a significant trend develops that adversely affects quality, an audit of the area is performed and corrective action implemented.

- Any out-of-control situations that are not addressed acceptably at the laboratory level may be reported to the Corporate Quality Director by the QA Manager, indicating the nature of the out-of-control situation and problems encountered in solving the situation.

12.3.5 Follow-up Audits

- Follow-up audits may be initiated by the QA Manager and shall be performed as soon as possible when the identification of a nonconformance casts doubt on the laboratory's compliance with its own policies and procedures, or on its compliance with state or federal requirements.
- These audits often follow the implementation of the corrective actions to verify effectiveness. An additional audit would only be necessary when a critical issue or risk to business is discovered.

(Also refer to Section 15.1.4, Special Audits.)

12.4 Technical Corrective Actions

In addition to providing acceptance criteria and specific protocols for technical corrective actions in the method SOPs, the laboratory has general procedures to be followed to determine when departures from the documented policies and procedures and quality control have occurred (refer to Section 11). The documentation of these procedures is through the use of an CAR.

Table 12-1 includes examples of general technical corrective actions. For specific criteria and corrective actions, refer to the analytical methods or specific method SOPs. The laboratory may also maintain Work Instructions on these items that are available upon request.

Table 12-1 provides some general guidelines for identifying the individual(s) responsible for assessing each QC type and initiating corrective action. The table also provides general guidance on how a data set should be treated if associated QC measurements are unacceptable. Specific procedures are included in Method SOPs, Work Instructions, QAM Sections 19 and 20. All corrective actions are reviewed monthly, at a minimum, by the QA Manager and highlights are included in the QA monthly report.

To the extent possible, samples shall be reported only if all quality control measures are acceptable. If the deficiency does not impair the usability of the results, data will be reported with an appropriate data qualifier and/or the deficiency will be noted in the case narrative. Where sample results may be impaired, the Project Manager is notified and appropriate corrective action (e.g., reanalysis) is taken and documented**.**

12.5 Basic Corrections

When mistakes occur in records, each mistake shall be crossed-out, [not obliterated (e.g. no white-out)], and the correct value entered alongside. All such corrections shall be initialed (or signed) and dated by the person making the correction. In the case of records stored electronically, the original "uncorrected" file must be maintained intact and a second "corrected" file is created.

This same process applies to adding additional information to a record. All additions made later than the initial must also be initialed (or signed) and dated.

When corrections are due to reasons other than obvious transcription errors, the reason for the corrections (or additions) shall also be documented.

Figure 12-1.
Example - Corrective Action Report

TestAmerica Edison

Data Inquiry Request Form / Corrective Action Form

Date Initiated:	**Job #:**	**Send Response to:** Name:
Date Needed:	**Analyses:**	Address:
Client:	**Lab :**	Phone:
	Deliverable / Report Type	FAX:
Contact:	**PDF/EDD** ____ **Full** ____	Email:
	Bound ____ **Reduced** ____	
	Unbound ____ **ResQA** ____	
Project:	**CD** ____ **Other** ____	**Send Via: FAX Mail UPS Email Courier**

1. Type of Non-Conformance:

____ Missing Sample/Analysis
____ Wrong Sample Identification
____ Missing Pages
____ Results in Question
____ Holdtime Violation
____ Calibration in Question
____ Insufficient Data for Validation
____ Explanation of Analysis
____ EDD
____ OTHER

2. Explanation of Details:

Initiator Signature:		**Date:**	

3. Required Actions: **Actions Completed:**

√ if needed	Department	Actions Required:	Initials:	Date:
	PM			
	LOGIN			
	VOAGC/MS			
	BNAMS			
	PEST/BNAGC			
	METALS			
	WETCHEM			
	SUBWORK			
	IT			
	ORG PREP			
	RP			

4. Final Approval of Data Inquiry Actions Taken:

Intiator Signature:		**Date:**	

5. LAB ERROR YES NO (IF YES, PLEASE COMPLETE SECTIONS 5 - 7) **CORRECTIVE ACTION ID#:**

6. Quality Assurance Review and Assignment of Further Action: *(to be completed by QA Manager - use page 2 if needed)*

Recommended Corrective Action:

7. Final Resolution of Corrective Action: *(to be completed by Dept. Supervisor - use page 2 if needed)*

Supervisor Signature:		**Date:**	

8. Quality Assurance Final Approval *(QA Manager or designee use only):*

QA Signature:		**Date:**	

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Table 12-1. Example – General Corrective Action Procedures

QC Activity *(Individual Responsible for Initiation/Assessment)*	Acceptance Criteria	Recommended Corrective Action
Initial Instrument Blank *(Analyst)*	- Instrument response < MDL.	- Prepare another blank. - If same response, determine cause of contamination: reagents, environment, instrument equipment failure, etc..
Initial Calibration Standards *(Analyst, Department Technical Manager)*	- Correlation coefficient > 0.99 or standard concentration value. - % Recovery within acceptance range. - See details in Method SOP.	- Reanalyze standards. - If still unacceptable, remake standards and recalibrate instrument.
Independent Calibration Verification (Second Source) *(Analyst, Department Technical Manager))*	- % Recovery within control limits.	- Remake and reanalyze standard. - If still unacceptable, then remake calibration standards or use new primary standards and recalibrate instrument.
Continuing Calibration Standards *(Analyst, Data Reviewer)*	% Recovery within control limits.	- Reanalyze standard. - If still unacceptable, then recalibrate and rerun affected samples.
Matrix Spike / Matrix Spike Duplicate (MS/MSD) *(Analyst, Data Reviewer)*	- % Recovery within limits documented in TALS and/or Work Instructions	- If the acceptance criteria for duplicates or matrix spikes are not met because of matrix interferences, the acceptance of the analytical batch is determined by the validity of the LCS. - If the LCS is within acceptable limits the batch is acceptable. - The results of the duplicates, matrix spikes and the LCS are reported with the data set. - For matrix spike or duplicate results outside criteria the data for that sample shall be reported with qualifiers.

QC Activity *(Individual Responsible for Initiation/Assessment)*	Acceptance Criteria	Recommended Corrective Action
Laboratory Control Sample (LCS) *(Analyst, Data Reviewer)*	- % Recovery within limits specified in TALS and/or Work Instructions	- Batch must be re-prepared and re-analyzed. This includes any allowable marginal exceedance. When not using marginal exceedances, the following exceptions apply: 1) when the acceptance criteria for the positive control are exceeded high (i.e., high bias) and there are associated samples that are non-detects, then those non-detects may be reported with data qualifying codes; 2) when the acceptance criteria for the positive control are exceeded low (i.e., low bias), those sample results may be reported if they exceed a maximum regulatory limit/decision level with data qualifying codes. **Note:** If there is insufficient sample or the holding time cannot be met, contact client and report with flags.
Surrogates *(Analyst, Data Reviewer)*	- % Recovery within limits of method or within three standard deviations of the historical mean.	- Individual sample must be repeated. Place comment in LIMS. - Surrogate results outside criteria shall be reported with qualifiers.
Method Blank (MB) *(Analyst, Data Reviewer)*	< Reporting Limit [1]	- Reanalyze blank. - If still positive, determine source of contamination. If necessary, reprocess (i.e. digest or extract) entire sample batch. Report blank results. - Qualify the result(s) if the concentration of a targeted analyte in the MB is at or above the reporting limit AND is > 1/10 of the amount measured in the sample.
Proficiency Testing (PT) Samples *(QA Manager, Department Technical Manager)*	- Criteria supplied by PT Supplier.	- Any failures or warnings must be investigated for cause. Failures may result in the need to repeat a PT sample to show the problem is corrected.
Internal / External Audits *(QA Manager, Department Technical Manager)*	- Defined in Quality System documentation such as SOPs, QAM, etc..	- Non-conformances must be investigated through CAR system and necessary corrections must be made.

QC Activity ***(Individual Responsible for Initiation/Assessment)***	**Acceptance Criteria**	**Recommended Corrective Action**
Reporting / Calculation Errors (Depends on issue – possible individuals include: Analysts, Data Reviewers, Project Managers, Department Technical Manager, QA Manager, Corporate QA, Corporate Management)	- SOP CW-L-S-002, Internal Investigation of Potential Data Discrepancies and Determination for Data Recall.	- Corrective action is determined by type of error. Follow the procedures in SOP CW-L-S-002 or the Corrective Action SOP (ED-GEN-003).
Client Complaints *(Project Managers, Lab Director Operations Manager, Sales and Marketing)*	-	- Corrective action is determined by the type of complaint. For example, a complaint regarding an incorrect address on a report will result in the report being corrected and then follow-up must be performed on the reasons the address was incorrect (e.g., database needs to be updated).
QA Monthly Report (Refer to Section 16 for an example) (QA Manager, Lab Director, Operations Manager, Department Technical Managers)	- QAM, SOPs.	- Corrective action is determined by the type of issue. For example, CARs for the month are reviewed and possible trends are investigated.
Health and Safety Violation (Safety Officer, Lab Director, Operations Manager, Department Technical Manager)	- Environmental Health and Safety (EHS) Manual.	- Non-conformance is investigated and corrected through CAR system.

Note:
1. Except as noted below for certain compounds, the method blank should be below the detection limit Concentrations up to five times the reporting limit will be allowed for the ubiquitous laboratory and reagent contaminants: methylene chloride, toluene, acetone, 2-butanone and phthalates **provided** they appear in similar levels in the reagent blank and samples. This allowance presumes that the detection limit is significantly below any regulatory limit to which the data are to be compared and that blank subtraction will not occur. For benzene and ethylene dibromide (EDB) and other analytes for which regulatory limits are extremely close to the detection limit, the method blank must be below the method detection limit

SECTION 13. PREVENTIVE ACTION / IMPROVEMENT

13.1 Overview

The laboratory's preventive action programs improve, or eliminate potential causes of nonconforming product and/or nonconformance to the quality system. This preventive action process is a proactive and continuous process of improvement activities that can be initiated through feedback from clients, employees, business providers, and affiliates. The QA Department has the overall responsibility to ensure that the preventive action process is in place, and that relevant information on actions is submitted for management review.

Dedicating resources to an effective preventive action system emphasizes the laboratory's commitment to its Quality Program. It is beneficial to identify and address negative trends before they develop into complaints, problems and corrective actions. Additionally, customer service and client satisfaction can be improved through continuous improvements to laboratory systems.

Opportunities for improvement may be discovered during management reviews, the monthly QA Metrics Report, evaluation of internal or external audits, results & evaluation of proficiency testing (PT) performance, data analysis & review processing operations, client complaints, staff observation, etc..

The monthly Management Systems Metrics Report shows performance indicators in all areas of the laboratory and quality system. These areas include revised reports, corrective actions, audit findings, internal auditing and data authenticity audits, client complaints, PT samples, holding time violations, SOPs, ethics training, etc.. These metrics are used in evaluating the management and quality system performance on an ongoing basis and provide a tool for identifying areas for improvement.

The laboratory's corrective action process is integral to implementation of preventive actions. A critical piece of the corrective action process is the implementation of actions to prevent further occurrence of a non-compliance event. Historical review of corrective action provides a valuable mechanism for identifying preventive action opportunities.

13.1.1 The following elements are part of a preventive action system:

- Identification of an opportunity for preventive action.
- Process for the preventive action.
- Define the measurements of the effectiveness of the process once undertaken.
- Execution of the preventive action.
- Evaluation of the plan using the defined measurements.
- Verification of the effectiveness of the preventive action.

- Close-Out by documenting any permanent changes to the Quality System as a result of the Preventive Action. Documentation of Preventive Action is incorporated into the monthly QA reports, corrective action process and management review.

13.1.2 Any Preventive Actions undertaken or attempted shall be taken into account during the annual Management Systems Review (Section 16). A highly detailed report is not required; however, a summary of successes and failures within the preventive action program is sufficient to provide management with a measurement for evaluation.

13.2 Management of Change

The Management of Change process is designed to manage significant events and changes that occur within the laboratory. Through these various tracking indicators, the potential risks inherent with a new event or change are identified and evaluated. The risks are minimized or eliminated through pre-planning and the development of preventive measures. The types of indicators monitored under this collective system include:

- SOP Tracking
  Current Revisions w/ Effective Dates
  Required Biennial Revisions w/ Due Date

- Proficiency Testing (PT) Sample Tracking
  Pass / Fail – most current 2 out of 3 studies.

- Instrument / Equipment List
  Current / Location

- Accreditations
  New / Expiring

- Method Capabilities
  Current Listing by program (e.g., Potable Water, Soils, etc.)

- Key Personnel
  Technical Managers, Department Supervisors, etc..

These items are maintained on TestAmerica's Intranet (Proposal Library) or on our internal database (TotalAccess) which uploads to our company internet site.

SECTION 14. CONTROL OF RECORDS

The laboratory maintains a records management system appropriate to its needs and that complies with applicable standards or regulations as required. The system produces unequivocal, accurate records that document all laboratory activities. The laboratory retains all original observations, calculations and derived data, calibration records and a copy of the analytical report for a minimum of five years after it has been issued.

14.1 Overview

The laboratory has established procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. A record index is listed in Table 14-1. Quality records are maintained by the QA Department in a database, which is backed up as part of the regular laboratory backup. Records are of two types; either electronic or hard copy paper formats depending on whether the record is computer or hand generated (some records may be in both formats). Technical records are maintained by Laboratory Operations under the direction of the Laboratory Operations Manager.

Table 14-1. Record Index[1]

	Record Types [1]:	**Retention Time:**
Technical Records	- Raw Data - Logbooks[2] - Standards - Certificates - Analytical Records - MDLs/IDLs/DOCs - Lab Reports	5 Years from analytical report issue*
Official Documents	- Quality Assurance Manual (QAM) - Work Instructions - Policies - SOPs - Policy Memorandums - Manuals	5 Years from document retirement date*
QA Records	- Internal & External Audits/Responses - Certifications - Corrective/Preventive Actions - Management Reviews - Method & Software Validation / Verification Data - Data Investigation	5 Years from archival* **Data Investigation:** 5 years or the life of the affected raw data storage whichever is greater (beyond 5 years if ongoing project or pending investigation)
Project Records	- Sample Receipt & COC Documentation - Contracts and Amendments - Correspondence - QAPP - SAP - Telephone Logbooks - Lab Reports	5 Years from analytical report issue*
Administrative Records	Finance and Accounting	10 years
	EH&S Manual, Permits,	7 years
	Disposal Records	Indefinitely
	Employee Handbook	Indefinitely
	Personnel files, Employee Signature & Initials, Administrative Training Records (e.g., Ethics)	Refer to HR Manual
	Administrative Policies Technical Training Records	7 years

[1] Record Types encompass hardcopy and electronic records.
[2] Examples of Logbook types: Maintenance, Instrument Run, Preparation (standard and samples), Standard and Reagent Receipt, Archiving, Balance Calibration, Temperature (hardcopy or electronic records).
* Exceptions listed in Table 14-2.

14.1.1 All records are stored and retained in such a way that they are secure and readily retrievable at the laboratory facility or an offsite location that provides a suitable environment to prevent damage or deterioration and to prevent loss**.** All records shall be protected against fire, theft, loss, environmental deterioration, and vermin. In the case of electronic records, electronic or magnetic sources, storage media are protected from deterioration caused by magnetic fields and/or electronic deterioration.

Access to the data is limited to laboratory and company employees. Records archived off-site are stored in a secure location where a record is maintained of any entry into the storage facility. Whether on-site or off-site storage is used, logs are maintained in each storage box to note removal and return of records. Records are maintained for a minimum of five years unless otherwise specified by a client or regulatory requirement.

For raw data and project records, record retention shall be calculated from the date the project report is issued. For other records, such as Controlled Documents, QA, or Administrative Records, the retention time is calculated from the date the record is formally retired. Records related to the programs listed in Table 14-2 have lengthier retention requirements and are subject to the requirements in Section 14.1.3.

14.1.2 Programs with Longer Retention Requirements

Some regulatory programs have longer record retention requirements than the standard record retention time. These are detailed in Table 14-2 with their retention requirements. In these cases, the longer retention requirement is enacted. If special instructions exist such that client data cannot be destroyed prior to notification of the client, the container or box containing that data is marked as to who to contact for authorization prior to destroying the data.

Table 14-2. Example: Special Record Retention Requirements

Program	[1]Retention Requirement
Drinking Water – All States	5 years (project records) 10 years - Radiochemistry (project records)
Drinking Water Lead and Copper Rule	12 years (project records)
NY Potable Water NYCRR Part 55-2	10 years

[1]Note: Extended retention requirements must be noted with the archive documents or addressed in facility-specific records retention procedures.

14.1.3 The laboratory has procedures to protect and back-up records stored electronically and to prevent unauthorized access to or amendment of these records. All analytical data is maintained as hard copy or in a secure readable electronic format. For analytical reports that are maintained as copies in PDF format, refer to Section 19.14.1 for more information. For additional details please refer to refer to TestAmerica Edison SOP No. ED-GEN-024 (Record Storage and Retention).

14.1.4 The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data, as well as rapid recovery of historical data The history of the sample from when the laboratory took possession of the samples must be readily understood through the documentation. This shall include inter-laboratory transfers of samples and/or extracts.

- The records include the identity of personnel involved in sampling, sample receipt, preparation, or testing. All analytical work contains the initials (at least) of the personnel involved. The laboratory's copy of the chain of custody is stored in the laboratory's hard copy project file (in addition to the scanned copy included in the analytical report PDF). The chain of custody would indicate the name of the sampler. If any sampling notes are provided with a work order, they are kept in the project file as well. For additional details please refer to refer to TestAmerica Edison SOP No. ED-GEN-024 (Record Storage and Retention).

- All information relating to the laboratory facilities equipment, analytical test methods, and related laboratory activities, such as sample receipt, sample preparation, or data verification are documented.

- The record keeping system facilitates the retrieval of all working files and archived records for inspection and verification purposes (e.g., set format for naming electronic files, set format for what is included with a given analytical data set. Reference TestAmerica Edison SOP No. ED-GEN-024 (Record Storage and Retention).

- Instrument data is stored sequentially by instrument. A given day's analyses are maintained in the order of the analysis. Run logs are maintained for each instrument or method; a copy of each day's run long or instrument sequence is stored with the data to aid in re-constructing an analytical sequence. Where an analysis is performed without an instrument, bound logbooks or bench sheets are used to record and file data. Standard and reagent information is recorded in logbooks or entered into the LIMS for each method as required.

- Changes to hardcopy records shall follow the procedures outlined in Section 12 and 19. Changes to electronic records in LIMS or instrument data are recorded in audit trails.

- The reason for a signature or initials on a document is clearly indicated in the records such as "sampled by," "prepared by," "reviewed by", or "analyzed by".

- All generated data except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent dark ink.

- Hard copy data may be scanned into PDF format for record storage as long as the scanning process can be verified in order to ensure that no data is lost and the data files and storage media must be tested to verify the laboratory's ability to retrieve the information prior to the destruction of the hard copy that was scanned.

- Also refer to Section 19.14.1 'Computer and Electronic Data Related Requirements'.

14.2 Technical and Analytical Records

14.2.1 The laboratory retains records of original observations, derived data and sufficient information to establish an audit trail, calibration records, staff records and a copy of each analytical report issued, for a minimum of five years unless otherwise specified by a client or regulatory requirement. The records for each analysis shall contain sufficient information to enable the analysis to be repeated under conditions as close as possible to the original. The records shall include the identity of laboratory personnel responsible for the sampling, performance of each analysis and reviewing results.

14.2.2 Observations, data and calculations are recorded real-time and are identifiable to the specific task.

14.2.3 Changes to hardcopy records shall follow the procedures outlined in Section 12 and 19. Changes to electronic records in LIMS or instrument data are recorded in audit trails.

The essential information to be associated with analysis, such as strip charts, tabular printouts, computer data files, analytical notebooks, and run logs, include:

- laboratory sample ID code**;**
- Date of analysis; Time of Analysis is also required if the holding time is seventy-two (72) hours or less, or when time critical steps are included in the analysis (e.g., drying times, incubations, etc.); instrumental analyses have the date and time of analysis recorded as part of their general operations. Where a time critical step exists in an analysis, location for such a time is included as part of the documentation in a specific logbook or on a benchsheet.
- Instrumentation identification and instrument operating conditions/parameters. Operating conditions/parameters are typically recorded in instrument maintenance logs where available.
- analysis type**;**
- all manual calculations and manual integrations**;**
- analyst's or operator's initials/signature**;**
- sample preparation including cleanup, separation protocols, incubation periods or subculture, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents**;**
- test results**;**
- standard and reagent origin, receipt, preparation, and use**;**
- calibration criteria, frequency and acceptance criteria**;**
- data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions**;**
- quality control protocols and assessment**;**
- electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries; and
- Method performance criteria including expected quality control requirements. These are indicated both in the LIMS and on specific analytical report formats**.**

14.3 Laboratory Support Activities

In addition to documenting all the above-mentioned activities, the following are retained QA records and project records (previous discussions in this section relate where and how these data are stored):

- all original raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts' work sheets and data output records (chromatograms, strip charts, and other instrument response readout records)**;**
- a written description or reference to the specific test method used which includes a description of the specific computational steps used to translate parametric observations into a reportable analytical value**;**
- copies of final reports**;**

- archived SOPs**;**
- correspondence relating to laboratory activities for a specific project**;**
- all corrective action reports, audits and audit responses**;**
- proficiency test results and raw data; and
- results of data review, verification, and crosschecking procedures

14.3.1 Sample Handling Records

Records of all procedures to which a sample is subjected while in the possession of the laboratory are maintained. These include but are not limited to records pertaining to:

- sample preservation including appropriateness of sample container and compliance with holding time requirement;
- sample identification, receipt, acceptance or rejection and login;
- sample storage and tracking including shipping receipts, sample transmittal / COC forms; and
- procedures for the receipt and retention of samples, including all provisions necessary to protect the integrity of samples.

14.4 Administrative Records

The laboratory also maintains the administrative records in either electronic or hard copy form. Refer to Table 14-1.

14.5 Records Management, Storage and Disposal

All records (including those pertaining to test equipment), certificates and reports are safely stored, held secure and in confidence to the client. Certification related records are available upon request.

All information necessary for the historical reconstruction of data is maintained by the laboratory. Records that are stored only on electronic media must be supported by the hardware and software necessary for their retrieval.

Records that are stored or generated by computers or personal computers have hard copy, write-protected backup copies, or an electronic audit trail controlling access**.**

The laboratory has a record management system (a.k.a., document control) for control of laboratory notebooks, instrument logbooks, standards logbooks, and records for data reduction, validation, storage and reporting. Laboratory notebooks are issued on a per analysis basis, and are numbered sequentially. All data are recorded sequentially within a series of sequential notebooks. Bench sheets are filed sequentially. Standards are primarily maintained in the LIMS (this electronic record may be augmented by a logbook record. Records are considered archived when noted as such in the records management system (a.k.a., document control.)

14.5.1 Transfer of Ownership

In the event that the laboratory transfers ownership or goes out of business, the laboratory shall ensure that the records are maintained or transferred according to client's instructions. Upon ownership transfer, record retention requirements shall be addressed in the ownership transfer agreement and the responsibility for maintaining archives is clearly established. In addition, in cases of bankruptcy, appropriate regulatory and state legal requirements concerning laboratory records must be followed. In the event of the closure of the laboratory, all records will revert to the control of the corporate headquarters. Should the entire company cease to exist, as much notice as possible will be given to clients and the accrediting bodies who have worked with the laboratory during the previous 5 years of such action.

14.5.2 Records Disposal

Records are removed from the archive and destroyed after 5 years unless otherwise specified by a client or regulatory requirement. On a project specific or program basis, clients may need to be notified prior to record destruction. Records are destroyed in a manner that ensures their confidentiality such as shredding, mutilation or incineration. (Refer to Tables 14-1 and 14-2).

Electronic copies of records must be destroyed by erasure or physically damaging off-line storage media so no records can be read.

If a third party records management company is hired to dispose of records, a "Certificate of Destruction" is required.

SECTION 15. AUDITS

15.1 Internal Audits

Internal audits are performed to verify that laboratory operations comply with the requirements of the lab's quality system and with the external quality programs under which the laboratory operates. Audits are planned and organized by the QA staff. Personnel conducting the audits should be independent of the area being evaluated. Auditors will have sufficient authority, access to work areas, and organizational freedom necessary to observe all activities affecting quality and to report the assessments to laboratory management and, when requested, to corporate management.

Audits are conducted and documented as described in the TestAmerica Corporate SOP on performing Internal Auditing, SOP No. CA-Q-S-004. The types and frequency of routine internal audits are described in Table 15-1. Special or ad hoc assessments may be conducted as needed under the direction of the QA staff.

Table 15-1. Types of Internal Audits and Frequency

Description	Performed by	Frequency
Quality Systems Audits	QA Department , QA approved designee, or Corporate QA	All areas of the laboratory annually
Method Audits	Joint responsibility: a) QA Manager or designee b) Technical Manager or Designee (Refer to CA-Q-S-004)	Methods Audits Frequency: 50% of methods annually
Special	QA Department or Designee	Surveillance or spot checks performed as needed, e.g., to confirm corrective actions from other audits.
Performance Testing	Analysts with QA oversight	Two successful per year for each TNI field of testing or as dictated by regulatory requirements

15.1.1 Annual Quality Systems Audit

An annual quality systems audit is required to ensure compliance to analytical methods and SOPs, TestAmerica's Data Integrity and Ethics Policies, TNI quality systems, client and state requirements, and the effectiveness of the internal controls of the analytical process, including but not limited to data review, quality controls, preventive action and corrective action. The completeness of earlier corrective actions is assessed for effectiveness & sustainability. The audit is divided into sections for each operating or support area of the lab, and each section is comprehensive for a given area. The area audits may be performed on a rotating schedule throughout the year to ensure adequate coverage of all areas. This schedule may change as situations in the laboratory warrant.

15.1.2 QA Technical Audits

QA technical audits are based on client projects, associated sample delivery groups, and the methods performed. Reported results are compared to raw data to verify the authenticity of results. The validity of calibrations and QC results are compared to data qualifiers, footnotes, and case narratives. Documentation is assessed by examining run logs and records of manual integrations. Manual calculations are checked. Where possible, electronic audit miner programs (e.g., MintMiner and Chrom AuditMiner) are used to identify unusual manipulations of the data deserving closer scrutiny. QA technical audits will include all methods within a two-year period.

15.1.3 SOP Method Compliance

Compliance of all SOPs with the source methods and compliance of the operational groups with the SOPs will be assessed by the Department Manager (i.e., Technical Manager) or qualified designee at least every two years. It is also recommended that the work of each newly hired analyst is assessed within 3 months of working independently, (e.g., completion of method

IDOC). In addition, as analysts add methods to their capabilities, (new IDOC) reviews of the analyst work products will be performed within 3 months of completing the documented training.

15.1.4 Special Audits

Special audits are conducted on an as needed basis, generally as a follow up to specific issues such as client complaints, corrective actions, PT results, data audits, system audits, validation comments, regulatory audits or suspected ethical improprieties. Special audits are focused on a specific issue, and report format, distribution, and timeframes are designed to address the nature of the issue.

15.1.5 Performance Testing

The laboratory participates semi-annually in performance audits conducted through the analysis of PT samples provided by a third party. The laboratory generally participates in the following types of PT studies: Drinking Water, Non-potable Water, Soil and Hazardous Waste.

It is TestAmerica's policy that PT samples be treated as typical samples in the production process. Furthermore, where PT samples present special or unique problems, in the regular production process they may need to be treated differently, as would any special or unique request submitted by any client. The QA Manager must be consulted and in agreement with any decisions made to treat a PT sample differently due to some special circumstance.

Written responses to unacceptable PT results are required. In some cases it may be necessary for blind QC samples to be submitted to the laboratory to show a return to control.

15.2 External Audits

External audits are performed when certifying agencies or clients conduct on-site inspections or submit performance testing samples for analysis. It is TestAmerica's policy to cooperate fully with regulatory authorities and clients. The laboratory makes every effort to provide the auditors with access to personnel, documentation, and assistance. Laboratory supervisors are responsible for providing corrective actions to the QA Manager who coordinates the response for any deficiencies discovered during an external audit. Audit responses are due in the time allotted by the client or agency performing the audit. When requested, a copy of the audit report and the labs corrective action plan will be forwarded to Corporate Quality.

The laboratory cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. The client may only view data and systems related directly to the client's work. All efforts are made to keep other client information confidential.

15.2.1 Confidential Business Information (CBI) Considerations

During on-site audits, auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment." When information is claimed as business confidential, the laboratory must place on (or attach to) the

information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend or other suitable form of notice, employing language such as “trade secret”, “proprietary” or “company confidential”. Confidential portions of documents otherwise non-confidential must be clearly identified. CBI may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. However, sample identifiers may not be obscured from the information. Additional information regarding CBI can be found in within the 2009 TNI standards.

15.3 Audit Findings

Audit findings are documented using the corrective action process and database. The laboratory’s corrective action responses for both types of audits may include action plans that could not be completed within a predefined timeframe. In these instances, a completion date must be set and agreed to by operations management and the QA Manager.

Developing and implementing corrective actions to findings is the responsibility of the Department (i.e., Technical) Manager where the finding originated. Findings that are not corrected by specified due dates are reported monthly to management in the QA monthly report. When requested, a copy of the audit report and the labs corrective action plan will be forwarded to Corporate Quality.

If any audit finding casts doubt on the effectiveness of the operations or on the correctness or validity of the laboratory’s test results, the laboratory shall take timely corrective action, and shall notify clients in writing if the investigations show that the laboratory results have been affected. Once corrective action is implemented, a follow-up audit is scheduled to ensure that the problem has been corrected.

Clients must be notified promptly in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any test report or amendment to a test report. The investigation must begin within 24-hours of discovery of the problem and all efforts are made to notify the client within two weeks after the completion of the investigation.

SECTION 16. MANAGEMENT REVIEWS

16.1 Quality Assurance Report

A comprehensive QA Report shall be prepared each month by the laboratory’s QA Department and forwarded to the Laboratory Director, their Quality Director as well as the General Manager. All aspects of the QA system are reviewed to evaluate the suitability of policies and procedures. During the course of the year, the Laboratory Director, General Manager or Corporate QA may request that additional information be added to the report.

On a monthly basis, Corporate QA compiles information from all the monthly laboratory reports. The Corporate Quality Directors prepare a report that includes a compilation of all metrics and notable information and concerns regarding the QA programs within the laboratories. The report

also includes a listing of new regulations that may potentially impact the laboratories. This report is presented to the Senior Management Team and General Managers.

16.2 Annual Management Review

The senior lab management team (Laboratory Director, QA Manager) conducts a review annually of its quality systems and LIMS to ensure its continuing suitability and effectiveness in meeting client and regulatory requirements and to introduce any necessary changes or improvements. It will also provide a platform for defining goals, objectives and action items that feed into the laboratory planning system. Corporate Operations and Corporate QA personnel may be included in this meeting at the discretion of the Laboratory Director. The LIMS review consists of examining any audits, complaints or concerns that have been raised through the year that are related to the LIMS. The laboratory will summarize any critical findings that can not be solved by the lab and report them to Corporate IT.

This management systems review (Corporate SOP No. CA-Q-S-008 & Work Instruction No. CA-Q-WI-020) uses information generated during the preceding year to assess the "big picture" by ensuring that routine actions taken and reviewed on a monthly basis are not components of larger systematic concerns. The monthly review should keep the quality systems current and effective, therefore, the annual review is a formal senior management process to review specific existing documentation. Significant issues from the following documentation are compiled or summarized by the QA Manager prior to the review meeting:

- Matters arising from the previous annual review.
- Prior Monthly QA Reports issues.
- Laboratory QA Metrics.
- Review of report reissue requests.
- Review of client feedback and complaints.
- Issues arising from any prior management or staff meetings.
- Minutes from prior senior lab management meetings. Issues that may be raised from these meetings include:
    - Adequacy of staff, equipment and facility resources.
    - Adequacy of policies and procedures.
    - Future plans for resources and testing capability and capacity.
- The annual internal double blind PT program sample performance (if performed),
- Compliance to the Ethics Policy and Data Integrity Plan. Including any evidence/incidents of inappropriate actions or vulnerabilities related to data Integrity.

A report is generated by the QA Manager and management. The report is distributed to the appropriate General Manager and the Quality Director. The report includes, but is not limited to:

- The date of the review and the names and titles of participants.
- A reference to the existing data quality related documents and topics that were reviewed.
- Quality system or operational changes or improvements that will be made as a result of the review [e.g., an implementation schedule including assigned responsibilities for the changes (Action Table)].

Changes to the quality systems requiring update to the laboratory QA Manual shall be included in the next revision of the QA Manual.

16.3 Potential Integrity Related Managerial Reviews

Potential integrity issues (data or business related) must be handled and reviewed in a confidential manner until such time as a follow-up evaluation, full investigation, or other appropriate actions have been completed and issues clarified. TestAmerica's Corporate Data Investigation/Recall SOP shall be followed (SOP No. CW-L-S-002) . All investigations that result in finding of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients.

TestAmerica's CEO, VP of Quality, Technical & Operations, General Managers and Quality Directors receive a monthly report from the Corporate Quality Director summarizing any current data integrity or data recall investigations. The General Manager's are also made aware of progress on these issues for their specific labs.

SECTION 17. PERSONNEL

17.1 Overview

The laboratory's management believes that its highly qualified and professional staff is the single most important aspect in assuring a high level of data quality and service. The staff consists of professionals and support personnel as outlined in the organization chart in Figure 4-1.

All personnel must demonstrate competence in the areas where they have responsibility. Any staff that is undergoing training shall have appropriate supervision until they have demonstrated their ability to perform their job function on their own. Staff shall be qualified for their tasks based on appropriate education, training, experience and/or demonstrated skills as required.

The laboratory employs sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned responsibilities.

All personnel are responsible for complying with all QA/QC requirements that pertain to the laboratory and their area of responsibility. Each staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular area of responsibility. Technical staff must also have a general knowledge of lab operations, test methods, QA/QC procedures and records management.

Laboratory management is responsible for formulating goals for lab staff with respect to education, training and skills and ensuring that the laboratory has a policy and procedures for identifying training needs and providing training of personnel. The training shall be relevant to the present and anticipated responsibilities of the lab staff.

The laboratory only uses personnel that are employed by or under contract to, the laboratory. Contracted personnel, when used, must meet competency standards of the laboratory and work in accordance to the laboratory's quality system.

17.2 Education and Experience Requirements for Technical Personnel

The laboratory makes every effort to hire analytical staffs that possess a college degree (AA, BA, BS) in an applied science with some chemistry in the curriculum. Exceptions can be made based upon the individual's experience and ability to learn. Selection of qualified candidates for laboratory employment begins with documentation of minimum education, training, and experience prerequisites needed to perform the prescribed task. Minimum education and training requirements for TestAmerica employees are outlined in job descriptions and are generally summarized for analytical staff in the table below.

The laboratory maintains job descriptions for all personnel who manage, perform or verify work affecting the quality of the environmental testing the laboratory performs. Job Descriptions are located on the TestAmerica intranet site's Human Resources web-page (Also see Section 4 for position descriptions/responsibilities).

Experience and specialized training are occasionally accepted in lieu of a college degree (basic lab skills such as using a balance, colony counting, aseptic or quantitation techniques, etc., are also considered).

As a general rule for analytical staff:

Specialty	Education	Experience
Extractions, Digestions, some electrode methods (pH, DO, Redox, etc.), or Titrimetric and Gravimetric Analyses	H.S. Diploma	On the job training (OJT)
GFAA, CVAA, FLAA, Single component or short list Chromatography (e.g., Fuels, BTEX-GC, IC	A college degree in an applied science or 2 years of college and at least 1 year of college chemistry	Or 2 years prior analytical experience is required
ICP, ICPMS, Long List or complex chromatography (e.g., Pesticides, PCB, Herbicides, HPLC, etc.), GCMS	A college degree in an applied science or 2 years of college chemistry	or 5 years of prior analytical experience
Spectra Interpretation	A college degree in an applied science or 2 years of college chemistry	And 2 years relevant experience Or 5 years of prior analytical experience

Specialty	Education	Experience
Department Managers (i.e,Technical Managers) - **General**	Bachelors Degree in an applied science or engineering with 24 semester hours in chemistry An advanced (MS, PhD.) degree may substitute for one year of experience	And 2 years experience in environmental analysis of representative analytes for which they will oversee
Department Managers (i.e,Technical Managers)– **Wet Chem** only (no advanced instrumentation)	Associates degree in an applied science or engineering or 2 years of college with 16 semester hours in chemistry	And 2 years relevant experience

When an analyst does not meet these requirements, they can perform a task under the direct supervision of a qualified analyst, peer reviewer or Department (i.e., Technical) Manager, and are considered an analyst in training. The person supervising an analyst in training is accountable for the quality of the analytical data and must review and approve data and associated corrective actions.

17.3 Training

The laboratory is committed to furthering the professional and technical development of employees at all levels.

Orientation to the laboratory's policies and procedures, in-house method training, and employee attendance at outside training courses and conferences all contribute toward employee proficiency. Below are examples of various areas of required employee training:

Required Training	Time Frame	Employee Type
Environmental Health & Safety	Prior to lab work	All
Ethics – New Hires	1 week of hire	All
Ethics – Comprehensive	90 days of hire	All
Data Integrity	30 days of hire	Technical and PMs
Quality Assurance	90 days of hire	All
Ethics – Comprehensive Refresher	Annually	All
Initial Demonstration of Capability (DOC)	Prior to unsupervised method performance	Technical

The laboratory maintains records of relevant authorization/competence, education, professional qualifications, training, skills and experience of technical personnel (including contracted personnel) as well as the date that approval/authorization was given. These records are kept on file at the laboratory. Also refer to "Demonstration of Capability" in Section 19.

The training of technical staff is kept up to date by:

- Each employee must have documentation in their training file that they have read, understood and agreed to follow the most recent version of the laboratory QA Manual and SOPs in their area of responsibility. This documentation is updated as SOPs are updated.
- Documentation from any training courses or workshops on specific equipment, analytical techniques or other relevant topics are maintained in their training file.
- Documentation of proficiency (refer to Section 19).
- An Ethics Agreement signed by each staff member (renewed each year) and evidence of annual ethics training.
- A Confidentiality Agreement signed by each staff member signed at the time of employment.
- Human Resources maintains documentation and attestation forms on employment status & records; benefit programs; timekeeping/payroll; and employee conduct (e.g., ethics violations). This information is maintained in the employee's secured personnel file.

Further details of the laboratory's training program are described in the Laboratory Training SOP (TestAmerica Edison SOP No. ED-GEN-022).

17.4 Data Integrity and Ethics Training Program

Establishing and maintaining a high ethical standard is an important element of a Quality System. Ethics and data integrity training is integral to the success of TestAmerica and is provided for each employee at TestAmerica. It is a formal part of the initial employee orientation within 1 week of hire followed by technical data integrity training within 30 days, comprehensive training within 90 days, and an annual refresher for all employees. Senior management at each facility performs the ethics training for their staff.

In order to ensure that all personnel understand the importance TestAmerica places on maintaining high ethical standards at all times; TestAmerica has established a Corporate Ethics Policy (Policy No. CW-L-P-004) and an Ethics Statement. All initial and annual training is documented by signature on the signed Ethics Statement demonstrating that the employee has participated in the training and understands their obligations related to ethical behavior and data integrity.

Violations of this Ethics Policy will not be tolerated. Employees who violate this policy will be subject to disciplinary actions up to and including termination. Criminal violations may also be referred to the Government for prosecution. In addition, such actions could jeopardize TestAmerica's ability to do work on Government contracts, and for that reason, TestAmerica has a Zero Tolerance approach to such violations.
Employees are trained as to the legal and environmental repercussions that result from data misrepresentation. Key topics covered in the presentation include:

- Organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting.
- Ethics Policy
- How and when to report ethical/data integrity issues. Confidential reporting.
- Record keeping.
- Discussion regarding data integrity procedures.
- Specific examples of breaches of ethical behavior (e.g. peak shaving, altering data or computer clocks, improper macros, etc., accepting/offering kickbacks, illegal accounting practices, unfair competition/collusion)
- Internal monitoring. Investigations and data recalls.
- Consequences for infractions including potential for immediate termination, debarment, or criminal prosecution.
- Importance of proper written narration / data qualification by the analyst and project manager with respect to those cases where the data may still be usable but are in one sense or another partially deficient.

Additionally, a data integrity hotline (1-800-736-9407) is maintained by TestAmerica and administered by the Corporate Quality Department.

SECTION 18. ACCOMMODATIONS AND ENVIRONMENTAL CONDITIONS

18.1 Overview

The laboratory is a 42,000 ft^2 secure laboratory facility with controlled access and designed to accommodate an efficient workflow and to provide a safe and comfortable work environment for employees. All visitors sign in and are escorted by laboratory personnel. Access is controlled by various measures.

The laboratory is equipped with structural safety features. Each employee is familiar with the location, use, and capabilities of general and specialized safety features associated with their workplace. The laboratory provides and requires the use of protective equipment including safety glasses, protective clothing, gloves, etc., OSHA and other regulatory agency guidelines regarding required amounts of bench and fume hood space, lighting, ventilation (temperature and humidity controlled), access, and safety equipment are met or exceeded.

Traffic flow through sample preparation and analysis areas is minimized to reduce the likelihood of contamination. Adequate floor space and bench top area is provided to allow unencumbered sample preparation and analysis space. Sufficient space is also provided for storage of reagents and media, glassware, and portable equipment. Ample space is also provided for refrigerated sample storage before analysis and archival storage of samples after analysis. Laboratory HVAC and deionized water systems are designed to minimize potential trace contaminants.

The laboratory is separated into specific areas for sample receiving, sample preparation, volatile organic sample analysis, non-volatile organic sample analysis, inorganic sample analysis, and administrative functions.

18.2 Environment

Laboratory accommodation, test areas, energy sources, lighting are adequate to facilitate proper performance of tests. The facility is equipped with heating, ventilation, and air conditioning (HVAC) systems appropriate to the needs of environmental testing performed at this laboratory.

The environment in which these activities are undertaken does not invalidate the results or adversely affect the required accuracy of any measurements.

The laboratory provides for the effective monitoring, control and recording of environmental conditions that may affect the results of environmental tests as required by the relevant specifications, methods, and procedures. Such environmental conditions include humidity and temperature levels in the laboratory (when appropriate).

When any of the method or regulatory required environmental conditions change to a point where they may adversely affect test results, analytical testing will be discontinued until the environmental conditions are returned to the required levels.

Environmental conditions of the facility housing the computer network and LIMS are regulated to protect against raw data loss.

18.3 Work Areas

There is effective separation between neighboring areas when the activities therein are incompatible with each other. Examples include:

- Volatile organic chemical handling areas, including sample preparation and waste disposal, and volatile organic chemical analysis areas.

Access to and use of all areas affecting the quality of analytical testing is defined and controlled by secure access to the laboratory building as described below in the Building Security section.

Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality. These measures include regular cleaning to control dirt and dust within the laboratory. Work areas are available to ensure an unencumbered work area. Work areas include:

- Access and entryways to the laboratory.
- Sample receipt areas.
- Sample storage areas.
- Chemical and waste storage areas.
- Data handling and storage areas.
- Sample processing areas.
- Sample analysis areas.

18.4 Floor Plan

A floor plan can be found in Appendix 1.

18.5 Building Security

Building keys are distributed to employees as necessary.

Visitors to the laboratory sign in and out in a visitor's logbook. A visitor is defined as any person who visits the laboratory who is not an employee of the laboratory. In addition to signing into the laboratory, the Environmental, Health and Safety Manual contains requirements for visitors and vendors. There are specific safety forms that must be reviewed and signed. Visitors (with the exception of company employees) are escorted by laboratory personnel at all times, or the location of the visitor is noted in the visitor's logbook.

SECTION 19. TEST METHODS AND METHOD VALIDATION

19.1 Overview

The laboratory uses methods that are appropriate to meet our clients' requirements and that are within the scope of the laboratory's capabilities. These include sampling, handling, transport,

storage and preparation of samples, and, where appropriate, an estimation of the measurement of uncertainty as well as statistical techniques for analysis of environmental data.

Instructions are available in the laboratory for the operation of equipment as well as for the handling and preparation of samples. All instructions, Standard Operating Procedures (SOPs), reference methods and manuals relevant to the working of the laboratory are readily available to all staff. Deviations from published methods are documented (with justification) in the laboratory's approved SOPs. SOPs are submitted to clients for review at their request. Significant deviations from published methods require client approval and regulatory approval where applicable.

19.2 Standard Operating Procedures (SOPS)

The laboratory maintains SOPs that accurately reflect all phases of the laboratory such as assessing data integrity, corrective actions, handling customer complaints as well as all analytical methods and sampling procedures. The method SOPs are derived from the most recently promulgated/approved, published methods and are specifically adapted to the laboratory facility. Modifications or clarifications to published methods are clearly noted in the SOPs. All SOPs are controlled in the laboratory.

- All SOPs contain a revision number, effective date, and appropriate approval signatures. Controlled copies are available to all staff.
- Procedures for writing an SOP are incorporated by reference to TestAmerica's Corporate SOP entitled 'Writing a Standard Operating Procedure', No. CW-Q-S-002.
- SOPs are reviewed at a minimum of every 2 years (annually for Drinking Water and DoD SOPs), and where necessary, revised to ensure continuing suitability and compliance with applicable requirements.

19.3 Laboratory Methods Manual

For each test method, the laboratory shall have available the published referenced method as well as the laboratory developed SOP.

Note: If more stringent standards or requirements are included in a mandated test method or regulation than those specified in this manual, the laboratory shall demonstrate that such requirements are met. If it is not clear which requirements are more stringent, the standard from the method or regulation is to be followed. Any exceptions or deviations from the referenced methods or regulations are noted in the specific analytical SOP.

The laboratory maintains an SOP Index for both technical and non-technical SOPs. Technical SOPs are maintained to describe a specific test method. Non-technical SOPs are maintained to describe functions and processes not related to a specific test method.

19.4 Selection of Methods

Since numerous methods and analytical techniques are available, continued communication between the client and laboratory is imperative to assure the correct methods are utilized. Once client methodology requirements are established, this and other pertinent information is summarized by the Project Manager. These mechanisms ensure that the proper analytical methods are applied when the samples arrive for log-in. For non-routine analytical services (e.g., special matrices, non-routine compound lists), the method of choice is selected based on client needs and available technology. The methods selected should be capable of measuring the specific parameter of interest, in the concentration range of interest, and with the required precision and accuracy.

19.4.1 Sources of Methods

Routine analytical services are performed using standard EPA-approved methodology. In some cases, modification of standard approved methods may be necessary to provide accurate analyses of particularly complex matrices. When the use of specific methods for sample analysis is mandated through project or regulatory requirements, only those methods shall be used.

When clients do not specify the method to be used or methods are not required, the methods used will be clearly validated and documented in an SOP and available to clients and/or the end user of the data.

The analytical methods used by the laboratory are those currently accepted and approved by the U. S. EPA and the state or territory from which the samples were collected. Reference methods include:

- *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, and Appendix A-C; 40 CFR Part 136, USEPA Office of Water. Revised as of July 1, 1995, Appendix A to Part 136 - Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (EPA 600 Series)*
- *Methods for Chemical Analysis of Water and Wastes, EPA 600 (4-79-020), 1983.*

- *Methods for the Determination of Inorganic Substances in Environmental Samples, EPA-600/R-93/100, August 1993.*
- *Methods for the Determination of Metals in Environmental Samples, EPA/600/4-91/010, June 1991. Supplement I: EPA-600/R-94/111, May 1994.*
- *Methods for the Determination of Organic Compounds in Drinking Water, EPA-600/4-88-039, December 1988, Revised, July 1991, Supplement I, EPA-600-4-90-020, July 1990, Supplement II, EPA-600/R-92-129, August 1992. Supplement III EPA/600/R-95/131 - August 1995 (EPA 500 Series) (EPA 500 Series methods)*
- *Technical Notes on Drinking Water Methods, EPA-600/R94-173, October 1994*
- *Statement of Work for Inorganics & Organics Analysis, SOM and ISM, current versions, USEPA Contract Laboratory Program Multi-media, Multi-concentration.*
- *Standard Methods for the Examination of Water and Wastewater, 18th/19th /20th/ on-line edition; Eaton, A.D. Clesceri, L.S. Greenberg, A.E. Eds; American Water Works Association, Water Pollution Control Federation, American Public Health Association: Washington, D.C.*
- *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), Third Edition, September 1986, Final Update I, July 1992, Final Update IIA, August 1993, Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996; Final Update IV, January 2008.*
- *Annual Book of ASTM Standards, American Society for Testing & Materials (ASTM), Philadelphia, PA.*
- *National Status and Trends Program, National Oceanographic and Atmospheric Administration, Volume I-IV, 1985-1994.*
- *Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-R-05-004, January 2005)*
- *Code of Federal Regulations (CFR) 40, Parts 136, 141, 172, 173, 178, 179 and 261*

The laboratory reviews updated versions to all the aforementioned references for adaptation based upon capabilities, instrumentation, etc., and implements them as appropriate. As such, the laboratory strives to perform only the latest versions of each approved method as regulations allow or require.

Other reference procedures for non-routine analyses may include methods established by specific states (e.g., Underground Storage Tank methods), ASTM or equipment manufacturers. Sample type, source, and the governing regulatory agency requiring the analysis will determine the method utilized.

The laboratory shall inform the client when a method proposed by the client may be inappropriate or out of date. After the client has been informed, and they wish to proceed contrary to the laboratory's recommendation, it will be documented.

19.4.2 Demonstration of Capability

Before the laboratory may institute a new method and begin reporting results, the laboratory shall confirm that it can properly operate the method. In general, this demonstration does not test the performance of the method in real world samples, but in an applicable and available clean matrix sample. If the method is for the testing of analytes that are not conducive to spiking, demonstration of capability may be performed on quality control samples.

A demonstration of capability (reference TestAmerica Edison Training SOP No. ED-GEN-022) is performed whenever there is a change in instrument type (e.g., new instrumentation), method or personnel (e.g., analyst hasn't performed the test within the last 12 months).

The initial demonstration of capability must be thoroughly documented and approved by the Department Manager (i.e., Technical Manager) and QA Manager prior to independently analyzing client samples. All associated documentation must be retained in accordance with the laboratories archiving procedures.

The laboratory must have an approved SOP, demonstrate satisfactory performance, and conduct an MDL study (when applicable). There may be other requirements as stated within the published method or regulations (i.e., retention time window study).

Note: In some instances, a situation may arise where a client requests that an unusual analyte be reported using a method where this analyte is not normally reported. If the analyte is being reported for regulatory purposes, the method must meet all procedures outlined within this QA Manual (SOP, MDL, and Demonstration of Capability). If the client states that the information is not for regulatory purposes, the result may be reported as long as the following criteria are met:

- The instrument is calibrated for the analyte to be reported using the criteria for the method and ICV/CCV criteria are met (unless an ICV/CCV is not required by the method or criteria are per project DQOs).
- The laboratory's nominal or default reporting limit (RL) is equal to the quantitation limit (QL), must be at or above the lowest non-zero standard in the calibration curve and must be reliably determined. Project RLs are client specified reporting levels which may be higher than the QL. Results reported below the QL must be qualified as estimated values. Also see Section 19.6.1.3, Relationship of Limit of Detection (LOD) to Quantitation Limit (QL).
- The client request is documented and the lab informs the client of its procedure for working with unusual compounds. The final report must be footnoted: *Reporting Limit based on the low standard of the calibration curve.*

19.4.3 Initial Demonstration of Capability (IDOC) Procedures

19.4.3.1 The spiking standard used must be prepared independently from those used in instrument calibration.

19.4.3.2 The analyte(s) shall be diluted in a volume of clean matrix sufficient to prepare four aliquots at the concentration specified by a method or the laboratory SOP.

19.4.3.3 At least four aliquots shall be prepared (including any applicable clean-up procedures) and analyzed according to the test method (either concurrently or over a period of days).

19.4.3.4 Using all of the results, calculate the mean recovery in the appropriate reporting units and the standard deviations for each parameter of interest.

19.4.3.5 When it is not possible to determine the mean and standard deviations, such as for presence, absence and logarithmic values, the laboratory will assess performance against criteria described in the Method SOP.

19.4.3.6 Compare the information obtained above to the corresponding acceptance criteria for precision and accuracy in the test method (if applicable) or in laboratory generated acceptance criteria (LCS or interim criteria) if there is no mandatory criteria established. If any one of the parameters do not meet the acceptance criteria, the performance is unacceptable for that parameter.

19.4.3.7 When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst must proceed according to either option listed below:

- Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with 19.4.3.3 above.
- Beginning with 19.4.3.3 above, repeat the test for all parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with 19.4.3.1 above.

Note: Results of successive LCS analyses can be used to fulfill the DOC requirement.

A certification statement (refer to Figure 19-1 as an example) shall be used to document the completion of each initial demonstration of capability. A copy of the certification is archived in the analyst's training folder.

Methods on line prior to the effective date of this Section shall be updated to the procedures outlined above as new analysts perform their demonstration of capability. A copy of the new record will replace that which was used for documentation in the past. At a minimum, the precision and accuracy of four mid-level laboratory control samples must have been compared to the laboratory's quality control acceptance limits.

19.5 Laboratory Developed Methods and Non-Standard Methods

Any new method developed by the laboratory must be fully defined in an SOP and validated by qualified personnel with adequate resources to perform the method. Method specifications and the relation to client requirements must be clearly conveyed to the client if the method is a non-standard method (not a published or routinely accepted method). The client must also be in agreement to the use of the non-standard method.

19.6 Validation of Methods

Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.
All non-standard methods, laboratory designed/developed methods, standard methods used outside of their scope, and major modifications to published methods must be validated to confirm they are fit for their intended use. The validation will be as extensive as necessary to meet the needs of the given application. The results are documented with the validation procedure used and contain a statement as to the fitness for use.

19.6.1 Method Validation and Verification Activities for All New Methods

While method validation can take various courses, the following activities can be required as part of method validation. Method validation records are designated QC records and are archived accordingly.

19.6.1.1 Determination of Method Selectivity

Method selectivity is the demonstrated ability to discriminate the analyte(s) of interest from other compounds in the specific matrix or matrices from other analytes or interference. In some cases to achieve the required selectivity for an analyte, a confirmation analysis is required as part of the method.

19.6.1.2 Determination of Method Sensitivity

Sensitivity can be both estimated and demonstrated. Whether a study is required to estimate sensitivity depends on the level of method development required when applying a particular measurement system to a specific set of samples. Where estimations and/or demonstrations of sensitivity are required by regulation or client agreement, such as the procedure in 40 CFR Part 136 Appendix B, under the Clean Water Act, these shall be followed.

19.6.1.3 Relationship of Limit of Detection (LOD) to the Quantitation Limit (QL)

An important characteristic of expression of sensitivity is the difference in the LOD and the QL. The LOD is the minimum level at which the presence of an analyte can be reliably concluded. The QL is the minimum concentration of analyte that can be quantitatively determined with acceptable precision and bias. For most instrumental measurement systems, there is a region where semi-quantitative data is generated around the LOD (both above and below the estimated MDL or LOD) and below the QL. In this region, detection of an analyte may be confirmed but quantification of the analyte is unreliable within the accuracy and precision guidelines of the measurement system. When an analyte is detected below the QL, and the presence of the analyte is confirmed by meeting the qualitative identification criteria for the analyte, the analyte can be reliably reported, but the amount of the analyte can only be estimated. If data is to be reported in this region, it must be done so with a qualification that denotes the semi-quantitative nature of the result.

19.6.1.4 Determination of Interferences

A determination that the method is free from interferences in a blank matrix is performed.

19.6.1.5 Determination of Range

Where appropriate to the method, the quantitation range is determined by comparison of the response of an analyte in a curve to established or targeted criteria. Generally the upper quantitation limit is defined by highest acceptable calibration concentration. The lower quantitation limit or QL cannot be lower than the lowest non-zero calibration level, and can be constrained by required levels of bias and precision.

19.6.1.6 Determination of Accuracy and Precision

Accuracy and precision studies are generally performed using replicate analyses, with a resulting percent recovery and measure of reproducibility (standard deviation, relative standard deviation) calculated and measured against a set of target criteria.

19.6.1.7 Documentation of Method

The method is formally documented in an SOP. If the method is a minor modification of a standard laboratory method that is already documented in an SOP, an SOP Attachment describing the specific differences in the new method is acceptable in place of a separate SOP.

19.6.1.8 Continued Demonstration of Method Performance

Continued demonstration of Method Performance is addressed in the SOP. Continued demonstration of method performance is generally accomplished by batch specific QC samples such as LCS, method blanks or PT samples.

19.7 Method Detection Limits (MDL) / Limits of Detection (LOD)

Method detection limits (MDL) are initially determined in accordance with 40 CFR Part 136, Appendix B or alternatively by other technically acceptable practices that have been accepted by regulators. MDL is also sometimes referred to as Limit of Detection (LOD). The MDL theoretically represents the concentration level for each analyte within a method at which the Analyst is 99% confident that the true value is not zero. The MDL is determined for each analyte initially during the method validation process and updated as required in the analytical methods, whenever there is a significant change in the procedure or equipment, or based on project specific requirements. Generally, the analyst prepares at least seven replicates of solution spiked at one to five times the estimated method detection limit (most often at the lowest standard in the calibration curve) into the applicable matrix with all the analytes of interest. Each of these aliquots is extracted (including any applicable clean-up procedures) and analyzed in the same manner as the samples. Where possible, the seven replicates should be analyzed over 2-4 days to provide a more realistic MDL. [To allow for some flexibility, this low level standard may be analyzed every batch or every week or some other frequency rather than doing the study all at once. In addition, a larger number of data points may be used if the appropriate t-value multiplier is used]

Refer to the Corporate SOP No. CA-Q-S-006 for details on the laboratory's MDL process.

19.8 Instrument Detection Limits (IDL)

The IDL is sometimes used to assess the reasonableness of the MDLs or in some cases required by the analytical method or program requirements. IDLs are most used in metals analyses but may be useful in demonstration of instrument performance in other areas.

IDLs are calculated to determine an instrument's sensitivity independent of any preparation method. IDLs are calculated either using 7 replicate spike analyses, like MDL but without sample preparation, or by the analysis of 10 instrument blanks and calculating 3 x the absolute value of the standard deviation.

If IDL is > than the MDL, it may be used as the reported MDL.

19.9 Verification of Detection and Reporting Limits

Once an MDL is established, it must be verified, on each instrument, by analyzing a quality control sample (prepared as a sample) at no more than 3 times the calculated MDL for single analyte analyses (e.g. most wet chemistry methods, Atomic Absorption, etc.) and no more than 4 times the calculated MDL for multiple analyte methods (e.g. GC, GCMS, ICP, etc.). The analytes must be qualitatively identified. This verification does not apply to methods that are not readily spiked (e.g. pH, turbidity, etc.) or where the lab does not report to the MDL. If the MDL does not verify, then the lab will not report to the MDL, or redevelop their MDL or use the level where qualitative identification is established. MDLs must be verified at least annually.

When the laboratory establishes a quantitation limit, it must be initially verified by the analysis of a low level standard or QC sample at 1-2 times the reporting limit and annually thereafter. The annual requirement is waived for methods that have an annually verified MDL. The laboratory will comply with any regulatory requirements.

19.10 Retention Time Windows

Most organic analyses and some inorganic analyses use chromatography techniques for qualitative and quantitative determinations. For every chromatography analysis or as specific in the reference method, each analyte will have a specific time of elution from the column to the detector. This is known as the analyte's retention time. The variance in the expected time of elution is defined as the retention time window. As the key to analyte identification in chromatography, retention time windows must be established on every column for every analyte used for that method. These records are kept with the files associated with an instrument for later quantitation of the analytes. Complete details are available in the laboratory SOPs.

19.11 Evaluation of Selectivity

The laboratory evaluates selectivity by following the checks within the applicable analytical methods, which include mass spectral tuning, second column confirmation, ICP interelement interference checks, chromatography retention time windows, sample blanks, spectrochemical, atomic absorption or fluorescence profiles, co-precipitation evaluations and specific electrode response factors.

19.12 Estimation of Uncertainty of Measurement

19.12.1 Uncertainty is "a parameter associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand" (as defined by the International Vocabulary of Basic and General Terms in Metrology, ISO Geneva, 1993, ISBN 92-67-10175-1). Knowledge of the uncertainty of a measurement provides additional confidence in a result's validity. Its value accounts for all the factors which could possibly affect the result, such as adequacy of analyte definition, sampling, matrix effects and interferences, climatic conditions, variances in weights, volumes, and standards, analytical procedure, and random variation. Some national accreditation organizations require the use of an "expanded uncertainty": the range within which the value of the measurand is believed to lie within at least a 95% confidence level with the coverage factor k=2.

19.12.2 Uncertainty is not error. Error is a single value, the difference between the true result and the measured result. On environmental samples, the true result is never known. The measurement is the sum of the unknown true value and the unknown error. Unknown error is a combination of systematic error, or bias, and random error. Bias varies predictably, constantly, and independently from the number of measurements. Random error is unpredictable, assumed to be Gaussian in distribution, and reducible by increasing the number of measurements.

19.12.3 The minimum uncertainty associated with results generated by the laboratory can be determined by using the Laboratory Control Sample (LCS) accuracy range for a given analyte. The LCS limits are used to assess the performance of the measurement system since they take into consideration all of the laboratory variables associated with a given test over time (except for variability associated with the sampling and the variability due to matrix effects). The percent recovery of the LCS is compared either to the method-required LCS accuracy limits or to the statistical, historical, in-house LCS accuracy limits.

19.12.4 To calculate the uncertainty for the specific result reported, multiply the result by the decimal of the lower end of the LCS range percent value for the lower end of the uncertainty range, and multiply the result by the decimal of the upper end of the LCS range percent value for the upper end of the uncertainty range. These calculated values represent a 99% confidence level with a coverage factor of k=3. As an example, for a reported result of 1.0 mg/l with an LCS recovery range of 50 to 150%, the estimated uncertainty in the result would be 1.0 +/- 0.5 mg/l.

19.12.5 In the case where a well recognized test method specifies limits to the values of major sources of uncertainty of measurement (e.g., 524.2, 525, etc.) and specifies the form of presentation of calculated results, no further discussion of uncertainty is required.

19.13 Sample Reanalysis Guidelines

Because there is a certain level of uncertainty with any analytical measurement, a sample re-preparation (where appropriate) and subsequent analysis (hereafter referred to as 'reanalysis') may result in either a higher or lower value from an initial sample analysis. There are also variables that may be present (e.g., sample homogeneity, analyte precipitation over time, etc.) that may affect the results of a reanalysis. Based on the above comments, the laboratory will reanalyze samples at a client's request with the following caveats. Note: Client specific Contractual Terms & Conditions for reanalysis protocols may supersede the following items.

- Homogenous samples: If a reanalysis agrees with the original result to within the RPD limits for MS/MSD or Duplicate analyses, or within $\pm$ 1 reporting limit for samples $\leq$ 5x the reporting limit, the original analysis will be reported. At the client's request, both results may be reported on the same report but not on two separate reports.

- If the reanalysis does not agree (as defined above) with the original result, then the laboratory will investigate the discrepancy and reanalyze the sample a third time for confirmation if sufficient sample is available.

- Any potential charges related to reanalysis are discussed in the contract terms and conditions or discussed at the time of the request. The client will typically be charged for reanalysis unless it is determined that the lab was in error.

- Due to the potential for increased variability, reanalysis may not be applicable to Non-homogenous, Encore, and Sodium Bisulfate preserved samples. See the Laboratory Director if unsure.

19.14 Control of Data

The laboratory has policies and procedures in place to ensure the authenticity, integrity, and accuracy of the analytical data generated by the laboratory.

19.14.1 Computer and Electronic Data Related Requirements

The three basic objectives of our computer security procedures and policies are shown below. More detail is outlined in the TestAmerica Corporate IT SOPs and in TestAmerica Edison SOPs No. ED-GEN-001 (Data Management and Handling Procedures) and ED-GEN-002 (Document Control). The laboratory is currently running the TALS LIMS which is a, custom in-house developed LIMS system that has been highly customized to meet the needs of the laboratory. It is referred to as LIMS for the remainder of this section. The LIMS utilizes Microsoft SQL Server which is an industry standard relational database platform. It is referred to as Database for the remainder of this section.

19.14.1.1 Maintain the Database Integrity: Assurance that data is reliable and accurate through data verification (review) procedures, password-protecting access, anti-virus protection, data change requirements, as well as an internal LIMS permissions procedure.

- LIMS Database Integrity is achieved through data input validation, internal user controls, and data change requirements.
- Spreadsheets and other software developed in-house must be verified with documentation through hand calculations prior to use. Cells containing calculations must be lock-protected and controlled.
- Instrument hardware and software adjustments are safeguarded through maintenance logs, audit trails and controlled access.

19.14.1.2 Ensure Information Availability: Protection against loss of information or service is ensured through scheduled back-ups, stable file server network architecture, secure storage of media, line filter, Uninterruptible Power Supply (UPS), and maintaining older versions of software as revisions are implemented.

19.14.1.3 Maintain Confidentiality: Ensure data confidentiality through physical access controls such as password protection or website access approval when electronically transmitting data.

19.14.2 Data Reduction

The complexity of the data reduction depends on the analytical method and the number of discrete operations involved (e.g., extractions, dilutions, instrument readings and concentrations). The

analyst calculates the final results from the raw data or uses appropriate computer programs to assist in the calculation of final reportable values.

For manual data entry, e.g., Wet Chemistry, the data is reduced by the analyst and then verified by the Department (Technical) Manager or alternate analyst prior to updating the data in LIMS. The spreadsheets, or any other type of applicable documents, are signed by both the analyst and alternate reviewer to confirm the accuracy of the manual entry(s).

Manual integration of peaks will be documented and reviewed and the raw data will be flagged in accordance with the TestAmerica Corporate SOP No. CA-Q-S-002, *Acceptable Manual Integration Practices*.

Analytical results are reduced to appropriate concentration units specified by the analytical method, taking into account factors such as dilution, sample weight or volume, etc. Blank correction will be applied only when required by the method or per manufacturer's indication; otherwise, it should not be performed. Calculations are independently verified by appropriate laboratory staff. Calculations and data reduction steps for various methods are summarized in the respective analytical SOPs or program requirements.

19.14.2.1 All raw data must be retained in the worklist folder, computer file (if appropriate), and/or runlog. All criteria pertinent to the method must be recorded. The documentation is recorded at the time observations or calculations are made and must be signed or initialed/dated (month/day/year). It must be easily identifiable who performed which tasks if multiple people were involved.

19.14.2.2 In general, concentration results are reported in milligrams per liter (mg/l) or micrograms per liter (µg/l) for liquids and milligrams per kilogram (mg/kg) or micrograms per kilogram (µg/kg) for solids. For values greater than 10,000 mg/l, results can be reported in percent, i.e., 10,000 mg/l = 1**%.** Units are defined in each lab SOP.

19.14.2.3 In reporting, the analyst or the instrument output records the raw data result using values of known certainty plus one uncertain digit. If final calculations are performed external to LIMS, the results should be entered in LIMS with at least three significant figures. In general, results are reported to 2 significant figures on the final report.

19.14.2.4 For those methods that do not have an instrument printout or an instrumental output compatible with the LIMS System, the raw results and dilution factors are entered directly into LIMS by the analyst, and the software calculates the final result for the analytical report. LIMS has a defined significant figure criterion for each analyte.

19.14.2.5 The laboratory strives to import data directly from instruments or calculation spreadsheets to ensure that the reported data are free from transcription and calculation errors. For those analyses with an instrumental output compatible with the LIMS, the raw results and dilution factors are transferred into LIMS electronically after reviewing the quantitation report, and removing unrequested or poor spectrally-matched compounds. The analyst prints a copy of what has been entered to check for errors. This printout and the instrument's printout of calibrations, concentrations, retention times, chromatograms, and mass spectra, if applicable, are retained with

the data file. The data file is stored in a monthly folder on the instrument computer; periodically, this file is transferred to the server and, eventually, to a tape file.

19.14.3 Logbook / Worksheet Use Guidelines

Logbooks and worksheets are filled out 'real time' and have enough information on them to trace the events of the applicable analysis/task. (e.g. calibrations, standards, analyst, sample ID, date, time on short holding time tests, temperatures when applicable, calculations are traceable, etc.)

- Corrections are made following the procedures outlined in Section 12.
- Logbooks are controlled by the QA Department. A record is maintained of all logbooks in the lab.
- Unused portions of pages must be "Z"'d out, signed and dated.
- Worksheets are created with the approval of the Department Managers/QA Manager at the facility. The QA Manager controls all worksheets following the procedures in Section 6.

19.14.4 Review / Verification Procedures

Review procedures are out lined in several SOPs (including but not limited to, TestAmerica Edison SOP Nos. ED-GEN-021: Data Review, ED-SPM-001:Login, and ED-RP-001:Reports Production) to ensure that reported data are free from calculation and transcription errors, that QC parameters have been reviewed and evaluated before data is reported. The general review concepts are discussed below, more specific information can be found in the SOPs.

19.14.4.1 The data review process at the laboratory starts at the Sample Control level. Sample Control personnel review chain-of-custody forms and input the sample information and required analyses into a computer LIMS. The Sample Control Supervisor reviews the transaction of the chain-of-custody forms and the inputted information. The Project Managers perform final review of the chain-of-custody forms and inputted information.

19.14.4.2 The next level of data review occurs with the Analysts. As results are generated, analysts review their work to ensure that the results generated meet QC requirements and relevant EPA methodologies. The Analysts transfer the data into the LIMS and add data qualifiers if applicable. To ensure data compliance, a different analyst or Department (Technical) Manager/Supervisor performs a second level of review. Second level review is accomplished by checking reported results against raw data and evaluating the results for accuracy. During the second level review, blank runs, QA/QC check results, initial and continuing calibration results, laboratory control samples, sample data, qualifiers and spike information are evaluated. Where calibration is not required on a daily basis, secondary review of the initial calibration results may be conducted at the time of calibration. Approximately 15% of all sample data from manual methods and from automated methods, all GC/MS spectra and all manual integrations are reviewed. Manual integrations are also electronically reviewed utilizing auditing software to help ensure compliance to ethics and manual integration policies. Issues that deem further review include the following:

- QC data are outside the specified control limits for accuracy and precision
- Reviewed sample data does not match with reported results
- Unusual detection limit changes are observed
- Samples having unusually high results
- Samples exceeding a known regulatory limit
- Raw data indicating some type of contamination or poor technique
- Inconsistent peak integration
- Transcription errors
- Results outside of calibration range

19.14.4.3 Unacceptable analytical results may require reanalysis of the samples. Any problems are brought to the attention of the Laboratory Director, Project Manager, Quality Assurance Manager, Technical Manager, or Supervisor for further investigation. Corrective action is initiated whenever necessary.

19.14.4.4 The results are then entered or directly transferred into the computer database and a hard copy (or .pdf) is printed for the client.

19.14.4.5 As a final review prior to the release of the report, the Project Manager reviews the results for appropriateness and completeness. This review and approval ensures that client requirements have been met and that the final report has been properly completed. The process includes, but is not limited to, verifying that chemical relationships are evaluated, COC is followed, cover letters/ narratives are present, flags are appropriate, and project specific requirements are met.

19.14.4.6 Any project that requires a data package is subject to a tertiary data review for transcription errors and acceptable quality control requirements. The Project Manager then signs the final report. The accounting personnel also check the report for any clerical or invoicing errors. When complete, the report is sent out to the client.

19.14.5 Manual Integrations

Computerized data systems provide the analyst with the ability to re-integrate raw instrument data in order to optimize the interpretation of the data. Though manual integration of data is an invaluable tool for resolving variations in instrument performance and some sample matrix problems, when used improperly, this technique would make unacceptable data appear to meet quality control acceptance limits. Improper re-integrations lead to legally indefensible data, a poor reputation, or possible laboratory decertification. Because guidelines for re-integration of data are not provided in the methods and most methods were written prior to widespread implementation of computerized data systems, the laboratory trains all analytical staff on proper manual integration techniques using TestAmerica's Corporate SOP (CA-Q-S-002).

19.14.5.1 The analyst must adjust baseline or the area of a peak in some situations, for example when two compounds are not adequately resolved or when a peak shoulder needs to be separated from the peak of interest. The analyst must use professional judgment and common sense to determine when manual integrating is required. Analysts are encouraged to ask for assistance from a senior analyst or manager when in doubt.

19.14.5.2 Analysts shall not increase or decrease peak areas for the sole purpose of achieving acceptable QC recoveries that would have otherwise been unacceptable. The intentional recording or reporting of incorrect information (or the intentional omission of correct information) is against company principals and policy and is grounds for immediate termination.

19.14.5.3 Client samples, performance evaluation samples, and quality control samples are all treated equally when determining whether or not a peak area or baseline should be manually adjusted.

19.14.5.4 All manual integrations receive a second level review. Manual integrations must be indicated on an expanded scale "after" chromatograms such that the integration performed can be easily evaluated during data review. Expanded scale "before" chromatograms are also required for all manual integrations on QC parameters (calibrations, calibration verifications, laboratory control samples, internal standards, surrogates, etc.) unless the laboratory has another documented corporate approved procedure in place that can demonstrate an active process for detection and deterrence of improper integration practices.

Figure 19-1. Example - Demonstration of Capability Documentation

DEMONSTRATION OF CAPABILITIY (DOC)

Laboratory Name:_____
Laboratory Address:_____
Method:_____ Matrix:_____
Date:_____ Analyst(s):_____
Source of Analyte(s):_____

Analytical Results

Analyst	Conc. (Units)	Rep 1	Rep 2	Rep 3	Rep 4	Avg. % Recovery	% RSD
_____	_____	_____	_____	_____	_____	_____	_____

% RSD = Percent relative standard deviation = standard deviation divided by average % Recovery

Raw data reference: _____

Certification Statement:

We, the undersigned, certify that:
1. The cited test method has met Demonstration of Capability requirements.
2. The test method was performed by the analyst(s) identified on this certification.
3. A copy of the test method and the laboratory-specific SOPs are available for all personnel on site.
4. The data associated with the method demonstration of capability are true, accurate, complete, and self-explanatory.
5. All raw data necessary to reconstruct and validate these analyses have been retained at the facility, and the associated information is well organized and available for review.
6.

_____ _____
Analyst Signature Date

_____ _____
Technical Director Signature Date

_____ _____
Quality Assurance Coordinator Signature Date

SECTION 20. EQUIPMENT and CALIBRATIONS

20.1 Overview

The laboratory purchases the most technically advanced analytical instrumentation for sample analyses. Instrumentation is purchased on the basis of accuracy, dependability, efficiency and sensitivity. Each laboratory is furnished with all items of sampling, preparation, analytical testing and measurement equipment necessary to correctly perform the tests for which the laboratory has capabilities. Each piece of equipment is capable of achieving the required accuracy and complies with specifications relevant to the method being performed. Before being placed into use, the equipment (including sampling equipment) is calibrated and checked to establish that it meets its intended specification. The calibration routines for analytical instruments establish the range of quantitation. Calibration procedures are specified in laboratory SOPs. A list of laboratory instrumentation is presented in Table 20-1. The most current list of laboratory instrumentation can be found in TestAmerica Edison Work Instruction No. ED-WI-002 (Equipment Inventory).

Equipment is only operated by authorized and trained personnel. Manufacturers instructions for equipment use are readily accessible to all appropriate laboratory personnel.

20.2 Preventive Maintenance

The laboratory follows a well-defined maintenance program to ensure proper equipment operation and to prevent the failure of laboratory equipment or instrumentation during use. This program of preventive maintenance helps to avoid delays due to instrument failure.

Routine preventive maintenance procedures and frequency, such as cleaning and replacements, should be performed according to the procedures outlined in the manufacturer's manual. Qualified personnel must also perform maintenance when there is evidence of degradation of peak resolution, a shift in the calibration curve, loss of sensitivity, or failure to continually meet one of the quality control criteria.

Table 20-2 lists examples of scheduled routine maintenance. It is the responsibility of each Technical Manager to ensure that instrument maintenance logs are kept for all equipment in his/her Department. Preventative maintenance procedures may also be outlined in analytical SOPs or instrument manuals. (Note: for some equipment, the log used to monitor performance is also the maintenance log. Multiple pieces of equipment may share the same log as long as it is clear as to which instrument is associated with an entry.)

Instrument maintenance logs are controlled and are used to document instrument problems, instrument repair and maintenance activities. Maintenance logs shall be kept for all major pieces of equipment. Instrument maintenance logs may also be used to specify instrument parameters.

- Documentation must include all major maintenance activities such as contracted preventive maintenance and service and in-house activities such as the replacement of electrical components, lamps, tubing, valves, columns, detectors, cleaning and adjustments.
- Each entry in the instrument log includes the Analyst's initials, the date, a detailed description of the problem (or maintenance needed/scheduled), a detailed explanation of the solution or maintenance performed, and a verification that the equipment is functioning properly (state

what was used to determine a return to control. e.g. CCV run on *'date'* was acceptable, or instrument recalibrated on 'date' with acceptable verification, etc.) must also be documented in the instrument records.

- When maintenance or repair is performed by an outside agency, service receipts detailing the service performed can be affixed into the logbooks adjacent to pages describing the maintenance performed. This stapled in page must be signed across the page entered and the logbook so that it is clear that a page is missing if only half a signature is found in the logbook.

If an instrument requires repair (subjected to overloading or mishandling, gives suspect results, or otherwise has shown to be defective or outside of specified limits) it shall be taken out of operation and tagged as out-of-service or otherwise isolated until such a time as the repairs have been made and the instrument can be demonstrated as operational by calibration and/or verification or other test to demonstrate acceptable performance. The laboratory shall examine the effect of this defect on previous analyses.

In the event of equipment malfunction that cannot be resolved, service shall be obtained from the instrument vendor manufacturer, or qualified service technician, if such a service can be tendered. If on-site service is unavailable, arrangements shall be made to have the instrument shipped back to the manufacturer for repair. Back up instruments, which have been approved, for the analysis shall perform the analysis normally carried out by the malfunctioning instrument. If the back up is not available and the analysis cannot be carried out within the needed timeframe, the samples shall be subcontracted.

If an instrument is sent out for service or transferred to another facility, it must be recalibrated and verified (including new initial MDL study) prior to return to lab operations.

20.3 Support Equipment

This section applies to all devices that may not be the actual test instrument, but are necessary to support laboratory operations. These include but are not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, field sampling devices, temperature measuring devices, thermal/pressure sample preparation devices and volumetric dispensing devices if quantitative results are dependent on their accuracy, as in standard preparation and dispensing or dilution into a specified volume. All raw data records associated with the support equipment are retained to document instrument performance.

20.3.1 Weights and Balances

The accuracy of the balances used in the laboratory is checked every working day, before use. All balances are placed on stable counter tops.

Each balance is checked prior to initial serviceable use with at least two certified ASTM type 1 weights spanning its range of use (weights that have been calibrated to ASTM type 1 weights may also be used for daily verification). ASTM type 1 weights used only for calibration of other weights (and no other purpose) are inspected for corrosion, damage or nicks at least annually and if no damage is observed, they are calibrated at least every 5 years by an outside calibration laboratory. Any weights (including ASTM Type 1) used for daily balance checks or

other purposes are recalibrated/recertified annually to NIST standards (this may be done internally if laboratory maintains “calibration only” ASTM type 1 weights).

All balances are serviced annually by a qualified service representative, who supplies the laboratory with a certificate that identifies traceability of the calibration to the NIST standards.

All of this information is recorded in logs, and the recalibration/recertification certificates are kept on file.

20.3.2 pH, Conductivity, and Turbidity Meters

The pH meters used in the laboratory are accurate to ± 0.1 pH units, and have a scale readability of at least 0.05 pH units. The meters automatically compensate for the temperature, and are calibrated with at least two working range buffer solutions before each use.

Conductivity meters are also calibrated before each use with a known standard to demonstrate the meters do not exceed an error of 1% or one umhos/cm.

Turbidity meters are also calibrated before each use. All of this information is documented in logs.

Consult pH and Conductivity, and Turbidity SOPs for further information.

20.3.3 Thermometers

All thermometers are calibrated on an annual basis with a NIST-traceable thermometer at temperatures bracketing the range of use. IR thermometers, digital probes and thermocouples are calibrated quarterly. IR Thermometers should be calibrated over the full range of use, including ambient, iced (4 degrees C) and frozen (0 to -5 degrees C), per the Drinking Water Manual.

The mercury NIST thermometer is recalibrated every five years (unless thermometer has been exposed to temperature extremes or apparent separation of internal liquid) by an approved outside service and the provided certificate of traceability is kept on file. The NIST thermometer(s) have increments of 1 degree (0.5 degree or less increments are required for drinking water microbiological laboratories), and have ranges applicable to method and certification requirements. The NIST traceable thermometer is used for no other purpose than to calibrate other thermometers.

All of this information is documented in logbooks. Monitoring method-specific temperatures, including incubators, heating blocks, water baths, and ovens, is documented in method-specific logbooks. More information on this subject can be found in the laboratory SOP No. ED-GEN-014 (Thermometer Calibration***).***

20.3.4 Refrigerators/Freezer Units, Waterbaths, Ovens and Incubators

The temperatures of all refrigerator units and freezers used for sample and standard storage are monitored each working day.

Ovens, waterbaths and incubators are monitored on days of use.

All of this equipment has a unique identification number, and is assigned a unique thermometer for monitoring.

Sample storage refrigerator temperatures are kept between > 0ºC and ≤ 6 ºC.

Specific temperature settings/ranges for other refrigerators, ovens waterbaths, and incubators can be found in method specific SOPs.

All of this information is documented in Daily Temperature Logbooks and method-specific logbooks.

20.3.5 Autopipettors, Dilutors, and Syringes

Mechanical volumetric dispensing devices including burettes (except Class A Glassware) are given unique identification numbers and the delivery volumes are verified gravimetrically, at a minimum, on a quarterly basis.

For those dispensers that are not used for analytical measurements, a label is / can be applied to the device stating that it is not calibrated. Any device not regularly verified can not be used for any quantitative measurements. Refer to TestAmerica Edison SOP No. ED-GEN-011 (Calibration and Use of Lab Pipettes).

Micro-syringes are purchased from Hamilton Company. Each syringe is traceable to NIST. The laboratory keeps on file an “Accuracy and Precision Statement of Conformance” from Hamilton attesting established accuracy.

20.3.6 Autoclaves

The laboratory utilizes autoclaves in the sample preparation step for certain mercury analysis procedures. These autoclaves have direct reading temperature and pressure gauges. These gauges are checked for accuracy on an annual basis.

20.3.7 Field Sampling Devices (Isco Auto Samplers)

Each Auto Sampler (ISCO) is assigned a unique identification number in order to keep track of the calibration. This number is also recorded on the sampling documentation.

The Auto Sampler is calibrated as needed based on manufacturers recommendations.

20.4 Instrument Calibrations

Calibration of analytical instrumentation is essential to the production of quality data. Strict calibration procedures are followed for each method. These procedures are designed to determine and document the method detection limits, the working range of the analytical instrumentation and any fluctuations that may occur from day to day.

Sufficient raw data records are retained to allow an outside party to reconstruct all facets of the initial calibration. Records contain, but are not limited to, the following: calibration date, method, instrument, analyst(s) initials or signatures, analysis date, analytes, concentration, response, type of calibration (Avg RF, curve, or other calculations that may be used to reduce instrument responses to concentration.)

Sample results must be quantitated from the initial calibration and may not be quantitated from any continuing instrument calibration verification unless otherwise required by regulation, method or program.

If the initial calibration results are outside of the acceptance criteria, corrective action is performed and any affected samples are reanalyzed if possible. If the reanalysis is not possible, any data associated with an unacceptable initial calibration will be reported with appropriate data qualifiers (refer to Section 12).

Note: Instruments are calibrated initially and as needed after that and at least annually.

20.4.1 Calibration Standards

Calibration standards are prepared using the procedures indicated in the Reagents and Standards section of the determinative method SOP. If a reference method does not specify the number of calibration standards, a minimum of 3 calibration points (exception being ICP and ICP/MS methods) will be used.

Standards for instrument calibration are obtained from a variety of sources. All standards are traceable to national or international standards of measurement, or to national or international standard reference materials.

The lowest concentration calibration standard that is analyzed during an initial calibration must be at or below the stated reporting limit for the method based on the final volume of extract (or sample).

The other concentrations define the working range of the instrument/method or correspond to the expected range of concentrations found in actual samples that are also within the working range of the instrument/method. Results of samples not bracketed by initial instrument calibration standards (within calibration range to at least the same number of significant figures used to report the data) must be reported as having less certainty, e.g., defined qualifiers or flags (additional information may be included in the case narrative). The exception to these rules is ICP methods or other methods where the referenced method does not specify two or more standards.

All initial calibrations are verified with a standard obtained from a second source and traceable to a national standard, when available (or vendor certified different lot if a second source is not

available). For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst at a different time or a different preparation would be considered a second source. This verification occurs immediately after the calibration curve has been analyzed, and before the analysis of any samples.

20.4.1.1 Calibration Verification

The calibration relationship established during the initial calibration must be verified initially and at least daily as specified in the laboratory method SOPs in accordance with the referenced analytical methods and in the 2009 TNI Standard. The process of calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models. Initial calibration verification is with a standard source secondary (second source standard) to the calibration standards, but continuing calibration verifications may use the same source standards as the calibration curve.

Note: The process of calibration verification referred to here is fundamentally different from the approach called "calibration" in some methods. As described in those methods, the calibration factors or response factors calculated during calibration are used to update the calibration factors or response factors used for sample quantitation. This approach, while employed in other EPA programs, amounts to a daily single-point calibration.

All target analytes and surrogates, including those reported as non-detects, must be included in periodic calibration verifications for purposes of retention time confirmation and to demonstrate that calibration verification criteria are being met, i.e., RPD, per 2009 TNI Std. EL-V1M4 Sec. 1.7.2.

All samples must be bracketed by periodic analyses of standards that meet the QC acceptance criteria (e.g., calibration and retention time). The frequency is found in the determinative methods or SOPs.

Note: If an internal standard calibration is being used (basically GCMS) then bracketing standards are not required, only daily verifications are needed. The results from these verification standards must meet the calibration verification criteria and the retention time criteria (if applicable).

Generally, the initial calibrations must be verified at the beginning of each 12-hour analytical shift during which samples are analyzed. (Some methods may specify more or less frequent verifications). The 12-hour analytical shift begins with the injection of the calibration verification standard (or the MS tuning standard in MS methods). The shift ends after the completion of the analysis of the last sample, QC, or standard that can be injected within 12 hours of the beginning of the shift.

A continuing instrument calibration verification (CCV) must be repeated at the beginning and, for methods that have quantitation by external calibration models, at the end of each analytical batch. Some methods have more frequent CCV requirements see specific SOPs. Most Inorganic methods require the CCV to be analyzed after ever 10 samples or injections, including matrix or batch QC samples.

Note: If an internal standard calibration is being used (basically GCMS) then bracketing standards are not required, only daily verifications are needed. The results from these verification standards must meet the calibration verification criteria and the retention time criteria (if applicable).

If the results of a CCV are outside the established acceptance criteria and analysis of a second consecutive (and immediate) CCV fails to produce results within acceptance criteria, corrective action shall be performed. Once corrective actions have been completed & documented, the laboratory shall demonstrate acceptable instrument / method performance by analyzing two consecutive CCVs, or a new initial instrument calibration shall be performed.

Sample analyses and reporting of data may not occur or continue until the analytical system is calibrated or calibration verified. However, data associated with an unacceptable calibration verification may be fully useable under the following special conditions:

a). when the acceptance criteria for the CCV are exceeded high (i.e., high bias) and the associated samples within the batch are non-detects, then those non-detects may be reported with a footnote or case narrative explaining the high bias. Otherwise the samples affected by the unacceptable CCV shall be re-analyzed after a new calibration curve has been established, evaluated and accepted; or

b). when the acceptance criteria for the CCV are exceeded low (i.e., low bias), those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise the samples affected by the unacceptable CCV shall be re-analyzed after a new calibration curve has been established, evaluated and accepted.

Samples reported by the 2 conditions identified above will be appropriately flagged.

20.4.1.2 Verification of Linear and Non-Linear Calibrations

Calibration verification for calibrations involves the calculation of the percent drift or the percent difference of the instrument response between the initial calibration and each subsequent analysis of the verification standard. (These calculations are available in the laboratory method SOPs. Verification standards are evaluated based on the % Difference from the average CF or RF of the initial calibration or based on % Drift or % Recovery if a linear or quadratic curve is used.

Regardless of whether a linear or non-linear calibration model is used, if initial verification criterion is not met, then no sample analyses may take place until the calibration has been verified or a new initial calibration is performed that meets the specifications listed in the method SOPs. If the calibration cannot be verified after the analysis of a single verification standard, then adjust the instrument operating conditions and/or perform instrument maintenance, and analyze another aliquot of the verification standard. If the calibration cannot be verified with the second standard, then a new initial calibration is performed.

- When the acceptance criteria for the calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported. Otherwise, the samples affected by the unacceptable calibration verification shall be reanalyzed after a new calibration curve has been established, evaluated and acepted.

- When the acceptance criteria for the calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise, the samples affected by the unacceptable verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted. Alternatively, a reporting limit standard may be analyzed to demonstrate that the laboratory can still support non-detects at their reporting limit.

20.5 Tentatively Identified Compounds (TICs) – GC/MS Analysis

For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted. Data system library search routines should not use normalization routines that would misrepresent the library or unknown spectra when compared to each other.

Note: If the TIC compound is not part of the client target analyte list but is calibrated by the laboratory and is both qualitatively and/or quantitatively identifiable, it should not be reported as a TIC. If the compound is reported on the same form as true TICs, it should be qualified and/or narrated that the reported compound is qualitatively and quantitatively (if verification in control) reported compared to a known standard that is in control (where applicable).

For example, the RCRA permit or waste delisting requirements may require the reporting of non-target analytes. Only after visual comparison of sample spectra with the nearest library searches may the analyst assign a tentative identification.

20.6 GC/MS Tuning

Prior to any GCMS analytical sequence, including calibration, the instrument parameters for the tune and subsequent sample analyses within that sequence must be set.

Prior to tuning/auto-tuning the mass spec, the parameters may be adjusted within the specifications set by the manufacturer or the analytical method. These generally don't need any adjustment but it may be required based on the current instrument performance. If the tune verification does not pass it may be necessary to clean the source or perform additional maintenance. Any maintenance is documented in the maintenance log.

Table 20-1. Example: Instrumentation List

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
METALS ICP	Thermo Jarrell Ash (4) S/N: ICP-20073407	ICAP 6500 Duo View	2007	Feb 09	Yes	6010B, 200.7, CLP
ICP	Thermo Jarrell Ash (5) S/N: IC5D20121709	ICAP 6500 Duo View	2012	2012	Yes	6010B, 200.7, CLP
ICP-MS ICPMS1 Heat Exchanger Autosampler	Agilent Technologies 7500ce S/N JP51201560 PolyScience Agilent TechnologiesG1879B S/N G57335 Cetac S/N 120536A520	G3272A 3370 ASX520	2006	May06	Yes	6020, 200.8
ICP-MS ICPMS2 Heat Exchanger Autosampler	Agilent Technologies 7500ce S/N JP82802644 Agilent Technologies G1879B S/N 108500855 Cetac ASX-500 S/N US0808108A520	G3272B 3370 G3286A	2010	June 2010	Yes	6020, 200.8
Mercury Analyzer	Leeman Labs (3) S/N HA-3010	Hydra AA	2003	Jan04	Yes	**OUT OF SERVICE (off site for repairs, 7/11/13)**
	Leeman Labs (5) S/N HA-8016	Hydra AA	2004	Jun04	Yes	7471A, 7470, 245.1 CLP
	Leeman Labs (4) S/N 2008 112-00064-1	Hydra AA	2013	June 2013	Yes	**OUT OF SERVICE (off site for repairs, 7/11/13)**
Hotblock 1	Environmental Express Limited S/N 2772CEC1378	SC154	2003	2003	No	3050B, CLP
Hotblock 2	Environmental Express Limited S/N 2391CEC1273	SC154	2004	2004	No	3050B, CLP
Hotblock 3	Environmental Express Limited S/N 4298CEC2048	SC150	2004	2004	No	200.7, 3010A, 200.8, CLP
Hotblock 4	Environmental Express Limited S/N 4507CEC2115	SC150	2006	2006	No	200.7, 3010A, 200.8, CLP
Hotblock 5	Environmental Express Limited S/N 4667CEC2183	SC150	2006	2006	No	200.7, 3010A, 200.8, CLP
Hotblock 6	Environmental Express Limited S/N 4667CEC2183	SC150	2006	2006	No	200.7, 3010A, 200.8, CLP
Hotblock 7	Environmental Express Limited S/N 2772CDC1378	SC150	2006	2006	No	200.7, 3010A, 200.8, CLP
Balance # 35	Acculab 18255989		2005	2005	No	3050B, CLP

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Balance # 33	Ohaus F0461200521139		2001	2001	No	7471A
GC/MS Semivolatiles (BNAMS2/GC) GC MS Tower Tray Controller	Hewlett-Packard S/N 2618A07933 S/N 3234A04110 S/N 2704A08901 S/N 2718A08680 S/N 2607A02892	5971 7673A	1986	1986	Yes	**OUT OF SERVICE**
(BNAMS4/GC) GC MS Tower Tray Controller	Hewlett-Packard S/N 3108A34490 S/N 3114A02077 S/N 2546A02861 S/N 2942A20598 S/N 2803A11211	5971A 7673A	1986	1986	Yes	8270C, 625, CLP
(BNAMS5/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10726100 S/N US35120328 S/N CN72441261 S/N CN40427800 S/N CN40427800	5890II 5975C 7890A	2007	2007	Yes	8270C, 625, CLP
(BNAMS6/GC) GC MS Tower Tray Controller	Hewlett-Packard S/N 3336A54722 S/N 3234A04274 S/N 2843A13155 S/N 2933A11253 S/N 3018A21811	7890 5971 7673	1990	1990	Yes	8270C, 625, CLP
(BNAMS9/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10349071 S/N US35120328 S/N CN35134357 S/N CN40427800 S/N CN40427800	5890II 5973 7683	2004	2004	Yes	8270C, 625, CLP
(BNAMS10/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10403063 S/N US35120373 S/N CN40334758 S/N CN40327770 S/N CN40327770	6890A 5973 7683	2004	2004	Yes	8270C, 625, CLP
(BNAMS11/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10727109 S/N US71236621 S/N CN35134357 S/N CN72441255	7890A 5975C	2007	2007	Yes	8270C, 625, CLP

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
(BNAMS12/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10531011 S/N US52420834 S/N CN61732705 S/N CN50932320	6890A 5975C	Unknown (xfr from CT lab)	2012	Yes	Pending Performance Evaluation: 8270, 625, CLP
(BNAMS13/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10529024 S/N US52430481 S/N CN53427241 S/N CN1739524	6890A 5975C	Unknown (xfr from CT lab)	2012	Yes	Pending Performance Evaluation: 8270, 625, CLP
(BNAMS14/GC) GC MS Tower Tray Controller	Agilent Technologies S/N CN10402079 S/N US35110172 S/N CN34433497 S/N CN40327583	6890A 5973	Unknown (xfr from KOP lab)	2012	Yes	Pending Performance Evaluation: 8270, 625, CLP
BNAGC2 GC Tower 1 Tower 2 Tray Controller	Hewlett-Packard S/N 3336A55994 S/N 3004A20530 S/N 3613A21129 S/N 3021A21938 S/N 3244A30371	5890 II 7673	1986	1986	Yes	**OUT OF SERVICE**
BNAGC8 GC Tower 1 Tray Controller	Hewlett-Packard S/N 3121A35833 S/N 2704805765 S/N 3131A25914 S/N 2921A03449	5890 7673A	1986	1986	Yes	Screen
Manifold Gases	Western Enterprise 28452	Innovator HBAC2-5-4	10/29/04	11/1/04	No	

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
GC/MS Volatiles					Yes	8260, 624, CLP, 524.2
	Agilent	5975	Feb06	Jul06		
VOAMS1	S/N US60532504					
	Agilent	6890N	Feb06	Jul06		
GC	S/N CN10606023					
	OI	4551A	Feb06	Jul06		
Autosampler	S/N D60345B194					
	OI	4660	Feb06	Jul06		
Concentrator	S/N D608466853					
	OI	SAM	Feb06	Jul06		
Spiker	S/N E610475713					
VOAMS2	Hewlett-Packard	5975C	2008	2008	Yes	8260, 624, CLP,
	S/N US80838709					
GC	Hewlett-Packard	7890A	2008	2008		
	S/N CN10813013					
Autosampler	OI	4552	2008	2008		
	S/N 14608					
Concentrator	OI	Eclipse 4660	2008	2008		
	S/N D607466340P					
VOAMS3	Agilent	5973inert	Feb04	Aug04	Yes	8260B, 624, CLP, 524.2
	S/N US35120382					
GC	Agilent	6890N	Feb04	Aug04		
	S/N CN10406105					
Autosampler	EST	Centurion	Jun04	Aug04		
	S/N CENT140051304					
Concentrator A	EST	Encon	May04	Aug04		
	S/N 367060704					
Concentrator B	EST	Encon	May04	Aug04		
	S/N 368060704					
VOAMS4	Hewlett-Packard	5975C	2008	2008	Yes	8260, 624, CLP,
	S/N US80838712					
GC	Hewlett-Packard	7890A	2008	2008		
	S/N CN10813014					
Autosampler 1	Archon	Archon	2008	2008		
	S/N 15264					
	OI					
Concentrator	S/N D809466076	4660	2008	2008		
VOAMS5	Agilent	5973	2005	2012	Yes	8260, 624
	S/N US44621422					
GC	Agilent	6890	2005	2012		
	S/N US01058019					
Autosampler	Archon	8100	2005	2012		
	S/N 14400					
Concentrator	EST	Encon	2005	2012		
	S/N 425042704					

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
VOAMS6	Agilent VOAMS6 S/N US35120322	5973inert	Feb04	Apr04	Yes	624, 524.2, CLP
GC	Agilent S/N CN10406076	6890N	Feb04	Apr04		
Autosampler	OI S/N D54645B461	4551A	Nov05	Dec05		
Concentrator	OI S/N D548466579	4660	Nov05	Dec05		
Spiker	OI S/N C425475656	SAM	Jun04	Jul04		
VOAMS7	Agilent S/N US43110514	5973inert	Oct 04	Nov 04	Yes	624, 524.2,8260 CLP
GC	Agilent S/N CN10437064	6890N	Oct 04	May 06		
Autosampler	Teledyne Tekmar S/N US08121007	Solatek	Tekmar swap	May 08		
Concentrator	Teledyne Tekmar S/N US08007007	Stratum	Tekmar swap	May 08		
VOAMS8	Agilent S/N US91411758	5973	Unknown (KOP acquisition)	March 2013	Yes	8260B, 624, 524.2
GC	Agilent S/N US00028879	6890	“ “	March 2013		
Autosampler	Archon S/N 14352	Archon	“ “	March 2013		
Concentrator	Tekmar-Dohrmann S/N USS02247018	3100 OEL	“ “	March 2013		
VOAMS9	Agilent S/N US44610847	5973	2005	2012	Yes	624, 524.2,8260 CLP
GC	Agilent S/N CN10517107	6890	2005	2012		
Autosampler	OI S/N15266	4552	2005	2012		
Concentrator	OI S/N D548466579P	4660	2005	2012		
VOAMS10	Hewlett-Packard S/N US10461695	5973	Unknown (KOP acquisition)	March 2013	Yes	8260B, 624, 524.2
GC	Hewlett-Packard S/N CN10419047	6890	“ “	March 2013		
Autosampler	Aquatek 70 S/N 94312017	70	“ “	March 2013		
Concentrator	Tekmar S/NUS02249002	14-3100	“ “	March 2013		

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
VOAMS11	Agilent	5973N	Jun03	Jul03	Yes	8260B, 62, CLP, 524.2
	S/N US30965664					
GC	Agilent	6890N	Jun03	Jul03		
	S/N CN10324011					
Autosampler	EST Archon	5100A	Jun03	Jul03		
	S/N 13970					
Concentrator	EST	Encon	Jun03	Jul03		
	S/N 279061703					
	Agilent	5973inert	Oct04	Nov04	Yes	8260, 624, CLP, 524.2
VOAMS12	S/N US43110519					
	Agilent	6890N	Oct04	Jun05		
GC	S/N CN10439051					
	EST	Archon 5100A	May05	Jun05		
Autosampler	S/N 14448					
	EST	Encon	May05	Jun05		
Concentrator	S/N 430051605					
	Agilent	Performance	Jun05	Jun05		
Turbo Pump Upgrade	S/N 56115832					
	Agilent	5973inert	Oct04	Nov04	Yes	8260, 624, CLP, 524.2
VOAMS13	S/N US43110517					
	Agilent	6890N	Oct04	Jun05		
GC	S/N CN10439052					
	EST	Archon 5100A	May05	Jun05		
Autosampler	S/N 14449					
	EST	Encon	May05	Jun05		
Concentrator	S/N 431051605					
	Agilent	Performance	Jun05	Jun05		
Turbo Pump Upgrade	S/N 56069171					

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Balance #22	Mettler 2115517886	PB1501	1997	1997	No	8260, 8015 GRO
Balance #50	Ohaus 1125573353	Explorer Pro	2006	2006	No	8260, 8015 GRO
Balance #32	Denver Instruments 126008			2011	No	8260, 8015 GRO
Oven Drying	Fisher Isotemp Oven 502N0045	13-246-516G	2/15/2005	3/3/2005	N0	
Oven Drying	Baxter 199012	DX-31	2000	2000	No	
GC Volatiles GC1 Autosampler Concentrator	 Agilent S/N US10610006 Archon S/N 14491 EST S/N 356042604	 6890N 8100 Encon	 Mar06 2005 2004	 May06 2013 2013	Yes	8015B (GRO)
SCREEN 5/6 GC Autosampler 1 Headspace 1 Autosampler 2 Headspace 2	Hewlett-Packard S/N 2921A23492 Tekmar S/N US04156005 Tekmar S/N US04156003 Tekmar S/N US04148014 Tekmar S/N US04163001	5890II 7050 7000 7050 7000	1993 Jun04 Jun04 Jun04 Jun04	1993 Jul04 Jul04 Jul04 Jul04	Yes	Screening/3810
GC3 PID Autosampler Concnetrator	Hewlett-Packard S/N 3310A49242 OI S/N 91-I107 Dynatech Archon S/N 11780-795 OI S/N J437460274	5890II 4430 5100 4560	1996 1996 1996 1996	1996 1996 1996 1996	Yes	8015B (GRO)

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
SCREEN 1/2 GC	Hewlett-Packard S/N 2950A29246	5890 II	1989	1989	Yes	**OUT OF SERVICE**
Autosampler 1	Tekmar S/N 91025014	7050	1989	1989		
Headspace 1	Tekmar S/N 91163066	7000	1989	1989		
Autosampler 2	Tekmar S/N 91168012	7050	1989	1989		
Headspace 2	Tekmar S/N 90255003	7000	1989	1989		
SCREEN 3/4 GC	Hewlett-Packard S/N 2908A21857	5890	1998	1998	Yes	Screening/3810
Autosampler 1	Tekmar S/N 91346013	7050	1998	1998		
Headspace 1	Tekmar S/N 91339015	7000	1998	1998		
Autosampler 2	Tekmar S/N 90256011	7050	1998	1998		
Headspace 2	Tekmar S/N 91025010	7000	1998	1998		
H-Nu PID	H-nu Systems S/N 801023	PI101	1989	1989	No	Headspace Screening
Hood Ductless Fume	Air Science P41007	PurAir15	Oct04	Nov04	No	
GC Semivolatiles BNAGC1 GC Network Injector Module Tray	Agilent Technologies S/N US10248079 S/N CN24428026 S/N CN24322270	6890N G2613A G2614A	2003	2005	Yes	NJDEP-OQA-QAM-025
BNAGC2 GC Network Injector Module Tray	Agilent Technologies S/N US00005410 S/N CN759A2046 S/N CN82949935	6890N 7683B 7683	2010	2012 (transferred from KOP lab)	Yes	8015B DRO/NJDEP EPH/ QAM-025
BNAGC 3 GC Network Tower Tray	Agilent Technologies S/N US10202132 S/N US00210996 S/N US92005328	6890N 7683 G2614A	Unkown (No. Canton)	2010 (transferred from Houma, LA)	Yes	8015B DRO/Fingerprints QAM-025
BNAGC4 GC Network Injector Module 1 Injector Module 2 Tray	Agilent Technologies S/N US10610005 S/N CN43820808 S/N CN43820804 S/N CN43830663	6890N G2913A G2914A G2614A	Feb06	Apr06	Yes	NJDEP EPH/ CT ETPH

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Ion chromatograph	Metrohm Peak, Inc.		Transferred from TestAmerica Watertown April 2012	April 2012	Yes	Anions by 300.0
Pump #1	S/N 1818011003121	818				
IC Detector	S/N 1818001003195	819				
IC Interface	S/N 1830002003151	830				
Separation Center	S/N 827303166820	820				
IC Compact Interface	S/N 1771011009124	771				
Liquid Handling Unit	S/N 827302166833	833				
Filtration Sample Processor	S/N 827306118788	788				
Pest/PCB						
	Hewlett-Packard		1992	1992	Yes	8081, CLP
GC1	S/N 2612A07669	5890A				
GC Mainframe	S/N CN22321930	G1513A				
Injector Module	S/N CN00005085	G1512A				
Controller	S/N US72101578	18596C				
Tray						
GC3	Hewlett-Packard		1992	1992	Yes	Herbicides
Series II GC	S/N 3223A42873	5890A				
Injector Module	S/N 3228A31372	18593B				
Controller	S/N 3049A23890	18594B				
Tray	S/N 3202A27453	18596B				
GC4	Hewlett-Packard		1997	1997	Yes	8081
Series II Plus GC	S/N 336A54563	5890A				
Injector Module	S/N 3013A22344	18593B				
Controller	S/N 3227A29129	18594B				
Tray	S/N 3624A42191	18596B				
GC5	Agilent Technologies		2002	2002	Yes	8081
GC Network	S/N US10226033	6890N				
Injector Module	S/N CN22025340	G2613A				
Tray	S/N CN21420543	G2614A				
GC6	Hewlett-Packard		1998	1998	Yes	608
GC Mainframe	S/N 2950A26642	5890A				
Injector Module	S/N CN13420438	G1513A				
Controller	S/N CN00004777	G1512A				
Tray	S/N US20407961	18596C				
GC7	Hewlett-Packard		1998	1998	Yes	8082
GC Mainframe	S/N 3029A29927	5890A				
Injector Module	S/N C11144007141	18593A				
Controller	S/N 626059	18594A				
Tray	S/N C11154103504	18596A				
GC8	Agilent Technologies		2000	2000	Yes	8082
GC Plus	S/N US00004463	6890				
Injector Module	S/N CN15221154	G1513A				
Controller	S/N 3631A05939	G1512A				
Tray	S/N 3050A23572	18596C				

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
GC9 GC Plus Injector Module Controller Tray	Agilent Technologies S/N US00043694 S/N CN13420437 S/N CN00004150 S/N US13807350	 6890 G1513A G1512A 18596C	2001	2001	Yes	8082
GC11 GC Plus Injector Module Controller Tray	Agilent Technologies S/N US00008746 S/N US64600228 S/N US72202100 S/N US22408138	 6890 G2513A G2512A 18596C	2003	2003	Yes	CLP
GCx GC Plus	Agilent Technologies S/N US00024529	6890			No	**OUT OF SERVICE** (dual ECD) Transfer from another TestAmerica lab.
GCxx GC Plus Injector Module Controller	Agilent Technologies S/N 3140A38803 CN13420438	 5890A 6890			Yes	**OUT OF SERVICE** (dual ECD) Transfer from another TestAmerica lab.
WET CHEMISTRY						
Spectrophotometer	HACH S/N 1205122	DR2800	2007	2007	No	365.2, 7196A, 353.2, 410.4
Spectrophotometer	HACH S/N 1204684	DR2800	2007	2007	No	365.2, 7196A, 353.2, 410.4
Spectrophotometer	HACH S/N 11204422	DR2800	2007	2013	No	7196A, USGS
UV-Vis Spectrophotometer	Thermo S/N 2D5J13001	Genesys 10	Transfer from another TestAmerica Lab	Transfer from another TestAmerica Lab	No	**OUT OF SERVICE (WAREHOUSE)**
Turbidimeter	HF Scientific S/N 200604033	Micro 100	2006	2006	No	180.1, SM 2130B
Turbidimeter	HACH S/N 12050C028810	HACH 2100N	2012	2012	No	180.1, SM 2130B
Ion Selective Meter	Orion S/N 006825	720A	1994	1994	No	350.1+ .2, 340.2, 150.1
Ion Selective Meter	Orion S/N 092904	720A+	2007	2007	No	350.1+ .2, 340.2, 150.1
pH Meter	Orion S/N 010005	320	2002	2002	No	Cr6+
pH Meter	Orion S/N 009986	320	2002	2002	No	350.1/4500 NH3 H
pH Meter	Orion 320 S/N 016995	320	2002	2002	No	TCLP (1311)
pH meter	Orion 320 S/N 017414	320		2009	No	4500-H B
pH meter	Orion S/N L00764	Star logR	2012	2012	No	Cr6+
pH meter	VWR S/N 02896	8025	2012	2012	No	Lachat distillation
Oven	VWR S/N 0402001	1320	2001	2001	No	2540C
Oven	VWR	1300U	2001	2001	No	2540C
Oven	VWR	1305U	2001	2001	No	2540B

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Oven	Fisher	230G	1997	1997	No	2540B, 2540D
Oven	Fisher	4216080	2012	2012	No	**Backup oven no designated test yet 10/18/12**
Oven	Fisher	4214960	2012	2012	No	2540D
Oven (Muffle Furnace)	Fisher S/N 901N002	550-14	2002	2002	No	160.4
Oven drying	VWR	1320	2001	2001	No	
Balance #27	A&D 12315883	HR-200	2005	2005	No	Gen. chem.
Balance #29	A&D 12315872	HR-200	2005	2005	No	160.1, 160.2
Balance #26	Sartorius 3503054	1712MP8	2003	2003	No	**OUT OF SERVICE (Warehouse)**
Balance #51	Ohaus 7125010794	Scout Pro	2006	2006	No	**OUT OF SERVICE (Warehouse)**
Balance #100	Mettler 122423439		2006	2006	No	Lloyd Kahn (TOC)
Balance # 13	Sartorius/ 50709085			2012	No	Gen chem
Balance #200	Denver Instruments/095010	P602	Unknown (xfr from CT lab)	2012	No	Gen Chem
Balance #901	Ohaus 1119201018	AP2500	Unknown (xfr from CT lab)	2012	No	**OUT OF SERVICE (Warehouse)**
Balance #900	Ohaus 2220	GA110	Unknown (xfr from CT lab)	2012	No	1664 Lab
Balance #902	Mettler ENR 4788007004	PE3600	Unknown (xfr from KOP lab)	2013	No	**pH, eH, Reactive CN,S**
Water Bath	Precision S/N 9302-112	50	1995	1995	No	7196A
Water Bath	Precision S/N 9305-024	50	1995	1995	No	7196A
Water System (Log-in)	Millipore S/N 07348-C		1990	1990	No	
Water System (Extr. room)	Barnstead S/N 1191020210415	D11911	1995	1995	No	
FTIR	Perkin Elmer S/N 139038	1600	1991	1991	No	418.1
Printer	Epson S/N 61P107612	FX-870	2003	2003	No	418.1
Fixed IR	Buck Scientific S/N 1026	404	2004	2004	No	418.1
COD reactor	HACH S/N 980300017418	45600	2007	2007	No	410.4, 5220D
COD reactor	HACH S/N 900402268	45600	2007	2007	No	410.4, 5220D
COD reactor	HACH S/N 1202323	DRB 200	2007	2007	No	410.4, 5220D
COD reactor	HACH S/N 1209887	DRB 200	2007	2007	No	410.4, 5220D
Auto-analyzer (Lachat #1)	Lachat S/N A83000-1476	QUICKEM 8000	1997	1997	Yes	335.3, 420.2, 353.2, 351.2, 350.1+ .2
Auto-analyzer (Lachat #2)	Lachat S/N 8300-1658	8000 Series	2000	2000	Yes	335.3, 350.1+ .2
Auto-analyzer (Lachat #3)	Lachat S/N 120700001443	8500 Series #2	2012	2012	Yes	335.4, 9012A/B
Xyz autosampler Reagent Pump	S/N 051258a260 S/N 312217-1	RP-150 Series	2012	2012	Yes	335.4,9012A/B

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
TOC Soil Analyzer (2)	Thermo Electron Corp. S/N 20034945	Flash EA 1112 Series	2004	2004	Yes	Lloyd Kahn's method
Printer	Epson S/N 41NE28676	LQ570	1997	1997	No	415.1
TOC Analyzer	Shimadzu S/N H51104335164	TOC-VCSH	2006	2006	Yes	Lloyd Kahn's method, 415.1, 9060, 5310B
Autosampler	Shimadzu S/N H52104301656SA	ASI-V	2006	2006	Yes	415.1, 5310B, 9060
TOC Analyzer 3	Shimadzu S/N H54204900389AE	TOC-L	2012	2012	Yes	5310B, 9060
Autosampler	Shimadzu S/N H5711490033SA	SAI-L	2012	2012	Yes	5310B, 9060
Solid Sample Module	Shimadzu S/N H52504300040NK	SSM-500A	2006	2006	Yes	**OUT OF SERVICE (WAREHOUSE)**
BOD Meter	YSI S/N 97S0534AE	5000	1998	1998	No	405.1
Incubator	GCA Precision Scientific		1998	1998	No	405.1
Hot Plate	Fischer Scientific S/N 103N0071		2001	2001	No	365.2
Hot Plate	Corning S/N 370301092774	PC-400	2007	2007	No	1311
Hot Plate	Fischer Scientific S/N 390502148495	PC-420	2007	2007	No	Lloyd Khan Method
Hot Plate	Fischer Scientific S/N 220897070707	PC-620	2007	2007	No	351.2
Conductivity Meter	Fischer Scientific S/N AB 81209007	Accumetab30	2002	2002	No	120.1, 9050A
Vortex mixer	Thermolyne S/N 632000855604	M63215	2002	2002	No	351.2
Dishwasher	Miele Professional S/N 208479	G7783CD	2003	2003	No	Glassware
Easy-Dist Distillation	Westco S/N 1095		2003	2003	No	350.1+ .2, 420.2, 9066
Easy-Dist Distillation	Westco S/N J097		2003	2003	No	335.3, 9012A & B
Easy-Dist Distillation	Westco S/N 1063		2007	2007	No	**OUT OF SERVICE (WAREHOUSE)**
Easy-Dist Distillation	Westco S/N 1110		2007	2007	No	353.3, 420.2, 9066
Lachat CN Hotblocks 1,2 & 3	S/N 120700002154 S/N 120700002155 S/N 120700002156		2012	2012	No	335.4, 9012A/B
Discreet Analyzer (Kone #1)	Konelab S/N S2019177	20	2003	2003	Yes	Automated Wet Chem
Dell Computer	Dell S/N 246175		2003	2003	No	Automated Wet Chem (Konelab)
BOD Aerator	Thomas Scientific S/N 1187	DOA-P104d-AA	1998	1998	No	405.1
BOD Plus Assay Liquid Handler DO meter YSI 52	Mantech Assoc., Inc. S/N 27OC3XB215 S/N O3C0812 AM	221 & 222 52CE	2003	2003	Yes	405.1
PC-Titration Plus Autotitrator Interface Titra-Rinse 1 Titra-Rinse 2 Buret Module 1 Buret Module 2 Titration Module	Mantech Assoc., Inc S/N MS-0H4-373 S/N MS-0G4-198 S/N MS-0G4-200 S/N MS-0H4-627 S/N MS-0H4-625 S/N MS-0B5-657	 PC-1000-102/4 PC-1000-408 PC-1000-408 PC-1104-00 PC-1104-00 PC-1300-475	2004	2004	Yes	310.1, 2320B – Alkalinity 2320B – Carbonate, Bicarbonate 4500 CO2D – Carbon Dioxide 130.2, 2340C – Hardness

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Ion Chromatograph (IC #1) Pump #1 Pump #2 Conduct. Detector Injector & Oven 2-Ch Interface Liq. Handling #1 Liq. Handling #2 Dil. Autosampler	Metrohm Peak, Inc. S/N 04187 S/N 04197 S/N 03181 S/N 04147 S/N 04184 S/N 04154 S/N 04118 S/N 03198	 818 818 819 820 830 833 833 838	May05	May05	Yes	7199
Ion chromatograph (IC #2) Pump #1 Pump #2 UV-VIS Detector IC Interface Separation Center Sample Processor	Metrohm Peak, Inc. SS4818011006190 SS1818011003192 SS1153001010101 SS1830002003180 SS1820023003168 SS1838001009171	 818 818 1010 (Bischoff) 830 820 838	Feb 2010	Feb 2010	Yes	7199
Filter pump	Emerson S/N SA55-NXGTB 4142		1997		No	Sample Filtering
Filter pump	Emerson S/N G8ECX	SA55JXgtd-4144	2002	2002	No	Sample Filtering
Redox meter	VWR S/N 001149	8005	1997	1997	No	SM2580
TCLP Extraction Lab						
Peristaltic Pump	PC-Titrate Model # PC-1000-40	MS-OF3-568	2004	2004	No	1311 ZHE
TCLP Extraction Apparatus/Timer included	Assoc. Design and Mfg. Co. S/N 1320	3740-4 BRE	Jul06	Sep06	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction1 Apparatus/Timer included	Assoc. Design and Mfg. Co. S/N 1352	3740-12 BRE	1997	1997	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction2 Apparatus/Timer included	Assoc. Design and Mfg. Co. S/N 1053	3740-12 BRE	1997	1997	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction3 Apparatus/Timer included	Assoc. Design and Mfg. Co. S/N 1249	3740-12 BRE	1997	1997	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction4 Apparatus/Timer included	Environmental Express Limited S/N 3384-12-473	LE 1002	May05	May05	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction5 Apparatus/Timer included	Environmental Express Limited S/N 3384-12-472	LE 1002	May05	May05	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction6 Apparatus/Timer included	Assoc. Design and Mfg. Co. S/N 2125	3740-12 BREII	Jul06	Sep06	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
TCLP Extraction7 Apparatus/Timer included	Assoc. Design and Mfg. Co. S/N 2126	3740-12 BREII	Jul06	Sep06	No	1311 TCLP, 1311 ZHE, 1312 SPLP, ASTM Leachate
SAMPLE LOGIN						
Balance #104	Denver Instruments S/N 126006		2009	2009	No	% Solids

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Isotemp Oven 1	Fisher S/N 410B01117	637G	Mar05	Mar05	No	%Solids
Isotemp Oven 2	Fisher S/N 505N0063	637G	Jun05	Jun05	No	%Solids
ORGANIC EXTRACTIONS						
N-EVAP #1	Organomation S/N 51004	N-EVAP 112	2004	2004	No	600/8000/CLP
N-EVAP #2	Organomation S/N 10253	N-EVAP 112	1990	1990	No	600/8000/CLP
Water Bath #1	Fisher Scientific S/N 605021280	15-491	2005	2005	No	600/8000/CLP
Water Bath #2	Fisher Scientific S/N (204272)	15-491	2007	2007	No	600/8000/CLP
Sonicator (Controller)	Sonic & Material, Inc. S/N 58783	VC750	Intercompany asset transfer	2012	No	8000/CLP
Sonicator Horn	Sonic & Material, Inc. S/N 33107206	CV33	Intercompany asset transfer	2012	No	8000/CLP
Sonicator #0 (Controller)	Tekmar SN 19606F (Asset # 36339)	TM600-2				**OUT OF SERVICE (WAREHOUSE)**
Sonicator #1 (Controller)	Sonic & Material, Inc. S/N 38701H (Asset #36362)	VCX 500	2006	2006	No	**OUT OF SERVICE (WAREHOUSE)**
Sonicator #2 (Controller)	Sonic & Material, Inc. S/N 38710H (Asset #36361)	VCX 500	2006	2006	No	**OUT OF SERVICE (WAREHOUSE)**
Sonicator Horn #3	Tekmar S/N 29281	CV17	1990	1990	No	**OUT OF SERVICE (WAREHOUSE)**
Sonicator Horn #4	Tekmar S/N illegible	CV17	1990	1990	No	**OUT OF SERVICE (WAREHOUSE)**
Sonicator #5 (Controller)	Sonic & Material, Inc. S/N 41748 M+ (Asset # 36363)	VCX 500	2004	2004	No	**OUT OF SERVICE (WAREHOUSE)**
Sonicator #6 (Controller)	Sonic & Material, Inc. S/N 41755 M+(Asset # 36364)	VCX 500	2004	2004	No	**OUT OF SERVICE (WAREHOUSE)**
Sonicator Horn # 7	Sonic & Material, Inc. S/N 3353027	CV33				**OUT OF SERVICE (WAREHOUSE)**
Sonicator Horn # 8	Sonic & Material, Inc. S/N 3353028	CV33				**OUT OF SERVICE (WAREHOUSE)**
Sonicator Horn # 9	Sonic & Material, Inc. S/N 3342405	CV33				**OUT OF SERVICE (WAREHOUSE)**
Sonicator Horn # 10	Sonic & Material, Inc. S/N 3342408	CV33				**OUT OF SERVICE (WAREHOUSE)**
Muffle Furnace #1	Thermolyne S/N 40800875	F6010	1990	1990	No	600/8000/CLP
Muffle Furnace #2	Thermolyne S/N illegible	F6028C	1990	1990	No	**OUT OF SERVICE (WAREHOUSE)**

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Large Muffle Furnace	Wilt Industries S/N 041213	210	2001	2001	No	600/8000/CLP
Dishwasher #1	Miele Professional S/N 53075564	G7783CD	2003	2003	No	608/8000/CLP
Dishwasher #2	Miele Professional S/N 53075571	G7783CD	2003	2003	No	608/8000/CLP
Vacuum Pump #1	Emerson electric MLD S/N UNL231171	5KH36KN90HX	1990	1990	No	600/8000/CLP
Vortex	Scientific Industries S/N 2-318564	6560	1995	1995	No	600/8000/CLP
Electric Mixer	Barnstead/Thermolyne S/N 125404091646		1995	1995	No	600/8000/CLP
Mini Hotplate/Stir	VWR Scientific S/N 33918-604	220	1995	1995	No	600/8000/CLP
Centrifuge #1	Sigma S/N 78646	2-5	2001	2001	No	600/8000/CLP
Centrifuge #2	Sigma S/N 78647	2-5	2001	2001	No	**OUT OF SERVICE (WAREHOUSE)**
Centrifuge #3	Sigma S/N 80226	2-5	2001	2001	No	**OUT OF SERVICE (WAREHOUSE)**
Balance # 60	Denver Instr S/N 115003			2012	No	600/8000/CLP
Balance #28	A&D S/N 12315879	HR-200	2005	2005	No	600/8000/CLP
Balance #30	A&D S/N 12315880	HR-200	2005	2005	No	600/8000/CLP
Soxtherm 1 Controller Chiller	OI Analytical S/N 4012358 S/N 4012351 S/N 10200022	Type 07-5101	2002	2002	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm 2 Controller Chiller	OI Analytical S/N 4010018 S/N 4010088 S/N 10200022	Type 07-5101	2002	2002	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm 3 Controller Chiller	OI Analytical S/N 4012359 S/N 4002805 S/N 10365037	Type 07-5101	2002	2002	No	3541
Soxtherm 4 Controller Chiller	OI Analytical S/N 492023 S/N 4022012 S/N 101365037	Type 07-5101	2002	2002	No	3541

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Soxtherm 5 Controller Chiller	Gerhardt S/N 4031668 S/N 4051753 S/N 107344070 (Thermo)	SOX 416	2007	2007	No	3541
Soxtherm 6 Controller Chiller	Gerhardt S/N 4073033 S/N 4051753 S/N 107344070 (Thermo)	SOX 416	2007	2007	No	3541
Soxtherm 7 Controller Chiller	Gerhardt S/N 4073030 S/N 4051753 S/N 107344069 (Thermo)	SOX 416	2007	2007	No	3541
Soxtherm 8 Controller Chiller	Gerhardt S/N 4073031 S/N 4051753 S/N 107344069 (Thermo)	SOX 416	2007	2007	No	3541
Soxtherm 9 Controller Chiller	OI Analytical S/N 4012357 S/N 4012354 S/N 101361126	Type 07-5101	2003	2003	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm10 Controller Chiller	OI Analytical S/N 4010016 S/N 4012353 S/N 101361126	Type 07-5101	2003	2003	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm11 Controller Chiller	OI Analytical S/N 4012356 S/N 480017 S/N 102002024	Type 07-5101	2005	2005	No	3541
Soxtherm12 Controller Chiller	OI Analytical S/N 4033530 S/N 401812 S/N 102002024	Type 07-5101	2005	2005	No	3541
Soxtherm13 Controller Chiller	Gerhardt S/N 4031667 S/N 4051747 S/N 101361121	SOX416 1177PD	2006	2006	No	3541
Soxtherm 14	Gerhardt S/N 4031666 S/N 4051747 S/N 101361121	SOX416	2006	2006	No	3541

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Soxtherm 15	Gerhardt S/N 4051583 S/N 4051747 S/N 10650017 (VWR)	SOX416	2006	2006	No	3541
Soxtherm 16	Gerhardt S/N 4051582 S/N 4051747 S/N 10650017 (VWR)	SOX416	2006	2006	No	3541
Soxtherm	OI Analytical S/N ????	Type 07-5101	???	???	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm	OI Analytical S/N ????	Type 07-5101	???	???	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm	OI Analytical S/N ????	Type 07-5101	???	???	No	**OUT OF SERVICE (WAREHOUSE)**
Soxtherm	OI Analytical S/N ????	Type 07-5101	???	???	No	**OUT OF SERVICE (WAREHOUSE)**
Microwave Extraction System	MARS Xpress 230/60 S/N MD5095	907501	Transfer from Knoxville 2012	2012	No	SW3546
Microwave Extraction System	MARS Xpress 230/60 S/N MD1952	907501	2009	2009	No	SW3546
Wrist Action Shaker 1	Burrell S/N	75	2003	2003	No	8151
Wrist Action Shaker 2	Labline S/N 12910443	3589	2003	2003	No	**OUT OF SERVICE (WAREHOUSE)**
Rotator 1	AP & R Machine & Tool S/N 222307		2003	2003	No	600/8000/CLP
Rotator 2	AP & R Machine & Tool S/N 222306		2003	2003	No	600/8000/CLP
Rotator 3	AP & R Machine & Tool S/N 222305		2003	2003	No	600/8000/CLP
Rotator 4	AP & R Machine & Tool S/N 222304		2003	2003	No	600/8000/CLP
Rotator 5	AP & R Machine & Tool S/N 222303		2003	2003	No	600/8000/CLP
Rotator 6	AP & R Machine & Tool S/N 222302		2003	2003	No	600/8000/CLP
FIELD SERVICES pH/Temp meter	Thermo Orion 15035	250A+	2000	2000	No	pH, Temperature
Conductivity meter	HACH 21000005660	Sension 5	2002	2002	No	Conductivity
DO meter	HACH 0200001321	Sension 6	2002	2002	No	Dissolved Oxygen
DO meter	HACH 001200002352	Sension 6	2000	2000	No	Dissolved Oxygen

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Turbidity meter	La Motte 0119-0997	2020	1998	1998	No	Turbidity
Turbidity meter	La Motte 3897-5102	2020	2002	2002	No	Turbidity
Turbidity meter	LaMotte 3649-3802	2020	2002	2002	No	Turbidity
pH/ORP meter	Cole Parmer 643409	05669-20			No	pH, Oxidation reduction
pH/ORP meter	HACH 31100003358	Sension 1	2005	2005	No	pH, Oxidation reduction
Cond./Salinity/ TDS meter	HACH 30500006215	Sension 5			No	Conductivity, Salinity, TDS
pH/ ORP meter	HACH 050400020239	Sension 1	2005	2005	No	pH, Oxidation reduction
pH/ ORP meter	HACH 050400022762	Sension 1	2005	2005	No	pH, Oxidation reduction
Cond./Salinity/ TDS meter	HACH 050300013668	Sension 5	2005	2005	No	Conductivity, Salinity, TDS
Cond./Salinity/ TDS meter	YSI 93L12159	33			No	Conductivity, Salinity, TDS
Turbidity meter	LaMotte ME 10036	2020e	2005	2005	No	Turbidity
Turbidity meter	LaMotte ME 10117	2020e	2005	2005	No	Turbidity
Cond./Salinity/ TDS meter	HACH 050506C50148	Sension 5	2005	2005	No	Conductivity, Salinity, TDS
DO meter	HACH 050500C60212	Sension 6	2005	2005	No	Dissolved oxygen
DO meter	HACH 050500C60066	Sension 6	2005	2005	No	Dissolved oxygen
pH/ ORP meter	HACH 050600C10445	Sension 1	2005	2005	No	pH, Oxidation reduction
pH/ ORP meter	HACH 4030004162	Sension 1	2005	2005	No	pH, Oxidation reduction
DO meter	Hach 040800001267		2006	2006	No	Dissolved Oxygen
Conductivity meter	Hach 050100002708		2006	2006	No	Conductivity
DO meter	Hach 040700001191		2006	2006	No	Dissolved Oxygen
pH/ mV meter	Hach 040200003831		2006	2006	No	pH, mV
Conductivity meter	Hach 050100002707		2006	2006	No	Conductivity
DO meter	Hach 030500007618		2006	2006	No	Dissolved Oxygen
pH/ mV	Hach 041200004666		2006	2006	No	pH, mV
Turbidity meter	LaMotte 4969-1604		2006	2006	No	Turbidity
Turbidity meter	LaMotte 4943-1604		2006	2006	No	Turbidity
Turbidity meter	LaMotte 1909-2900		2006	2006	No	Turbidity
pH/mV meter	Hach 041200002902		2006	2006	No	pH, mV
pH/mV meter E-019	Hach 41200002933	Sension 1	2006	2006	No	pH, mV
Conductivity meter E-027	Hach 050500C50193	Sension 5	2006	2006	No	Conductivity

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
pH meter E-028	Hach 040800010007	Sension 1	2006	2006	No	pH meter
pH/mV meter M-039	Hach 0804C410063	Sension 1				pH/ORP
pH/mV meter M-034	Hach 06070C710134	Sension 1	Oct06	Oct06	No	pH/ORP
Conductivity meter M-028	Hach 050500C50288	Sension 5	Aug05	Aug05	No	Conductivity
DO meter M-032	Hach 05070C360249	Sension 6	Nov06	Nov06	No	DO
pH/mV meter M-036	Hach 07080C710259	Sension 1	Oct07	Oct07	No	pH/ORP
pH/mV meter M-030	Hach 050600C10468	Sension 1	Aug05	Aug05	No	pH/ORP
pH/mV meter M-037	Hach 08020c110145	Sension 1	Mar08	Mar08	No	pH/ORP
DO meter E-030	Hach 07120C260018	Sension 6	2008	2008	No	DO
pH E-031	Thermo Orion 018168	Model 230			No	pH
pH/ORP E-029	Hach 07070C610178	Sension1	2008	2008	No	pH/ORP
DO E-032	YSI 01F0708AA	55/25 FT			No	DO
pH E-033	Thermo Orion 017788	Model 230A			No	pH
pH E-034	Thermo Orion 017630	Model 230A			No	pH
Chlorine meter CL-007	Hach 040200011290	Pocket Colorimeter II	2006	2006	No	330.5, SM 18th 4500 Cl G
Chlorine meter CL-002	Hach 020100174404	Pocket Colorimeter	2006	2006	No	330.5, SM 18th 4500 Cl G
Chlorine meter CL-003	Hach 040200011345	Pocket Colorimeter II	2006	2006	No	330.5, SM 18th 4500 Cl G
Chlorine meter CL-004	Hach 961200102549	Pocket Colorimeter	2006	2006	No	330.5, SM 18th 4500 Cl G
Chlorine meter CL-006	Hach 030400034505	Pocket Colorimeter	2005			
Chlorine meter CL-005	Hach 020100174252	Pocket Colorimeter	2006			
Chlorine meter CL-008	Hach 4796-4900	Colorimeter 1200				
Colorimeter M-040	Hach 041050031426	48450-60 DR/850			No	
Water level meter	Solonist S/N 37993		Jan05	Feb05	No	
Water level meter	Solonist S/N 37995		Jan05	Feb05	No	
Water level meter	Solonist S/N 42807		Jan06	Jan06	No	
Water level meter	Fisher				No	
PID meter	RAE Systems S/N 110-010953	PGM-7600	May05	May05	No	
PID meter	RAE Systems S/N 110-010984	Mini RAE 2000	May05	May05	No	
PID meter	RAE Systems S/N 110-01094	Mini Rae 2000	May05	May05	No	
PID meter	RAE Systems S/N 103958	Plus Classic	Jan05	Jan05	No	
PID meter	PE Photovac S/N DQGD302	2020			No	

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Comp sampler	ISCO S/N 205C01376	603704001-3700	May05	May05	Yes	
Comp sampler	ISCO S/N 205C01380	603704001-3700	May05	May05	Yes	
Comp sampler	ISCO S/N 204G00984	3700			Yes	
Comp sampler	ISCO S/N 05248-001	2700			Yes	
Comp sampler	ISCO	2700			Yes	
Comp sampler	ISCO	2700			Yes	
Comp sampler	ISCO	2700			Yes	
Submersible pump	Grundfos S/N 05141-8349	MP1 / 1A106003	May05	May05	No	
Submersible pump	Grundfos S/N 05141-8361	MP1 / 1A106003	May05	May05	No	
Submersible pump	Grundfos S/N 0621-0014	A1A106003P1	Jul06	Jul06	No	
Submersible pump	Grundfos S/N 06029591				No	
Submersible pump	Grundfos S/N 98490294				No	
Submersible pump	Grundfos				No	
Submersible pump	Grundfos				No	
Submersible pump	Grundfos				No	
Submersible pump	Proactive S/N 1371	SS Monsoon	July06	Jul06	No	
Pump control box	Grundfos S/N H0412210120	91126028	May05	May05	No	
Pump control box	Grundfos S/N H0412210120	91126028	May05	May05	No	
Pump control box	Grundfos S/N P1940304254		May05	May05	No	
Pump control box	Grundfos S/N 203831		May05	May05	No	
Pump control box	Grundfos S/N H0303130012		May05	May05	No	
Pump control box	Grundfos S/N 9517		May05	May05	No	
Pump control box	Grundfos		May05	May05	No	
Pump control box	ProActive	Low-flow with power booster	Jul06	Jul06	No	
Trash pump	North Star S/N E06	10633	2007	2007	No	
Generator	Honda S/N EB-3000C	EZGP-1145763	May05	May05	No	
Generator	Honda S/N EB-3000C	EZGP-1151238	Jun05	Jun05	No	
Generator	Honda S/N EZGL1002930	EB-3000C	2005	2005	No	
Generator	Honda				No	
Generator	Honda				No	
Control Pack	QED S/N MP15-1300	MP-15	May05	May05	No	

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Control Pack	QED S/N MP15-1297	MP-15	May05	May05	No	
Control Pack	QED S/N MP15-1298	MP-15	May05	May05	No	
Control Pack	QED S/N MP15-1299	MP-15	May05	May05	No	
Control Pack	QED	MP-15	May05	May05	No	
Control Pack	QED	MP-15	May05	May05	No	
Control Pack	QED	MP-15	May05	May05	No	
Control Pack	QED	MP-15	May05	May05	No	
Control Pack	QED	MP-15	May05	May05	No	
Bladder Pump	QED S/N 10993	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED S/N 10997	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED S/N 10995	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED S/N 10996	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED S/N 11191	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED S/N 11192	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED 11512	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED 10948	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED 10949	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED	MP-SPK-4P	May05	May05	No	
Bladder Pump	QED	MP-SPK-4P			No	
Bladder Pump	QED	MP-SPK-4P			No	
Peristaltic Pump	Solonist S/N 002562	410			No	
Peristaltic Pump	Solonist S/N 002071	410			No	
Peristaltic Pump	Solonist S/N 001979	410			No	
Peristaltic Pump	Solonist S/N 002642	410			No	
Peristaltic Pump	ISCO	Accuwell 150 portable pump			No	
Peristaltic Pump	ISCO	Accuwell 150 portable pump			No	
Peristaltic Pump	ISCO	Accuwell 150 portable pump			No	
Peristaltic Pump	ISCO	Accuwell 150 portable pump			No	
Peristaltic Pump	ISCO	Accuwell 150 portable pump			No	
Peristaltic Pump	ISCO	Accuwell 150 portable pump			No	
Centrifugal Pump	Teel S/N 3021	2P110B			No	

Instrument Type	Manufacturer	Model	Purchase Date	Install Date	Autosampler	Method Performed
Centrifugal Pump	Teel S/N 0036	2P110B			No	
Centrifugal Pump	Teel S/N 0034	2P110B			No	
Centrifugal Pump	Teel S/N 1962	2P110B			No	
Centrifugal Pump	Teel	2P110B			No	
Compressor	Coleman / Honda S/N D02812339	CT5090412	Jun05	Jun05	No	
Compressor	Honda/Campbell Hausfeld S/N VT697203AJ				No	
Multi-probe meter YSI-1	YSI S/N 06F1362AC	556 MPS	Jul06	Jul06	No	
GPS	Ashtech 10564	110454-01			No	
Oil/Water Interface probe	Testwell					
Oil/Water Interface probe	Testwell					
Oil/Water interface Probe	Solonist 122-008699-1	122	Sept07	Sept07	No	
Oil/Water interface probe	Solonist S/N 122 007364-1		Aug06	Aug06	No	

Table 21-2. Example: Schedule of Routine Maintenance

Instrument	Procedure	Frequency
Leeman Mercury Analyzer	Check tubing for wear Fill rinse tank with 10% HCl Change dryer tube Fill reductant bottle with 10% Stannous Chloride	Daily Daily As needed Daily
ICP	Check pump tubing Check liquid argon supply Check fluid level in waste container Check filters Clean or replace filters Check torch Check sample spray chamber for debris Clean and align nebulizer Check entrance slit for debris Change printer ribbon Replace pump tubing	Daily Daily Daily Weekly As required Daily Monthly Monthly Monthly As required As required
ICP MS	Change pump tubing Clean torch Check / clean nebulizer Clean cones Check air filters Check multiplier voltages & do cross calibration Replace sample uptake tubing Check rotary pump oil Check oil mist filters Check chiller water level	Weekly or As required Weekly or As required Weekly or As required Weekly or As required Weekly or As required Weekly or As required Weekly or As required Weekly or As required Monthly Monthly
UV-Vis Spectrophotometer	Clean ambient flow cell Precision check/alignment of flow cell Wavelength verification check	As required As required Semi-annually
Auto Analyzers	Clean sampler Check all tubing Clean inside of colorimeter Clean pump well and pump rollers Clean wash fluid receptacle Oil rollers/chains/side rails Clean optics and cells	Daily Daily Daily Quarterly Weekly Weekly Quarterly
Gas Chromatograph/Mass Spectrometer (GC/MS)	Ion gauge tube degassing Pump oil-level check Pump oil changing Analyzer bake-out Analyzer cleaning Resolution adjustment COMPUTER SYSTEM AND PRINTER: Air filter cleaning Change data system air filter Printer head carriage lubrication Paper sprocket cleaning Drive belt lubrication	As required Monthly Annually As required As required As required As required As required As required As required As required

Table 21-2. Example: Schedule of Routine Maintenance

Instrument	Procedure	Frequency
Gas Chromatograph	Compare standard response to previous day or since last initial calibration Check carrier gas flow rate in column Check temp. of detector, inlet, column oven Septum replacement Glass wool replacement Check system for gas leaks with SNOOP Check for loose/frayed wires and insulation Bake injector/column Change/remove sections of guard column Replace connectors/liners Change/replace column(s)	Daily Daily via use of known compound retention Daily As required As required W/cylinder change as required Monthly As Required As Required As Required As Required
Electron Capture Detector (ECD)	Detector wipe test (Ni-63) Detector cleaning	Semi-annually As required
Flame Ionization Detector (FID)	Detector cleaning	As required
Photoionization Detector (PID)	Change O-rings Clean lamp window	As required As required
HPLC	Change guard columns Change lamps Change pump seals Replace tubing Change fuses in power supply Filter all samples Change autosampler rotor/stator	As required As required Semi-annually or as required As required As required Daily As required
Balances	Class "S" traceable weight check Clean pan and check if level Field service	Daily, when used Daily At least Annually
Conductivity Meter	0.01M KCl calibration Conductivity cell cleaning	Daily As required
Turbidimeter	Check light bulb	Daily, when used
Deionized/Distilled Water	Daily conductivity check Check deionizer light Monitor for VOA's System cleaning Replace cartridge & large mixed bed resins	Daily Daily Daily As required As required
Drying Ovens	Temperature monitoring Temperature adjustments	Daily As required
Refrigerators/ Freezers	Temperature monitoring Temperature adjustment Defrosting/cleaning	Daily As required As required
Vacuum Pumps/ Air Compressor	Drained Belts checked Lubricated	Weekly Monthly Semi-annually
pH/Specific Ion Meter	Calibration/check slope Clean electrode	Daily As required

Table 21-2. Example: Schedule of Routine Maintenance

Instrument	Procedure	Frequency
BOD Incubator	Temperature monitoring Coil and incubator cleaning	Daily Monthly
Centrifuge	Check brushes and bearings	Every 6 months or as needed
Water baths	Temperature monitoring Water replaced	Daily Monthly or as needed

SECTION 21. MEASUREMENT TRACEABILITY

21.1 Overview

Traceability of measurements shall be assured using a system of documentation, calibration, and analysis of reference standards. Laboratory equipment that are peripheral to analysis and whose calibration is not necessarily documented in a test method analysis or by analysis of a reference standard shall be subject to ongoing certifications of accuracy. At a minimum, these must include procedures for checking specifications of ancillary equipment: balances, thermometers, temperature, Deionized (DI) and Reverse Osmosis (RO) water systems, automatic pipettes and other volumetric measuring devices. (Refer to Section 20.3). With the exception of Class A Glassware and glass microliter syringes, quarterly accuracy checks are performed for all mechanical volumetric devices. Wherever possible, subsidiary or peripheral equipment is checked against standard equipment or standards that are traceable to national or international standards. Class A Glassware and glass microliter syringes should be routinely inspected for chips, acid etching or deformity (e.g., bent needle). If the Class A glassware or syringe is suspect, the accuracy of the glassware will be assessed prior to use.

21.2 NIST-Traceable Weights and Thermometers

Reference standards of measurement shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated.

For NIST-traceable weights and thermometers, the laboratory requires that all calibrations be conducted by a calibration laboratory accredited by A2LA, NVLAP (National Voluntary Laboratory Accreditation Program), or another accreditation organization that is a signatory to a MRA (Mutual Recognition Arrangement) of one of more of the following cooperations – ILAC (International Laboratory Accreditation Cooperation) or APLAC (Asia-Pacific Laboratory Accreditation Cooperation). A calibration certificate and scope of accreditation is kept on file at the laboratory.

21.3 Reference Standards / Materials

Reference standards/materials, where commercially available, are traceable to certified reference materials. Commercially prepared standard materials are purchased from vendors accredited by A2LA or NVLAP with an accompanying Certificate of Analysis that documents the standard purity. If a standard cannot be purchased from a vendor that supplies a Certificate of Analysis, the purity of the standard is documented by analysis. The receipt of all reference standards must be documented. Reference standards are labeled with a unique Standard Identification Number and expiration date. All documentation received with the reference standard is retained as a QC record and references the Standard Identification Number.

All reference, primary and working standards/materials, whether commercially purchased or laboratory prepared, must be checked regularly to ensure that the variability of the standard or material from the 'true' value does not exceed method requirements. The accuracy of calibration standards is checked by comparison with a standard from a second source. In cases where a second standard manufacturer is not available, a vendor certified different lot is acceptable for use as a second source. For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst would be considered a second source.

The appropriate Quality Control (QC) criteria for specific standards are defined in laboratory SOPs. In most cases, the analysis of an Initial Calibration Verification (ICV) or LCS (where there is no sample preparation) is used as the second source confirmation. These checks are generally performed as an integral part of the analysis method (e.g. calibration checks, laboratory control samples).

All standards and materials must be stored and handled according to method or manufacturer's requirements in order to prevent contamination or deterioration. Refer to the Corporate Environmental Health & Safety Manual or laboratory SOPs. For safety requirements, please refer to method SOPs and the laboratory Environmental Health and Safety Manual.

Standards and reference materials shall not be used after their expiration dates unless their reliability is verified by the laboratory and their use is approved by the Quality Assurance Manager. The laboratory must have documented contingency procedures for re-verifying expired standards.

21.4 Documentation and Labeling of Standards, Reagents, and Reference Materials

Reagents must be at a minimum the purity required in the test method. The date of reagent receipt and the expiration date are documented. The lots for most of the common solvents and acids are tested for acceptability prior to company wide purchase. [Refer to TestAmerica's Corporate SOP (CA-Q-S-001), Solvent and Acid Lot Testing and Approval.]

All manufacturer or vendor supplied Certificate of Analysis or Purity must be retained, stored appropriately, and readily available for use and inspection. These records are maintained in the applicable analytical Departments. Records must be kept of the date of receipt and date of expiration of standards, reagents and reference materials. In addition, records of preparation of laboratory standards, reagents, and reference materials must be retained, stored appropriately, and be readily available for use and inspection. For detailed information on documentation and labeling, please refer to method specific SOPs.

Commercial materials purchased for preparation of calibration solutions, spike solutions, etc.., are usually accompanied with an assay certificate or the purity is noted on the label. If the assay purity is 96% or better, the weight provided by the vendor may be used without correction. If the assay purity is less than 96% a correction will be made to concentrations applied to solutions prepared from the stock commercial material.

21.4.1 All standards, reagents, and reference materials must be labeled in an unambiguous manner. Standards are logged into the laboratory's LIMS system, and are assigned a unique identification number. The following information is typically recorded in the electronic database within the LIMS.

- Standard ID
- Description of Standard
- Department
- Preparer's name
- Final volume and number of vials prepared
- Solvent type and lot number

- Preparation Date
- Expiration Date
- Standard source type (stock or daughter)
- Standard type (spike, surrogate, other)
- Parent standard ID (if applicable)
- Parent Standard Analyte Concentration (if applicable)
- Parent Standard Amount used (if applicable)
- Component Analytes
- Final concentration of each analyte
- Comment box (text field)

Records are maintained (either electronically or hard-copy) for standard and reference material preparation. These records show the traceability to purchased stocks or neat compounds. These records also include method of preparation, date of preparation, expiration date and preparer's name or initials. Preparation procedures are provided in the Method SOPs.

21.4.2 All standards, reagents, and reference materials must be clearly labeled with a minimum of the following information:

- Expiration Date (include prep date for reagents)
- Standard ID (***Specify from LIMS or logbook***)
- Special Health/Safety warnings if applicable

Records must also be maintained of the date of receipt for commercially purchased items or date of preparation for laboratory prepared items. Special Health/Safety warnings must also be available to the analyst. This information is maintained by the facility Environmental Health and Safety Coordinator.

21.4.3 In addition, the following information may be helpful:

- Date opened (for multi-use containers, if applicable)
- Description of standard (if different from manufacturer's label or if standard was prepared in the laboratory)
- Recommended Storage Conditions
- Concentration (if applicable)
- Initials of analyst preparing standard or opening container

All containers of prepared reagents must include an expiration date and an ID number to trace back to preparation.

Procedures for preparation of reagents can be found in the Method SOPs.

Standard ID numbers must be traceable through associated logbooks, worksheets and raw data.

All reagents and standards must be stored in accordance to the following priority: 1) with the manufacturer's recommendations; 2) with requirements in the specific analytical methods as specified in the laboratory SOP.

SECTION 22. SAMPLING

22.1 Overview

The laboratory provides the following sampling and field services. Sampling procedures are described in the following SOPs as applicable:

- Groundwater Sampling (TestAmerica Edison SOP #s ED-FLD-008 and ED-FLD-009)
- Wastewater Sampling (TestAmerica Edison SOP # ED-FLD-014)
- Potable Sampling
- Waste Sampling
- Soil and Sediment Sampling
- Flow Monitoring (TestAmerica Edison SOP #s ED-FLD-008 and ED-FLD-009)
- Field Parameter Analysis (TestAmerica Edison SOPs ED-FLD-001 thru ED-FLD-007, ED-FLD-010)
- Cleaning and Decontamination of Field Equipment (see individual SOPs listed above and TestAmerica Edison SOP# ED-GEN-013)

22.2 Sampling Containers

The laboratory offers clean sampling containers for use by clients. These containers are obtained from reputable container manufacturers and meet EPA specifications as required. Any certificates of cleanliness that are provided by the supplier are maintained at the laboratory.

22.2.1 Preservatives

Upon request, preservatives are provided to the client in pre-cleaned sampling containers. In some cases containers may be purchased pre-preserved from the container supplier. Whether prepared by the laboratory or bought pre-preserved, the grades of the preservatives are at a minimum:

- Hydrochloric Acid – Reagent ACS (Certified VOA Free) or equivalent
- Methanol – Purge and Trap grade
- Nitric Acid – Instra-Analyzed or equivalent
- Sodium Bisulfate – ACS Grade or equivalent
- Sodium Hydroxide – Instra-Analyzed or equivalent
- Sulfuric Acid – Instra-Analyzed or equivalent
- Sodium Thiosulfate – ACS Grade or equivalent

22.3 Definition of Holding Time

The date and time of sampling documented on the COC form establishes the day and time zero. As a general rule, when the maximum allowable holding time is expressed in “days” (e.g., 14 days, 28 days), the holding time is based on calendar day measured. Holding times expressed

in “hours” (e.g., 6 hours, 24 hours, etc.) are measured from date and time zero. The first day of holding time ends twenty-four hours after sampling. Holding times for analysis include any necessary reanalysis. However, there are some programs that determine holding time compliance based on the date and specific time of analysis compared to the time of sampling regardless of how long the holding time is.

22.4 Sampling Containers, Preservation Requirements, Holding Times

The preservation and holding time criteria specified in the laboratory SOPs are derived from the source documents for the methods. If method required holding times or preservation requirements are not met, the reports will be qualified using a flag, footnote or case narrative. As soon as possible or “ASAP” is an EPA designation for tests for which rapid analysis is advised, but for which neither EPA nor the laboratory have a basis for a holding time.

22.5 Sample Aliquots / Subsampling

Taking a representative sub-sample from a container is necessary to ensure that the analytical results are representative of the sample collected in the field. The size of the sample container, the quantity of sample fitted within the container, and the homogeneity of the sample need consideration when sub-sampling for sample preparation. It is the laboratory’s responsibility to take a representative subsample or aliquot of the sample provided for analysis.

Analysts should handle each sample as if it is potentially dangerous. At a minimum, safety glasses, gloves, and lab coats must be worn when preparing aliquots for analysis.

Guidelines on taking sample aliquots & subsampling are located SOP No. ED-GEN-007 (Subsampling).

SECTION 23. HANDLING OF SAMPLES

Sample management procedures at the laboratory ensure that sample integrity and custody are maintained and documented from sampling/receipt through disposal.

23.1 Chain of Custody (COC)

The COC form is the written documented history of any sample and is initiated when bottles are sent to the field, or at the time of sampling. This form is completed by the sampling personnel and accompanies the samples to the laboratory where it is received and stored under the laboratory’s custody. The purpose of the COC form is to provide a legal written record of the handling of samples from the time of collection until they are received at the laboratory. It also serves as the primary written request for analyses from the client to the laboratory. The COC form acts as a purchase order for analytical services when no other contractual agreement is in effect. An example of a COC form may be found in Figure 23-1.

23.1.1 Field Documentation

The information the sampler needs to provide at the time of sampling on the container label is:

- Sample identification

- Date and time
- Preservative

During the sampling process, the COC form is completed and must be legible (see Figure 23-1). This form includes information such as:

- Client name, address, phone number and fax number (if available)
- Project name and/or number
- The sample identification
- Date, time and location of sampling
- Sample collectors name
- The matrix description
- The container description
- The total number of each type of container
- Preservatives used
- Analysis requested
- Requested turnaround time (TAT)
- Any special instructions
- Purchase Order number or billing information (e.g. quote number) if available
- The date and time that each person received or relinquished the sample(s), including their signed name.

When the sampling personnel deliver the samples directly to TestAmerica personnel, The samples are stored in a cooler with ice, as applicable, and remain solely in the possession of the client's field technician until the samples are delivered to the laboratory personnel. The sample collector must assure that each container is in his/her physical possession or in his/her view at all times, or stored in such a place and manner to preclude tampering. The field technician relinquishes the samples in writing on the COC form to the sample control personnel at the laboratory or to a TestAmerica courier. When sampling personnel deliver the samples through a common carrier (Fed-Ex, UPS), the CoC relinquished date/time is completed by the field personnel and samples are released to the carrier. Samples are only considered to be received by lab when personnel at the fixed laboratory facility have physical contact with the samples.

Note: Independent couriers are not required to sign the COC form. The COC is usually kept in the sealed sample cooler. The receipt from the courier is stored in log-in by date; it lists all receipts each date.

23.1.2 Legal / Evidentiary Chain-of-Custody

The laboratory may, upon special request, adhere to legal/evidentiary chain of custody requirements. If TestAmerica agrees to such procedures the samples are identified for legal/evidentiary purposes on the COC, login will complete the custody seal retain the shipping record with the COC, and initiate an internal COC for laboratory use by analysts and a sample disposal record.

23.2 Sample Receipt

Samples are received at the laboratory by designated sample receiving personnel and a unique laboratory project identification number is assigned. Each sample container shall be assigned a unique sample identification number that is cross-referenced to the client identification number such that traceability of test samples is unambiguous and documented. Each sample container is affixed with a durable sample identification label. Sample acceptance, receipt, tracking and storage procedures are summarized in the following sections.

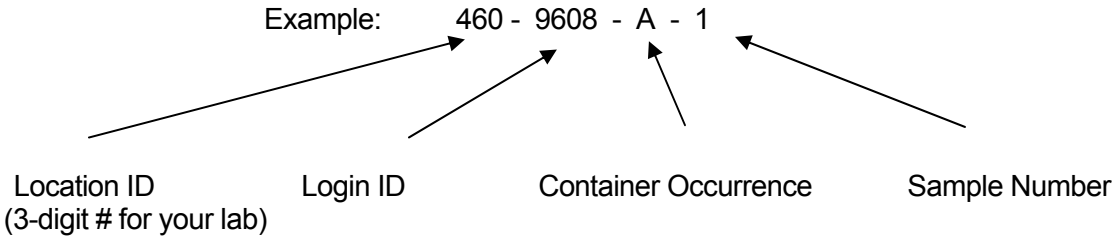
23.2.1 Laboratory Receipt

When samples arrive at the laboratory, sample receiving personnel inspect the coolers and samples. The integrity of each sample must be determined by comparing sample labels or tags with the COC and by visual checks of the container for possible damage. Any non-conformance, irregularity, or compromised sample receipt must be documented via the Sample Receipt application within TALS (the laboratory LIMS) and brought to the immediate attention of the appropriate Project Manager who will, in turn, contact the client. The COC, shipping documents, documentation of any non-conformance, irregularity, or compromised sample receipt, record of client contact, and resulting instructions become part of the project record.

23.2.1.1 Unique Sample Identification

All samples that are processed through the laboratory receive a unique sample identification to ensure that there can be no confusion regarding the identity of such samples at anytime. This system includes identification for all samples, subsamples and subsequent extracts and/or digestates.

The laboratory assigns a unique identification (e.g., Sample ID) code to each sample container received at the laboratory. This Primary ID is made up of the following information (consisting of 4 components):



The above example states that TestAmerica Edison Laboratory (Location 460). Login ID is 9608 (unique to a particular client/job occurrence). The container code indicates it is the first container ("A") of Sample #1.

If the primary container goes through a prep step that creates a "new" container, then the new container is considered secondary and gets another ID. An example of this being a client sample in a 1-Liter amber bottle is sent through a Liquid/Liquid Extraction and an extraction vial is created from this step. The vial would be a SECONDARY container. The secondary ID has 5 components.

Example: 460 - 9608 - A - 1 - **A** **Secondary Container Occurrence**

Example: 460-9608-A-1-A, would indicate the PRIMARY container listed above that went through a step that created the 1st occurrence of a Secondary container.

With this system, a client sample can literally be tracked throughout the laboratory in every step from receipt to disposal.

23.3 Sample Acceptance Policy

The laboratory has a written sample acceptance policy (Figure 23-2) that clearly outlines the circumstances under which samples shall be accepted or rejected. These include:

- a COC filled out completely;
- samples must be properly labeled;
- proper sample containers with adequate volume for the analysis (Sampling Guide) and necessary QC;
- samples must be preserved according to the requirements of the requested analytical method (Sampling Guide);
- sample holding times must be adhered to (Sampling Guide);
- all samples submitted for water/solid Volatile Organic analyses must have a Trip Blank submitted at the same time;
- the project manager will be notified if any sample is received in damaged condition.

Data from samples which do not meet these criteria are flagged and the nature of the variation from policy is defined.

23.3.1 After inspecting the samples, the sample receiving personnel sign and date the COC form, make any necessary notes of the samples' conditions and store them in appropriate refrigerators or storage locations.

23.3.2 Any deviations from these checks that question the suitability of the sample for analysis, or incomplete documentation as to the tests required will be resolved by consultation with the client. If the sample acceptance policy criteria are not met, the laboratory shall either:

- Retain all correspondence and/or records of communications with the client regarding the disposition of rejected samples, or

- Fully document any decision to proceed with sample analysis that does not meet sample acceptance criteria.

Once sample acceptance is verified, the samples are logged into the LIMS according SOP No. ED-SPM-001.

23.4 Sample Storage

In order to avoid deterioration, contamination or damage to a sample during storage and handling, from the time of receipt until all analyses are complete, samples are stored in refrigerators, freezers or protected locations suitable for the sample matrix. Sample containers designated for metals only analysis are stored un-refrigerated. In addition, samples to be analyzed for volatile organic parameters are stored in separate refrigerators designated for volatile organic parameters only. Samples are never to be stored with reagents, standards or materials that may create contamination.

To ensure the integrity of the samples during storage, refrigerator blanks are maintained in the volatile sample refrigerators and analyzed every two weeks.

Analysts and technicians retrieve the sample container allocated to their analysis from the designated refrigerator and place them on carts, analyze the sample, and return the remaining sample or empty container to the refrigerator from which it originally came. All unused portions of samples, including empty sample containers, are returned to the secure sample control area. All samples are kept in the refrigerators for 30 days after delivery of the final report to the client, which meets or exceeds most sample holding times. After 30 days the samples are disposed of or, upon client request moved to an sample archive area where they are stored for an additional time period agreed upon with the client or dictated by the applicable analytical program (ex. USEPA CLP).

Access to the laboratory is controlled such that sample storage need not be locked at all times unless a project specifically demands it. Samples are accessible to laboratory personnel only. Visitors to the laboratory are prohibited from entering the refrigerator and laboratory areas unless accompanied by an employee of TestAmerica.

23.5 Hazardous Samples and Foreign Soils

To minimize exposure to personnel and to avoid potential accidents, hazardous and foreign soil samples are stored in an isolated area designated for hazardous waste only.

Procedures for the handling and storage of hazardous samples is addressed in the TestAmerica Corporate Safety Manual (TestAmercia Document No. CW-E-M-001) and in TestAmerica Edison SOP No. ED-SPM-001 (Sample Receipt, Login, Identification, And Storage).

Procedures for the acceptance and handling of USDA regulated domestic and foreign soils are detailed in TestAmerica SOP No. ED-SPM-006 (Procedure for Acceptance and Handling of Regulated Domestic and Foreign Soil).

23.6 Sample Shipping

In the event that the laboratory needs to ship samples, the samples are placed in a cooler with enough ice to ensure the samples remain just above freezing and at or below 6.0°C during transit. The samples are carefully surrounded by packing material to avoid breakage (yet maintain appropriate temperature). A trip blank is enclosed for those samples requiring water/solid volatile organic analyses. The chain-of-custody form is signed by the sample control technician and attached to the shipping paperwork. Samples are generally shipped overnight express or hand-delivered by a TestAmerica courier to maintain sample integrity. All personnel involved with shipping and receiving samples must be trained to maintain the proper chain-of-

custody documentation and to keep the samples intact and on ice. The Environmental, Health and Safety Manual contains additional shipping requirements.

Note: If a client does not request trip blank analysis on the COC or other paperwork, the laboratory will not analyze the trip blanks that were supplied. However, in the interest of good client service, the laboratory will advise the client at the time of sample receipt that it was noted that they did not request analysis of the trip blank; and that the laboratory is providing the notification to verify that they are not inadvertently omitting a key part of regulatory compliance testing.

23.7 Sample Disposal

Samples should be retained for a minimum of 30 days after the project report is sent, however, provisions may be made for earlier disposal of samples once the holding time is exceeded. Some samples are required to be held for longer periods based on regulatory or client requirements (e.g., 60 days after project report is sent). The laboratory must follow the longer sample retention requirements where required by regulation or client agreement. Several possibilities for sample disposal exist: the sample may be consumed completely during analysis, the sample may be returned to the customer or location of sampling for disposal, or the sample may be disposed of in accordance with the laboratory's waste disposal procedures, TestAmerica Edison SOP No. ED-SPM-007 (Disposal of Samples and Associated Laboratory Waste). All procedures in the laboratory Environmental, Health and Safety Manual are followed during disposal. Samples are normally maintained in the laboratory no longer than 2 months from receipt unless otherwise requested. Unused portions of samples found or suspected to be hazardous according to state or federal guidelines may be returned to the client upon completion of the analytical work.

If a sample is part of a known litigation, the affected legal authority, sample data user, and/or submitter of the sample must participate in the decision about the sample's disposal. All documentation and correspondence concerning the disposal decision process must be kept on file. Pertinent information includes the date of disposal, nature of disposal (such as sample depletion, hazardous waste facility disposal, return to client), names of individuals who conducted the arrangements and physically completed the task. The laboratory will remove or deface sample labels prior to disposal unless this is accomplished through the disposal method (e.g., samples are incinerated).

Figure 23-1. Chain of Custody (COC)

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Temperature on Receipt _____

Drinking Water? Yes ☐ No ☐

TAL-4124 (1007)

Client	Project Manager	Date	Chain of Custody Number 053963
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page _____ of _____
City / State / Zip Code	Site Contact / Lab Contact	Analysis (Attach list if more space is needed)	
Project Name and Location (State)	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.	Matrix / Containers & Preservatives		Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH											

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other_____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By			1. Received By		
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Figure 23-2. Example: Sample Acceptance Policy

All incoming work will be evaluated against the criteria listed below. Where applicable, data from any samples that do not meet the criteria listed below will be noted on the laboratory report defining the nature and substance of the variation. In addition the client will be notified either by telephone, fax or e-mail ASAP after the receipt of the samples.

1) Samples must arrive with labels intact with a Chain of Custody filled out completely. The following information must be recorded.
   - Client name, address, phone number and fax number (if available)
   - Project name and/or number
   - The sample identification
   - Date, time and location of sampling
   - The collectors name
   - The matrix description
   - The container description
   - The total number of each type of container
   - Preservatives used
   - Analysis requested
   - Requested turnaround time (TAT)
   - Any special instructions
   - Purchase Order number or billing information (e.g. quote number) if available
   - The date and time that each person received or relinquished the sample(s), including their signed name.
   - The date and time of receipt must be recorded between the last person to relinquish the samples and the person who receives the samples in the lab, and they must be exactly the same.
   - Information must be legible

2) Samples must be properly labeled.
   - Use durable labels (labels provided by TestAmerica are preferred)
   - Include a unique identification number
   - Include sampling date and time & sampler ID
   - Include preservative used.
   - Use indelible ink
   - Information must be legible

3) Proper sample containers with adequate volume for the analysis and necessary QC are required for each analysis requested.

4) Samples must be preserved according to the requirements of the requested analytical method.

5) Most analytical methods require chilling samples to 4° C (other than water samples for metals analysis). For these methods, the criteria are met if the samples are chilled to below 6° C and above freezing (0°C). For methods with other temperature criteria (e.g. some bacteriological methods require ≤ 10 °C), the samples must arrive within ± 2° C of the required temperature or within the method specified range. **Note:** Samples that are hand delivered to the laboratory immediately after collection may not have had time to cool sufficiently. In this case the samples will be considered acceptable as long as there is evidence that the chilling process has begun (arrival on ice).

5i.) Samples that are delivered to the laboratory on the same day they are collected may not meet the requirements of Section 5. In these cases, the samples shall be considered acceptable if the samples were received on ice.

5ii.) If sample analysis is begun within fifteen (15) minutes of collection, thermal preservation is not required.

5iii.) Thermal preservation is not required in the field if the laboratory receives and refrigerates the sample within fifteen (15) minutes of collection.

- Chemical preservation (pH) will be verified prior to analysis and documented, either in sample control or at the analyst's level. The project manager will be notified immediately if there is a discrepancy. If analyses will still be performed, all affected results will be flagged to indicate improper preservation.

- **For Volatile Organic analyses in drinking water (Methods 502.2 or 524.2**). Residual chlorine must be neutralized prior to preservation. If there is prior knowledge that the samples are not chlorinated, state it on the COC and use the VOA vials pre-preserved with HCl. The following are other options for a sampler and laboratory where the presence of chlorine is not known:

  - 1. Test for residual chlorine in the field prior to sampling.
    - If no chlorine is present, the samples are to be preserved using HCl as usual.
    - If chlorine is present, add either ascorbic acid or sodium thiosulfate prior to adding HCl.

  - 2. Use VOA vials pre-preserved with sodium thiosulfate or ascorbic acid and add HCl after filling the VOA vial with the sample.

- **FOR WATER SAMPLES TESTED FOR CYANIDE (by Standard Methods or EPA 335)**
  - In the Field: Samples are to be tested for Sulfide using lead acetate paper prior to the addition of Sodium Hydroxide (NaOH). If sulfide is present, the sample must be treated with Cadmium Chloride and filtered prior to the addition of NaOH.

    - If the sulfide test and treatment is not performed in the field, the lab will test the samples for sulfide using lead acetate paper at the time of receipt and if sulfide is present in the sample, the client will be notified and given the option of retaking the sample and treating in the field per the method requirements or the laboratory can analyze the samples as delivered and qualify the results in the final report.

  - It is the responsibility of the client to notify the laboratory if thiosulfate, sulfite, or thiocyanate are known or suspected to be present in the sample. This notification may be on the chain of custody. The samples may need to be subcontracted to a laboratory that performs a UV digestion. If the lab does not perform the UV digestion on samples that contain these compounds, the results must be qualified in the final report.

- The laboratory must test the sample for oxidizing agents (e.g. Chlorine) prior to analysis and treat according to the methods prior to distillation. (ascorbic acid or sodium arsenite are the preferred choice).

6) Sample Holding Times
   - TestAmerica will make every effort to analyze samples within the regulatory holding time. Samples must be received in the laboratory with enough time to perform the sample analysis. Except for short holding time samples (< 48hr HT) sample must be received with at least 48 hrs (2 working days) remaining on the holding time for us to ensure analysis.

   - Analyses that are designated as "field" analyses (Odor, pH, Dissolved Oxygen, Disinfectant Residual; a.k.a. Residual Chlorine, and Redox Potential) should be analyzed ASAP by the field sampler prior to delivering to the lab (within 15 minutes). However, if the analyses are to be performed in the laboratory, TestAmerica will make every effort to analyze the samples within 24 hours from receipt of the samples in the testing laboratory. Samples for "field" analyses received after 4:00 pm on Friday or on the weekend will be analyzed no later than the next business day after receipt (i.e., Monday, unless Monday is a holiday). Samples will remain refrigerated and sealed until the time of analysis. The actual times of all "field" sample analyses are noted in the final report. Samples analyzed in the laboratory will be qualified on the final report with an 'H' to indicate holding time exceedance.

7) All samples submitted for Volatile Organic analyses must have a Trip Blank submitted at the same time. TestAmerica will supply a blank with the bottle order.

8) The project manager will be notified if any sample is received in damaged condition. TestAmerica will request that a sample be resubmitted for analysis.

9) Recommendations for packing samples for shipment.

   - Pack samples in Ice rather than "Blue" ice packs.

   - Soil samples should be placed in plastic zip-lock bags. The containers often have dirt around the top, do not seal very well and are prone to intrusion from the water which results from melted ice.

   - Water samples are best package when wrapped with bubble-wrap or paper (newspaper, or paper towels) and then placed in plastic zip-lock bags.

   - Fill cooler void spaces with bubble wrap.

SECTION 24. ASSURING THE QUALITY OF TEST RESULTS

24.1 Overview

In order to assure our clients of the validity of their data, the laboratory continuously evaluates the quality of the analytical process. The analytical process is controlled not only by instrument calibration as discussed in Section 20, but also by routine process quality control measurements (e.g. Blanks, Laboratory Control Samples (LCS), Matrix Spikes (MS), duplicates (DUP), surrogates, Internal Standards (IS)). These quality control checks are performed as required by the method or regulations to assess precision and accuracy. Quality control samples are to be treated in the exact same manner as the associated field samples being tested. In addition to the routine process quality control samples, Proficiency Testing (PT) Samples (concentrations unknown to laboratory) are analyzed to help ensure laboratory performance.

24.2 Controls

Sample preparation or pre-treatment is commonly required before analysis. Typical preparation steps include homogenization, grinding, solvent extraction, sonication, acid digestion, distillation, reflux, evaporation, drying and ashing. During these pre-treatment steps, samples are arranged into discreet manageable groups referred to as preparation (prep) batches. Prep batches provide a means to control variability in sample treatment. Control samples are added to each prep batch to monitor method performance and are processed through the entire analytical procedure with investigative/field samples.

24.3 Negative Controls

Table 24-1. Example – Negative Controls

Control Type	Details
Method Blank (MB)	are used to assess preparation and analysis for possible contamination during the preparation and processing steps.
	The specific frequency of use for method blanks during the analytical sequence is defined in the specific standard operating procedure for each analysis. Generally it is 1 for each batch of samples; not to exceed 20 environmental samples.
	The method blank is prepared from a clean matrix similar to that of the associated samples that is free from target analytes (e.g., Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples. The method blank goes through all of the steps of the process (including as necessary: filtration, clean-ups, etc.).
	Reanalyze or qualify associated sample results when the concentration of a targeted analyte in the blank is at or above the reporting limit as established by the method or by regulation, AND is greater than 1/10 of the amount measured in the sample.
Calibration Blanks	are prepared and analyzed along with calibration standards where applicable. They are prepared using the same reagents that are used to prepare the standards. In some analyses the calibration blank may be included in the calibration curve.
Instrument Blanks	are blank reagents or reagent water that may be processed during an analytical sequence in order to assess contamination in the analytical system. In general, instrument blanks are used to differentiate between contamination caused by the analytical system and that caused by the sample handling or sample prep process. Instrument blanks may also be inserted throughout the analytical sequence to minimize the effect of carryover from samples with high analyte content.

Table 24-1. Example – Negative Controls

Control Type	Details
Trip Blank [1]	are required to be submitted by the client with each shipment of samples requiring aqueous and solid volatiles analyses (or as specified in the client's project plan). Additionally, trip blanks may be prepared and analyzed for volatile analysis of air samples, when required by the client. A trip blank may be purchased (certified clean) or is prepared by the laboratory by filling a clean container with pure deionized water that has been purged to remove any volatile compounds. Appropriate preservatives are also added to the container. The trip blank is sent with the bottle order and is intended to reflect the environment that the containers are subjected to throughout shipping and handling and help identify possible sources if contamination is found. The field sampler returns the trip blank in the cooler with the field samples.
Field Blanks [1]	are sometimes used for specific projects by the field samplers. A field blank prepared in the field by filling a clean container with pure reagent water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)
Equipment Blanks [1]	are also sometimes created in the field for specific projects. An equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (TNI)
Holding Blanks	also referred to as refrigerator or freezer blanks, are used to monitor the sample storage units for volatile organic compounds during the storage of VOA samples in the laboratory

[1] When known, these field QC samples should not be selected for matrix QC as it does not provide information on the behavior of the target compounds in the field samples. Usually, the client sample ID will provide information to identify the field blanks with labels such as "FB", "EB", or "TB."

Evaluation criteria and corrective action for these controls are defined in the specific standard operating procedure for each analysis.

24.4 Positive Controls

Control samples (e.g., QC indicators) are analyzed with each batch of samples to evaluate data based upon (1) Method Performance (Laboratory Control Sample (LCS) or Blank Spike (BS)), which entails both the preparation and measurement steps; and (2) Matrix Effects (Matrix Spike (MS) or Sample Duplicate (MD, DUP), which evaluates field sampling accuracy, precision, representativeness, interferences, and the effect of the matrix on the method performed. Each regulatory program and each method within those programs specify the control samples that are prepared and/or analyzed with a specific batch

Note that frequency of control samples vary with specific regulatory, methodology and project specific criteria. Complete details on method control samples are as listed in each analytical SOP.

24.4.1 Method Performance Control - Laboratory Control Sample (LCS)

The LCS measures the accuracy of the method in a blank matrix and assesses method performance independent of potential field sample matrix affects in a laboratory batch.

The LCS is prepared from a clean matrix similar to that of the associated samples that is free from target analytes (for example: Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples. The LCS is spiked with verified known amounts of analytes or is made of a material containing known and verified amounts of analytes, taken through all preparation and analysis steps along with the

field samples. Where there is no preparation taken for an analysis (such as in aqueous volatiles), or when all samples and standards undergo the same preparation and analysis process (such as Phosphorus), a calibration verification standard is reported as the LCS. In some instances where there is no practical clean solid matrix available, aqueous LCS's may be processed for solid matrices; final results may be calculated as mg/kg or ug/kg, assuming 100% solids and a weight equivalent to the aliquot used for the corresponding field samples, to facilitate comparison with the field samples.

Certified pre-made reference material purchased from a NIST/A2LA accredited vendor may also be used for the LCS when the material represents the sample matrix or the analyte is not easily spiked (e.g. solid matrix LCS for metals, TDS, etc.).

The specific frequency of use for LCS during the analytical sequence is defined in the specific standard operating procedure for each analysis. It is generally 1 for each batch of samples; not to exceed 20 environmental samples.

If the mandated or requested test method, or project requirements, do not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample (and Matrix Spike) where applicable (e.g. no spike of pH). However, in cases where the components interfere with accurate assessment (such as simultaneously spiking chlordane, toxaphene and PCBs in Method 608), the test method has an extremely long list of components or components are incompatible, at a minimum, a representative number of the listed components (see below) shall be used to control the test method. The selected components of each spiking mix shall represent all chemistries, elution patterns and masses, permit specified analytes and other client requested components. However, the laboratory shall ensure that all reported components are used in the spike mixture within a two-year time period.

- For methods that have 1-10 target analytes, spike all components.
- For methods that include 11-20 target analytes, spike at least 10 or 80%, whichever is greater.
- For methods with more than 20 target analytes, spike at least 16 components.
- Exception: Due to analyte incompatibility in pesticides, Toxaphene and Chlordane are only spiked at client request based on specific project needs.
- Exception: Due to analyte incompatibility between the various PCB aroclors, aroclors 1016 and 1260 are used for spiking as they cover the range of all of the aroclors. Specific aroclors may be used by request on a project specific basis.

24.5 Sample Matrix Controls

Table 24-3. Sample Matrix Control

Control Type	Details	
Matrix Spikes (MS)	Use	used to assess the effect sample matrix of the spiked sample has on the precision and accuracy of the results generated by the method used;
	Typical Frequency [1]	At a minimum, with each matrix-specific batch of samples processed, an MS is carried through the complete analytical procedure. Unless specified by the client, samples used for spiking are randomly selected and rotated between different client projects.If the mandated or requested test method does not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample and Matrix Spike. Refer to the method SOP for complete details
	Description	essentially a sample fortified with a known amount of the test analyte(s).
Surrogate	Use	Measures method performance to sample matrix (organics only).
	Typical Frequency [1]	Are added to all samples, standards, and blanks, for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available. The recovery of the surrogates is compared to the acceptance limits for the specific method. Poor surrogate recovery may indicate a problem with sample composition and shall be reported, with data qualifiers, to the client whose sample produced poor recovery.
	Description	Are similar to matrix spikes except the analytes are compounds with properties that mimic the analyte of interest and are unlikely to be found in environment samples.
Duplicates[2]	Use	For a measure of analytical precision, with each matrix-specific batch of samples processed, a matrix duplicate (MD or DUP) sample, matrix spike duplicate (MSD), or LCS duplicate (LCSD) is carried through the complete analytical procedure.
	Typical Frequency [1]	Duplicate samples are usually analyzed with methods that do not require matrix spike analysis.
	Description	Performed by analyzing two aliquots of the same field sample independently or an additional LCS.
Internal Standards	Use	Are spiked into all environmental and quality control samples (including the initial calibration standards) to monitor the qualitative aspect of organic and some inorganic analytical measurements.
	Typical Frequency [1]	All organic and ICP methods as required by the analytical method.
	Description	Used to correct for matrix effects and to help troubleshoot variability in analytical response and are assessed after data acquisition. Possible sources of poor internal standard response are sample matrix, poor analytical technique or instrument performance.

[1] See the specific analytical SOP for type and frequency of sample matrix control samples.

[2] LCSD's are normally not performed except when regulatory agencies or client specifications require them. The recoveries for the spiked duplicate samples must meet the same laboratory established recovery limits as the accuracy QC samples. If an LCSD is analyzed both the LCS and LCSD must meet the same recovery criteria and be included in the final report. The precision measurement is reported as "Relative Percent Difference" (RPD). Poor precision between duplicates (except LCS/LCSD) may indicate non-homogeneous matrix or sampling.

24.6 Acceptance Criteria (Control Limits)

As mandated by the test method and regulation, each individual analyte in the LCS, MS, or Surrogate Spike is evaluated against the control limits published in the test method. Where there are no established acceptance criteria, the laboratory calculates in-house control limits with the use of control charts or, in some cases, utilizes client project specific control limits. When this occurs, the regulatory or project limits will supersede the laboratory's in-house limits.

Note: For methods, analytes and matrices with very limited data (e.g., unusual matrices not analyzed often), interim limits are established using available data or by analogy to similar methods or matrices.

Once control limits have been established, they are verified, reviewed, and updated if necessary on an annual basis unless the method requires more frequent updating. Control limits are established per method (as opposed to per instrument) regardless of the number of instruments utilized.

Laboratory generated % Recovery acceptance (control) limits are generally established by taking ± 3 Standard Deviations (99% confidence level) from the average recovery of a minimum of 20-30 data points (more points are preferred).

- Regardless of the calculated limit, the limit should be no tighter than the Calibration Verification (ICV/CCV). (Unless the analytical method specifies a tighter limit).

- In-house limits cannot be any wider than those mandated in a regulated analytical method. Client or contract required control limits are evaluated against the laboratory's statistically derived control limits to determine if the data quality objectives (DQOs) can be achieved. If laboratory control limits are not consistent with DQOs, then alternatives must be considered, such as method improvements or use of an alternate analytical method.

- The lowest acceptable recovery limit will be 10% (the analyte must be detectable and identifiable). Exception: The lowest acceptable recovery limit for Benzidine will be 5% and the analyte must be detectable and identifiable.

- The maximum acceptable recovery limit will be 150%.

- The maximum acceptable RPD limit will be 35% for waters and 40% for soils. The minimum RPD limit is 10%.

- If either the high or low end of the control limit changes by ≤ 5% from previous, the control chart is visually inspected and, using professional judgment, they may be left unchanged if there is no affect on laboratory ability to meet the existing limits.

24.6.1 The lab must be able to generate a current listing of their control limits and track when the updates are performed. In addition, the laboratory must be able to recreate historical control limits.

24.6.1.1 The QA Department generates and reviews Quality Control Limit Summaries using the TALS Control Chart module. These tables summarize the updated, proposed precision and accuracy acceptability limits for each applicable analysis performed at TestAmerica Edison Once the QA Department is satisfied that the proposed limits are satisfactory the tables are forwarded to the applicable Department (Technical) Manager for final review. Once the proposed limits have been reviewed they entered into the appropriate TALS Method Limit Group database and approved for use (effectively replacing the existing limits in the database). The Quality Assurance Department maintains an archive of all limits used within the laboratory.

24.6.2 A LCS that is within the acceptance criteria establishes that the analytical system is in control and is used to validate the process. Samples that are analyzed with an LCS with recoveries outside of the acceptance limits may be determined as out of control and should be

reanalyzed if possible. If reanalysis is not possible, then the results for all affected analytes for samples within the same batch must be qualified when reported. The internal corrective action process (see Section 12) is also initiated if an LCS exceeds the acceptance limits. Sample results may be qualified and reported without reanalysis if:

- The analyte results are below the reporting limit and the LCS is above the upper control limit.

- If the analytical results are above the relevant regulatory limit and the LCS is below the lower control limit.

24.6.3 If the MS/MSDs do not meet acceptance limits, the MS/MSD and the associated spiked sample is reported with a qualifier for those analytes that do not meet limits. If obvious preparation errors are suspected, or if requested by the client, unacceptable MS/MSDs are reprocessed and reanalyzed to prove matrix interference. A more detailed discussion of acceptance criteria and corrective action can be found in the lab's method SOPs and in Section 12.

24.6.4 If a surrogate standard falls outside the acceptance limits, if there is not obvious chromatographic matrix interference, reanalyze the sample to confirm a possible matrix effect. If the recoveries confirm or there was obvious chromatographic interference, results are reported from the original analysis and a qualifier is added. If the reanalysis meets surrogate recovery criteria, the second run is reported (or both are reported if requested by the client). Under certain circumstances, where all of the samples are from the same location and share similar chromatography, the reanalysis may be performed on a single sample rather than all of the samples and if the surrogate meets the recovery criteria in the reanalysis, all of the affected samples would require reanalysis.

24.7 Additional Procedures to Assure Quality Control

The laboratory has written and approved method SOPs to assure the accuracy of the test method including calibration (see Section 20), use of certified reference materials (see Section 21) and use of PT samples (see Section 15).

A discussion regarding MDLs, Limit of Detection (LOD) and Limit of Quantitation (LOQ) can be found in Section 19.

- Use of formulae to reduce data is discussed in the method SOPs and in Section 20.
- Selection of appropriate reagents and standards is included in Section 9 and 21.
- A discussion on selectivity of the test is included in Section 5.
- Constant and consistent test conditions are discussed in Section 18.
- The laboratories sample acceptance policy is included in Section 23.

SECTION 25. REPORTING RESULTS

25.1 Overview

The results of each test are reported accurately, clearly, unambiguously, and objectively in accordance with State and Federal regulations as well as client requirements. Analytical results are issued in a format that is intended to satisfy customer and laboratory accreditation requirements as well as provide the end user with the information needed to properly evaluate the results. Where there is conflict between client requests and laboratory ethics or regulatory requirements, the laboratory's ethical and legal requirements are paramount, and the laboratory will work with the client during project set up to develop an acceptable solution. Refer to Section 7.

A variety of report formats are available to meet specific needs.

In cases where a client asks for simplified reports, there must be a written request from the client. There still must be enough information that would show any analyses that were out of conformance (QC out of limits) and there should be a reference to a full report that is made available to the client. Review of reported data is included in Section 19.

25.2 Test Reports

Analytical results are reported in a format that is satisfactory to the client and meets all requirements of applicable accrediting authorities and agencies. A variety of report formats are available to meet specific needs. The report is printed on laboratory letterhead, reviewed, and signed by the appropriate project manager. At a minimum, the standard laboratory report shall contain the following information:

25.2.1 A report title (e.g. Analytical Report For Samples) with a "sample results" column header.

25.2.2 Each report cover page printed on company letterhead, which includes the laboratory name, address and telephone number.

25.2.3 A unique identification of the report (e.g. work order number) and on each page an identification in order to ensure the page is recognized as part of the report and a clear identification of the end.

Note: Page numbers of report are represented as page # of ##. Where the first number is the page number and the second is the total number of pages.

25.2.4 A copy of the chain of custody (COC).

25.2.5 The name and address of client and a project name/number, if applicable.

25.2.6 Client project manager or other contact

25.2.7 Description and unambiguous identification of the tested sample(s) including the client identification code.

25.2.8 Date of receipt of sample, date and time of collection, and date(s) of test preparation and performance, and time of preparation or analysis if the required holding time for either activity is less than or equal to 72 hours.

25.2.9 Date reported or date of revision, if applicable.

25.2.10 Method of analysis including method code (EPA, Standard Methods, etc).

25.2.11 Reporting limit.

25.2.12 Method detection limits (if requested)

25.2.13 Definition of Data qualifiers and reporting acronyms (e.g. ND).

25.2.14 Sample results.

25.2.15 QC data consisting of method blank, surrogate, LCS, and MS/MSD recoveries and control limits.

25.2.16 Condition of samples at receipt including temperature. This may be accomplished in a narrative or by attaching sample login sheets

25.2.17 A statement expressing the validity of the results, that the source methodology was followed and all results were reviewed for error.

25.2.18 A statement to the effect that the results relate only to the items tested and the sample as received by the laboratory.

25.2.19 A statement that the report shall not be reproduced except in full, without prior express written approval by the laboratory coordinator.

25.2.20 A signature and title of the person(s) accepting responsibility for the content of the report and date of issue. Signatories are appointed by the Lab Director.

25.2.21 When TNI accreditation is required, the lab shall certify that the test results meet all requirements of TNI or provide reasons and/or justification if they do not.

25.2.22 The laboratory includes a cover letter.

25.2.23 Where applicable, a narrative to the report that explains the issue(s) and corrective action(s) taken in the event that a specific accreditation or certification requirement was not met.

25.2.24 When soil samples are analyzed, a specific identification as to whether soils are reported on a “wet weight” or “dry weight” basis.

25.2.25 Appropriate laboratory certification number for the state of origin of the sample, if applicable.

25.2.26 If only part of the report is provided to the client (client requests some results before all of it is complete), it must be clearly indicated on the report (e.g., partial report). A complete report must be sent once all of the work has been completed.

25.2.27 Any non-TestAmerica subcontracted analysis results are provided as a separate report on the official letterhead of the subcontractor. All TestAmerica subcontracting is clearly identified on the report as to which laboratory performed a specific analysis.

25.2.28 Non-accredited tests shall be clearly identified in the case narrative when claims of accreditation to the TNI standard are made.

Note: Refer to the Corporate SOP on Electronic Reporting and Signature Policy (No. CA-I-P-002) for details on internally applying electronic signatures of approval.

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25.3 Reporting Level or Report Type

The laboratory offers four levels of quality control reporting. Each level, in addition to its own specific requirements, contains all the information provided in the preceding level. The packages provide the following information in addition to the information described above:

- Level I is a report with the features described in Section 25.2 above.
- Level II (also called 'Results/QA) is a Level I report plus summary information, including results for the method blank reported to the laboratory MDL, percent recovery for laboratory control samples and matrix spike samples, and the RPD values for all MSD and sample duplicate analyses.
- NJDEP Reduced Deliverables Format which contains, at minimum, the elements listed in the current NJDEP Technical Requirements for Site Remediation, N.J.A.C. 7:26E.
- NJDEP Full Deliverables Format (Non-USEPA CLP Methods) which contains, at minimum, the elements listed in the current NJDEP Technical Requirements for Site Remediation, N.J.A.C. 7:26E.
- NJDEP Full Deliverables Format (USEPA CLP Methods) which contains, at minimum, the elements listed in the current NJDEP Technical Requirements for Site Remediation, N.J.A.C. 7:26E.
- NYSDEC ASP 'A' and 'B' Deliverables Format which contain, at minimum, the elements listed in the current *New York State Department of Environmental Conservation Analytical Services Protocol*.

In addition to the various levels of QC packaging, the laboratory also provides reports in diskette deliverable form. Initial reports may be provided to clients by facsimile. All faxed reports are followed by hardcopy. Procedures used to ensure client confidentiality are outlined in Section 25.6.

25.3.1 Electronic Data Deliverables (EDDs)

EDDs are routinely offered as part of TestAmerica's services. TestAmerica Edison offers a variety of EDD formats including NJ Hazsite Deliverables, Excel, Dbase, GISKEY, and Text Files.

EDD specifications are submitted to the IT Department by the PM for review and undergo the contract review process. Once the facility has committed to providing data in a specific electronic format, the coding of the format may need to be performed. This coding is documented and validated. The validation of the code is retained by the IT staff coding the EDD.

EDDs shall be subject to a review to ensure their accuracy and completeness. If EDD generation is automated, review may be reduced to periodic screening if the laboratory can demonstrate that it can routinely generate that EDD without errors. Any revisions to the EDD format must be reviewed until it is demonstrated that it can routinely be generated without errors. If the EDD can be reproduced accurately and if all subsequent EDDs can be produced error-free, each EDD does not necessarily require a review.

25.4 Supplemental Information for Test

The lab identifies any unacceptable QC analyses or any other unusual circumstances or observations such as environmental conditions and any non-standard conditions that may have affected the quality of a result. This is typically in the form of a footnote or a qualifier and/or a narrative explaining the discrepancy in the front of the report.

Numeric results with values outside of the calibration range, either high or low are qualified as 'estimated'.

Where quality system requirements are not met, a statement of compliance/non-compliance with requirements and/or specifications is required, including identification of test results derived from any sample that did not meet TNI sample acceptance requirements such as improper container, holding time, or temperature.

Where applicable, a statement on the estimated uncertainty of measurements; information on uncertainty is needed when a client's instructions so require.

Opinions and Interpretations - The test report contains objective information, and generally does not contain subjective information such as opinions and interpretations. If such information is required by the client, the Laboratory Director will determine if a response can be prepared. If so, the Laboratory Director will designate the appropriate member of the management team to prepare a response. The response will be fully documented, and reviewed by the Laboratory Director, before release to the client. There may be additional fees charged to the client at this time, as this is a non-routine function of the laboratory.

Note: Review of data deliverable packages for submittal to regulatory authorities requires responses to non-conforming data concerning potential impact on data quality. This necessitates a limited scope of interpretation, and this work is performed by the QA Department. This is the only form of "interpretation" of data that is routinely performed by the laboratory.

When opinions or interpretations are included in the report, the laboratory provides an explanation as to the basis upon which the opinions and interpretations have been made. Opinions and interpretations are clearly noted as such and where applicable, a comment should be added suggesting that the client verify the opinion or interpretation with their regulator.

25.5 Environmental Testing Obtained From Subcontractors

If the laboratory is not able to provide the client the requested analysis, the samples would be subcontracted following the procedures outlined in the Corporate SOP on Subcontracting (SOP No. CA-L-S-002).

Data reported from analyses performed by a subcontractor laboratory are clearly identified as such on the analytical report provided to the client. Results from a subcontract laboratory outside of TestAmerica are reported to the client on the subcontract laboratory's original report stationary and the report includes any accompanying documentation.

25.6 Client Confidentiality

In situations involving the transmission of environmental test results by telephone, facsimile or other electronic means, client confidentiality must be maintained.

TestAmerica will not intentionally divulge to any person (other than the Client or any other person designated by the Client in writing) any information regarding the services provided by TestAmerica or any information disclosed to TestAmerica by the Client. Furthermore, information known to be potentially endangering to national security or an entity's proprietary rights will not be released.

Note: This shall not apply to the extent that the information is required to be disclosed by TestAmerica under the compulsion of legal process. TestAmerica will, to the extent feasible, provide reasonable notice to the client before disclosing the information.

Note: Authorized representatives of an accrediting authority are permitted to make copies of any analyses or records relevant to the accreditation process, and copies may be removed from the laboratory for purposes of assessment.

25.6.1 Report deliverable formats are discussed with each new client. If a client requests that reports be faxed or e-mailed, the reports are faxed with a cover sheet or e-mailed with the following note that includes a confidentiality statement similar to the following:

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at the 1-800-765-0980 (or for e-mails: please notify us immediately by e-mail or by phone (1-800-765-0980) and delete this material from any computer).

25.7 Format of Reports

The format of reports is designed to accommodate each type of environmental test carried out and to minimize the possibility of misunderstanding or misuse.

25.8 Amendments to Test Reports

Corrections, additions, or deletions to reports are only made when justification arises through supplemental documentation. Justification is documented using the laboratory's corrective action system (refer to Section 12).

The revised report is retained on the Archive data server, as is the original report. The revised report is stored in the Archive data server under the sample number followed by "Rev (n)" where 'n' is the revision number. The revised report will have the words "Revision (n)" on the report cover page beneath the report date. Additionally, a section entitled "Revised Report" will appear on the Case Narrative page. A brief explanation of the reasons for the re-issue will be included in this section.

25.9 Policies on Client Requests for Amendments

25.9.1 Policy on Data Omissions or Reporting Limit Increases

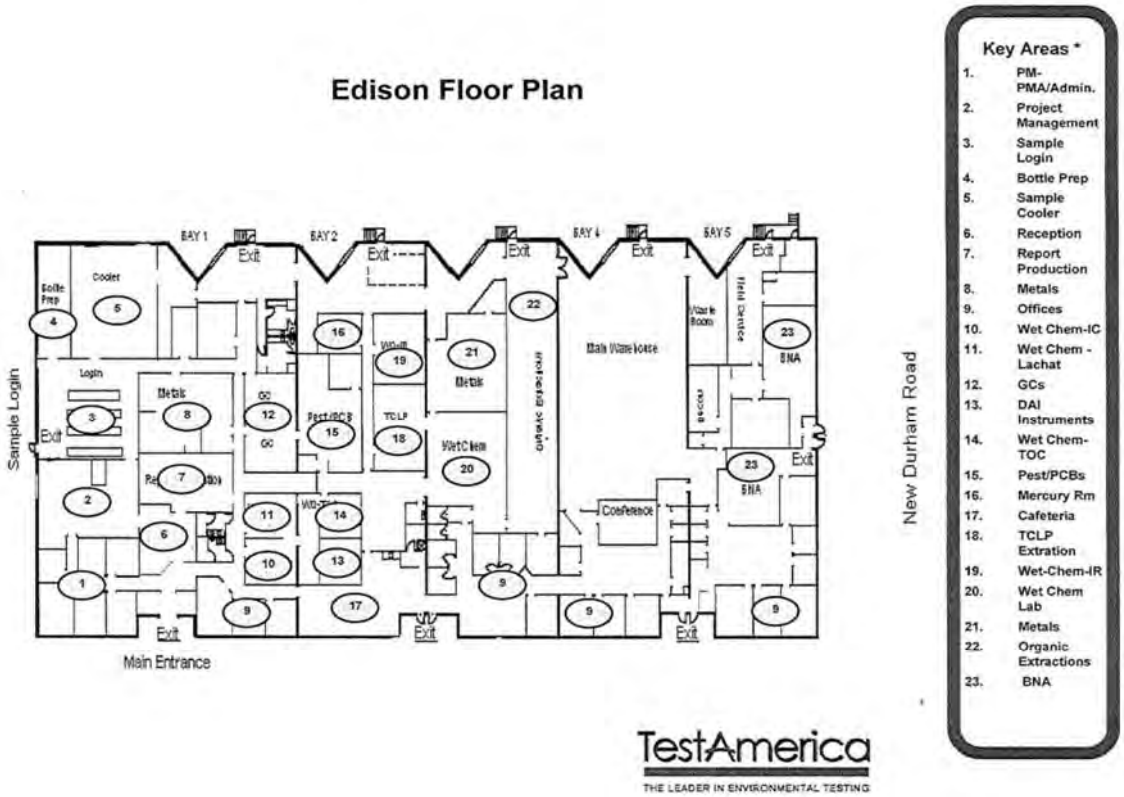
Fundamentally, our policy is simply to not omit previously reported results (including data qualifiers) or to not raise reporting limits and report sample results as ND. This policy has few exceptions. Exceptions are:

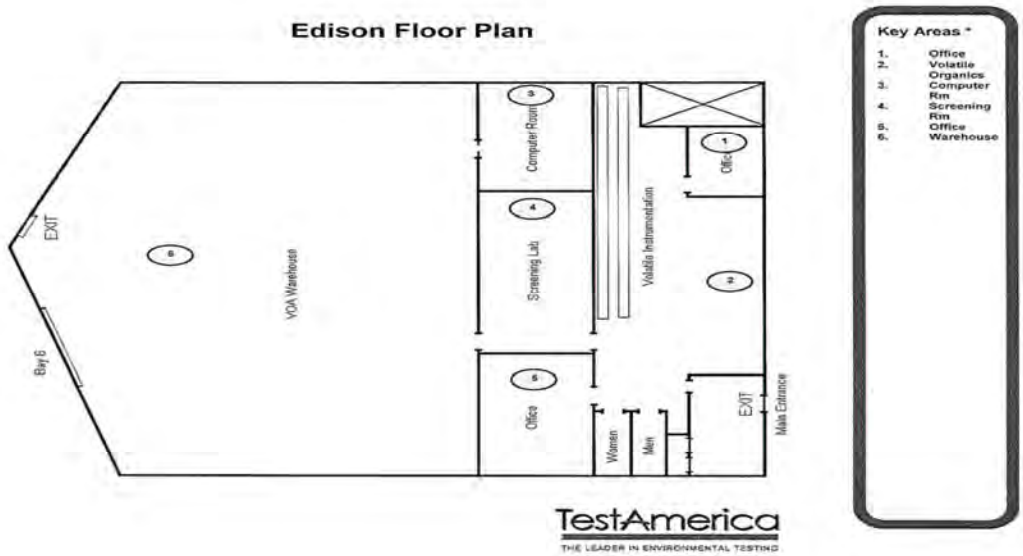
- Laboratory error.
- Sample identification is indeterminate (confusion between COC and sample labels).
- An incorrect analysis (not analyte) was requested (e.g., COC lists 8315 but client wanted 8310). A written request for the change is required.
- Incorrect limits reported based on regulatory requirements.
- The requested change has absolutely *no possible* impact on the interpretation of the analytical results and there is *no possibility* of the change being interpreted as misrepresentation by anyone inside or outside of our company.

25.9.2 Multiple Reports

TestAmerica does not issue multiple reports for the same work order where there is different information on each report (this does not refer to copies of the same report) unless required to meet regulatory needs and approved by QA.

Appendix 1. Laboratory Floor Plan





Appendix 2. Glossary/Acronyms (EL-V1M2 Sec. 3.1)

Glossary:

Acceptance Criteria: Specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

Accreditation: The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory.

Accuracy: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. (QAMS)

Analyst: The designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.

Analytical Uncertainty: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis. (TNI)

Assessment: The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation). (TNI)

Audit: A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI)

Batch: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** is composed of one (1) to twenty (20) environmental samples of the same quality systems matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be twenty-four (24) hours. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed twenty (20) samples. (TNI)

Bias: The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). (TNI)

Blank: A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (ASQC)

Calibration: A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. (TNI)

1) In calibration of support equipment the values realized by standards are established through the use of reference standards that are traceable to the International System of Units (SI).

2) In calibration according to methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications.

Calibration Curve: The mathematical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. (TNI)

Calibration Standard: A substance or reference material used to calibrate an instrument (QAMS)

Certified Reference Material (CRM): A reference material accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. (TNI).

Chain of Custody (COC) Form: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; the collector; time of collection; preservation; and requested analyses. (TNI)

Compromised Samples: Those samples which are improperly sampled, insufficiently documented (chain of custody and other sample records and/or labels), improperly preserved, collected in improper containers, or exceeding holding times when delivered to a laboratory. Under normal conditions, compromised samples are not analyzed. If emergency situation require analysis, the results must be appropriately qualified.

Confidential Business Information (CBI): Information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products. TNI and its representatives agree to safeguarding identified CBI and to maintain all information identified as such in full confidentiality.

Confirmation: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to Second Column Confirmation; Alternate wavelength; Derivatization; Mass spectral interpretation; Alternative detectors or Additional Cleanup procedures. (TNI)

Conformance: An affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements. (ANSI/ASQC E4-1994)

Correction: Actions necessary to correct or repair analysis specific non-conformances. The acceptance criteria for method specific QC and protocols as well as the associated corrective actions. The analyst will most frequently be the one to identify the need for this action as a result of calibration checks and QC sample analysis**.** No significant action is taken to change behavior, process or procedure.

Corrective Action: The action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

Data Audit: A qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data re of acceptable quality (i.e., that they meet specified acceptance criteria).

Data Reduction: The process of transforming the number of data items by arithmetic or statistical calculations, standard curves, and concentration factors, and collation into a more useable form. (TNI)

Deficiency: An unauthorized deviation from acceptable procedures or practices, or a defect in an item. (ASQC)

Demonstration of Capability: A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI)

Document Control: The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly, and controlled to ensure use of the correct version at the location where the prescribed activity if performed. (ASQC)

Duplicate Analyses: The analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory. (EPA-QAD)

Equipment Blank: Sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures.

External Standard Calibration: Calibrations for methods that do not utilize internal standards to compensate for changes in instrument conditions.

Field Blank: Blank prepared in the field by filing a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken (EPA OSWER)

Field of Accreditation: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation.

Holding Times: The maximum time~~s~~ that samples may be held prior to analyses and still be considered valid or not compromised. (40 CFR Part 136)

Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical test method. (TNI)

Internal Standard Calibration: Calibrations for methods that utilize internal standards to compensate for changes in instrument conditions.

Instrument Blank: A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA-QAD)

Instrument Detection Limit (IDL): The minimum amount of a substance that can be measured with a specified degree of confidence that the amount is greater than zero using a specific instrument. The IDL is associated with the instrumental portion of a specific method only, and sample preparation steps are not considered in its derivation. The IDL is a statistical estimation at a specified confidence interval of the concentration at which the relative uncertainty is ± 100%. The IDL represents a range where qualitative detection occurs on a specific instrument. Quantitative results are not produced in this range.

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank, or QC check sample): A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes, taken through all preparation and analysis steps of the procedure unless otherwise noted in a reference method. 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.

An LCS shall be prepared at a minimum of 1 per batch of 20 or less samples per matrix type per sample extraction or preparation method except for analytes for which spiking solutions are not available such as total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, temperature, dissolved oxygen or turbidity. The results of these samples shall be used to determine batch acceptance.

Least Squares Regression (1st Order Curve): The least squares regression is a mathematical calculation of a straight line over two axes. The y axis represents the instrument response (or Response ratio) of a standard or sample and the x axis represents the concentration. The regression calculation will generate a correlation coefficient (r) that is a measure of the "goodness of fit" of the regression line to the data. A value of 1.00 indicates a perfect fit. In order to be used for quantitative purposes, r must be greater than or equal to 0.99 for organics and 0.995 for inorganics.

Limit(s) of Detection (LOD) [a.k.a., Method Detection Limit (MDL)]: A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. (TNI)

LOD Verification [a.k.a., MDL Verification]: A processed QC sample in the matrix of interest, spiked with the analyte at no more than 3X the LOD for single analyte tests and 4X the LOD for multiple analyte tests and processed through the entire analytical procedure.

Limit(s) of Quantitation (LOQ) [a.k.a., Reporting Limit]: The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. (TNI)

Quality System (QS) Matrix: The component or substrate that contains the analyte of interest. For purposes of batch and QC requirement determinations, the following matrix distinctions shall be used:

Aqueous: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine —Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: Any aqueous sample that has been designated as a potable or potential potable water source.

Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Non-Aqueous Liquid: Any organic liquid with <15% settleable solids.

Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: Includes soils, sediments, sludges, and other matrices with >15% settleable solids.

Chemical Waste: A product or by-product of an industrial process that results in a matrix not previously defined.

Air & Emissions: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device. (TNI)

Matrix Spike (spiked sample or fortified sample): A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of target analyte to a specified amount of sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Matrix Spike Duplicate (spiked sample or fortified sample duplicate): A replicate matrix spike prepared and analyzed to obtain a measure of the precision of the recovery for each analyte.

Method Blank: A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses.

Method Detection Limit: The minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. (40 CFR Part 136, Appendix B)

Negative Control: Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.

Non-conformance: An indication, judgment, or state of not having met the requirements of the relevant specifications, contract, or regulation.

Performance Audit: The routine comparison of independently obtained qualitative and quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory.

Positive Control: Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI)

Preservation: Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. (TNI)

Proficiency Testing: A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI)

Proficiency Testing Program: The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI)

Proficiency Test Sample (PT): A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within specified acceptance criteria. (TNI)

Quality Assurance: An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is of the type of quality needed and expected by the client. (TNI)

Quality Assurance [Project] Plan (QAPP): A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EAP-QAD)

Quality Control: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality. (TNI)

Quality Control Sample: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control. (TNI)

Quality Manual: A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (TNI)

Quality System: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC activities. (TNI)

Raw Data: The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI)

Record Retention: The systematic collection, indexing and storing of documented information under secure conditions.

Reference Material: Material or substance one or more properties of which are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI)

Reference Standard: Standard used for the calibration of working measurement standards in a given organization or a given location. (TNI)

Sampling: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure.

Second Order Polynomial Curve (Quadratic): The 2nd order curves are a mathematical calculation of a slightly curved line over two axis. The y axis represents the instrument response (or Response ratio) of a standard or sample and the x axis represents the concentration. The 2nd order regression will generate a coefficient of determination (COD or r^2) that is a measure of the "goodness of fit" of the quadratic curvature the data. A value of 1.00 indicates a perfect fit. In order to be used for quantitative purposes, r^2 must be greater than or equal to 0.99.

Selectivity: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent or that may behave similarly to the target analyte or parameter within the measurement system. (TNI)

Sensitivity: The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI)

Spike: A known mass of target analyte added to a blank, sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.

Standard: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organizations procedures and policies. (TNI)

Standard Operating Procedures (SOPs): A written document which details the method for an operation, analysis, or action, with thoroughly prescribed techniques and steps. SOPs are officially approved as the methods for performing certain routine or repetitive tasks. (TNI)

Storage Blank: A blank matrix stored with field samples of a similar matrix (volatiles only) that measures storage contribution to any source of contamination.

Surrogate: A substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes.

Surrogate compounds must be added to all samples, standards, and blanks, for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available. Poor surrogate recovery may indicate a problem with sample composition and shall be reported to the client whose sample produced poor recovery. (QAMS)

Systems Audit (also Technical Systems Audit): A thorough, systematic, qualitative on-site assessment of the facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a total measurement system. (EPA-QAD)

Technical Manager: A member of the staff of an environmental laboratory who exercises actual day-to-day supervision of laboratory operations for the appropriate fields of accreditation and reporting of results

Technology: A specific arrangement of analytical instruments, detection systems, and/or preparation techniques.

Traceability: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI)

Trip Blank: A blank matrix placed in a sealed container at the laboratory that is shipped, held unopened in the field, and returned to the laboratory in the shipping container with the field samples.

Uncertainty: A parameter associated with the result of a measurement that characterizes the dispersion of the value that could reasonably be attributed to the measured value.

Acronyms:

CAR – Corrective Action Report
CCV – Continuing Calibration Verification
CF – Calibration Factor
CFR – Code of Federal Regulations
COC – Chain of Custody
DOC – Demonstration of Capability
DQO – Data Quality Objectives
DUP - Duplicate
EHS – Environment, Health and Safety
EPA – Environmental Protection Agency
GC - Gas Chromatography
GC/MS - Gas Chromatography/Mass Spectrometry
HPLC - High Performance Liquid Chromatography
ICP - Inductively Coupled Plasma Atomic Emission Spectroscopy
ICP/MS – ICP/Mass Spectrometry
ICV – Initial Calibration Verification
IDL – Instrument Detection Limit
IH – Industrial Hygiene
IS – Internal Standard
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
LIMS – Laboratory Information Management System
LOD – Limit of Detection
LOQ – Limit of Quantitation
MDL – Method Detection Limit
MDLCK – MDL Check Standard
MDLV – MDL Verification Check Standard
MRL – Method Reporting Limit Check Standard
MS – Matrix Spike
MSD – Matrix Spike Duplicate
NELAP - National Environmental Laboratory Accreditation Program
PT – Performance Testing
TNI – The NELAC Institute
QAM – Quality Assurance Manual
QA/QC – Quality Assurance / Quality Control
QAPP – Quality Assurance Project Plan
RF – Response Factor
RPD – Relative Percent Difference
RSD – Relative Standard Deviation
SD – Standard Deviation
SOP – Standard Operating Procedure
TAT – Turn-Around-Time
VOA – Volatiles
VOC – Volatile Organic Compound

Appendix 3. Laboratory Certifications, Accreditations, Validations

TestAmerica Edison maintains accreditations, certifications, and approvals with numerous state and national entities. Programs vary but may include on-site audits, reciprocal agreements with another entity, performance testing evaluations, review of the QA Manual, Standard Operating Procedures, Method Detection Limits, training records, etc. At the time of this QA Manual revision, the laboratory has accreditation/certification/licensing with the following organizations:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Certifications

Laboratory	Program	Authority	Identification	Expiration Date
TestAmerica Edison	Federal	USDA	NJCA-003-08	03/11/2014
TestAmerica Edison	NELAP	New Jersey	12028	06/30/2014
TestAmerica Edison	NELAP	New York	11452	04/01/2014
TestAmerica Edison	NELAP	Pennsylvania	68-00522	02/28/2014
TestAmerica Edison	State Program	Connecticut	PH-0200	09/30/2014
TestAmerica Edison	State Program	DE Haz. Subst. Cleanup Act (HSCA)	N/A	04/30/2014
TestAmerica Edison	State Program	Rhode Island	LAO00132	12/30/2013

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* Certification Valid - Laboratory is Pending Renewal with the Program Authority

For more information, or to contact a local TestAmerica representative nearest you, please visit our website at www.testamericainc.com

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The certificates and parameter lists (which may differ) are available, upon request, from a laboratory representative. for each organization may be found on the corporate web site, the laboratory's public server, the final report review table, and in the following offices: QA, marketing, and project management.

QUALITY ASSURANCE MANUAL

ALS Environmental

Middletown Facility

34 Dogwood Lane

Middletown, PA 17057

717-944-5541 (T)

717-944-1430 (F)

www.alsglobal.com

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QUALITY ASSURANCE MANUAL

SOPID:	QA Plan	Rev. Number:	23	Revision Date:	1/03/2013

Approved By: _____ Date: 1/4/13
Quality Assurance Manager - Helen MacMinn

Approved By: _____ Date: 1/3/2013
Technical Manager - Anna Milliken

Approved By: _____ Date: 1/4/2013
Laboratory Director - Peter Frick

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1) Document History

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Revision 1	January, 1989
Revision 2	January, 1990
Revision 3	January, 1991
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Revision 13	August, 2001
Revision 14	February, 2003
Revision 15	September, 2004
Revision 16	February, 2005
Revision 17	July, 2006
Revision 18	October, 2007
Revision 19	October, 2008
Revision 20	November, 2009
Revision 21	November, 2010
Revision 22	December 7, 2011
Revision 23	December, 2012

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2) Quality Assurance Program Plan Identification Form

Document Title:	Quality Assurance Plan
Organization Title:	ALS
Organization Unit:	Environmental
Address:	34 Dogwood Lane Middletown, PA 17057
Phone:	(717) 944-5541 (717) 944-1430 fax

3) Quality Policy and Objectives

The main objective of ALS Environmental is to provide our Customers with high quality laboratory services that meet all requirements of our regulatory authorities and organizations providing recognition. We are dedicated to providing our Customers with analytical data and services that conform to ISO Guide 17025 requirements and to continually improve the effectiveness of the quality system. This Quality Assurance Plan details facilities, personnel and equipment necessary for accomplishing this objective along with general procedures and practices, which will be followed to maintain adherence to this objective.

There is a firm commitment from all members of this laboratory to follow a comprehensive Quality Assurance Plan (QAP). This commitment and dedication to quality is fully supported and communicated from management to the bench level through our policies in order to meet the objectives of our analytical laboratory and best serve our Customers. The following Quality Assurance Plan is an embodiment of the current practices of quality assurance/quality control implemented by ALS to ensure the production of accurate, consistent data of known quality. The stated policies and procedures meet the requirements of all certifications/accreditations currently held by the laboratory, including the most current NELAP standards and the most current Department of Defense (DoD) QSM.

ALS's approach to Quality Assurance starts with the Laboratory Director who delineates policy and sets goals in conjunction with Corporate management personnel. Management staff and laboratory personnel implement policies. Each department assists in the process by providing assessment of operating procedures along with recommendations for improvements or corrections. All personnel are aware of the relevance and importance of their activities and how they contribute to the overall achievement of the objectives of the quality system.

Secondly, a Quality Assurance Manager, who reports directly to the Laboratory Director, oversees prevention, assessment and control procedures for the analytical laboratory and various associated departments within the organization. These three functions, prevention,

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assessment and control, comprise the foundation of the laboratory's approach to Quality Assurance.

In addition to implementing the policies and practices established in the QAP, each laboratory section is responsible for keeping an updated version of their Standard Operating Procedures (SOPs) applicable to their section to ensure continuity of analysis throughout the laboratory. Specifics in the areas such as sample handling, instrument calibration, quality control measures, data acquisition and data processing are thoroughly outlined and explained in each SOP. By continuously updating and following the guidelines stated in the QAP and SOPs, the laboratory is able to generate data of consistently high quality.

Existing in conjunction with the quality program at ALS Environmental is a comprehensive Ethics Program. This ensures the prevention of data quality compromise. Each employee is expected to maintain a firm commitment to comply with all applicable laws and regulations, and to conduct business in accordance with the letter, spirit, and intent of all relevant laws and to refrain from any illegal, dishonest, or unethical conduct. The ALS Environmental business policy is outlined in the employee handbook and the ALS Ethics Credo that each employee must read and agree to as a condition of his or her initial employment. Documentation that each employee has read and understands the significance of the Ethics Credo becomes part of an individual's training records. Thereafter, on an annual basis each employee is required to review the Ethics Credo which is then documented as part of their permanent training record.

The policies and practices of quality assurance/quality control presented in the following text are set forth as minimums. Any additional measures that a project or investigation requires can be incorporated into the project specific Quality Assurance Project Plan (QAPP).

Separate Microbiological and Field Sampling Quality Assurance Plans have been established. These plans should be referred to for the specific quality control procedures required for the microbiology and field services departments.

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4) Organization and Management Structure

4.1 Ownership

ALS Environmental is part of the ALS Group USA, incorporated and is owned by ALS Limited.

4.2 Organizational Structure of Personnel

See Appendix A for ALS's Organizational Chart, which is structured by Position and Department.

4.3 Job Descriptions

4.3.1 Laboratory Director

Reports To:

- Director of Operations Eastern USA

Responsibilities:

- Ensure commitment to compliance with the standards as stated in ISO 17025.
- Direct the day-to-day operations and management of the laboratory.
- Guide Sales & Marketing activities.
- Provide senior management with timely information about business matters, which include financial, sales, marketing, personnel, capital expenditures, safety, and quality issues.
- Guarantee quality in the services provided by the laboratory.
- Insure the financial health of the laboratory.

Requirements:

- Education: A four-year college degree from an accredited educational institution or equivalent.

Experience:

- A minimum of five years nonacademic experience.

Deputy:

- In the absence of the Laboratory Director, the Operations Manager will assume the above responsibilities.

4.3.2 Operations Manager

Reports To:

- Laboratory Director

Responsibilities:

- Manages sales team in corporate and satellite offices by developing and implementing new goals and objectives to increase sales and profits.
- Maintain existing customer bases by managing and maintaining corporate relationships and contract renewals.
- Oversee growth and expansion of remote satellite offices to enable overall growth of services and sectors for ALS Environmental.
- Provide industry updates to Laboratory Director for consideration of future expansion and market trends.
- Assist management team in personnel related matters to strengthen overall laboratory organization.
- Control costs of overall organization to ensure maximum profitability for stockholders.
- Promote and develop corporate policy throughout the entire corporation while stressing unity and consistency in each remote office location.

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- Supervise the Accounting Department, Field Services, Sample Receiving, and Customer Service Department in streamlining operations and resolving customer conflicts.
- Maintain knowledge of relevant environmental criteria and guidelines.
- Manage sponsorship of event programs and trade shows to promote the laboratory and its capabilities.
- Advise Laboratory Director and Executive Management team on strategies to improve market position and profitability of corporation.
- Manage regional laboratory facilities and service centers

Requirements:

- Education: Completion of a university degree and/or college level Chemistry program or equivalent.

Experience:

- A minimum of three (3) years related Environmental Chemistry experience.
- A minimum of three (3) years related sales experience.

Deputy:

- In the absence of the Operations Manager, the Laboratory Director will assume the above responsibilities.

4.3.3 IT Manager

Reports To:

- Laboratory Director

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO 17025.
- Direct the work of systems analysts, computer programmers, support specialists, and other computer-related workers.
- Plan and coordinate activities such as installation and upgrading of hardware and software, programming and systems design, development of computer networks, and implementation of Internet and Intranet sites.
- Provide day-to-day onsite administrative support for software users in a variety of applications.
- Maintain network hardware and software, analyze problems, and monitor the network to ensure its availability to system users.

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- Gather data to identify customer needs and then use the information to identify, interpret, and evaluate system and network requirements.
- Provide custom programming, reports and electronic deliverables to meet the requirements of in-house staff and external customers.
- Implement and monitor software security systems which will maintain the integrity of computer programs and data on the hard disk files of the lab's server and the hard drives of individual machines.
- Establish, implement and maintain the disaster recovery procedures for information resources.
- Provide technical support in evaluating, selecting, implementing, and maintaining systems and application software.
- Develop and implement office automation systems.

Requirements:

- Education: A four-year college degree from an accredited educational institution in chemistry or a related science or equivalent.

Experience:

- A minimum of three years nonacademic laboratory experience.

Deputy:

- In the absence of the IT Manager, these job responsibilities will be distributed among the IT staff.

4.3.4 Technical Manager

Reports To:

- Operations Manager, Laboratory Director,

Responsibilities:

- Ensure commitment to compliance with the standards as stated in ISO17025.
- Supports the activities of the production laboratory by providing technical guidance and client support in relation to troubleshooting instrument problems, methods development, results interpretation and compliance with NELAP, DoD, and other QA Program requirements.
- Ensures the efficient operations of all laboratory instrumentation by providing the departmental supervisors technical guidance with relation to method compliance and method development.

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- Develops and maintains laboratory systems, working with the QA Manager to ensure ALS Environmental compliance with the DoD QSM, NELAP, and other QA Program requirements.
- Assists IT Manager in the understanding and development of automated data deliverables for ALS clientele including direct interface with the IT Group, software vendors, and laboratory staff which are required to accomplish this task.
- Assists analytical staff in the timely development of new methods in a cost-effective manner.
- Responds to client inquiries as a direct response to their analytical results.
- Provides assistance to the Sales and Marketing team on technical presentations to be presented to potential and existing customer base.
- Provides technical review of QAPPs and SOWs submitted for request for proposals.
- Proficient in the knowledge of and responsible for investigating all regulations and technical requirements for both Federal and State environmental programs and communicating updates and revisions to all personnel affected by these changes.
- Performs additional duties as assigned.

Requirements:

- Education: A four-year college degree from an accredited educational institution in the chemical, environmental, biological sciences, physical sciences or engineering, with at least 24 credit hours in chemistry.

Experience:

- A minimum of two years experience in the environmental analysis of organic and inorganic analyses for which the laboratory maintains accreditation.

Deputy:

- In the absence of the Technical Manager, the Operations Manager will assume the above responsibilities.

4.3.5 Quality Assurance/Quality Control Manager

The Quality Assurance Manager operates independently of all data generating areas.

Reports To:

- Laboratory Director

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Responsibilities:

- Ensure commitment to compliance with the standards as stated in ISO17025.
- Serve as the focal point for QA/QC in the laboratory.
- Maintain an adequate and current quality assurance plan.
- Monitor the QA program as documented in the QA plan and ensure all elements are carried out as written.
- Conduct scheduled and unscheduled audits and inspections and report findings to management.
- Conduct and respond to scheduled on-site evaluations by regulatory agencies.
- Ensure that current SOPs are available for all methods and that they conform to recognized standards.
- Prepare project specific quality assurance plans as needed.
- Conduct an annual quality review with Upper Management.
- Coordinate proficiency testing program for certification requirements.
- Maintain single blind PE sample program.
- Maintain a record of deficiencies or "out of control" events and any corrective actions taken.
- Oversee and/or review quality control data.
- Evaluate data objectively and perform assessments without outside (e.g., managerial) influence.
- Initiate and maintain employee training records.
- Maintain subcontractor approval program.
- Perform orientation for “new” employees detailing laboratory QA/QC requirements.
- Provide Sales with required quality control documentation for submission of “Request for Bid” proposals.

Requirements

- Education: A four-year college degree from an accredited educational institution in a basic or applied science or equivalent and at least 24 credit hours in Chemistry.

Experience:

- A minimum of two years nonacademic laboratory experience.
- The Quality Assurance Manager shall have a general knowledge of the analytical methods for which data review is performed.

Deputy:

- In the absence of the Quality Assurance Manager, the Quality Assurance Officer will assume the above responsibilities.

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4.3.6 Reporting Manager

Reports to:

- Technical Manager

Responsibilities:

- Review technical deliverable information in RFPs to determine feasibility of projects.
- Prepare and update SOPs relating to data reporting.
- Perform laboratory verification/validation of data deliverable packages.
- Oversee assembling of data packages per client/project requirements.
- Oversee preparation of Regulatory Forms for various states for analyses performed in the laboratory.
- Provide resources and training to analysts in the department.
- Modify reports and data packages to correct any deficiencies noted during validation.
- Communicate with clients concerning their reportable needs.
- Oversee generation of Electronic Deliverables (EDDs) upon project request.

Requirement:

- Education: Completion of a university degree and/or college level Chemistry program or equivalent.

Experience:

- A minimum of two (2) years related Environmental Chemistry experience.

Deputy:

- In the absence of the Reporting Manager, the Reporting Officer will assume the above responsibilities.

4.3.7 Project Coordinator Supervisor

Reports to:

- Operations Manager

Responsibilities:

- Primary point of contact to coordinate, manage and provide timely responses to customer inquiries related to

the management of projects and status of work in progress-from the beginning of sample collection to the final report submission.

- Review initial QAPP (if required) and at job start-up, review all data information including Chain-of-Custody (COC) forms, accuracy of COC entry, and will coordinate the final laboratory report submission including EDDs and data deliverable packages.
- Available to client on a day-to-day basis to provide scheduling associated with sample collection, sample containers/bottle specifications, shipping containers, receipt of samples, appropriate turnaround times/due dates, project planning, and final report requirements. Scheduling, collection and bottle specifications are responsibilities that are shared with the Field Services Coordinator on a daily basis.
- Maintain a general working knowledge of analytical methods, method updates, and method usage in order to monitor compliance with industry and local/state/federal regulations.
- Work with Account Executives, laboratory management and operations staff to meet customer requirements and resolve service and technical issues during every phase of the project. Facilitate corrective action when needed.
- Define project requirements to ensure all contract requirements are met and communicate requirements to appropriate personnel. Work closely with internal sample receiving personnel to ensure proper receipt, login, and subcontracting of samples, when required.
- Supervise and provide guidance to project coordinators in all areas of customer service and project management.

Requirement:

- Education: Completion of a university degree and/or college level Chemistry program or equivalent.

Experience:

- A minimum of five (5) years related Environmental Chemistry experience.

Deputy:

- In the absence of the Project Coordinator Supervisor, these job responsibilities will be distributed among the Project Coordinators.

4.3.8 Laboratory Supervisor

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Reports to:

- Technical Manager

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO17025.
- Oversee the review and approval of technical information that originates in their department.
- Ensure that analysts perform QC checks at required intervals and that all required method criteria are met.
- Ensure that samples are completed within holding times and that due date commitments are met.
- Ensure that analysts working in their department are trained properly and that all documentation is maintained to assure training and competency.
- Ensure that SOPs are up to date and are reviewed annually.
- Ensure that method detection limit studies are performed as required.
- Perform annual reviews for employees under their supervision.
- Oversee the development of new methods or modifications to current procedure.
- Ensure that all results produced within the department are reported in a concise, accurate manner.

Requirement:

- Education: Two years of education in a physical or environmental science. .

Experience:

- A minimum of two years of nonacademic experience in relevant analyses.
- A supervisor shall be familiar with relevant test methods and associated calibrations.

4.3.9 Analyst

Reports To:

- Laboratory Supervisor

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO17025.
- Review data and utilize professional discretion and judgment in approving results for release to clients.
- Assist with the development of new methods or modifications to current procedures if required.
- Evaluate the results of QC samples.

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- Identify and report quality problems to the supervisor or QA department.
- Follow appropriate methodologies, running QC checks as required.
- Document activities and report results in a concise and accurate manner.
- Supervise a small group of assistant analysts or technicians if required by the department supervisor.

Requirements:

- Education: Two years of education in a physical or environmental science.

Experience:

- A minimum of two years of nonacademic experience in relevant analyses.

4.3.10 Assistant Analyst

Reports To:

- Laboratory Supervisor

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO17025.
- Evaluate the results of QC samples.
- Identify and report quality problems to the supervisor or QA Coordinator.
- Follow appropriate methodologies, running QC checks as required.
- Document activities and report results in a concise and accurate manner.

Requirements:

- Education: Two years of education in physical or environmental science or two years work experience in a testing laboratory.

Experience:

- Two years of work experience in a testing laboratory.

4.3.11 Technician

Reports To:

- Laboratory Supervisor

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Responsibilities:

- Follow appropriate methodologies, running QC checks as required.
- Document activities and report results in a concise and accurate manner.

Requirements:

- Education: High school graduate or equivalent

5) Safety

ALS Environmental is conscious of providing a safe and healthy work place for its employees. This is accomplished by adequate safety training for all personnel. Employees receive all the necessary safety training and information to meet the guidelines established by the Occupational Safety and Health Administration (OSHA). ALS complies with the "Right-to-Know" laws established by the federal government.

The ALS safety committee is responsible for maintaining the Material Safety Data Sheets (MSDS) within the laboratory facility and organizing continued safety training for all employees. The safety committee performs inspections of the facilities for compliance with safety regulations and verifies that all safety equipment is in good working condition.

It is ALS policy that safety glasses or splash goggles and lab coats be worn by every person entering designated laboratory areas and no food or beverages are allowed to be brought into these areas. Any accidents that occur in the laboratory that involve any form of personal injury or near-miss must be reported on an Incident Investigation or First Aid Form. The pertinent information pertaining to the incident is maintained on the form. This includes the date that the incident occurred, the person(s) involved, details of the incident, and information about the physician or health care professional, if required. Any reportable injuries or illnesses are recorded on OSHA Form 301. A record of these reports is kept by the safety committee and summarized annually on OSHA Form 300. This summary form is posted on the Health and Safety bulletin board through the month of April each year.

ALS maintains a written safety program, which details the safety policies of the laboratory. The program includes, at a minimum, a General Safety Plan, Chemical Hygiene Plan, and Emergency Action Plan. These manuals are read and signed-off as understood by all employees following their initial orientation. Additionally, all employees receive safety training during initial induction and at least bi-annually after that. These records can be found in the individual's training records maintained by the QC department.

6) Training

6.1 Overview

All personnel are responsible for complying with all quality and data integrity policies and procedures that are relevant to their area of responsibility.

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All personnel who are involved in activities related to sample analysis, evaluation of results or who sign test reports, must demonstrate competence in their area of responsibility. Appropriate supervision is given to any personnel in training and the trainer is accountable for the quality of the trainees work. Personnel are qualified to perform the tasks they are responsible for based on education, training, experience and demonstrated skills as required for their area of responsibility.

The laboratory provides goals with respect to education, training and skills of laboratory staff. These goals are outlined in ALS's Standard Operating Procedure, 99-Train. Training needs are identified at the time of employment and when personnel are moved to a new position or new responsibilities are added to their job responsibilities. Ongoing training, as needed, is also provided to personnel in their current jobs. The effectiveness of the training must be evaluated before the training is considered complete.

Contracted personnel, when used, must meet the same competency standards and follow the same policies and procedures that laboratory employees must meet.

6.2 Job Descriptions

Job descriptions are available for all positions that manage, perform, or verify work affecting data quality, and are located in Section 4, Organization and Management Structure. An overview of top management's responsibilities is also included in this section.

Job descriptions include the specific tasks, minimum education and qualifications, skills, and experience required for each position.

6.3 Personnel Training

All personnel are appropriately trained and competent in their assigned tasks before they contribute to functions that can affect data quality. It is management's responsibility to assure personnel are trained. Training records are used to document management's approval of personnel competency. The date on which authorization and/or competence is confirmed is included.

Training records are maintained by the QC Department and include Ethics training documentation, certificates for short courses or seminars attended, professional accreditation or certification maintained by the individual, miscellaneous job-related training documentation, and a summary of past and ongoing Demonstration of Capabilities.

6.4 Minimum Experience and Training

In addition to the requirements listed in sections 4.3.1 through 4.3.11 persons hired for the following job functions must meet the following minimum experience and training requirements before working independently in these areas, unless a supervisor or designee is available for consultation.

- Inductively coupled plasma-emission (ICP) spectroscopy: One year experience with satisfactory completion of a short course on ICP or equivalent in-house training.
- Inductively coupled plasma-emission (MS) spectroscopy: One year experience with satisfactory completion of a short course on ICP/MS or equivalent in-house training.

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- Gas chromatography: One year experience with satisfactory completion of a short course on basic GC or equivalent in-house training.
- HPLC: One year experience with satisfactory completion of a short course on basic HPLC or equivalent in-house training.
- Mass spectrometry: One year experience with satisfactory completion of a vendor's training course, professional sponsored short course or equivalent in-house training.
- Mass spectra interpretation: One year experience with satisfactory completion of a vendor's training course, professional sponsored short course or equivalent in-house training.
- General chemistry and instrumentation: Six months experience or equivalent training either in-house or through professional short courses.
- Sample collection: Six months experience or equivalent training either in-house or through professional short courses.

6.5 Ethics Training

Data integrity training is provided as a formal part of new employee orientation and a refresher is given annually for all employees as detailed in the Ethics and Data Integrity corporate SOP CE-GEN-001. Employees are required to understand that any infractions of the laboratory data integrity procedures shall result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment or civil/criminal prosecution. Attendance for required training is monitored through a signature attendance sheet maintained by the QC Department.

7) Document Control

Record keeping is extremely critical in an environmental laboratory to assure the validity of the data produced. ALS produces two types of records: electronic records and hardcopy records. The record keeping system at ALS maintains procedures for the identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. This allows for the historical reconstruction of all laboratory activities that produced the analytical data.

As part of our DoD requirements the laboratory shall establish and maintain procedures to control all documents that form part of its quality system both from internal and external sources. These documents include policy statements, procedures, specifications, calibration tables, charts, textbooks, posters, notices, memoranda, software, drawings, plans, etc. These may be various media, whether hard copy or electronic, and they may be digital, analog, photographic or written. DoD requires that no documents be placed on display, for any reason, which are not controlled by the QC Department. Uncontrolled information within the department should be recorded in a secure area where it will be available to other staff members and not inadvertently lost.

7.1 Electronic Records

Electronic records include those generated by the entry of information into the Laboratory Information Management System (LIMS) and software systems. These systems are routinely backed up via standard rotation schemes and/or automated backup schedules. These backup processes are verified, reviewed and tested for restoration capabilities. Electronic media is

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securely stored. According to the backup rotation schedule incremental backups are performed each weekday, while full backups are every week. Weekly, monthly, and quarterly tapes are created. Weekly tapes are rotated approximately every 30 days. Monthly tapes are kept for (1) year and quarterly tapes are kept for (5) years. Weekly, monthly, and quarterly backup tapes are stored in the ALS media safe located in an off-site storage facility. This facility provides a suitable environment to prevent damage or deterioration and to prevent loss.

7.2 Hardcopy Records

Hardcopy records produced by the laboratory are a combination of forms, reports and logbooks. The original Chain of Custody is electronically scanned and stored on the network according to work order number in PDF format where it is automatically printed with the hardcopy analytical report submitted to the client. The original Chain of Custody records are then retained in numerical order and maintained by administrative personnel. The Lab Analysis Reports for all Customer samples are also stored on the network in PDF format and are backed-up in the same way as all other electronic data. At the end of each calendar year, the hardcopy file records are moved from this office to an off-site storage warehouse where these records shall be protected from loss, damage, misuse, or deterioration. All records are kept for a minimum of five (5) years, or longer if requested by the Customer. Records are filed in this facility alphabetically and chronologically in order to permit retrieval when required. Access to archived information is controlled and documented with an access log filed with the document storage facility. A copy of the access log is maintained by the ALS Accounting Department who is responsible for contacting the storage facility for document retrieval. Data, which are expected to become part of a legal action, may be maintained for a longer period of time dependent on legal counsel. Filing, copying and maintaining legible hardcopy records is the responsibility of the Customer Service Representatives and the Department Supervisors.

7.3 Hardcopy Laboratory Logbooks

Laboratory logbooks are sequentially numbered documents used to record specific information related to sample receipt, preparation, and analysis. This information may include, but is not limited to, preservation records, instrument maintenance, sample measurement data, etc. All laboratory logbooks are assigned and labeled with a unique identification number before being placed into use. This provides a system for direct document control and tracking. The supervisor of each department is responsible for the storage and retention of any logbooks used in their department.

Laboratory logbooks are kept in the laboratories until filled or no longer in use. Once a logbook is "retired" or no longer in use, it is also placed into storage. This includes the logbooks assigned to individual analysts, those in which instrument maintenance, calibrations, etc. were recorded, reference material notebooks, sample preservation notebooks and all other bound materials generated by the laboratory. As with all other records these logbooks are archived in an off-site storage warehouse where they are protected from loss, damage, misuse, or deterioration. Laboratory logbooks are kept for a minimum of five (5) years or longer if requested by the Customer.

7.4 Worksheets

Laboratory worksheets are forms used to document information relating to laboratory sample analysis processes. The forms vary and are used throughout the laboratory in both hardcopy and electronic format. Each form is controlled by the quality control department and tracked by

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assigning each a control number. This procedure ensures that any changes made to the forms are documented, and each revision is appropriately dated and initiated.

The electronic worksheets exist in two copies and are backed up in the same way as all other electronic data stored on the ALS network. The first copy is the original workbook template and is not used in the daily production/calculation of results (serves as a master copy). The second copy is used in the daily production and is actually populated with results by the analysts and is used to report data directly to the LIMS. Both workbooks use a password to protect the formulas used in any calculations and the structure of the workbook, where applicable.

7.5 Raw Data

Raw instrument data are generated daily in each department of the laboratory. Raw data include all original observations, calculations and derived data, calibration records and a copy of the test reports. All raw data generated is stored in each individual department for a period of time judged sufficient by the supervisor of that department. The data is then transferred to labeled file boxes affixed with barcodes identifying the contents, and held in locked storage areas until transferred to a facility that enables us to store the data under conditions established by the regulatory authorities. These records are stored for a minimum of five (5) years from generation of the last entry in the records. Additionally, raw data, when transferred to appropriate servers, is maintained in electronic format, and is backed-up in the same way as all other electronic data.

7.6 Data Deliverable Packages

Deliverable Packages are reviewed and verified by the Data Reporting Department prior to submission to the Customer. The contents of a data deliverable package are dictated by individual client requirements, but can include chain-of-custody documentation, quality control summary forms, associated shipping documents and associated raw data. A copy of the original data package is retained by ALS in PDF format.

7.7 Quality Control Summary Packages

QC Summary Packages are generated from the Horizon LIMS and contain sample results, in addition to a QC summary report of batch QC results. QC results include blank, Laboratory Control Sample, batch matrix spike and matrix spike duplicate results, surrogate recoveries, Relative Percent Difference (RPD), and percent recoveries. QC Summary Packages are stored on server space on the ALS network.

7.8 Quality Assurance Documents

Control of quality assurance documents is to be maintained by the Quality Assurance Department. Only "controlled" documents may be posted in the laboratory. Messages on Post-it notes will be considered "uncontrolled" and cannot be used.

Quality assurance plans and standard operating procedures are subject to the following requirements:

7.8.1 The ALS Quality Assurance Plan must be signed and approved by the Laboratory Director, Technical Manager, and the Quality Assurance Manager.

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7.8.2 All ALS Standard Operating Procedures (SOPs) must be signed and approved by the Quality Assurance Manager and Department Supervisor or designee.

7.8.3 The QA Plan and SOPs must have document control information placed in the upper right hand corner of each document page. The information required is the document name, revision number; revision date, and page number (see upper right hand corner of this page for format).

7.8.4 The first page of the QA Plan shall contain the facility name, address, phone number, fax number, and website. The second page of the QA Plan shall contain the Document name, identification number, revision number, revision date, appropriate signatures, archival date, and document control number.

7.8.5 The first page of the SOPs shall contain the document name, SOP identification number, revision number, revision date, instituted date, and document control number. The second page of the SOPs shall contain the document title, SOP identification number, revision number, appropriate signatures, and annual review log.

7.8.6 The document name of an SOP will consist of the ALS department number and a unique code to be determined by the department supervisor. For example, a hexavalent chromium SOP, written by the Wet Chemistry Department, may have the name 04-CR+6.

7.8.7 Reproduction and distribution of the QA Plan and SOPs is to be handled by the Quality Assurance Department. The original documents will be filed in the Quality Assurance Department. Documents to be distributed will be given a control number and will be listed in the Controlled Document Logbook. Department Supervisors or their designee will then sign and date the logbook when they receive a controlled document. Every time a controlled copy is produced from a master document the following stamp is used to mark all pages of the document:

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DO NOT DUPLICATE
If this stamp is not colored red,
this is not a controlled copy

7.8.8 When a document has been revised, the old revision will be collected, the date returned will be recorded in the logbook and the new revision will be issued following the same procedure. The original copy of the superseded document will be kept in the Quality Assurance office and will be stamped "SUPERSEDED BY REVISION", directly on the cover page of the SOP, with the new revision number written in. All other copies will be disposed of.

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7.8.9 Each department receiving a controlled document will be responsible for that document and the information contained in that document. Supervisors or their designee need to assure its safekeeping. If a controlled document is lost or damaged, the Quality Assurance Manager shall be notified immediately so it can be noted in the controlled document logbook and a new document issued.

7.8.10 The QA Plan is treated in the same manner as an ALS SOP and as such, is distributed to each department as a controlled document, signed for by the department head or designee, placed with the department SOPs and is accessible to all departmental employees.

7.8.11 Laboratory supervisors or their designees are responsible for validating and reviewing SOPs annually for revision as required (i.e. methods are updated by EPA; new instrumentation is purchased, etc.). Revisions of SOPs must be submitted to the Quality Control Department according to the procedures stipulated in Standard Operating Procedure 99-SOPs. The QC department will then complete the administrative validation and approval before the SOP is initiated within the department.

7.8.12 If it is necessary to make a change in a controlled document before a new revision is created, the change shall be entered by hand in the document by a supervisory or managerial employee, and the change initialed and dated. All controlled copies of that document shall be changed in this manner. The document shall then be submitted to the Quality Assurance Department for revision.

7.8.13 The QC Department is responsible for the annual review and revision of the QA Plan. This requires updating procedures, replacing obsolete documents, and presenting regulatory updates as necessary.

7.9 External Documents

The Quality Control Department has established a procedure for maintaining control of all external documents that form part of its quality system. The external documents include sources such as regulations, standards, test methods, instrument manuals, textbooks, and journals. A Master Inventory List has been established that organizes these documents by department, and assigns a unique identification number to each for easy reference. It is the responsibility of each Department Supervisor to notify the Quality Control Department of any additions/deletions to this list. Additionally, the Master Inventory List will be included as part of the in-house audit review process in order to verify that all relevant reference documents are controlled and part of the master list.

A listing of methodologies routinely used at ALS is given in Section 15.1 of this Quality Assurance Plan. The current versions are maintained by checking Federal and State websites for the latest updates. A list of all currently controlled documents is available and updated as these revisions are implemented within the laboratory.

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Originals for all accreditations/certifications are located in the reception area of the laboratory as required by Federal and State regulatory agencies. These accreditations/certifications are contained in a binder and arranged in alphabetical order and maintained regularly by administrative personnel. Copies of these documents are also retained in the QC Department and are available on the network for use by Sales and Customer Service in order to assist them in responding to Customer requests. This information can also be found on our website at www.analyticallab.com or at www.alsglobal.com/environmental.aspx# .

Documents determined to be outdated, but retained for knowledge preservation will be marked as "obsolete". References removed from the Quality Assurance Department, for use by laboratory personnel, should be signed-out in the *Reference Library Logbook* and signed back in upon its return.

8) Traceability of Measurement

The laboratory has an established program for achieving measurement traceability for the calibration, verification and maintenance of its measuring and testing equipment. This includes balances, thermometers and all reference standards.

Calibration laboratories, accredited to ISO/IEC 17025 by a recognized Accreditation Body, will conduct the calibrations and verifications of measuring and test equipment, reference standards, and reference materials used in laboratory operations. The calibration laboratory will issue an accredited test report containing appropriate statements of measurement results, and measurement uncertainty. The test record will document endorsement of the Accreditation Body by inclusion of the Accreditation Body's symbol or will otherwise make reference to the calibration laboratory's accredited status.

Annual calibration of all laboratory balances is contracted to Mettler-Toledo, Inc., 1900 Polaris Parkway, Columbus, OH 43240. Calibration of all Class "1" weights is performed every five years and contracted to Troemner, 201 Wolf Drive, Thorofare, NJ, 08086-0087. Calibration of all in-house thermometers is performed annually against a NIST certified thermometer. The calibration of the NIST certified thermometer is performed every three years by ICL Calibration Laboratories, Inc., 1501 Decker Avenue, Stuart, FL 34994.

All certificates of calibration for the balances, weights, and thermometers are kept on file in the QA Department for review by management and all regulatory agencies. Certificates for reference standards are maintained by the supervisors of each department.

8.1 Reagents

Reagent quality is of extreme importance to laboratory results. All chemicals and reagents used in the laboratory meet purity and traceability requirements specified in the individual methods. Each laboratory area has standard operating procedures, which define the quality of reagents being used. It is the responsibility of the supervisor of each area to requisition reagents of required quality. All purchased reagents are delivered to the Sample Receipt Area to be unpacked, verified for accuracy against the invoice, and labeled with a unique reference ID number. This reference ID number is then electronically recorded in the Chemical Reagent Logbook (See example, Figure 1) along with the chemical name, manufacturer, lot number, date received, receiver's initials, expiration date, number of bottles, and storage location. The

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storage of chemicals is governed by the manufacturer's recommendations and by the analytical procedures for which the chemicals are used. Purchased reagents are to be labeled with the reference ID number, date opened, expiration date, initials and date of the analyst opening the reagent. For both solid and liquid stock chemicals that do not list a supplier expiration date, ALS will label these chemicals with an expiration date of 5 years from the date of receipt.

Assigned personnel from Sample Receiving will be expected to receive, enter, label, and deliver all reagents to their respective departments daily. If the quantity of receivables is such that this task cannot be completed during normal business hours these materials will be isolated and restricted from use unless in the case of an emergency and then only with the assistance of Sample Receiving personnel throughout all shifts including weekends.

Verification that the chemical or reagent purchased is of the correct purity and traceability before being put into use is the responsibility of the supervisor of the department in which the reagent will be used. The preparation of working reagents is recorded in bound logbooks or electronically within each department. These logbooks document the name of the reagent, reference ID number, and the concentration of the reagent, the reference number(s) of the stock reagent(s) used as well as the dilutions performed, date of preparation, date of expiration, and initials of the preparer. The container holding the working reagent is labeled with the reference ID number, initials of the preparer, the date of preparation, and the expiration date as determined by the method. Any health and/or safety concerns are also listed on the container.

Each lot of chemical or reagent used is monitored and controlled for any unusual contaminants that interfere with analysis as evident in results of prescreens and/or method and reagent blanks. If a working reagent is found to be suspect, it is removed from use and traced back to the original lot number, which is then investigated. If the stock reagent is found to be the source of the problem, it is completely removed from use. Any samples contained in batches in which the suspect reagent was used for analysis will be reanalyzed if sufficient remaining sample allows, or flagged with a comment on the report. The corrective action process described in Section 20.0 of this manual is used to document these assessments.

8.2 Reference Standards

Reference standards are used for calibration and calibration verification in all analyses requiring comparison to a chemical substance. The reference standards used are those specified in the reagent sections of the respective standard operating procedures. Wherever available, reference standards are traceable to national standards of measurement. If NIST (National Institute of Standards and Technology) traceable standards are not available, reference standards of the best purity and quality from a reputable supplier are procured by the supervisors of each department by careful study and consideration of the chemically pure substances available. It is the responsibility of the supervisor of each area to requisition reference standards of required quality appropriate for the analysis being performed and to provide correlation of results per NELAC standards. All purchased reference standards are delivered to the Sample Receipt Area to be unpacked, verified for accuracy against the invoice. The standards are then delivered to the individual departments along with their respective Certificates of Analysis provided by the supplier, where the supervisor verifies that the correct standards have been received. Certificates of Analysis are kept on file for all reference standards within the respective departments. Records are maintained for each stock reference standard used in the laboratory including the identity, a unique reference ID number, dates received, lot number, and supplier. Each reference standard will itself be labeled with the

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reference ID number, the date received, the date opened, and the initials of the analyst opening the standard, or will be labeled with the reference ID number allowing the traceability to these items.

Assigned personnel from Sample Receiving will be expected to receive, enter, label, and deliver all standards to their respective departments daily. If the quantity of receivables is such that this task cannot be completed during normal business hours these materials will be isolated and restricted from use unless in the case of an emergency and then only with the assistance of Sample Receiving personnel throughout all shifts including weekends.

Working standards are prepared using quality reagents as outlined in 8.1, reference standards, Class A volumetric glassware, and properly calibrated laboratory equipment such as balances and pipettors. Bound or electronic logbooks are maintained indicating the reference ID number of the working standard, the concentration, the reference ID number(s) of the stock standard(s) used, the dilution performed, the matrix, the preparation and expiration date, and initials of the analyst preparing the standard. All prepared standards will be properly labeled with the reference ID number, the date of preparation, the preparer's initials and the expiration date of the standard, or will be labeled with the reference ID number allowing the traceability to these items. This documentation allows standard traceability back to the original Certificate of Analysis.

Reference standards from an independent source are used in all methods for calibration verification. They are purchased and prepared separately from a source independent of the calibration standards. If not available from a reliable second source, they are prepared separately from a different lot than that of the calibration standards. These are used to verify and control the accuracy of the working calibration standards before Customer samples are analyzed. Acceptance criteria are set per method requirements for the calibration verification standards, and are listed in each respective standard operating procedure. Calibration verification standards falling outside of the acceptance criteria result in the analysis being discontinued until the cause can be investigated and corrected.

Reference standards used to spike samples before a preparative process, such as surrogate and matrix spike solutions used during extractions, are subjected to a critical solution quality verification procedure. This ensures that the standards are of acceptable quality. This procedure consists of preparing organic surrogate and spiking solutions pursuant to the method required, and aliquoting a portion of each lot into a separate analysis vial. The formulated standard aliquot is delivered to the appropriate analytical department for testing. Once the analytical department grants approval, as indicated by a completed Quality Verification Data Form (see Figure 2), the solutions are confirmed and documented for the extraction of samples. If approval is denied due to insufficient quality, all portions of the lot of surrogate or spiking solution are discarded. Verification that the standard is the correct concentration and of the correct purity is the focus of this procedure

8.3 Removal of Expired Chemicals and Standards

Any chemical, reagent, solution or standard, which is past its expiration date, and cannot be verified for reliability, is removed from service and placed in the laboratory's internal waste management system. Expired standards or chemicals will not be used for analyzing samples unless the laboratory verifies its reliability. Verification records shall be kept with the Supplier's Certificate of analysis and retained for review by local, state and federal agencies for a period of

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five (5) years. Any expired standard, which is retained for training purposes, or as a reference material must be clearly marked, "Not for Instrument Calibration – Expired Standard" or "Not for Analytical Use – Expired Standard."

8.4 Purchased Materials

ALS routinely purchases consumable items for the laboratory through the laboratory-purchasing agent. The department supervisors are responsible for selecting all items for laboratory use as specified in the individual method SOPs. All items shall be of the required quality as dictated in these SOPs. The Operations Manager or Technical Manager reviews all *purchase requisitions* before the orders are placed. The supervisors will submit all pertinent information on a purchase order to the Purchaser. The Purchaser is responsible for placing the order with the approved vendor and assuring that items are received intact in the time period requested by the department supervisor. It is possible for a department supervisor to place an order directly with the appropriate vendor in cases where an item is needed in a short period of time and the Purchaser or Operations Manager are not available to approve and place the order. Records are documented for all items ordered by the laboratory. Those from the current year are filed in the administrative office, while those from previous years are filed in locked storage for a minimum of ten (10) years.

All purchased items are delivered to a Sample Receipt Area to be unpacked, verified for accuracy against the invoice, and inspected for breakage. Any unacceptable item is returned to the Purchaser to be sent back to the vendor in return for the correct, intact item. Items that are common to all the departments and those received in large quantities, such as sample collection bottles (8.4.2), are stored in the locked storage room until use. The Sample Receipt Custodian may initial the invoice for these items. Other items are delivered directly to the department that submitted the order for initialing of the invoice and storage. It is the responsibility of the department supervisor to insure that the items received are of the required quality. Any certificates received for goods and services that have a direct influence on quality are saved and filed for reference.

The same consumable items used in the routine analysis of samples, such as test tubes, Pasteur pipettes, etc., are also used in the preparation and analysis of calibration standards and control checks. If the quality of results for the calibration standards and control checks is within the acceptance criteria outlined in the method, then the consumable items are considered to be of acceptable quality to perform the analysis.

8.4.1 Volumetric Dispensing Devices and Glassware

Mechanical dispensing devices such as (but not limited to) Eppendorf pipettes shall be checked for accuracy before first use and at least monthly thereafter. It is strongly recommended that autopipetttors/dispensers be calibrated weekly, if possible. Verification of accuracy is not required for Class A glassware unless there is evidence of deterioration or when required by specific project plans.

8.4.2 Non-Volumetric Dispensing Devices and Glassware

Non-Class A lab ware, which is applicable only when used for measuring initial sample volume or final extract/digestate volume and gas-tight syringes for any use shall be verified for precision and accuracy before first use or when there is evidence of deterioration.

8.4.3 Sample Collection Bottles

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ALS provides appropriate containers for sample collection. See Appendix B for a listing of the appropriate sample containers available for each method. All bottles are disposed of after a single sampling.

ALS purchases pre-cleaned bottles for various analyses. These are cleaned in accordance with EPA specifications. Careful inspection and comparison of the bottles received against the invoice is performed to assure that the quality of the bottles is that which was ordered. Bottles used for microbiological samples are subject to a documented sterility check for every batch of the same lot number. This check must meet acceptance criteria described in the same document before the bottles can be used for sample collection. All bottles are used only once, and are disposed of.

Bottles used in the analysis of samples are also used in the periodic analysis of field and trip blanks. The department supervisors monitor results of field and trip blanks at the time of department approval. If a field or trip blank is found to have positive results, and contamination from the bottle is suspected to be the cause, the corrective action process described in Section 20.0 of this manual is followed.

8.5 Vendor Approval

8.5.1 New Vendor

Once interest in using a new vendor is determined by management or supervisory personnel, the Purchaser will initiate the *New Vendor Evaluation* procedure. Prior to any Purchase Order being placed, the Middletown Office Manager will assign the Purchaser the task of starting the evaluation process. The Purchaser is required to use the *New Vendor Evaluation Form* to gather as much information as possible on the potential vendor as the form dictates. This may involve extracting the Dun and Bradstreet rating of the vendor, requesting vendor references, questioning management regarding the vendor's known reputation in the industry, etc. This form is then turned into the Middletown Office Manager for review and final approval. If the vendor meets ALS requirements, the new vendor will be listed on the ALS Approved Vendor List. All New Vendor records will be maintained in the Purchasing Department for review.

8.5.2 Existing Vendor Evaluation

Each significant vendor affecting quality analysis in ALS shall be evaluated periodically. The Purchaser shall perform this evaluation function with the assistance and participation of affected laboratory personnel. The Purchaser shall perform no less than five (5) evaluations per calendar year. Evidence of these evaluations will be documented on the Existing *Vendor Evaluation Form,* which will become a permanent record for that vendor. These records will be maintained by the Purchaser for review.

8.5.3 Vendor Performance Monitoring

A *Vendor Incident Record* will be maintained showing any problems that arise throughout the year with any existing approved vendor. Any ALS employee can complete this record in an attempt to capture any and all related quality issues regarding products and services received. These records shall be kept active until resolved in which case the record shall be maintained in

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the vendor's permanent file for reference. These records will also be critical in the periodic review of an existing approved vendor.

8.6 Balances

ALS maintains multiple balances for analytical measurements throughout the laboratory. Calibration checks are performed and documented on each day of use for each balance. The assignment of the primary and back-up personnel to perform these daily calibration checks shall be the responsibility of Department Supervisors. This calibration check consists of a measurement of two or more NBS Class 1 weight reference standards bracketing the anticipated analysis range. The weights will be used exclusively for daily calibrations and the results compared to acceptance criteria found in the associated balance calibration Standard Operating Procedure.

Each balance is serviced and calibrated over the range of use annually by a manufacturer's certified representative. Balance Calibration Reports and Certificates of Weight Traceability are kept on file identifying traceability of test weights used to the National Institute of Standards and Technology. NBS Class 1 weights are returned to a certified calibration laboratory at least every five years for re-certification.

9) Scope of Tests

Unless superseded by Customer or project requirements, analysis of samples is performed using EPA or EPA-approved methods. For those analyses that do not have EPA-approved methods, the analytical methods used are taken from standard sources, where such methods exist (ASTM, API, etc.). The standard analytical methodologies performed by ALS can be found in Appendix B along with the recommended container, preservation, storage and holding times for each methodology.

ALS will not accept samples that require test methods that have not been published in national standards, such as those listed in Section 14.0 of this document, unless these methods have been agreed upon by the Customer and have been documented and validated by the laboratory. It is the responsibility of the laboratory management to determine which validation studies are appropriate for a given analysis on a case-by-case basis. The effectiveness of a non-standard analytical method is then evaluated and approved by laboratory management as determined by the results of the validation studies performed. Examples of validation studies demonstrating effectiveness are reference standard analysis, blank studies, MDL studies, precision and accuracy studies, determination of calibration range, or proficiency sample evaluation. These studies will be made available to the Customer and any recipients of the reports upon request. Non-standard methods are clearly indicated on Laboratory Analysis Reports as modified or in-house methods.

10) Review of Solicitation, Offer or Contract

When the laboratory receives a solicitation, offer or contract, it is assigned to one of the sales staff. The sales staff may include the Operations Director, Operations Manager, Technical Lab Manager, Technical Sales Representative, and/or Project Manager/Customer Services Representative, who are supported by the Sales Coordinator and are all capable of completing a

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solicitation, offer or contract. The solicitation, offer or contract also referred to as a Request for Proposal (RFP), Request for Quotation (RFQ), or similar document may contain the following items: price inquiry, contractual language, specific QAPP information, target compound lists, method requirements, delivery schedules, and data reporting requirements. Copies of all documentation received as part of the solicitation, offer or contract, shall be submitted directly to the Sales Coordinator who will place all initial documentation received into the customer-specific folder under Project Files and/or Business Development files on the ALS file server. Upon receipt of the solicitation, offer or contract, the sales staff will determine whether the request is a "new/complex" offer requiring a comprehensive technical review and approval process or a "routine/repetitive" offer requiring a simple review and approval.

For new or complex solicitations, offers or contracts, the sales staff will review pertinent items for content and project specific requirements and disperse as needed to the appropriate staff for technical review and approvals. The Operations Director, Operations Manager and/or Technical Laboratory Manager will be involved with the technical review for method specific or project specific analytical requirements, meeting the designated turnaround schedules, proposed subcontract lab (if required), data deliverables requirements and proposed work plan as requested within the solicitation, offer or contract. As part of the review process, the QA Manager will review and provide the sales staff with required quality control documentation such as certification/accreditation approval, copies of SOPs/PTs as requested, subcontract lab approval (if required), for submission of the lab's response to the solicitation, offer or contract. Any deviations to the original solicitation, offer or contract, are documented and submitted to the customer and included with the lab's response to the offer.

The Sales Coordinator is responsible for supporting the sales staff in generating the specific qualifications information and/or promotional information required for new/complex solicitations. The Sales Coordinator completes the final solicitation, offer or contract following the collection of the pricing and above technical information from the resolution of outstanding questions or issues generated by each approval process. Copies of all internal communications for new/complex solicitations involving the resolution of outstanding questions or issues generated by each approval process between the sales staff and the Sales Coordinator will be kept in the customer-specific folder under Project Files and/or Business Development files on the ALS file server. Copies of pertinent discussions with a customer relating to the customer's requirements will also be kept in the customer-specific folder under Project Files and/or Business Development files on the ALS file server. Documented discussions and approvals (dated and initialed) will be sent via e-mail or as scanned documentation to the Sales Coordinator for inclusion into these files on the network. Documented discussions and/or approvals will include documentation related to the technical review for method specific or project specific analytical requirements, designated turnaround schedules, data deliverables requirements, work plan, pricing offer, or certification/accreditation review, as requested within the solicitation, offer or contract.

For routine/repetitive or new/complex solicitations, a Proposal Request Form (Figure 3) is provided for the sales staff to gather all the details of the project for inclusion into the customer-specific folder under Project Files and/or Business Development files on the ALSI file server in order to create project setup in the LIMS to satisfy the details and requirements of each project submitted to the laboratory.

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The sales staff reviews the terms & conditions of sale, and the overall requirements of the scope of work for continuity, enforceable penalties, liabilities, and expectations, as indicated in the solicitation, offer or contract. The sales staff is responsible for on-time delivery of response and will follow up with the Customer after the solicitation, offer or contract is delivered.

Upon award of the solicitation/offer or awarded contract, any deviations or amendments to the contract are documented and communicated to all affected personnel. If accreditation does not exist or cannot be completed prior to the project start date, the request for solicitation, offer or contract may be refused by ALS. Additionally, if during the course of the contract the laboratory is subject to suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation this information will be immediately communicated to the Customer. Copies of all internal communications and/or pertinent discussions with a customer regarding deviations or amendments of a contract will be sent via e-mail or as scanned documentation to the Sales Coordinator for inclusion into the customer-specific folder under Project Files and/or Business Development files on the ALS file server.

10.1 Laboratory Capacity Review

For any solicitations, offers, or contracts generated over $100,000, a review of the equipment and personnel will be performed by the Laboratory Director, Operations Manager and/or Technical Manager. Documentation of review and approval will be designated on the Proposal Request Form (Figure 3) which is completed by the proposal staff and submitted to the Sales and Marketing Coordinator for inclusion into the client-specific folder under Project Files and/or Business Development files on the ALS file server. The Proposal Request Form is used to define the project specifications requested by the Customer for either new/complex or routine/repetitive solicitations, offers or contracts. If the laboratory does not have the capabilities to perform new work, this will be noted on the cover sheet. Actions taken to provide the necessary resources will be documented on the cover sheet or it will be noted that the proposal was not accepted.

10.2 Amendment to Contract

When an amendment is requested to a contract that has been already signed and accepted by both parties and the project has not been initiated, the laboratory will reserve the right to propose adjusted rates and delivery schedules that reflect the "new scope of work." If the changes in the work do not impact the objectives of the work plan nor necessitate a change in delivery schedule or unit pricing, then the amendment will be adopted and all parties involved will proceed under the amended contract.

An amendment to a contract that necessitates changes in the product to be delivered, turnaround times, sample delivery groups, required labor and equipment to meet objectives may require a negotiation in the unit pricing for the new analytical services package. No work outside the original scope of work will be performed until all outstanding issues and/or discrepancies are cleared between the Customer and the laboratory.

Amendments during an ongoing project that necessitate pricing adjustments, delivery schedule changes, or other changes to the normal laboratory routine, will be mutually addressed in a timely manner by the Customer and the laboratory. The laboratory will make all attempts to meet holding times on samples received under the initial contract in "good faith" that all parties will meet with a mutual understanding of the new delivery schedule and associated fees for the change orders.

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All affected laboratory departments are participants in the commitments made to an amended scope of work under an amended contract.

11) Demonstrating Method Performance

When new methods are implemented or a Customer requires a method not routinely performed, there are certain requirements that must be fulfilled prior to performing work to demonstrate adequate method performance.

Methods published in national standards that have not previously been performed at ALS require a demonstration of method performance that meets or exceeds minimum expectations as published in the method. These may include, but are not limited to, initial demonstration studies required by the method, blank studies, method detection limit studies, precision and accuracy studies, QC check sample performance, and calibration ranges. A standard operating procedure must also be written for the analysis. Once these validation studies have been completed and satisfactory performance has been demonstrated, samples may be analyzed by the new method.

Methods not published in national standards, such as special project procedures or screening methods are also subject to a demonstration of method performance before use in analyzing project samples. It is the responsibility of the Laboratory Operations Manager or QC Manager to determine which studies are appropriate for a given analysis on a case-by-case basis. Once satisfactory performance has been demonstrated as determined by laboratory management, samples may be analyzed by the new method.

12) Customer Services

Customer Services is one of the most important and integral parts of the ALS operation. ALS's Customer Services Department consists of Project Coordinators who are responsible for the Customer's project from set-up through completion. These responsibilities include routine requests for coordinating technical support from new or established Customers, project set-up and document review, project status requests, maintenance of pertinent discussions with Customers relating to sample analysis requirements, and project follow-up upon completion of the analytical tasks.

The Project Coordinators along with the support of the individual laboratory departments have the greatest impact on the success of a Customer's environmental monitoring program or project. The Project Coordinators are the laboratory's interface with the Customer and a major key to continuing a future relationship with them. In conjunction with the success of a program or project, our Customers rely on the responsive and efficient manner in which their questions or concerns are managed.

The ALS Customer Services Department is under the direction of the Operations Manager. However, the Customer Services Manager supervises the direct day-to-day operations of all Project Coordinators. All of these functions relate directly to the initial set-up of an environmental monitoring program or project, initiation of ALS's services, and project follow-up support.

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12.1 Project Planning

Standard Operating Procedures (SOPs) and required instrumentation have been continually purchased and brought online in response to markets created throughout this time-period. Tests and associated instrumentation are for commercial application, and therefore, most of the work that is brought to the facility is to be completed following standardized EPA procedures that have been incorporated into the ALS's SOPs.

The Operations Director, Operations Manager, and/or Technical Lab Manager are responsible for the type and quantity of work that is accepted and moreover promoted by ALS. Solicitations, offers, contracts and/or specific Customer requests that are extraordinary are reviewed by the Operations Director, Operations Manager, and/or Technical Lab Manager as to the viability of the program and the ability of the laboratory and associated personnel to successfully complete the objective of the scope of work. Subcontracting, MDL studies for non-standardized compounds, and scheduling adjustments may all come about as a result of each project's inherent requirements. The objective of having prior notification of sample receipt or prior notification of a Customer's expectations is to have as much time as possible to react and to meet or be able to address the Customer's project requirements.

Daily work schedules are generated, validated and utilized by the Department Supervisors as they oversee production within their departments. The key components of these schedules are holding times, delivery times and the specific or extraordinary requirements of a sample delivery group. The Laboratory Technical Manager oversees the Department Supervisors who are held accountable for the management of their respective departments.

Customer Services assists the Sample Receiving Department in the review and formalization of the tests that will be performed, associated bottle ware for the field, labeling, test methodology to be requested, adequate and proper preservation reagents as well as communication to the field. They also communicate within the laboratory regarding sample deliveries and holding times associated with the sample delivery groups.

As the Customer's samples are logged-in and processed, any discrepancies or issues will then be addressed as soon as possible to their Customer Service representative.

12.2 Organizational and Technical Interface

Customer Services is the main contact for a project once the first sample delivery group has been received and logged-in by the laboratory. Project tracking includes not only the Customer Services Department but also involves the cooperation of the Laboratory Operations Manager who will track the project movement throughout the laboratory, resolve any issues that arise during the sample preparation, analytical steps and final reporting of the data. Project Coordinators are assigned upon contract award.

Large projects with multiple sample delivery groups usually require constant interaction with the field to communicate coordination of supplies and sample movement into the facility. This allows the Project Coordinator to establish the ongoing dialogue needed and the openness of communication that develops between the Customer and the laboratory. Delays in sample processing due to instrumentation failure, matrix effects, etc., are brought to the Customer's

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attention as soon as practically possible once the Department Supervisor has notified Customer Services. It is imperative that the Project Coordinator be notified in a timely manner by the laboratory personnel to minimize any additional costs and operational impacts in the field.

Scope of Work changes, delays in the field due to equipment failures or weather are all communicated through the Project Coordinator into the laboratory departments that are affected by the change. Work schedules can then be adjusted and resources can be redirected within the operation for maximization of equipment utilization for the Customer and their samples.

Delays in fieldwork may require a re-commitment by the laboratory towards the due dates and deadlines that were initially set. The Operations Manager and Department Supervisors will then mutually agree upon a new commitment to the Customer so that all involved can plan proactively for future commitment of all resources.

13) Control of Nonconformance Testing

Ideally, all data inquiries should occur prior to the release of the analytical results to a Customer. However, if a Customer should question an analytical result, the analysis must be reviewed thoroughly in order to alleviate the Customer's concerns as well as to ensure that the laboratory is not suffering from a procedural problem.

If Customer Services determines that further corrective action is necessary due to a data inquiry received by a Customer it shall be documented on an ALS Corrective Action Report (CAR) (see Figure 5). This form will contain the general information of the data in question. Following initiation, the appropriate department supervisor will review this inquiry. The supervisor will review all associated raw data regarding the inquiry. Root cause analysis/resolution will be recorded on the CAR. The CAR will then be returned to the Project Coordinator with a copy to the QA Department. The Project Coordinator will inform the Customer of all pertinent information regarding the data inquiry. If reanalysis is required, the Customer will be given the approximate date that they can expect reanalysis results.

The QA Department will review the copy of the inquiry and perform follow-up regarding quality issues, if required. An electronic NCAR program has been instituted by the Corporate QA Manager which produces a monthly summary charted by "cause". These charts are reviewed monthly by the Corporate QA Manager and annually by ALS management. These NCAR summary charts may affect changes to the laboratory's quality assurance practices.

From the information available a CAR may precipitate a correction of the final results, reanalysis of the Customer sample and/or additional action by the Quality Control Department. Additional action may include performing an internal audit to determine if the problem occurred due to a non-authorized procedural change requiring method revision and/or additional analyst training.

Additional information regarding control of nonconformance testing can be found in the Standard Operating Procedure 99-Corr A.

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13.1 Stop Work Procedures

These procedures for the control of nonconformance testing may require the halting of work and withholding of analytical test reports. The responsibility and authority for the management of issues deemed as critical will be the responsibility of the Operations Director, ALS Middletown, PA. Likewise, the authority for the resumption of a work stoppage following corrective action will also be assigned to the Director.

In the event the Operations Director, ALS Middletown, PA is unavailable the responsibility will fall on the Technical Manager of ALS Middletown, PA.

14) Test Method Reference

14.1 Analytical Procedure References

ALS relies primarily upon the most current EPA approved revisions of the references listed below for methodologies used in the laboratory. Procedures contained in these references are acceptable for use only after the lab has demonstrated and documented adequate performance with the method such as method detection limit studies, precision and accuracy studies, proficiency sample analysis, and linear calibration range studies. These studies are then routinely verified as long as the methods are in use in the laboratory.

- "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, EPA/600/4-79/020, Revised 1983.
- "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 20th Edition, 21st Edition, 22nd edition.
- "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA SW-846, Third Edition, 1986, Updates I, II, IIA, IIB, III, IIIA, IIIB, IV, IVA, and IVB.
- 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants.
- 40 CFR Part 141, National Primary Drinking Water Regulations.
- "Methods for the Determination of Organic Compounds in Drinking Water", EPA 600/4-88/039, Rev. July 1991; Supplement I, EPA 600/4-90/020, July 1990; Supplement II, EPA 600/R-92/129, August 1992; Supplement III, EPA-600/R-95/131, August 1995.
- "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA 600/R-93/100, August 1993.
- "Methods for the Determination of Metals in Environmental Samples", Supplement EPA 600/4-88/039, Rev. July 1991; Supplement I, EPA 600/R-94/111, July 1990; Supplement II, EPA 600/R-92/129, August 1992.
- Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1, EPA815-R-00-014.

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- NIOSH Manual of Analytical Methods, 4th Edition, DHHS (NIOSH) Publication 94-113 (August 1994), 1st Supplement Publication 96-135, 2nd Supplement Publication 98-119, 3rd Supplement Publication 2003-154.

- Annual Book of ASTM Standards.

- National Environmental Laboratory Accreditation 2009 Standard, EPA/600/R-04/003, Approved June 5, 2003.

- International ANS/ISO/IEC 17025 Standard, Second Edition, 2005-05-15.

- Department of Defense (DoD), Version 4.2, October 25, 2010

14.2 Standard Operating Procedures

Standard Operating Procedures (SOPs) are available on the ALS server in the Common>Quality Assurance>SOPs folder. The SOPs are comprised of clear, complete written instructions for completing each standard test performed by ALS. Standard Operating Procedures include the following sections if applicable to the laboratory's direct performance of the method. Otherwise, analysts shall consult the reference method indicated in the Scope and Application Section of each SOP for the sections not included in a particular SOP. Other pertinent sections in addition to the following may be included as necessary.

- Scope and Application which includes:
  - Identification of the Test Method
  - Applicable Matrix or Matrices
  - Detection Limit
  - Reference Methods
- Method Summary
- Definitions
- Interferences
- Safety
- Apparatus and Materials
- Reagents
  - Includes any chemicals used in the procedure, including reference standards
- Calibration
- Quality Control which includes:
  - Data Assessment and Acceptance Criteria for Quality Control Measures
  - Corrective Actions for Out-of-Control or Unacceptable Data
- Sample Collection, Preservation, and Storage
- Procedure
- Calculations
- Reporting Results
- Pollution Prevention
- Waste Management
- Maintenance and Troubleshooting
- Tables, Diagrams, Flowcharts, and Validation Data
- SOP Revision Summary

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- SOP Concurrence Form/Statement

All personnel are expected to read and understand the most current revision of SOPs applicable to their position. To acknowledge concurrence to the procedures outlined in the SOP, personnel shall submit a Concurrence Statement to the QA Department for each applicable SOP as determined by their Supervisor. Concurrence Statements are kept on file as part of the analyst training record, to indicate that they have read, understood, and agreed to follow this revision of the SOP. Laboratory supervisors are responsible for overseeing the validation, maintenance and SOP updates on an annual basis, which are then administratively validated and or reviewed by the Quality Assurance Department before being initiated for use in the laboratory. A guideline for writing, issuing, and revising SOPs can be found in ALS SOP 99-SOPs. All revisions of Standard Operating Procedures are archived in the Quality Assurance Department where they are retained for a minimum of five (5) years.

14.3 Laboratory Analyses

14.3.1 Test Scheduling

Test scheduling is accomplished through the Laboratory Information Management System (LIMS) and is coordinated by the laboratory supervisors. Each of the laboratory departments prints a "Backlog Report" at the beginning of each day or during the day as needed. This report lists the outstanding analyses from each of the departments. Each department supervisor is responsible for monitoring Backlog Reports pertinent to their section, which is used in the scheduling and recording of laboratory analyses. The Backlog Reports are identified as follows:

- VOGC - Gas Chromatography - Volatiles
- VOMS – Gas Chromatography/Mass Spectroscopy - Volatiles
- SVGC - Gas Chromatography - Semivolatiles
- HPLC - High Performance Liquid Chromatography
- SVMS – Gas Chromatography/Mass Spectroscopy – Semivolatiles
- META – Metals
- WETC – Wet Chemistry
- MICR – Microbiology
- SUB - Subcontracted Analyses
- PREP – Prep Department
- FLD - Field Analyses
- EXTR – Organic Extractions
- MDIG – Metals Digestion
- WCPR – Wet Chemistry Preparation
- PM – Project Coordinator
- CSRV – Customer Service
- TO15 – TO15 in Air
- LEAC - Leachate Processing
- YORK – York Laboratory Analysis

Using the LIMS reports, the supervisors assign tests to the laboratory analysts. The analysts enter the computer system to schedule the analyses. This is done in the "Batching" area of the LIMS. The information entered by the analyst is recorded in the system for use by other

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laboratory personnel. Anyone using the computer system to inquire on the scheduled samples will see this information.

14.3.2 Record of Analyses

Laboratory records are traceable, retrievable and legible and include sufficient information and explanation such that any staff that did not perform the generation can readily interpret them. This also allows repetition of the analysis at a later date, if necessary.

While performing a test, all the necessary information is recorded in different manners, depending on the type of test. A test that does not use automated equipment has all necessary information recorded in logbooks or electronic laboratory notebooks. The worksheets are test-specific and contain the date of analysis, the initials of the analyst, the laboratory sample numbers, the result obtained, the units of the results, any calculations involved, instrument ID, and any comments concerning unusual circumstances encountered. All entries into paper logbooks are original and are recorded in indelible ink.

Other tests require the use of automated instruments and computers. The computer printouts *contain* the laboratory sample number or a reference ID which can be traced to the sample number using an analytical run logbook, instrument ID, analyst's initials, date of analysis, and time of analysis in the header information. The header should also contain a reference to the method being used. Included with each package of data there is a listing of samples analyzed in the sequence and a listing of the instrument parameters under which the samples were analyzed. If any deviations from the set instrument parameters are required for an individual sample, these changes are noted on that sample's printout. If an instrument is set to run over more than one shift and another analyst will be taking over the responsibility of the analysis of samples run on his/her shift, a comment is written on the printout of the first sample where responsibility was transferred.

If any corrections or amendments to the records need to be made, the incorrect data will have a single line drawn through it and the correct data entered. If the correction is due to other than a transcription error the reason must be clearly stated. The change is initialed and dated by the person responsible for making the change.

14.3.3 Preps Performed Entry

Preparatory processes, such as sample digestions or extractions, frequently involve dilutions or concentrations of samples before analysis begins. These dilutions or extractions result in factors that must be taken into consideration when calculating final concentrations. In order to account for these "prep factors", the initials and final volumes/weights are entered into the LIMS after the samples are prepared and readied for analysis. This is accomplished by a preparatory analyst in the LIMS "Posting" area to create a batch of sample prep factors. Each batch is test specific and contains the date of preparation, the analyst performing the prep, the associated batch QC sample identifications, and the initial and final volumes/weights of each of the samples in the batch. These initial and final measurements are then easily retrievable and automatically used in the calculation of final sample concentrations, which are reported to the Customer. This system eliminates the possibility of human error resulting from manual calculations.

14.3.4 Reporting Results

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Once an analysis has been completed and results checked for validity, the data is available to enter into the LIMS. All sample results and their associated quality control data are entered into the LIMS under the individual laboratory departments for the analyses performed in those departments. This is accomplished by each analyst in the LIMS "Posting" Entry/Edit area. Each batch is test specific and contains date and time of analysis, analyst completing the analysis, the instrument used for analysis, and sample results generated for one or more Customer samples as well as the associated quality control data produced during the analysis of those samples. In addition, any comments concerning the samples themselves or the analysis of the samples, such as non-conformances or interferences with the method are entered at this time. The Rounding Rule used for the reporting of results is if the figure following those to be retained is greater than or equal to 5, the absolute value of the result is to be rounded up; otherwise the absolute value of the result is to be rounded down. As an example 0.4365 will be rounded to 0.437 and 2.3564 will rounded to 2.356. All results are reported to three significant figures but limited to the number of decimal places in the reporting limit for the individual compound or analyte.

15) Sample Handling

15.1 Sample Collection

15.1.1 Sampling Procedures

In order to produce meaningful analytical data, ALS must have samples that are representative of the system from which they were taken. If the representation and integrity of the samples received in the laboratory cannot be verified due to inadequate sampling procedures, the usefulness of the analytical data produced for these samples is limited. The laboratory cannot accept responsibility for improper sampling of Customer-procured samples and will document the condition of the samples and analyze them as delivered. If an incorrect sampling procedure is suspected, the Customer will be notified as soon as possible by the Project Coordinator. ALS will postpone testing, if the holding time will not be exceeded, pending Customer response. Sampling instructions and acceptance criteria are available to Customers upon request.

Sample collection services are provided by ALS through personnel from the field services department. Documented procedures for field sampling are outlined in the *Field Services Sampling Plan*. Sampling personnel ensure that collected samples are representative of the original systems, fully labeled and identified, and properly preserved and transported to the laboratory.

Where sampling, as in obtaining sample aliquots from a submitted sample, is carried out as part of the test method, the laboratory uses documented procedures as outlined in SOP 19-Subsampling to obtain a representative sub sample.

15.1.2 Bottle Orders/Bottle Preservation

Bottle orders requested by customers are filled via a program that allows ALS to enter, store and track bottle orders and are completed by ALS Sample Receiving. Preparatory personnel enter any tracking numbers and cooler numbers associated with the order. Bottle order sheets and labels are printed automatically and a copy of the order is sent along to the customer describing exactly what has been sent. The program has the ability to assign site IDs to the

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bottles, permit documentation of special instructions, time date and time stamp the order, and dependent upon how the order is being delivered, can notify Field Services personnel automatically via e-mail to deliver the bottles to the appropriate customer.

Bottle preservation is performed by ALS according to the information in Appendix B, which lists appropriate preservatives and holding times for commonly performed analyses. The grade of acids and bases that are used for preservation are all designated for specialized instrumental methods, including trace organic or trace element analysis.

Because ALS does not know the exact nature of the matrix to be preserved, a uniform amount of acid or base is added to the bottles prior to shipment. The amount added equates to 8.0 mL of concentrated acid per liter of sample or approximately 8.0 mL of 10 Normal sodium hydroxide solution per liter of sample. For samples collected in amounts less than one liter, the preservative amounts will be decreased proportionally. It is the responsibility of the Field Service Coordinator and/or the Project Coordinator to manage the generation of bottle orders through the Sample Receiving Department. Additional information on bottle preparation can be found in the Standard Operating Procedure entitled 19-Bottle.

Upon return of the samples to the laboratory, the pH is measured on all samples (excluding those analyses which must be done at the bench level according to the individual SOP's) where pH adjustment is needed for proper preservation. If the pH of any container is outside the specified limits for a given test, additional acid/base is added to bring the pH into the proper range. An adjustment of this nature is recorded in the Electronic Preservation Logbook (See Figure 4), which is maintained in the sample receipt area, along with the lot number of the preservative used. It is also documented on the Corrective Action Form (See Figure 5), which is maintained with the chain of custody. It is the responsibility of the Sample Custodian to maintain the Electronic Preservation Logbook. Any adjustment is also noted as a comment on the final laboratory report. This testing and adjustment procedure is also followed for other preservation requirements such as the addition of sodium thiosulfate to eliminate residual chlorine content and temperature of samples.

For volatile organic samples, the pH and chlorine content is checked using one of two different procedures depending upon the type of autosampler used. For the Archon style autosampler, the pH and chlorine content of the sample is not checked until the analysis of the sample is completed. This is because the analysis of a VOA sample is done in a completely closed system and the sample is never opened in the laboratory. The Archon autosampler removes an aliquot for testing by piercing the septa and withdrawing the sample at the time the sample is analyzed. At the completion of the analysis sequence, the sample remains are tested for pH and chlorine content using conventional methods.

The pH and chlorine content will be recorded on the associated laboratory logbook in both the GC and GC/MS departments. If a sample pH or chlorine content is not within the proper range the sample will be analyzed, a comment (qualifier) will be placed on the final laboratory report, and a corrective action form will be initiated. The appropriate Project Coordinator will be notified by the department, who will then take the proper steps to notify the Customer. The Customer can then make the decision as to whether or not to resample.

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The Sample Receiving Technician will check the volatile analysis bottles upon receipt to ensure no headspace is present. If sample containers have been found to contain headspace, the Receiving Technician will note this on the Chain of Custody and notify the appropriate Project Coordinator who will then take the proper steps to notify the Customer. The Customer will be informed that the volatile sample does not conform to proper sampling procedures. It will then be the Customer's decision as to whether the sample is analyzed or resampled. If the sample is analyzed, a comment will be placed on the lab report stating that the sample contained headspace.

For tests that require filtration prior to preservation, this filtration is performed in the field prior to the sample entering the bottles containing preservative. If the laboratory must filter any sample prior to analysis it should not be preserved.

15.1.3 Holding Time

Holding time is the time from sampling until the start of analysis unless otherwise specified by the client. The date and time of sampling documented on the chain of custody establishes the time zero. If the holding time is specified to be measured in hours, then each hour is measured from the minute the sample was collected in 60-minute intervals. When the maximum allowable holding time is expressed in days, the holding time is based on calendar day measured from time zero, the date the sample was collected. The first day of holding time is not passed until midnight of the day after the sample was collected. Holding times for analysis include any necessary re-analysis due to instrument failure or analyst error that does not yield useful data. If sample re-analysis is necessary due to sample matrix, such as a dilution or matrix spike failure due to matrix interference, the holding time still applies. A comment is added to the final report stating that further analysis was required past hold time. The sampling time must be documented on the chain of custody form by the Customer. See Appendix B for a listing of analytical methods and their holding times.

15.1.4 Turnaround Time

Turnaround time is the time from receipt of samples to the transmittal of analytical data by mail, electronically or facsimile. The day the chain-of-custody is signed by the sample custodian is day zero in the turnaround time. Samples results will be due by the close of business on the last day of the turnaround time. The turnaround time is based on working business days, excluding weekends and holidays.

5.2 Sample Custody

15.2.1 Chain of Custody Form

Chain of Custody documentation tracks the historical possession of samples. A completed Chain of Custody must accompany all samples entering the laboratory (Appendix C). This form provides essential information to the laboratory regarding sample collection and analysis required, and includes the customer name, project name, sampler's name or initials, sample location, sampling date and time, number of containers, type of preservative used, sample type, special remarks concerning the sample or project, and analytical parameters requested.

Standard Operating Procedure 19-Rec/Han provides instruction on reviewing and inspecting the chain of custody for discrepancies. This is accomplished by inspection and comparison of the samples received against the chain of custody to identify any discrepancies. Sample receiving will immediately notify the customer service department of samples received without a chain of

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custody via US Mail, Federal Express, UPS, etc. These samples will be placed on hold until the chain of custody is received from the Customer. For walk-in customers dropping off samples, a copy of the COC will be given to them to fill out before sample acceptance. Complete chain of custody documentation, including memos, transmittal forms, etc., are scanned into the ALS database, filed, and properly retained by the laboratory

Sample preparation logs and sample analysis logs document the progression of extracts/digestates from preparation to analysis. The LIMS also tracks this progression and documents dates and times prepared and analyzed on the final laboratory analysis report. A more detailed internal chain of custody is available for use upon Customer request for special projects or for samples being tested for litigation purposes (See Figure 6). This internal chain of custody is created electronically using functionality available in the laboratory LIMS. Standard Operating Procedure 99-LCOC provides detailed instructions describing this procedure.

15.1.4 Sample Receipt

Upon arrival in the laboratory, samples are received by a sample receiving technician who ensures that a proper Chain of Custody accompanies all samples. The Chain of Custody will be signed by the person delivering the samples to relinquish the samples to the sample receiving technician. The technician will then inspect and compare the samples to be received against the Chain of Custody to identify any discrepancies before signing the form and receiving the samples into the custody of the laboratory. The date and time relinquished/received is also recorded on the Chain of Custody. A Cooler Receipt Checklist section on the Chain of Custody is completed for each customer. Information relating to shipping, sample temperature, custody seals, Chain of Custody/label agreement, container condition, sample amount, and container size/type/preservation is recorded.

If discrepancies cannot be resolved at the time of sample receipt by Sample Receiving personnel Project Management will address them during the chain-of-custody review following LIMS entry.

15.1.5 Acceptance/Rejection Criteria

When a sample arrives in the laboratory, a decision is made to accept or reject the sample. It is the responsibility of the Sample Receiving Department to verify and document any nonconformance regarding use of appropriate sample containers, preservatives, packaging, and incorrect documentation and labeling upon receipt of samples. The condition of the sample, such as sample cooler temperature, pH, chlorine content, etc., is recorded on the Chain of Custody and in the Sample Preservation Logbook (See Figure 4). Any conditions outside of acceptance criteria are noted as comments on the final laboratory report. In cases where samples are hand delivered to the laboratory immediately after collection, they are immediately refrigerated.

ALS reserves the right to reject a sample upon receipt in the laboratory if any of the following conditions occur:

- The sample is not properly documented on the chain of custody form and on the sample label with water resistant labels and indelible ink. Documentation shall include sample identification, the location, date and time of collection, collector's name, preservation type, sample type, and any special remarks concerning the sample.
- The sample has exceeded the holding time for the requested analysis.
- The incorrect preservative was used during sample collection.

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- Incorrect sampling protocols were used during sampling (i.e., a sample not being filtered in the field for dissolved metals).
- Improper sample container was used.
- Insufficient sample is present to perform the requested analysis.
- Improper storage or transport of sample has occurred prior to receipt.
- Excessive amount of sample has been collected or other conditions exist which would make disposal difficult.
- Samples show signs of damage or contamination.
- Sample contains hazardous raw material that is not accompanied by an MSDS or material that cannot be safely handled by the laboratory (i.e.: radioactive material).

When there exists any doubt as to a samples' suitability for testing, where the sample does not conform to the description provided, when the samples show signs of damage or contamination, or where the test required is not fully specified, the appropriate customer service representative is notified. They, in turn, are responsible for notifying the Customer for further instruction before proceeding. Any instruction given by the Customer is recorded on the original chain of custody and may be noted on the Final Lab Analysis Report. If the sample does not meet the above acceptance criteria, the appropriate customer service representative or Project Coordinator shall retain correspondence and/or records of conversations concerning the final disposition of rejected samples or fully document any decision to proceed with the analysis of samples not meeting acceptance criteria. The condition of these samples shall, at a minimum, be noted on the chain of custody document. The analysis data shall be appropriately qualified on the final report.

15.1.6 Sample Identification and Control

To ensure sample traceability, all samples receive a unique sample identification number that is assigned sequentially by the Laboratory Information Management System (LIMS). This identification number identifies and tracks the sample throughout the laboratory. This tracking number is affixed to the chain of custody and the sample bottles in the form of a waterproof label following entry into the LIMS. The LIMS contains all the information necessary to locate and track the sample. It also contains any pertinent information from the chain of custody regarding specific analyses and turnaround commitments.

15.1.7 Sample Storage

Since samples have different storage requirements, samples are maintained in various locations throughout the laboratory. Samples are stored away from all standards, reagents, and other potentially contaminating sources in such a manner as to prevent cross-contamination. All samples received, requiring refrigeration, are stored above the freezing point of water up to 6°C to comply with state certification requirements. Samples receiving volatile analyses are segregated from other samples in order to prevent cross-contamination. High concentration material or neat chemicals shall be stored separately. Samples not requiring refrigeration, such as aqueous metals samples, are stored at room temperature. After results are reported to the Customer, samples are held for an approximate two-week period. At the end of the two-week holding period, samples will either be discarded by the laboratory or returned to the Customer. ALS will not be responsible for disposal of materials known or suspected to contain dioxins, dibenzofurans, radioactive material, and high level PCBs. Special storage requirements for legal, project or other reasons will be met upon request.

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All refrigerators and freezers used for sample and standard storage contain thermometers immersed in glycerol. The temperature of each refrigerator or freezer is recorded at least once a workday according to instructions in SOP 99-TEMP.

The thermometers used in the refrigerators and freezers will be calibrated against a NIST certified thermometer reference standard which is used for calibration only, and for no other purpose, once a year at a minimum of two points surrounding the temperature range of the thermometer being calibrated according to instructions in SOP 99-TCAL. A hardbound logbook will be kept for recording the temperatures. The calibrations of the thermometers will be recorded in logbooks. The NIST certified thermometers will be returned to the manufacturer once every three years for recalibration.

16) Subcontracted Analyses

There are occasions when particular laboratory analyses cannot be completed in-house by ALS. This may occur because the laboratory does not have the necessary instrumentation, equipment or certification to perform the analyses. ALS also subcontracts overflow work as necessary when instrument problems occur or physical capacity is exceeded. Prospective subcontracting firms are thoroughly reviewed with an emphasis on their quality control program and associated certifications. A register of all approved subcontractors is retained in the QC Department. ALS will ensure that the laboratory receiving the subcontracted work maintains the necessary certifications and level of quality to perform the work to project specifications.

ALS advises its Customers in each proposal of its intention to subcontract any portion of the testing to a third party. If it is necessary to subcontract work as a result of unforeseen circumstances, Customers will be contacted by their Project Coordinator to gain their permission. This is documented on the Chain of Custody. When samples are sent, they are shipped to an appropriately certified subcontracting firm from ALS's Sample Receiving department and the results of the analyses are transmitted back to ALS for review. Any subcontracted analysis is noted as such on ALS's final laboratory analysis report with an identification of the appropriate subcontractor. The original subcontractor analysis reports, or a true duplicate thereof, may also be attached to the associated ALS Laboratory Analysis Report.

Samples requiring NELAP certification will be shipped to an ALS approved laboratory accredited under NELAP for the tests to be performed and/or with a laboratory that meets applicable statutory and regulatory requirements for performing the tests and submitting the results of tests performed.

17) Laboratory Facilities and Equipment

17.1 General Description

ALS is located on a one-acre lot on the north side of PA Route 283, five miles southeast of Harrisburg. ALS's address is 34 Dogwood Lane, Middletown, PA 17057. The building has an area of approximately 26,000 square feet on two levels. The lower level contains the metals and wet chemistry laboratories, QA, Reporting, and IT departments, Accounting Offices, Purchaser, Human Resources and Field Services Garage. This level also contains sample storage, gas storage; chemical and waste storage areas (see Appendix D, Figure 1). The upper level

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contains the GC, GC/MS, HPLC, Sample Preparation, and microbiology laboratories, sample receipt, sample storage areas, customer service and administrative offices (see Appendix D, Figure 2).

17.2 Security

The building has fire and smoke alarms and an electronic security system that are monitored by ADT. During weekends and off-shift hours the electronic security system is used to prevent unauthorized entry into the building. At approximately 7 p.m., the doors providing access to the building are locked and are kept locked until approximately 7 a.m. Any non-employee wishing to enter the building during these hours must use the door buzzer and wait for an employee to permit them access. All visitors, during both business hours and off-shift hours, must sign in and out at the receptionist's desk. The employee whom they are visiting will be notified of their presence and will come to the lobby to escort the visitor to the appropriate office or lab. People dropping off samples for analysis (and who do not leave the reception area) and field samplers entering the building for the sole purpose of dropping off samples in the Sample Receipt area will not need to sign in.

17.3 Laboratory Accommodations

ALS has made great efforts to ensure that laboratory accommodations including lighting, temperature, ventilation, and energy sources are consistent to facilitate proper performance of testing in all areas. Temperature and humidity are important factors in the operation of instrumentation in the laboratory. All areas of the laboratory have separate temperature controls in order to allow for optimal adjustment of these factors. Certain areas of the laboratory contain controls for temperature and humidity due to the operational and test method regulation specifications of the specialized equipment contained in those areas.

Regarding ventilation, extra provisions have been developed in order to provide Customers with a greater assurance that their samples are being processed in a professional and quality environment. These include such things as maintenance of a negative air pressure in the preparatory laboratories and a net positive pressure in the organic laboratories and hallways leading to the preparatory laboratories. Additionally, access to and use of neighboring areas where activities are incompatible is controlled. This ensures that any solvent contamination resulting from sample extraction processes is kept out of the analysis laboratories. In addition, all fume hoods meet OSHA standards for face velocity, and good housekeeping practices are maintained throughout the laboratory. This helps to ensure the safety of ALS employees as well as the integrity of Customer samples.

17.4 Waste Management

ALS conducts waste management practices consistent with all applicable EPA rules and regulations. Spent reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. Reference SOP 19 – Waste Disposal for information regarding ALS waste management procedures.

17.5 Pollution Prevention

Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. Management shall consider pollution prevention a high priority. Extended storage of unused chemicals increases the risk of accidents. The laboratory shall consider smaller quantity purchases which will result in fewer unused chemicals being stored and reduce the potential for exposure by employees. ALS tracks chemicals when received by

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recording their receipt in an electronic logbook. Each chemical is then labeled according to required procedures and stored in assigned locations for proper laboratory use.

17.6 Deionized Water

Deionized water is used for all analyses performed in the laboratory. Deionized water is provided to each individual laboratory by a laboratory-wide circulation system that has been designed and is currently serviced by an outside vendor. This system consists of tap water being introduced first to a sediment cartridge, with a 1-micron pore size, which is used for particle elimination, then to carbon filters, which are used for removal of chlorine and organic contaminant. Water is circulated through three ion exchange tanks, containing anion and cation resins that are used to deionize water, and an ultraviolet sterilizer, which is used to provide control of bacteria. A polishing tank containing mixed anion and cation resins is also used as a final deionizing source and to act as a safeguard to maintain the quality of the water before and during servicing. Finally, water flows through a 0. 2-micron filter to remove any colloidal silica before distribution to all areas of the laboratory. This system provides quality water with a typical resistivity reading of 17.7-18.3 MΩ·cm. The deionized water system is equipped with a continuous resistivity monitor. If the monitoring system finds the water quality in exceedance of the criteria, the indicator light will turn red to alert personnel to contact the water filtration service company for routine maintenance. The readings are monitored and recorded daily. The conductivity of the water is determined and recorded at least weekly by the water quality department. ALS SOP 04-H_2OMON provides details concerning the monitoring of the deionized water system.

17.7 Gas Storage

A separate gas storage room contains the necessary specialty gases that are required for specific analytical equipment. The gases leave the centralized storage room through individual lines leading to the analytical departments. Other non-flammable gas tanks can be found in wet chemistry, GC-Volatiles, Organic Prep, and GC-Semivolatiles. All gas tanks are properly secured with chains and department personnel are trained in proper handling.

17.8 Instrumentation

The laboratory has a full complement of instrumentation and support equipment such as fume hoods, refrigerators, freezers, ovens, balances, a deionized water system, etc., required for the correct performance of all tests. All instruments are maintained by trained employees and/or by manufacturer's service personnel. Reference materials, including instrumentation manuals provided by the manufacturer, are available to provide instruction in the proper use of the instrumentation. A Master Inventory List is maintained by the QC Department that organizes these external documents by department, and assigns a unique identification number to each for easy reference. A complete listing of instrumentation and equipment is included in Appendix E which is updated annually by the QC Department.

17.9 Instrument Maintenance

ALS personnel can accomplish preventative maintenance as well as some repairs on-site. ALS also maintains some service agreements with instrument manufacturers to further ensure the operational viability of all equipment.

All maintenance and servicing done on instruments and equipment is recorded in hardbound or electronic logbooks. The instrument logs contain general information about the instrument, including the name of the manufacturer, instrument model, serial number, date of purchase,

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date placed into service, current instrument location, condition when received (e.g., new, used, reconditioned), and information concerning any service contracts maintained. They also contain information concerning any routine maintenance done by ALS personnel. Information concerning routine maintenance should include a brief description of the maintenance performed, the frequency required, the date performed, and the initials of personnel performing the maintenance and any comments concerning the procedure. Also contained in the log is information concerning repairs done by ALS personnel or instrument manufacturers. This information includes the date of servicing, the initials of personnel performing the service, record of why it was done and the results of the servicing relative to instrument performance. The individual logbooks are located on-line or in the laboratory with the instruments to which they pertain along with copies of manufacturer's instructions, where available. Once a hardbound logbook is filled, a new logbook will be initiated. The general information about the instrument and the routine maintenance required will be transferred over to the new logbook. The old logbook may remain in the laboratory for at least one year so that the analysts may use it as a reference. When removed from the department the retired logbook will be archived according to required procedures, where it will be kept for a minimum of five (5) years.

It is the responsibility of the section leaders to determine the effect, if any, of an instrument defect on previous results. If an effect has been determined that questions the validity of any sample results, the QA Manager is notified and the corrective action procedure is followed.

17.10 Instrument Calibration

All instrumentation must be calibrated prior to use. The initial calibration determines the working range of the instrument by measuring the analytical response in relation to the amount of analyte present. All initial calibrations are method specific, and may be comprised of a single point or multi-points. The type of calibration performed depends on the type of instrumentation and the method of analysis in use. Step by step calibration procedures are outlined in detail in each Standard Operating Procedure. Also included is the frequency of calibration required and the materials needed to perform each calibration. Only standard reference materials as defined in section 8.2 are used for calibration.

All initial calibrations are verified for accuracy by analysis of a second source standard. This is a check standard prepared from a reference material procured from a different source than that used for the calibration. This provides verification that the calibration standard has been prepared at the correct concentration. When a different source is not available or cost prohibitive a second lot of material from the same vendor is acceptable.

All initial calibrations are controlled by analysis of continuing calibration standards and/or QC check samples. These are method specific or mid-range level calibration standards that are analyzed at specific frequencies as established by the method. The amount of analyte recovered is compared to the acceptance criteria of the method. Acceptable recoveries verify the stability of the calibration and lack of instrument drift throughout the analysis. If the acceptance criteria are not met, method specific corrective action must be taken.

18) Data Verification Procedures

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18.1 Data Quality Objectives

The data quality objectives discussed below ensure that data will be gathered and presented in accordance with procedures appropriate for its intended uses, and that the data will be of known and documented quality able to withstand scientific and legal scrutiny. The quality of the measurement data can be defined in terms of completeness, accuracy, precision and traceability.

18.1.1 Completeness

Completeness is defined as the percentage of measurements that are judged to be valid measurements. Factors negatively affecting completeness include the following: sample leakage or breakage in transit or during handling, missed method prescribed holding times, lost sample during laboratory analysis through accident or improper handling, improper documentation such that traceability is compromised, or rejection of sample results due to failure to conform to QC criteria specifications.

18.1.2 Accuracy

Accuracy is the measure of agreement between an analytical result and its "true" or accepted value. Deviations from a standard value represent a change in the measurement system. Potential sources of deviations include (but are not limited to) the sampling process, sample preservation, sample handling, matrix effects, sample analysis and data reduction. Sampling accuracy is typically assessed by collecting and analyzing field and trip blanks for the parameters of interest. Analytical laboratory accuracy is determined by comparing results from the analysis of laboratory control samples or check standards to their known values. Accuracy results are generally expressed as percent recovery.

18.1.3 Precision

Precision is the determination of the reproducibility of measurements under a given set of conditions, or a quantitative measure of the variability of a group of measurements compared to their average value. Precision is typically measured by analyzing field duplicates and laboratory duplicates (sample duplicate, matrix spike duplicate, check standard duplicate and/or laboratory duplicate). Precision is most frequently expressed as standard deviation, percent relative standard deviation or relative percent difference.

18.1.4 Traceability

Traceability is the extent to which reported analytical results can be substantiated by supporting documentation. Traceability documentation exists in two essential forms: those which link the quantitation process to authoritative standards and those which explicitly describe the history of each sample from collection to analysis and disposal.

18.2 Laboratory Quality Control Definitions

Technical personnel are responsible for complying with all quality assurance/quality control requirements that pertain to their technical functions. ALS uses the following internal quality controls to verify that the data produced by the laboratory has the required degree of accuracy and precision and is free from contamination due to laboratory processes. All samples are normally processed in preparation and analytical batches of no more than 20 samples per batch. The following quality control checks defined below are appropriate for the various methods performed in the laboratory. Individual SOPs will further define the specific checks to be analyzed with each method. Additionally, a Customer's individual Quality Assurance Project

Plan may require the laboratory to include additional checks for analysis depending on the *site* requirements.

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18.2.1 Method Blank

A method blank is an analytical control consisting of all reagents, internal standards, and surrogate standards that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination contributed from the preparation or processing of the sample.

18.2.2 Reagent Blank

A reagent blank is an analyte-free sample that contains all the reagents used in a particular method. It is prepared and analyzed to determine if contamination is present at detectable levels that can be attributed to the reagents used in the process.

18.2.3 Field Blank

A field blank consists of reagent water that is transported to the sampling site, transferred from one vessel to another at the site, and preserved with the appropriate reagents. This serves as a check on reagent and environmental contamination.

18.2.4 Trip Blank

A trip blank consists of reagent water that is transported to the sampling site and returned to the laboratory without being opened. This serves as a check on sample contamination originating from sample transport, shipping, and from the site conditions. The holding time for the trip blank begins when received by the laboratory, unless otherwise specified by the client, such as the time when field samples were collected.

18.2.5 Refrigerator / Storage Blank

Refrigerator/storage blanks are placed in VOA refrigerators on a weekly basis and analyzed by GC/MS for the full Volatile Organic Analytes/Target Compound List (VOA-TCL). These blanks are used to monitor the volatile storage refrigerators for the presence of sample cross-contamination. In order to maintain continuous measurement within each refrigerator these blanks are prepared and logged into the Laboratory Information Management System (LIMS) by the Sample Custodian for specific turnaround times. This ensures that at least one blank is present in each volatile refrigerator at all times. If contamination is found the analyst is required to take corrective action to prevent the problem from affecting other stored samples. All samples associated with a positive blank will then be qualified on the analytical report. The QC Department reviews these results and maintains these files for review by regulatory agencies for a period of 5 years.

18.2.6 Quality Control Reference Sample or Calibration Verification Standard (Second Source Standard)

A QC reference sample is a sample prepared from a source other than that used for calibration at a concentration within the calibration range. It is used to verify that the calibration standards were prepared accurately. It is analyzed after every initial calibration performed in the laboratory.

18.2.7 Laboratory Control Sample (LCS/LFB)

A Laboratory Control Sample (aka Laboratory Fortified Blank) is a laboratory blank fortified at a known concentration. Aqueous and solid LCSs are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples. An LCS is analyzed with each preparative or analytical batch as required by the method. It provides a measure of the accuracy of the analytical system in the absence of matrix effects.

18.2.8 Surrogate Standards

Surrogates are organic compounds which are similar to analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. These compounds are spiked into all blanks, calibration and check standards, samples (including duplicates and QC reference samples), and spiked samples prior to an organic analysis. Percent recoveries are calculated for each surrogate to detect problems in the sample preparation process and monitor the efficiency of the process.

18.2.9 Duplicate

A duplicate is a second aliquot of a sample that is prepared and analyzed in the same manner as the original sample in order to determine the precision of the method. Samples selected for duplicate analysis are rotated among Customer samples so that various matrix problems may be noted and/or addressed. Poor precision in a sample duplicate may indicate a problem with the sample composition and shall be reported to the Customer whose sample was used for the duplicate analysis.

18.2.10 Matrix Spike/Matrix Spike Duplicate

A matrix spike/matrix spike duplicate is the addition of a known amount of a target analyte to a sample that is subjected to the entire analytical procedure. Samples selected for matrix spiking are rotated among Customer samples so that various matrix problems may be noted and/or addressed. Poor performance in a matrix spike may indicate a problem with the sample composition and shall be reported to the Customer whose sample was used for the spike.

18.2.11 Method Detection Limit (MDL)

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

18.2.12 Reportable Detection Limit (RDL)

The reportable detection limit on the laboratory report is a concentration at which the laboratory routinely reports results. The RDL may also be the method detection limit and is based on whether the Customer requires the result reported down to the MDL. It is laboratory policy to indicate on the laboratory report when the method detection limit is used as the RDL.

18.2.13 Common Laboratory Contaminants

Some common laboratory contaminants include: methylene chloride, acetone, 2-Butanone, hexane, phthalates, aluminum, and zinc. These analytes are sometimes seen in laboratory blanks due to their use in the processing of samples. When blank contamination occurs it is required that samples associated with these blanks be reprocessed. However, if reprocessing cannot occur due to lack of sample, holding time issues, or Customer turnaround time a comment will be placed on the analytical report defining the problem.

18.2.14 Internal Standard (IS)

A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method (NELAP).

18.2.15 Minimum Reporting Level (MRL)

Minimum Reporting Levels represent an estimate of the lowest concentration of a compound that can be quantitatively measured by a group of experienced drinking water laboratories.

18.2.16 Detection Limit (DL) for DoD

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The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.

18.2.17 Limit of Detection (LOD) for DoD

The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

18.2.18 Limit of Quantitation (LOQ) for DoD

The lowest concentration that produces a quantitative result within specified limits of precision and bias. For DoD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard.

18.3 Proficiency Testing (PT) Samples

These reference materials provided by the EPA, state agencies, government agencies or certified commercial vendors monitor accuracy performance of the laboratory on a regular basis. It is an essential part of ALS's quality program to maintain accreditation and certification by regulatory agencies. It is laboratory policy to analyze and report PT samples as if they were regular compliance samples. This includes analysis of all methods under the Scope of Work for NELAC and includes all matrices presently accredited for by both NELAC and non-NELAC state agencies. Other than "full volume" samples, PT samples typically require a preparation step prior to analysis. For tracking purposes it is required that all PT sample preparations be recorded in either the Standard/Reagent Logbook or the Sequence Logbook depending on the preference of the Departmental Supervisor.

Participation in these programs provides the laboratory with evidence of correlation of results with other laboratories and national standards. Proficiency testing results are filed and archived for at least five (5) years. ALS participates in the following programs:

Program	Sample Type	Frequency
In-house Blind Study	Organics/Inorganics/Metals	Semi-Annually
Water Pollution Study (WP) provided by a NELAC and/or NIST approved provider	Organics/Inorganics/Metals/ Microbiology	Semi-annually
Water Supply Study (WS) provided by a NELAC and/or NIST approved provider	Organics/Inorganics/Metals/ Microbiology	Semi-annually
Discharge Monitoring Report provided by a NELAC and/or NIST approved provider	Inorganics/Metals	Annually-As req'd by state regulatory agency)

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Program	Sample Type	Frequency
Laboratory Soil Proficiency Testing Program	Organics/Inorganics/Metals	Semi-annually

18.3.1 Non-Proficiency Testing Analytes

When no commercial Proficiency Testing (PT) sample is available for an analyte that is routinely reported by ALS to a client, the QC Department will use control charts to monitor and evaluate the accuracy of the analytical procedure against defined acceptance criteria documented in the Standard Operating Procedure. These control charts will track either the Laboratory Control Sample, Matrix Spike, Sample Duplicate, or Secondary Source standards to demonstrate this performance.

18.4 Quality Control Charts

Control chart data are initially generated through the QA/QC Control Charts Utility program. Following determination of initial set-up criteria it is monitored annually through an in-house statistical analysis program.

Control chart criteria are used by ALS to establish method performance of a given analysis and to monitor trends of QC results over time. These data sets also allow for the development of quality control criteria where no method or regulatory criteria exist. Control charts are initially generated after approximately 20-30 accuracy or precision data points are accumulated for each method. The control limits are then calculated to three standard deviations above and below the mean (99% confidence).

These criteria are assessed annually through an in-house program that compares the limits from the previous year to current calculated criteria. If the limits differ by more than 10% a control chart is then recreated for that analyte and evaluated to determine whether modification to the established criteria is justified. If a change in criteria is required the LIMS and all software programs associated with the evaluation of data are updated to reflect the new limits. See Standard Operating Procedure 99-QC Chart for more specific information

Documented quality control limits are generated by the analysis of quality control samples or specific minimum acceptance limits established by the method and/or Standard Operating Procedure. This allows any out-of-control parameters to be detected before data is reported. If the Out-of-control parameter is judged to be sample related, the analysis may continue. The corrective action policy must be followed, and the result reported with a comment qualifying the results.

When the analyst deems an analysis out of control, the reason for the out-of-control situation is investigated immediately. The response to the out-of-control situation will depend on the analysis and the corrective action measure stipulated in the SOP shall be consulted. In addition, the supervisor will evaluate and depending on the situation may halt analysis of any additional samples until the problem has been corrected. Corrective action may include re-assay of the check samples, recalibration, instrument maintenance or other SOP mandated operations. If it is necessary to report results obtained when the system is judged to be out-of-control, the

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corrective action policy will be followed, and the data will be flagged on the laboratory analysis report and a qualifying comment will be attached.

18.5 Method Detection Limits

Method detection limits (MDLs) are determined and documented in accordance with federal guidelines contained in 40 CFR Part 136 Appendix B. The detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix. The statistical procedure allows for computation of method detection limits based upon a minimum of seven analyses of a check sample that is prepared at a concentration between 1 and 5 times the estimated MDL. Once an MDL study has been performed, all detection limits will be verified immediately with a verification check sample spiked at approximately 2 times the current reported MDL. The MDL verification check sample shall be acceptable if the laboratory can reliably detect and identify by method-specified criteria all analytes in the check sample. If the method has no confirmation, the check sample must produce a signal that is at least 3 times the instrument's noise level.

Method detection limit studies are performed annually for each method and matrix of concern during initial method validation or when a major change in operating conditions or instrument configuration occurs. When an MDL is not required for any analyte for which spiking solutions or quality control samples are not available, the laboratory will not report a value below the Reporting Limit.

ALS has developed, tested, and validated an in-house MDL program using Microsoft Access to calculate MDL values based on analytical results entered in the LIMS for each method, matrix, and analyte combination. The analytical results are posted in the LIMS for the 7 or more replicates, in the same manner as the analysts post data to the LIMS. The program can calculate the MDL values automatically, and will allow the user to publish the MDL values electronically to the LIMS. In departments where the Access Program is not implemented, the MDL calculations are performed by appropriate software as designated by the Department Supervisor. See SOP 99-MDL for more specific information.

Reporting Limits or Practical Quantitation Limits are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. These are listed on all lab reports along with the analytical result. They are determined by multiplying the calculated Method Detection Limit by two (2) to five (5) times and incorporating a safety factor that is developed using guidance from recovery studies and blank concentrations, or by reporting the lowest standard of the initial calibration curve. Results outside of the quantitation range must be reported as estimated. In addition, in the cases of compounds that are identified by a recognizable pattern (for example, PCBs, toxaphene, technical-chlordane), the limit of quantitation is not based solely on the limit of detection of the various components, but on the concentration of the mixture at which the pattern becomes recognizable to the analyst.

For DoD projects, limits of detection and quantitation are calculated using a unique system from that described above. An MDL study is initially performed to determine the Detection Limit (DL). This study does not need to be re-performed unless there is a change in instrumentation or procedure. From the DL, a Limit of Detection (LOD) is determined by analyzing a quality system matrix spiked 1 to 4 times the DL. If this verification meets all

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method criteria for analyte detection, the LOD verification is acceptable and set at the spiked level. This must be performed quarterly. The Limit of Quantitation (LOQ) is set at or above the lowest initial calibration standard. Precision and bias must be determined at the LOQ. A quarterly verification must also be performed for the LOQ, and is performed similarly to the LOD verification only it must be within the criteria determined during the precision and bias study.

18.6 Data Reduction, Validation and Reporting

ALS has an established sequence of approvals that analysis results undergo before being issued to a Customer on a final report as described in SOP 99-DATA. Each step in the process is initialed and dated upon completion. The individual analyses on the report are initially reviewed by the analysts performing the testing. The analyst ensures that all quality control information is in control. The laboratory supervisor or designee, responsible for the particular analysis, then reviews the data generated by the analyst. The records are checked for SOP compliance and calculation errors which are documented on the raw data. Once all data has received approval by the supervisors or designees, results are released in LIMS for reporting. . Organic data and some inorganic data are electronically uploaded and do not need to be checked for transcription errors and completeness. Once all of the data for a workorder has been entered into the LIMS and the data reviews by the sections have been completed, the workorder is scheduled to print automatically by the LIMS during the next print run. The report is then printed with the electronic signature of the Technical Manager. If at any point in the data reduction, validation, and reporting process, an error is found with the data entered into LIMS, the error will be corrected and the correction will be recorded in a LIMS audit trail function. The LIMS will document the sample number, the correction that was made, the reason for making the correction, the date and time the correction was made and the initials of the person making the correction.

All of the information necessary for the interpretation of the test results and all information required by the methods used are included on the report.

The front page of the report supplies information including project name, purchase order number (if available), workorder No., customer name and address, date of sample receipt, NELAC reference, website information for NELAC Scope of Accreditation and the signature of an approved signatory.

The second page of the report lists laboratory and field sample ID's and additional information regarding sampling and receipt. Also included here are the "Workorder" comments that apply to the entire workorder, the definitions of qualifiers used in reporting sample results and notes pertaining to methodology.

In the actual body of the report, the test/parameter being analyzed is listed along with the result, units, reporting limit, method reference, date and time analyzed along with container ID. If the sample requires a preparation step the information relating to this part of the analysis will be recorded. Also included may be "line item comments" where a comment is attached directly to a particular result, "sample comments" where comments are attached at the end of a report. These comments will indicate any out of the ordinary circumstances such as a method non-conformance or interference problem. All surrogate percent recoveries are provided following each organic analysis. If the client requires the method detection limit to be included on the

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final report, this can be set-up through the client profile or for individual projects and is addressed through the Project Coordinator.

If changes need to be made to a report that has already been transmitted to the Customer ALS will uniquely identify the change by placing a comment on the report as to what change was made, the date it was made and the initials of the person authorized to make the change.

If additional tests are requested on a sample that has been started but not finished by the laboratory, the test request will be added to the appropriate sample in the LIMS. Additional tests for a laboratory sample can be added by either the Technical Manager, sample custodian or the customer service representative.

18.7 Data Deliverable Reporting

ALS is capable of preparing a variety of data deliverable reports. For all data packages produced, the hardcopy data is scanned, and maintained on the server. All packages are organized and assembled on a specific basis in order to comply with the Customer's regulatory or project specific requirements. Shipments of deliverable packages are documented and sent through a commercial carrier. In general, ALS Deliverables may contain:

- Case Narrative – Information on sample types, tests performed, any problems encountered, and general comments.
- Analytical Data – Data are reported by sample with the appropriate significant figures and reporting limits, and have been adjusted for dilution, if appropriate.
- Laboratory Performance QC Information – The summary results and raw data of LCSs and method blanks analyzed with the project are provided. Any data or QC anomalies are discussed in the narrative or are listed as comments on the analytical report.
- Matrix Specific QC Information – The summary results and raw data of any sample duplicates and MS/MSDS analyzed with the samples as specific QC are provided. Any additional project specific QC requested by the Customer is also reported. All QC results include supporting information such as concentration of the spike, percent recovery, and percent difference/RPD.
- Methodology – Reference to analytical methodology used is cited in the deliverable package.

18.8 Electronic Data Deliverables

The generation of Electronic Data Deliverables (EDD) from the Horizon LIMS is accomplished with the use of a custom written computer routine written and validated by in-house programmers. A variety of EDD formats are available at the Customer's request and specific formats required by a Customer's QAPP can be formatted and incorporated into the ALS EDD generator.

19) Corrective Actions and Feedback

When a system or performance audit indicates a deficiency, when established quality control limits are violated, or when professional judgment by an experienced analyst indicates that a result may be inaccurate, corrective action is necessary. Corrective actions are measures taken to correct a problem, which may adversely affect the quality of a reported result, and to prevent its reoccurrence if possible. Corrective action may consist of, but is not limited to, things such

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as re-preparation of a sample, reanalysis of a sample, maintenance of malfunctioning equipment, revision of standard operating procedures, qualification of a sample result with a detailed explanation, or re-training of personnel. See SOP 99-CorrA for details concerning the corrective action documentation procedure.

An experienced analyst, upon review of raw data, is expected to use professional judgment when accepting and rejecting results of an analysis. In cases in which an analysis successfully passes all method QC requirements, an analyst may use professional experience to judge the sample result questionable. This may be due to previous sample history, lack of correlation between results of multiple test methods performed, or general dissatisfaction with the result obtained. In these cases analysts are given the authorization to reanalyze the sample as a form of corrective action. In all cases of re-analysis, it must be documented clearly in the raw data which results were reported to the Customer.

If corrective action is required because routine data quality assessments are out-of-control, such as surrogate recoveries below acceptable limits or duplicate relative percent difference values above acceptable limits, the data is evaluated on a sample-by-sample and/or batch basis. Data is evaluated with respect to SOP criteria and the corrective action may be limited to rejecting the sample or batch or accepting it and reporting the result with a qualifying comment on the Lab Analysis Report. The decision that is made is indicated on the raw data, such as on the analytical worksheet, electronic or hardbound data logbooks. If a quality control violation occurs within the Organic Departments and is judged to be matrix related, a Sample Non-conformance Form is completed (see Figure 7) and filed with the raw data. If a quality control violation is judged to be non-matrix related, a corrective action form is completed (see Figure 5). If a trend is not observed during the course of data validation, additional corrective action or documentation is not necessary.

If the corrective action is required because of a systemic deficiency or if a situation occurs affecting data usability for more than one batch (i.e., standards preparation errors), a more global assessment must be made. In these cases, the deficiency, along with the corrective actions initiated, is recorded on a corrective action form. The corrective action documentation shall be completed by the department supervisor or his designee and contain a root cause analysis including what occurred, immediate action taken, cause and long term corrective action to be taken to prevent the reoccurrence of the deficiency in the future. The corrective action report will be reviewed by the Quality Control Department and the process monitored to ensure that implementation of the corrective action is complete.

If at any point in ALS's system it becomes evident that an error has occurred (either human or instrumental) which may have jeopardized the validity of reported results, the QA Manager, Laboratory Manager, Technical Manager and appropriate Project Coordinator are notified immediately. The Customer Service Representative makes an initial phone call immediately to all potentially affected Customers defining the error. This documented phone call will address the specific tests and samples involved and define the effect that the suspected problem would have on issued results. After a thorough review by the QA Manager all corrective actions and resolutions will be documented on a Corrective Action Form as explained in the Corrective Action SOP (99-Corr). At the Client's request a letter will be sent defining the problem and the associated corrective actions initiated to resolve the issues.

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19.1 Preventive Action

Preventive actions are long-term improvements the laboratory makes to prevent non-conformances.

The QA Manager tracks all external and internal corrective actions on a monthly basis. Based on this review the QA Manager shall make the determination if there are any apparent problems or trends that need to be addressed within the laboratory operations. If necessary, system audits and/or method audits will be performed as a result of this review. The Laboratory Director and/or Operations Manager will become involved where changes are required in personnel, instrumentation or procedures.

ALS encourages all employees to contribute their ideas on issues relating to facility and system improvements, increased efficiency, waste elimination, ensuring a safe working environment and improving customer satisfaction while maintaining a high level of quality. For this purpose we have two Suggestion Boxes available on both upper and lower floors along with suggestion forms (See Figure 9). The Office Manager retrieves these suggestions monthly for review and then they are evaluated by Upper Management for implementation, when merited.

The laboratory encourages both positive and negative customer feedback. This feedback is used and analyzed to improve the management system, testing, calibration and project management activities. Customer satisfaction surveys are an example of the type of feedback used to determine customer satisfaction with the various aspects of our operation. . A survey link is attached to all ALS emails which allows automatic feedback from our clients directly to ALS Corporate offices. These surveys are reviewed and summarized on a monthly basis. Results of these surveys are sent to the Management of each laboratory facility. The approval scores are numbered one (1) through ten (10) with (10) being the highest satisfaction rating. Approval scores less than seven (7) require a corrective action and a client response. Analysis of these surveys is used by the Sales Department to incorporate continued improvement of the ALS overall system. Customer feedback combined with audit results, analysis of data, and corrective and preventive actions are discussed during annual management reviews and when necessary, new policies are established to meet our customers' needs on a consistent basis.

20) Departure from Procedure

There are occasions when it becomes necessary to deviate from documented policies and procedures. When a deviation is necessary, prior evaluation and approval by the Laboratory Director is required and the customer must be notified. Customer approval can be granted verbally or in writing, but in all cases is documented. A comment states the specifics of the deviation, the applicable test(s) and the reasoning for the deviation. These comments will appear on the final lab report. Deviations from SOPs will be noted with the appropriate initials and date in the data logbook. All departures from procedures are documented on corrective action forms and submitted to the QA office for review.

21) Complaints

All complaints, initiated by Customers are taken seriously. Complaints are handled according to the Standard Operating Procedure SOP 99-Complaints. This procedure outlines the steps taken to process complaints in the laboratory.

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An external complaint consists of any non-compliance with customer's project specifications as indicated by the Customer. Upon receipt of an external complaint, an External Complaint Form is initiated (See Figure 8). Information such as customer name, Customer contact, date/time, applicable COC numbers, and the ALS contact are documented. The specific items discussed are also documented. If an appropriate resolution can be worked out immediately with the Customer, that too is documented. Otherwise, the External Complaint Form is submitted to QC Manager for determination of an appropriate resolution. Any complaint concerning the quality of reported results that cannot be resolved directly with the client may be referred to the accrediting agency or regulatory authority within the state from which the samples were collected. The finalized External Complaint Form including all related documentation pertaining to the resolution is kept on file in the QA Office and distributed to all departments involved with the corrective action.

22) Confidentiality, Proprietary Rights, and Transfer of Ownership

22.1 Confidentiality and Reporting

The confidentiality of Customer information is strictly maintained through rigid controls. Reports and information are issued only to the Customers who have submitted the work except as otherwise indicated by the Customer. The laboratory will sign an acceptable confidentiality agreement as required. Copies of the final laboratory report, mailed via regular mail or sent via email, are covered in the analysis fees. Additional copies of reports sent to another address may be charged per copy. Charges for express mail services, sample shipping, and fax services may be extra.

22.2 Limitation of Liability

Notwithstanding any other provision herein, ALS's liability and Customer's exclusive remedy for any cause of action arising hereunder, whether based on contract, negligence, or any other cause of action, shall be limited to the compensation received by ALS from the Customer for the services rendered therewith. All claims, including negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by ALS within ninety (90) days after ALS's completion of the services provided.

22.3 Transfer of Ownership

In the event of a transfer of ownership of the laboratory, the new owner will agree in writing, which shall be either stipulated in a purchase agreement or as a separate record retention document, that the current records shall be maintained for a period of not less than five (5) years.

In the event of a laboratory closure, the current owner/management will notify in writing all Customers for whom the laboratory performed sample analysis within the last ten (10) years that the laboratory will be closing. This letter will instruct the Customers to contact the laboratory to provide instructions on how previous records are to be transferred to the Customer's care.

23) Audit and Review

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23.1 Audits from Regulatory Agencies

As a participant in state and federal certification programs, the laboratory is audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on an annual or bi-annual basis and focus on laboratory conformance to the specific program protocols for which the lab is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action within an agreed upon time frame. All audit reports will be kept on file in the QA office for a period of five (5) years.

23.2 Internal Audits

The QA Manager or experienced designee is responsible for performing internal audits. All technical laboratory sections of ALS are required to participate in these internal audits annually. The procedure for performing these internal audits is outlined in SOP 99-Intaudit. The findings of these audits are to be formally documented and submitted to the laboratory management. The QC Manager, Laboratory Director, Operations Manager, Technical Manager and/or Laboratory Supervisors will have the responsibility for resolving points at issue or for effecting the necessary corrective actions to resolve any deficiencies found during the audit. The mandated timeframe for responding to an internal audit will be two (2) weeks from receipt of the audit report, issued to the department, by the QC Manager. After implementation of corrective action(s), the quality control department will review the progress and ensure that the root cause was eliminated and that the corrective actions taken were effective in overcoming the nonconformance.

The audit program is to focus on the following areas:

- Maintenance of acceptable and complete SOPs in company format.
- Maintenance of training records.
- Maintenance of notebooks.
- Maintenance of instrument records.
- Evaluation of standard control records.
- Evaluation of sample handling procedures.
- Evaluation of data handling and storage procedures.
- Evaluation of computer competency.

In response to internal audit findings the laboratory shall take the necessary corrective actions to resolve any problems found. Documentation of these corrective actions shall be in the form of a written response and include the following points:

- Statement of the Problem as defined from the audit report.
- "Root Cause" Analysis following investigation.
- A plan of action to correct the problem.
- Steps for implementing the corrective action plan.
- Demonstration of implementation of the corrective action taken.

When audit findings cast doubt on the effectiveness of the operations or on the correctness or validity of the laboratory's environmental test results, the laboratory shall take immediate corrective action and the Laboratory Director and Operations Manager shall be notified. The

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Customer will be notified in writing within 24 hours of discovery, whenever investigations show that their laboratory results are impacted.

Discovery of evidence of inappropriate actions or vulnerabilities related to data integrity shall be investigated. Any investigation that results in findings of inappropriate activity shall be considered a violation of the ALS "Ethics Credo". Actions taken shall include the following: immediate disciplinary action, corrective action, and appropriate Customer notification, if necessary. All documentation relating to an investigation shall be maintained for a period of five (5) years.

23.3 Management Quality Review

A review of the entire quality system is to be carried out annually. The QC Manager, Laboratory Director, Operations Manager, and Technical Director will have the responsibility for resolving points at issue or for effecting necessary changes to the laboratory's quality assurance practices. All actions resulting from the annual management review will be carried out within an appropriate and agreed timescale.

The purpose of these reviews is to discover:

- whether management objectives (as defined by the quality system) are being met
- whether designated duties are being carried out satisfactorily
- whether procedures described in the quality system are being followed
- opportunities for quality improvements
- requirements for capital expenditures

The review includes:

- matters arising from the previous review
- assessment reports from state, national or third party accrediting agencies
- reports from Customer audits
- reports from supervisory personnel
- corrective action summaries
- results of internal audits done since the last review, including corrective actions implemented
- results of participation in proficiency testing
- results of in-house quality checks
- details of any complaints from Customers
- staff training (for both new and existing staff members)
- adequacy of staff, equipment and facility resources
- future plans and estimates for new work, new staff, new equipment, etc.

23.4 Audit Response

The laboratory is required to respond with corrective action to any audit findings and recommendations of regulatory agencies before certification for a particular program can be granted. If a recommendation is related to document format, then the laboratory personnel will revise the document format and a copy of the revised document format will be submitted to the appropriate representatives of the regulatory agency. If a recommendation is related to an actual procedure, then the recommendation will be communicated to the laboratory personnel informing them of the correct procedure and a record of this communication will be submitted to the appropriate representatives of the regulatory agency. If a recommendation is related to

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the written procedures, then the laboratory personnel will revise the written SOPs and a copy of the new SOPs will be submitted to the appropriate representatives of the regulatory agency. The QC Manager will conduct a follow-up to verify that corrective action has been implemented. All on-site audit reports and responses are kept in the Quality Control Department for a period of five (5) years.

24) Uncertainty of Measurement

The uncertainty components, which are of importance to a given procedure, must be accounted for using appropriate methods of analysis. Therefore, the laboratory must determine the uncertainty attributed to individual testing procedures. Since for most analytical procedures, the laboratory control sample (LCS) is subject to the entire process of preparation through analysis, all procedural elements that would contribute to uncertainty will be inclusive in the overall LCS results. The LCS is performed with every batch of samples where appropriate for the method.

Measurement uncertainty is a statistical accuracy calculation equal to twice the standard deviation of the LCS recoveries for a given continuous set of LCS recoveries. This statistical observation is reported as standard deviation by percentage. Although there is no requirement that measurement uncertainty be reported with sample results, if requested by a Customer, it would be applied by multiplying the determined analyte concentration by the uncertainty percentage.

24.1 Measurement Uncertainty Calculation for Reporting

Uncertainty (at 95% confidence level, K=2) can be expressed as:
$X (1 \pm 2S_r)$

Where:
X is the analytical result
Sr is the relative standard deviation of the LCS data

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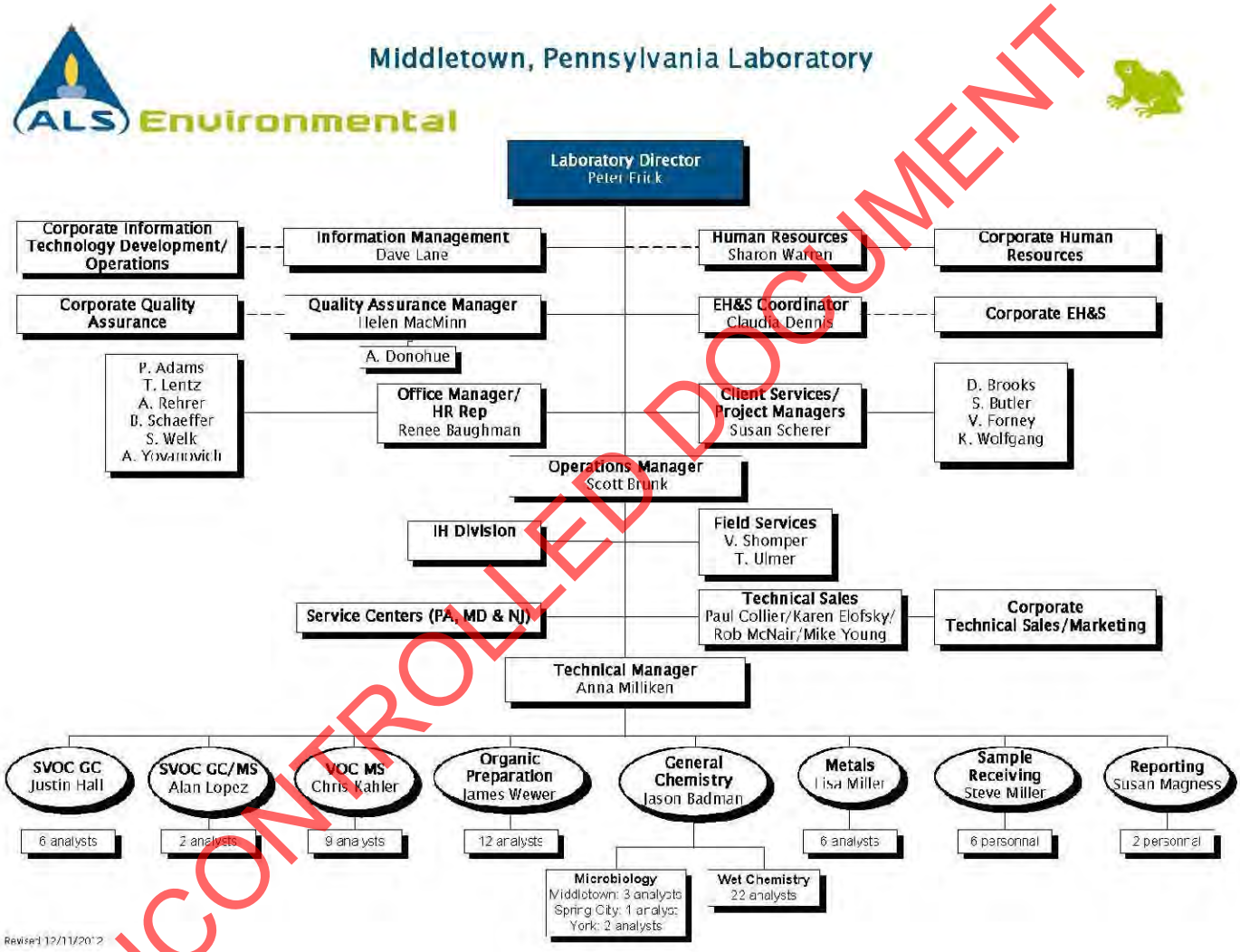
Appendix A – Organizational Chart



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Appendix B – Container, Preservation, Storage, and Holding Times

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
METALS						
Total Metals Digestion by Microwave	3015	NW, LW	P or G	HNO_3 pH<2 *	6 months	500mL
	3051A	S, SW	P or G	Cool 6° C *	6 months	100g
Total Metals Digestion by Hotplate	3050	S, SW	P or G	Cool 6° C *	6 months	100g
ICP Metals	200.7/6010C/6020A	PW, NW	P or G	HNO_3 pH<2 *	6 months	500mL
	3000 series/ 6010C	S, SW	P or G	Cool 6° C *	6 months	100g
ICP/MS Metals	200.8	PW, NW	P or G	HNO_3 pH<2 *	6 months	500mL
	3000 series/ 6020A	S, SW	P or G	Cool 6° C *	6 months	100g
Chromium, Hexavalent (CrVI)	3500CrD/7196A	PW,NW	P or G	Cool 6° C (pH = 9.3-9.7)	WW - 28 days- with ammonium sulfate buffer DW - 24 hrs.	500mL
Chromium, Hexavalent (CrVI)	3000/7196A	S, SW	P or G	Cool 6° C	30 days digestion/ 7 days after digestion for analysis	100g
Mercury (Hg)	200.8/245.1	PW, NW	P or G	HNO_3 pH<2 *	28 days	500mL
	6020/7470A	NW, SW	P or G	HNO_3 pH<2 *	28 days	500mL
	245.7	NW	G or FP	5 ml/L 12 N HCl (Highest Purity required)	Preserved sample 28 Days	100 mL
	1631	NW	G or FP	5 ml/L 12 N HCl (Highest Purity required) or 5 mL/L BrCl	Preserved sample 28 Days	100 mL
	7471A	S, SW	P or G	Cool 6° C	28 days	100g
*Note: Samples not preserved at the time of collection, must be held for 24 hours after preservation prior to analysis.						
INORGANICS						
Acidity	2310B	PW, NW	P or G	Cool 6° C	14 days	200mL
Alkalinity	2320B	PW, NW	P or G	Cool 6° C	14 days	200mL
Alkalinity, Phenolphthalein	2320B	PW, NW	P or G	Cool 6° C	14 days	200mL
Ammonia (as N)	350.3/4500 NH3B/4500 NH3D/ASTM D6919-03	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	500mL
	350.3	S, SW	P or G	Cool 6° C	28 days	100g
Biochemical Oxygen Demand (BOD)	5210B	PW, NW	P or G	Cool 6° C	48 hours	1000mL
BOD, Carbonaceous (CBOD)	5210B	PW, NW	P or G	Cool 6° C	48 hours	1000mL
Bromate	300.1	PW, NW	P or G	50 mg/L EDA	28 days	1000mL
Carbon Dioxide, Free*	4500-CO_2 Free - calculation	PW, NW	N/A	N/A	NA	N/A
Carbon Dioxide, Total*	4500-CO_2 Total - calculation					
*Results determined by pH & Bicarbonate calculation.						
Bromide	300.0/9056	PW, NW	P or G	Cool 6° C	28 days	100mL
	300.1	PW, NW	P or G	50 mg/L EDA; Cool 6° C	28 days	1000mL
	9056/300.0	S, SW	P or G	Cool 6° C	28 days	25g
Chloride	300.0/9056	PW, NW	P or G	Cool 6° C	28 days	100mL
	9056/300.0	S, SW	P or G	Cool 6° C	28 days	25g
Chlorine, Residual	4500Cl G	PW, NW	P or G	N/A	Analyze immediately	200mL

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
Chemical Oxygen Demand	410.4/HACH 8000	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	50mL
ChlorophyllA	10200H	PW, NW	P (opaque) or amber	Cool 6° C	Filter within 24 hrs of receipt; analyze within 21 days	1L
Chlorate	300.1	PW, NW	P or G	50 mg/L EDA	28 days	1000mL
Chlorite	300.1	PW,NW	P or G (opaque)	50 mg/L EDA; Cool 6° C	14 days	1000mL
ClamTrol/CT1300	In-House	NW	P or G	Cool 6° C	24 hours	1L
Color	2120B	PW, NW	P or G	Cool 6° C	48 hours	1000mL
Corrosivity	Langlier Index Calculation (pH, TDS, Alkalinity, Calcium)	PW, NW	P or G	1 bottle HNO_3 pH<2; 1 bottle 6° C	NA	50mL (2)
	9040B, 4500 H&B	LW	P or G	Cool 6° C	Analyze immediately	100g or 8 oz. jar
	9045C	S, SW	P or G	Cool 6° C	Analyze immediately	100g or 8 oz. jar
Cyanide	335.4	PW, NW	P or G	NaOH pH>12; Cool 6° C (use Ascorbic Acid if Chlorinated)	Distillation & Analysis 14 days	500mL
	9012	S, SW	P or G	Cool 6° C	14 days	100g
Cyanide, Amendable	4500CNG	PW	P or G	NaOH pH>12; Cool 6° C	Distillation & Analysis 14 days	500mL
	9012	S, SW	P or G	Cool 6° C	14 days	100g
Dissolved Organic Carbon	5310B	PW,NW	G, amber	HCl pH<2;Cool 6° C	28 days	125mL
Ferrous Iron	3500FeB	PW,NW	P or G	Cool 6° C	48 hours	500mL
Ferric Iron	Calculation	NA	NA	NA	NA	NA
Flash Point	1010A	PW,NW	G, Teflon-lined septum	Cool 6° C	14 days	100mL
Fluoride	4500F-C	PW,NW PW,NW	P	Cool 6° C	28 days	100mL
	300.0/9056	PW,NW PW,NW	P	Cool 6° C	28 days	100mL
	9056/300.0	PW,NW PW,NW	P	Cool 6° C	28 days	25g
Hardness, Calcium	3500CaD	PW,NW	P or G	HNO_3 or H_2SO_4 pH<2	6 months	500mL
Hardness, Magnesium	Calculation from Total and Calcium Hardness	PW,NW	NA	HNO_3 or H_2SO_4 pH<2	NA	500mL
Hardness, Total	2340B/2000.7	PW, NW	P or G	HNO_3 or H_2SO_4 pH<2	6 months	100mL
Hydrazine	ASTM 1385-01	NW	P	10% HCl (5ml); Cool 6°C	48 hours	100mL
H150M	In-House	NW	P or G	Cool 6° C	24 hours	1L
Ignitability	1030	SW	P or G	Cool 6° C	14days	500g
Nitrogen, Kjeldahl	351.3/4500 N Org B/ 4500 NH3D	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	500mL
	351.3/4500 NH3D	S, SW	P or G	Cool 6° C	28 days	100g
Nitrate-Nitrogen	300.0/9056	PW, NW	P or G	Cool 6° C	48 hours	100mL
	300.0/9056	S, SW	P or G	Cool 6° C	48 hours	25g
	353.2	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	100mL
Nitrate/Nitrite-Nitrogen	300.0/9056 (Calculation)	PW, NW	P or G	Cool 6° C	48 hours	100mL
	300.0/9056 (Calculation)	S, SW	P or G	Cool 6° C	48 hours	25g
	353.2	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	100mL
Nitrite-Nitrogen	4500B	PW, NW	P or G	Cool 6° C	48 hours	100mL
	300.0/9056	PW, NW	P or G	Cool 6° C	48 hours	100mL

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
	9056/300.0	S, SW	P or G	Cool 6° C	48 hours	25g
Nitrogen, Organic	Calculation TKN -NH3	PW, NW	NA	NA	NA	N/A
	Calculation TKN - NH3	S, SW	NA	NA	NA	N/A
Nitrogen, Total	Calculation TKN+NO3	PW, NW	NA	NA	NA	N/A
	Calculation TKN+NO3	S, SW	NA	NA	NA	N/A
Odor	2150B / 140.1	PW	G	Cool 6° C	Analyze Immediately	1000mL
Oil and Grease	1664	PW, NW	G	HCl or H_2SO_4 pH<2; Cool 6° C	28 days	1000mL (3)
	9071B	S, SW	G – Teflon lined screw cap	Cool 6° C	28 days	100g
Orthophosphate	4500-PE	PW, NW	P or G	Cool 6° C	Filter within 15 minutes; analyze 48 hours	100mL
Osmotic Pressure	Interim Method	PW, NW	P or G	Cool 6° C	48 hours	100mL
Oxygen, Dissolved	4500 OG	PW, NW	G Bottle and Top	None	Analyze immediately	500mL
Paint Filter Liquids Test	9095	LW, S, SW	P or G	None	NA	100g or 100mL
Perchlorate	314.0	PW,NW	P or G	Cool 6° C	28 days	100mL
pH	150.1/4500 H-B	PW, NW	P or G	None	Analyze immediately	50mL
	9040B	LW	P or G	None	Analyze immediately	50mL
	9045C	S, SW	P or G	None	Analyze immediately	50g
Phenols	420.4	NW	G	H_2SO_4 pH<2;Cool 6° C	28 days	500mL
	9066	S, SW	G	Cool 6° C	28 days	100g
Phosphorus, Polyhydrolizable	365.1	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	500mL
	365.1	S, SW	P or G	Cool 6° C	28 days	100g
Phosphorus, Soluble	365.1	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	500mL
	365.1	S, SW	P or G	Cool 6° C	Filter within 24 hrs. of receipt; analyze within 28 days	100g
Phosphorus, Total	365.1	PW, NW	P or G	H_2SO_4 pH<2;Cool 6° C	28 days	500mL
	365.1	S, SW	P or G	Cool 6° C	28 days	100g
Reactive Cyanide	SW846 Section 7.3.3.2	S, SW	P or G	Cool 6° C	NA	100g or 8 oz. jar
Reactive Sulfide	SW846 Section 7.3.4.2	S, SW	P or G	Cool 6° C	NA	100g or 8 oz. jar
Residue, Filterable (TDS)	160.1/2540C	PW, NW	P or G	Cool 6° C	7 days	250mL
Residue, Nonfilterable (TSS)	160.2/2540D	PW, NW	P or G	Cool 6° C	7 days	250mL
Residue, Settleable	160.5/2540F	PW, NW	P or G	Cool 6° C	48 hours	1000mL
Residue, Total	160.3/2540B	PW, NW	P or G	Cool 6° C	7 days	250mL
	160.3/2540G	S, SW	P or G	Cool 6° C	7 days: 14 days when other analyses being analyzed	100g
Residue, Volatile	160.4/2540E	PW, NW	P or G	Cool 6° C	7 days	250mL
	160.4/2540E/2540G	S, SW	P or G	Cool 6° C	7 days	100g
Silica, Dissolved	370.1/4500SiD	PW, NW	P	Cool 6° C	28 days	100mL
Specific Conductance	120.1	PW, NW	P or G	Cool 6° C	28 days	100mL
	2510/9050	PW,NW	P or G	Cool 6° C	28 days	100 mL
Sulfate	300	PW, NW	P or G	Cool 6° C	28 days	250mL
Sulfide	376.1	PW, NW	P or G	Zn Acetate; NaOH pH>9; Cool 6° C	7 days	500mL
	9034	S, SW	G	Cool 6° C	7 days	50g Sludge; 25g Dry

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
Sulfite	377.1/4500 SO3B	PW, NW	P or G	Cool 6° C	Analyze immediately	500mL
Surfactants (MBAS)	5540C	PW, NW	P or G	Cool 6° C	48 hours	2L
Tannin	5540B	Tannin or Lignin	P or G	Cool 6° C	28 days	150mL
Temperature	170.1	PW, NW	P or G	None	Field Analysis - Only	100mL
Total Organic Carbon	5310C	PW, NW	G	HCl; pH<2;Cool 6° C	28 days	125mL
	9060A	S, SW	G, amber	Cool 6° C	28 days	50g Sludge; 25g Dry
Total Halogens	9076	S, SW, Oil	Amber G, Teflon-lined septum	Cool 6° C	14 days	125mL
Total Organic Halogen	9020B	PW, NW	G, Teflon-lined septum	H_2SO_4 pH<2; Cool 6° C	28 days	250mL (2)
	9023	S, SW	Amber G, Teflon-lined septum	Cool 6° C	28 days	100g
Turbidity	180.1/SM2130B	PW, NW	P or G	Cool 6° C	48 hours	100mL
UV254	5910B	PW, NW	1L amber	Cool 6° C	48 Hours	1L
Volatile Suspended Solids	160.4/2540E	PW, NW	P or G	Cool 6° C	7 days	200mL
MICROBIOLOGY						
Fecal Coliform	9222D	PW, GW, NW, Sludge	P or G Sterile	Cool <10° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 30 hours-DW; 8 hours-WW; 8 hours-SW; 24 hours SCM (503 Rule)	125mL
Iron Bacteria	In-House	NW	P or G Sterile	Cool 6° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 24 hours	125mL
Total Coliform	9223B	PW, NW	P or G Sterile	Cool <10° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 30 hours-DW; 8 hours-WW; 8 hours-SW	125mL
E. coli	9223B	PW, NW	P or G Sterile	Cool <10° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 30 hours-DW; 8 hours-WW 24 hours - Biosolids by Method 1680	125mL
Standard Plate Count	9215 B	PW, NW	P or G Sterile	Cool 6° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 8 hrs for DW Maximum 24 hours at 4°C–all other matrices	125mL
Streptococci, Fecal	9230B	NW	P or G	Cool <10° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 8 hours -WW	125mL

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
Enterococci	9230B	NW	P or G	Cool <10° C; 0.0008% $Na_2S_2O_3$	As soon as possible after collection up to 8 hours-WW	125mL
ORGANICS						
Separatory Funnel Extraction	3510C	NW, LW	G, Teflon-lined cap	Cool 6° C (See determinative method for add'l preservation requirements)	7 days	1000mL (2)
Continuous Liquid/Liquid Extraction	3520C	NW, LW	G, Teflon-lined cap	Cool 6° C (See determinative method for add'l preservation requirements)	7 days	1000mL (2)
Ultrasonic Extraction	3550B	S, SW	G, Teflon-lined cap	Cool 6° C	14 days (SW-846, Update IV does not specify a hold time for PCBs. ALSI will continue to use 14 days for extraction in order to meet client's TAT.)	100g or 8 oz. jar
Soxhlet Extraction	3540C	S, SW	G, Teflon-lined cap	Cool 6° C	14 days	100g or 8 oz. jar
Volatiles P&T	5030B	NW, LW	G, Teflon-lined septum	HCl; Cool 6° C; pH<2	14 days,Unpreserved samples can be held for up to 7 days	40mL (3)
Acrolein&Acrylonitrile	5030B	NW, LW	G, Teflon-lined septum	Adjust pH 4-5, Cool 6°C	7 Days	40 mL (2)
Volatiles Closed-System P&T Extraction	5035-Encores	S, SW	Encore™ Sampler	Cool 6° C	48 Hours	3-5g Encores for Low Level; 1-5g Encores for Med Level
Volatiles Closed-System P&T Extraction (NaSO4)	5035-Vials	S, SW	Preweigh–Low Level:1g Sodium Bisulfate, 5 mL Reagent Water in a 40 mL VOA vial with stir bar	Cool 6°C after filled with sample	Analyze 14 days after filled with sample	Low Level: 2-Low Level Containers; 1-Medium Level Container
Volatiles Closed-System P&T Extraction (Freezing)	5035-Vials	S, SW	40 mL VOA	Cool -7°C after filled with sample	Analyze 14 days from sampling time	Low Level: 2-Low Level Containers; 1-Medium Level Container
Volatiles Closed-System P&T Extraction	5035-Vials	S, SW	Preweigh-Med Level: 5mL MEOH in 40mL VOA vial	Cool 6°C after filled with sample	Analyze 14 days after sample collection	Med Level: 1-Medium Level Container
Volatiles Closed-System P&T Extraction	5035	S, SW	G, Teflon-lined septum	Cool 6°C	48 hours	4 oz. Jar

UNCONTROLLED DOCUMENT

Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
Alcohols/Acetates and Glycols	8015 Modified	LW	G,Teflon-lined septum	Cool 6 ° C	14 days	40mL (2)
		SW	G,Teflon-lined septum	Cool 6 ° C	14 days	4 oz
Alcohols/Acetates	D3695	LW	G, Teflon-lined septum	Cool 6° C	14 days	40mL (2)
		SW	G,Teflon-lined septum	Cool 6 ° C	14 days	4 oz
Haloacetic Acids	552.2	PW	Amber Glass, Teflon-lined septum	Cool 6° C; 25 mg Ammonium Chloride (NH_4Cl)	14 days/14 days	250mL
EDB/DBCP	504.1	PW	G, Teflon-lined septum	Cool 6° C; 3mg $Na_2S_2O_3$	14 days	40mL (2)
EDB	8011	PW	G, Teflon-lined septum	Cool 6° C; 3mg $Na_2S_2O_3$	14 days	40mL (2)
GC-Chlorinated Acids (Herbicides)	515.3	PW	Amber G, Teflon-lined cap	Cool 6° C; 80mg $Na_2S_2O_3$ per Liter of Sample	14 days/ 14 days	1000mL (2)
GC/MS-Solid Phase Extraction	525.2	PW	Amber Glass Teflon-lined cap	Cool 6° C; add 50 mg Sodium Sulfite (Na_2SO_3) per liter for residual Cl ; pH <2 HCl (6N)	14days/30 days	1000mL (2)
GC/MS-Solid Phase Extraction	527	PW	Amber Glass Teflon-lined cap	Cool 6°C; add 0.1g L-Ascorbic Acid, 0.35g EDTA Trisodium Salt, 9.4g Potassium Dihydrogen Citrate	14days/28days	1000mL (2)
GC/MS solid Phase Extraction	529	PW	Amber Glass Teflon-lined cap	Cool 6°C; 0.5g Copper Sulfate, 0.3g tris (hydroxymethyl) aminomethane, 4.7g tris (hydroxymethyl) aminomethane hydrochloride	14days/30days	1000mL (2)
GC/MS-Endothall by Solid Phase Ion Exchange	548.1	PW	Amber G, Teflon-lined cap	Cool 6°C; 20mg $Na_2S_2O_3$ (pH <2 with HCl if high biological content)	7 days/14 days	250mL (2)
HPLC-Glyphosate	547	PW	Amber G, Teflon-lined cap	Cool 6° C; 4 mg $Na_2S_2O_3$	14 days (18 months frozen)	40mL (2)
GC-Herbicides	8151A	NW, LW	Amber G, Teflon-lined cap	Cool 6°C	7 days/40 days	1000mL (2)
	8151A	S, SW	4 oz Plastic Jar	Cool 6°C	14 days/40 days	30g
GC-Organic Acids	In-house	NW	P or G; zero headspace	None	14 days	250mL
GC-PCB Screening	508A	PW	Amber G, Teflon-lined cap	Cool 6° C	14 days/30 days	1000mL (2)
GC-Pesticides	505	PW	G, Teflon-lined septum	Cool 6° C; 3mg $Na_2S_2O_3$	If Heptachlor is present 7 days, if not 14 days	40 mL (2)
GC-Pesticides	608 /8000 series/8081A	NW, LW	G, Teflon-lined cap	Cool 6° C; 5<pH<9 ($Na_2S_2O_3$ if chlorinated)	7 days/40 days	1000mL (2)
	8000 series/8081A	S, SW	G, Teflon-lined cap	Cool 6° C	14 days/40 days	100g or 8 oz. jar
GC-Organophosphorus Pesticides	622	NW	1L Amber	Cool 6° C	7 days/40 days	1000mL (2)

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
GC-PCBs	608	NW, LW	G, Teflon-lined cap	Cool 6° C	7 days/40 days	1000mL (2)
	8000 series/8082	NW, LW	G, Teflon-lined cap	Cool 6° C	7 days/40 days (SW-846 Update IV does not specify a hold time for PCBs. ALSI will continue to use 14 days for extraction in order to meet routine TAT.)	1000mL (2)
GC-PCBs	8000 series/8082	S, SW	G, Teflon-lined cap	Cool 6° C	14 days/40 days (SW-846 Update IV does not specify a hold time for PCBs. ALSI will continue to use 14 days for extraction in order to meet routine TAT.)	100g or 8 oz. jar
GC-PCBs in Oil	EPA 600/4-81-045	Oil	P or G	Room Temperature	40 days/40 days	1 gram
HPLC, PAHs	8000 Series/ 8310	NW, LW	G, Teflon-lined cap	Cool 6° C (Add 3-mL 0.008% $Na_2S_2O_3$ if residual chlorine is present	7 days/40 days	1000mL (2)
	8000 Series/8310	S, SW	G, Teflon-lined cap	Cool 6° C	14 days/40 days	100g or 8 oz. jar
HPLC-Nitroaromatics and Nitramines (Explosives)	8000 Series/8330B	NW, LW	G, Teflon-lined cap	Cool 6° C(Add 3-mL 0.008% $Na_2S_2O_3$ if residual chlorine is present	7 days/40 days	1000mL (2)
	8000 Series/8330B	S, SW	G, Teflon-lined cap	———	60 days/40 days	per Decision Unit
HPLC-Nitroguanidine	USACE Special Report 89-35	NW, LW	G, Teflon-lined cap	Cool 6° C	7 days/28 days	40mL (2)
	USACE Special Report 89-35	S, SW	G, Teflon-lined cap	Cool 6° C	14 days/28 days	50g or 4 oz. jar
GC, Nitrogen Phosphorus Pesticides	8000 Series/8141A	NW	G, Teflon-lined cap	Cool 6° C	7 days/40 days	1000mL (2)
	8000 Series/8141A	S, SW	G, Teflon-lined cap	Cool 6° C 5<pH<8	14 days/40 days	100g or 8 oz. jar
GC-Chlorinated Pesticides/PCBs	508	PW	Amber G, Teflon-lined cap	Cool 6° C; 80mg $Na_2S_2O_3$	7 days/14 days	1000mL (2)
GC-Pesticides, Nitrogen Phosphorus	507	PW	Amber G, Teflon-lined septum	Cool 6° C; 80mg $Na_2S_2O_3$	14 days/14 days	1000mL (2)
Diquat and Paraquat	549.2	PW	High density amber plastic or silanized amber glass	Cool 6° C; 80mg $Na_2S_2O_3$(H_2SO_4 pH<2 if biologically active)	7 days/21days	1000mL (2)

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
GC/MS-Purgeable Organics	524.2	PW	G, Teflon-lined septum	Cool 6° C;HCl pH<2; 25 mg Ascorbic Acid or $Na_2S_2O_3$	14 days	40mL (2)
	8260B	NW	G, Teflon-lined septum	0.008% $Na_2S_2O_3$;HCl pH<2;Cool 6° C	14 days	40mL (2)
	624	NW	G, Teflon-lined septum	unpreserved; Cool 6°C	7 days	40 mL (2)
	8260B	S, SW	See Method 5035	Cool 6° C	14 days	See Method 5035
GC/MS-Semivolatiles	625/ 8000 series/8270C	NW	G, Teflon-lined septum	0.008% $Na_2S_2O_3$;Cool 6° C	7/40 days	1000mL (2)
	8000 series/ 8270C	S, SW	G, Teflon-lined septum	Cool 6° C	14/40 days	100g or 8 oz. jar
HPLC-Carbamates	531.1	PW	G, Teflon-lined cap	Mono-chloroacetic Acid to pH 3; 80 mg/L $Na_2S_2O_3$;Cool 6° C	28 days	40mL (2)
TOTAL PETROLEUM HYDROCARBONS						
Landfill Gas	RSK175	NW	G	HCl pH<2	14 days	40mL (2)
Dissolved Gases	RSK-175	W	G, Teflon-lined septum	HCl; Cool 6° C	14 days	40 mL (2)
Total Petroleum Hydrocarbons (TPH)	1664	NW	G	Cool 6° C; pH<2, H2SO4	28 days	1000mL (2)
	418.1	PW, NW	G	Cool 6° C; pH<2, H2SO4	28 days	1000mL (2)
	418.1 modified	S, SW	G	Cool 6° C	28 days	100g or 8 oz. jar
	NJEPH	NW	G	Cool 6° C; pH<2, HCl	14 days/40 days	1000mL (2)
	NJEPH	S, SW	G, PTFE, Silicone Cap Liners	Cool 6° C	14 days/40 days	100g or 8 oz. jar
	NJ-OQA-QAM-025,Rev. 6	S, SW	G, PTFE, Silicone Cap Liners	Cool 6° C	7 days/40 days	50g or 4 oz. jar
Total Petroleum Hydrocarbons as Diesel	8000 series/ 8015D	PW, NW	G	Cool 6° C; pH<2, H2SO4	7 days/40 days	1000mL (2)
	8000 series/ 8015D	S, SW	G	Cool 6° C	14 days/40 days	100g or 8 oz. jar
Gasoline Range Organics	8000 series/8015B	PW, NW	G, Teflon-lined septum	Cool 6° C, pH<2 HCl	14 days	40mL (2)
Gasoline Range Organics	8000 series/8015B	S, SW	See Method 5035	Cool 6° C	14 days	See Method 5035
LEACHING PROCEDURES						
TCLP Metals Only	1311	LW	P or G	Cool 6° C	28 days to leaching	1000mL
		SW	P or G	Cool 6° C	28 days to leaching	500g
GC-TCLP Herbicides	1311	LW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	3000mL
		SW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	500g
GC-TCLP Pesticides	1311	LW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	3000mL
		SW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	500g
GC/MS-TCLP Volatile Organics	1311	LW	G, Teflon-lined septum	Cool 6° C	14 days to leaching	200mL

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume
GC/MS-TCLP Volatile Organics	1311	SW	G, Teflon-lined septum	Cool 6° C	14 days to leaching	100g
GC/MS-TCLP Semivolatiles	1311	LW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	3000mL
		SW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	500g
SPLP Metals Only	1312	LW	P or G	Cool 6° C	28 days to leaching	1000mL
SPLP Metals Only	1312	SW	P or G	Cool 6° C	28 days to leaching	500g
GC/MS-SPLP Volatile Organics	1312	LW	G, Teflon-lined septum	Cool 6° C	14 days to leaching	200mL
GC/MS-SPLP Volatile Organics	1312	SW	G, Teflon-lined septum	Cool 6° C	14 days to leaching	100g
GC/MS-SPLP Semivolatiles	1312	LW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	3000mL
		SW	G, Teflon-lined cap	Cool 6° C	14 days to leaching	500g
Air Procedures						
Cabon Dioxide, Carbon Monoxide, Methane, Nitrogen, Oxygen	3C	Air	Tedlar Bags	———	14 days	Sample volume at client's discretion
Methane, Ethane, Ethene	RSK – 175	Air	Tedlar Bags	Non-preserved	14 days	400 µL of air
Polyaromatic Hydrocarbons	TO-13	Air	XAD Sorbent Cartridges (PUF Cartridges)	Cool 6° C	7 days/40	Sample volume at client's discretion
Volatile Organics	TO-15	Air	Summa Canisters	———	30 days	Sample volume at client's discretion

Radiologicals for Subcontracting

Parameter	Preservative[1]	Container[2]	Max. Holding Time[3]	Instrumentation[4]
Gross Alpha	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, B, or G
Gross Beta	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, or G
Strontium-89	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, B, or G
Strontium-90	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, B, or G
Radium-226	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, B, D or G
Radium 228	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, or G
Cesium-134	Conc. HCl to pH <2[5]	P or G	6 months	A, C, or G
Iodine-131	None	P or G	8 days	A, C or G
Tritium	None	G	6 months	E
Uranium	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	A, B, F, H
Photon emitters	Conc. HCl or HNO_3 to pH <2[5]	P or G	6 months	C

[1] It is recommended that the preservative be added to the sample at the time of collection unless suspended solids activity is to be measured. If the sample has to be shipped to a laboratory or storage area unpreserved, acidification of the sample (in its original container) may be delayed for a period not to exceed 5 days. A minimum of 16 hours must elapse between acidification and analysis.

[2] P = Plastic, hrd or soft; G = Glass, hard or soft; FP = Fluoropolymer, hard or soft

[3] Holding time is defined as the period from time of sampling to time of analysis. In all cases, samples should be analyzed as soon after collection as possible. If a composite sample is prepared, a holding time cannot exceed 12 months.

[4] A = Low background proportional system; B = Alpha and beta scintillation system; C = Gamma spectrometer [Ge(Hp) or Ge(Li)]; D = Scintillation cell system; E = Liquid scintillation system; F = Fluorometer; G = Low background alpha and beta counting system other than gas-flow proportional; H = Alpha spectrometry system.

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Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water; NW-Nonpotable Water; LW-Liquid Waste; S-Soil; SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis/ Holding Time	Minimum Volume

* If HCl is used to acidify samples which are to be analyzed for gross alpha or gross beta activities, the acid salts must be converted to nitrate salts before transfer of the samples to planchets.

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Appendix C – Chain-of-Custody Record

ALS Environmental

34 Dogwood Lane
Middletown, PA 17057
P. 717-944-5541
F. 717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

Page ___ of ___
Courier:
Tracking #:

COC#

Co. Name:
Contact (Report to):
Phone:
Address:

Bill to (if different than Report to):
PO#:

Project Name/#:
ALS Quote #:

TAT: ☐ Normal-Standard TAT is 10-12 business days. ☐ Rush-Subject to ALS approval and surcharges.
Date Required:
Approved By:

Email? ☐ Y
Fax? ☐ Y No

***Container Type
***Container Size
Preservative

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	COC Comments	Sample Date	Military Time	*G or C	**Matrix	Enter Number of Containers Per Analysis
1						
2						
3						
4						
5						
6						
7						
8						

Receipt Information (completed by Sample Receiver)
Performed by:
Cooler Temp:
Therm. ID:
No. of Coolers:
Notes:

Circle appropriate Y or N.	Correct containers?	Correct sample volume?	Correct preservation?	Headspace/Volatiles?
	N	N	N	N
	Y	Y	Y	Y

	Custody seals Present?	(if present) Seals intact?	Received on ice?	COC/Labels complete/accurate?	Container in good condition?
N	N	N	N	N	N
Y	Y	Y	Y	Y	Y

SAMPLED BY (Please Print):
LOGGED BY (signature): DATE TIME
REVIEWED BY (signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1			2		
3			4		
5			6		
7			8		
9			10		

Data Deliverables: ☐ Standard ☐ CLP-like ☐ NJ-Reduced ☐ NJ-Full ☐ (other)
EDDs Required? ☐ If yes, format type:
SDWA Forms? ⇨ yes ☐ yes ☐ yes ☐ yes ☐
State Samples Collected In? MD ☐ NJ ☐ NY ☐ PA ☐ Other
DOD Criteria Required?

ALS FIELD SERVICES
☐ Pickup
☐ Labor
☐ Composite Sampling
☐ Rental Equipment
☐ Other:

*G=Grab; C=Composite **Matrix: Al=Air; DW=Drinking Water; GW=Groundwater; Ol=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater
***Container Type: AG-Amber Glass; CG-Clear Glass, PL-Plastic. Container Size: 250ml, 500ml, 1L, 8oz., etc. Preservative: HCl, HNO3, NaOH, etc.

Copies: WHITE - ORIGINAL CANARY - CUSTOMER COPY

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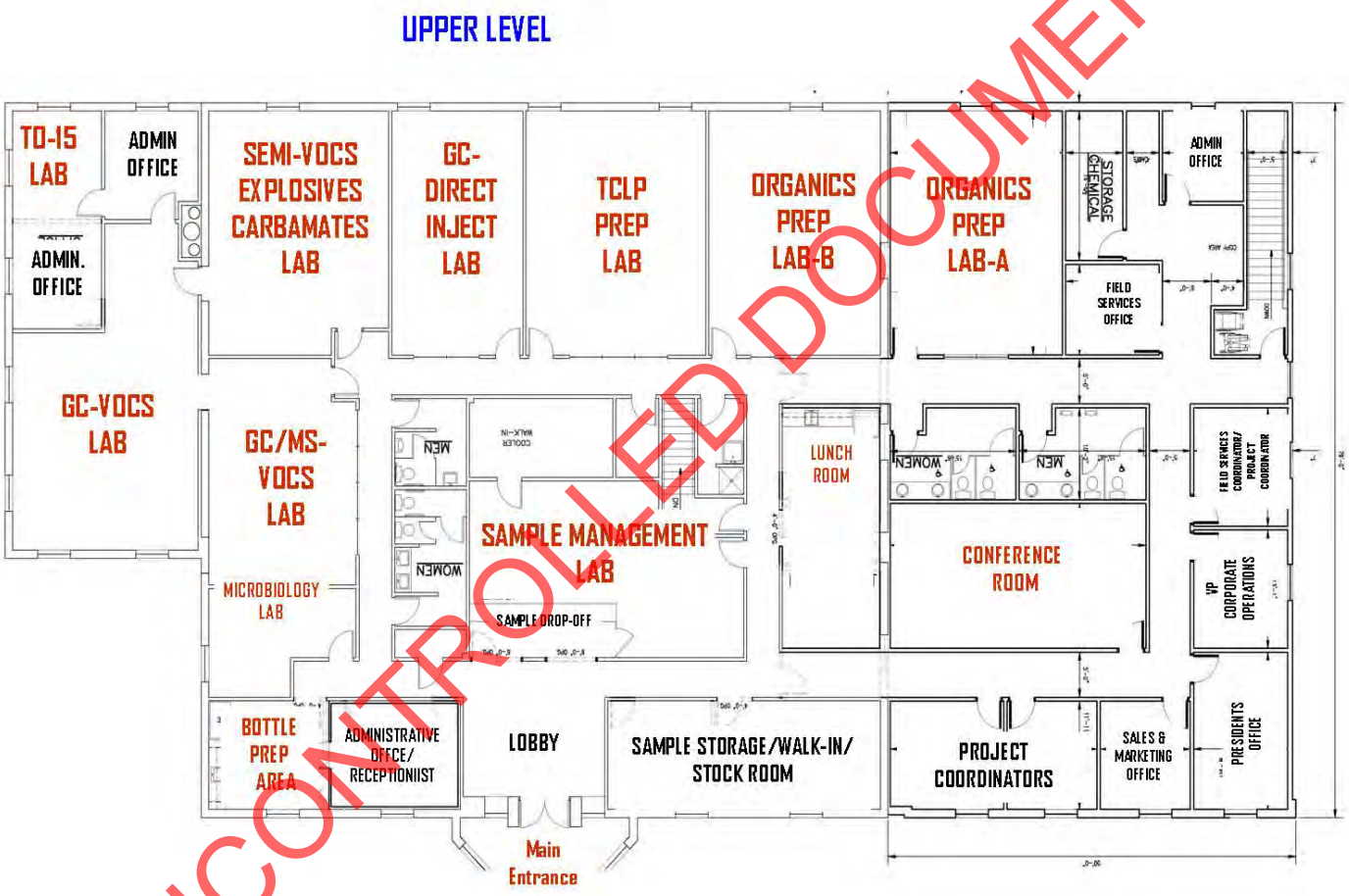
Appendix D – Laboratory Floor Plans



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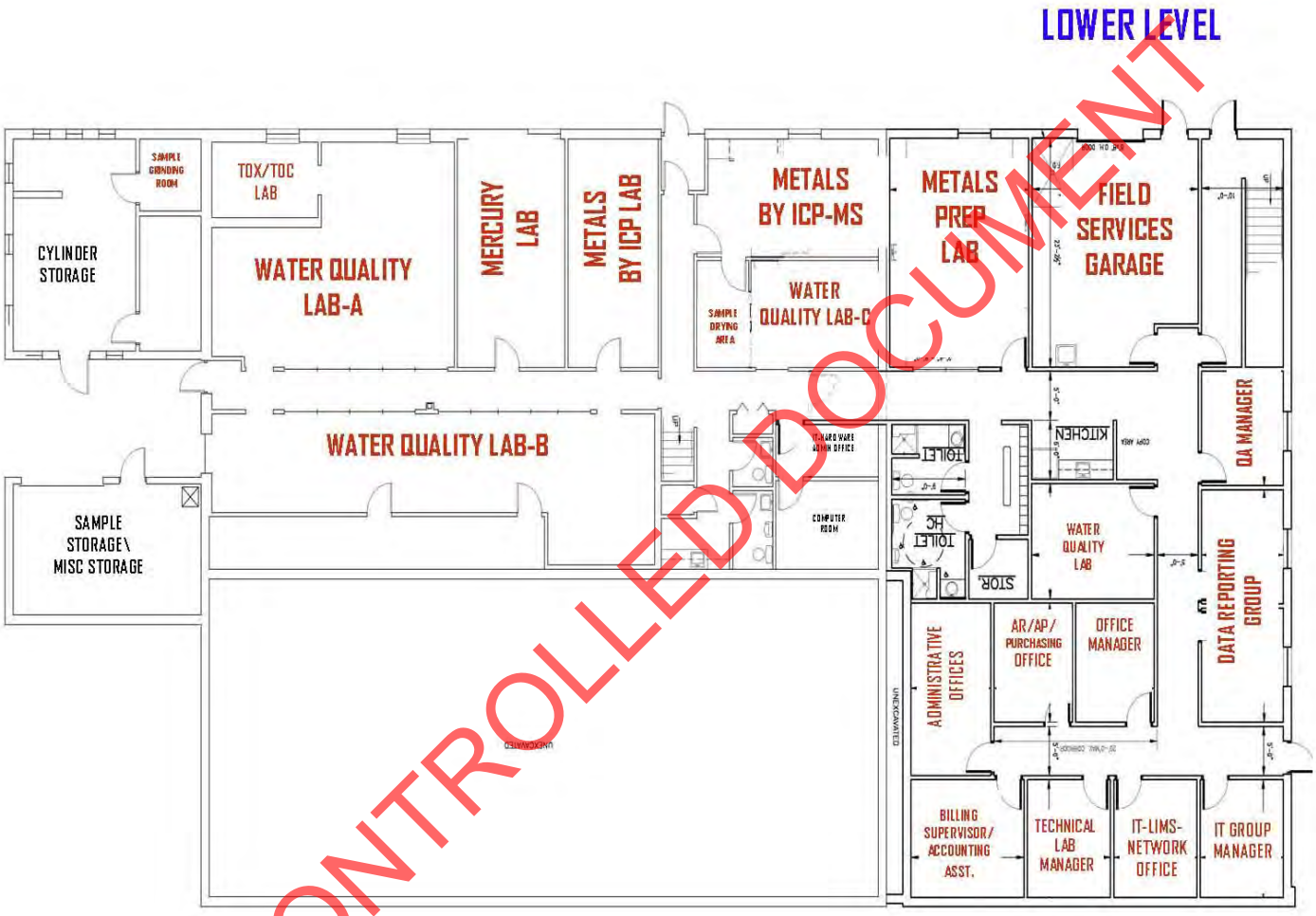

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Appendix E – Instrument List

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ANALYTICAL INSTRUMENTATION LIST

Instr ID #	Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
GC-8	Gas Chromatograph (with PID/FID)	Hewlett Packard	5890 II	GC-BTEX/GRO	3203A40203	1994: new	1994
GC-8	Purge and Trap Concentrators with Autosampler and Sample Heater	Tekmar/01 Analytical	2000/Archon 4552	GC-VOA	90135019/13918	NA	NA
MS-02	Gas Chromatograph/Mass Selective Detector with Autosampler and Injector	Hewlett Packard	GC:5890 MS:5971A AS:18594B INJ:7673-18593B	GC/MS-BNA	GC: 3033A31928 MS:NA AS:3330A32741 INJ:3237A32144	2001: used	2001
MS-06	Gas Chromatograph/Mass Selective Detector with Autoinjector	Hewlett Packard	GC:5890E MS:5972A AS:18594B INJ:7673-18593B	GC/MS-BNA	GC:3310A48504 MS:3524A02822 AS:3113A25478 INJ:3524A42956	2006: used	2006
MS-09	Gas Chromatograph/Mass Selective Detector with large volume injector (LVI)	Hewlett Packard with APEX LVI	GC:6890 MS:5973 AS:G2614A INJ:G2613A LVI:Prosep 800	GC/MS-BNA (DW)	GC:US00027847 MS:US92522731 AS:US81100437 INJ:US80400174 LVI:E9905901B	2000: new	2000
MS-12	Gas Chromatograph/Mass Selective Detector with Autosampler and Injector	Agilent Technology	7890A / 7683B / 5975C	GC/MS-BNA (DW)	US10747008 / CN74444553 / US73337770	2007: new	2007
MS-14	Gas Chromatograph/Mass Selective Detector with Autosampler and Injector	Hewlett Packard	GC:5970A MS:5975C AS:G4514A INJ:G4513A	GC/MS-BNA	GC: CN10934018 MS:US9100249 AS:CN91300208 INJ:CN91500737	2009: new	2009
			HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)				
HPLC-1	Quat Pump	Dionex	LPG3400A	HPLC	1730713	2006: New	2006
HPLC-1	Autosampler	Dionex	WPS3000SL	HPLC	1710710	2006: New	2006
HPLC-1	ColumnCompartment	Dionex	TCL3000	HPLC	3880607	2006: New	2006
HPLC-1	UV Detector	Dionex	VWD3400	HPLC	2110718	2006: New	2006
HPLC-2	Degasser	Agilent	G1322A	HPLC	JP736019204	2009: Used	2009
HPLC-2	Quat Pump	Agilent	G1311A	HPLC	US53601035	2009: Used	2009
HPLC-2	Autosampler	Agilent	G1313A	HPLC	US82404196	2009: Used	2009
HPLC-2	Column Compartment	Agilent	G1316A	HPLC	DE82206233	2009: Used	2009
HPLC-2	Fluorescence Detector	Agilent	G1321B	HPLC	DE14904125	2009: Used	2009
HPLC-2	Hand Held Controller	Agilent	G1323B	HPLC	DE01911606	2009: Used	2009
HPLC-2	Post Column Reactor	ASI	310	HPLC	310-0501	2004: new	2004
HPLC-2	Series II Pump 1	Lab Alliance	Series II	HPLC	A12537	2004: new	2004
HPLC-2	Series II Pump2	Lab Alliance	Series II	HPLC	A12538	2004: new	2004
Sonicator 1	Sonicator	Branson	2510R-MT	organic extraction	RLA080842886E	2008	2008
			Vol GAS CHROMATOGRAPHY/MASS SPECTROMETRY				
GC-12	Gas Chromatograph (with PID/ELCD)	Hewlett Packard	5890II	GC-VOA	3235A44488	1994; NA	1994
GC-12	Purge and Trap Concentrators with Autosampler and Sample Heater	Tekmar/Dynatech	LSC2000/ Archon 5100	GC-VOA	90296013/11767-695	1992: NA 1995	1995
MS-01	Purge and Trap Concentrator with Autosampler and Sample Heater	EST	Enchon Evolution/Centurion	GC/MS-VOA	EV361051911/CENTS2 3206011	2011:new	2011
MS-01	Gas Chromatograph/Mass Selective Detector (with EI, packed or capillary columns, and autoinjector)	Hewlett Packard	7890A/5975C	GC/MS-VOA	CN11141117/US11124 3913	2011:new	2011
MS-03	Gas Chromatograph/Mass Selective Detector with Purge and Trap Concentrator/Autoinjector	Hewlett Packard	5890/5972	GC/MS-VOA	3336A59812/3501A025 69	1995: new	1995

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ANALYTICAL INSTRUMENTATION LIST

Instr ID #	Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
MS-03	Purge and Trap Concentrator with Autosampler and Sample Heater	Tekmar/EST	3000/Archon EST	GC/MS-VOA	93133003/14516	1986: new	1986
MS-05	Gas Chromatograph/Mass Selective Detector (with EI and capillary column) with Autoinjector	Hewlett Packard	5890/5971	GC/MS-VOA	3140A38964/3022A01159	2001: used	2001
MS-06	Purge and Trap Concentrator with Autosampler and Sample Heater	Tekmar/01 Analytical	3000/Archon 5100A	GC/MS-VOA	3518A10324/11807-396A	1990: used	1990
MS-07	Gas Chromatography/Mass Selective Detector (with EI and capillary column) with Autoinjector	Hewlett Packard	5890/5972	GC/MS-VOA	3133A37488/3324J00051	1992:used	1992
MS-07	Purge and Trap Concentrator with Autosampler and Sample Heater	Tekmar/01 Analytical	2000/Archon 4452	GC/MS-VOA	92163013/13449	1999: used	1999
MS-08	Gas Chromatograph/Mass Selective Detector with Autosampler and Injector	Hewlett Packard	GC:5890E MS:5972 AS:18593B INJ:7673A	GC/MS-BNA	GC:3336A60351 MS:2W3723RR AS:2906A14031 INJ:3216A30461	2005: used	2005
MS-11	Gas Chromatograph/Mass Selective Detector	Finnigan	Trace GC/Trace DSQ	GC/MS-VOA	20033754/100084	2003: new	2003
MS-11	Purge and Trap Concentrator with Autosampler and Sample Heater	Tekmar/Tekmar	Velocity XPT/ Aquatek 70	GC/MS-VOA	US03150011/US06023010	2003: new	2003
MS-13	Gas Chromatograph/DSQ Mass Selective Detector with Entech Preconcentrator/Autosampler	Finnigan	100200/ 7100A/7016CA	GC/MS-VOA IN AIR	20042638 / 100200 1134 / 1106	2005: new	2005
MS-13	with can cleaner and dynamic diluter	Entech	3100A / 4600A	GC/MS-VOA IN AIR	1073 / 1209	2005: new	2005
MS-15	Gas Chromatograph/Mass Selective Detector with Purge and Trap Concentrator/Autoinjector	Hewlett Packard	5890/5971	GC/MS-VOA	3140A39364/3188A03169	2006: used	2006
MS-15	Purge and Trap Concentrator with Autosampler and Sample Heater	Tekmar/01 Analytical	2000/Archon 4452	GC/MS-VOA	92014003/14414	2006: used	2006
MS-17	Gas Chromatograph/Mass Selective Detector with Purge and Trap Concentrator/Autosampler	Agilent Technology with OI Corp	GC:7890A MS:5975C PT:4660 AS:4552	GC/MS-VOA	GC:CN10833010 MS:0583130149 PT:D817466336P AS:13523	2008: new	2008
MS-19	Gas Chromatograph/Mass Selective Detector with Purge and Trap Concentrator/Autosampler	Agilent Technology with Tekmar and Environmental Sample Technologies (EST)	GC:5890 Series II MS: 5971 PT:LSC2000 AS:Archon	GC/MS-VOA	GC:2950A26771 MS:3118A02554 PT:90169002 AS:15573	2008: used	2009
MS-21	Gas Chromatograph	Agilent	7890A	TO15	CN11261104	1/5/12: new	5/12
MS-21	Mass Selective Detector	Agilent	5975C	TO15	US11293908	1/5/12: new	5/12
MS-21	Preconcentrator	Entech	7200	TO15	1005	1/5/12: new	5/12
NA	Incubated Shaker	Lab-Line Enviroshaker	3527-6	GCMS-SV	06018415	2009: new	2009
			METALS				
ICP650	Inductively Coupled Plasma w/autosampler	Thermo	ICAP-6000 SERIES	ICP Metals	ICP 20073007	2007: new	2007
ICP652	Inductively Coupled Plasma w/autosampler	Thermo	ICAP-6000 SERIES	ICP Metals	ICP20083713	2008: new	2008
A7700	Inductively Coupled Plasma-Mass Spectroscopy	Agilent	7700X	ICP-MS Metals	JP11040846	2011:new	2011
ELANDR	Inductively Coupled Plasma-Mass Spectroscopy	Perkin Elmer	ELAN DRCE	ICP-MS Metals	W0290306H	2005: used	2005
CETAC	Mercury Analyzer	CETAC	M6100	Mercury	030501QT6	2005: new	2005
HYDRA	Mercury Analyzer	Teledyne	Hydra AF Gold+	Mercury	8008	2008: new	2009
Microwave #1	Microwave Digestion System	CEM Corporation	MARS	Metals Digestion	MD9111	2007: new	2007
NA	Hot Water Bath	Thermo-Fisher	2847	Wet Chem/Hg Digestion	208314-194	2008: new	2008

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ANALYTICAL INSTRUMENTATION LIST

Instr ID #	Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date In Service
NA	CPI Mod-Block (Hot Block)	CPI	Not appplicable	Metals Digestion	Not appplicable	1999:new	1999
NA	CPI Mod-Block (Hot Block)	CPI	Not appplicable	Metals Digestion	Not appplicable	2005:new	2005
SCP-3	Hotblock & Controller	SCP Science	Dig PREP	200.8 & 200.7 TRMD Digestions	MSX0512391056	10/23/12: new	10/24/2012
NA	Hot plate w/remote control	Barnstead/Thermolyne	Type 2200	Metals Digestion	1719070404920	NA	NA
NA	Hot plate w/remote control	Barnstead/Thermolyne	Type 2200	Metals Digestion	41105 1226658	NA	NA
NA	Hot plate	Lindberg/BLue	Not appplicable	Metals Digestion	ROBL-524714-RL	2007:new	2007
BAL-01	Balance	Mettler Toledo	PM4800	Metals Prep	1113242887	prior to 2010	prior to 2010
BAL-20	Balance	Ohaus	AV412C	Metals Prep	8033351242	2012: new	2012
			WET CHEMISTRY				
BRANLU	AA3 Autoanalyzer (Colorimeter)	Bran-Luebbe	AA3	Phenol/Cyanide/Phosphate/Nitrate by 353.2/ LL ammonia and TKN	54449525/9528237	2002: new	2002
BRANLU	AA3 Autoanalyzer (Pump)	Bran Luebbe	Pump 4	Phenol/Cyanide/Phosphate/Nitrate by 353.2/ LL ammonia and TKN	9526859/54504070	2002: new	2002
BRANLU	AA3 Autoanalyzer (Autosampler)	Wescto Sci. Inst.	Bran Luebbe Compact Autosampler	Phenol/Cyanide/Phosphate/Nitrate by 353.2/ LL ammonia and TKN	96227	2002: new	2002
NA	Autoclave	Market Forge	Sterilmatic	Wet Chem	GM2304	1993: new	1993
AUTOT	Autotitrator (Buret Module)	ManTech	PC1104-00	pH/Alkalinity/Specific Conductance	MS-0C6-695	2006:new	2006
AUTOT	Autotitrator (Buret Module)	ManTech	PC1104-00	pH/Alkalinity/Specific Conductance	MS-0E6-695	2006:new	2006
AUTOT	Autotitrator (TitraStip Module)	ManTech	PC-1300-475	pH/Alkalinity/Specific Conductance	MS-OE6-686	2006:new	2006
AUTOT	Autotitrator (Interface Module)	ManTech	PC-100102/4	pH/Alkalinity/Specific Conductance	MS-0D6-420	2006:new	2006
AUTOT	Autotitrator (Titra Rinse Module)	ManTech	PC-1000-408	pH/Alkalinity/Specific Conductance	MS-0D6-282	2006:new	2006
AUTOT	Autotitrator (Titra Rinse Module)	ManTech	PC-1000-408	pH/Alkalinity/Specific Conductance	MS-OE6-712	2006:new	2006
AUTOT	Autotitrator (Autosampler)	ManTech	123XL	pH/Alkalinity/Specific Conductance	27086XB060	2006:new	2006
AUTOT	Autotitrator (Conductivity Meter)	Jenway	4510	pH/Alkalinity/Specific Conductance	02013	2006:new	2006
NA	Balance	Mettler	PB5001S/FACT	Wet Chem	112907042	2008:new	2008
NA	Balance	Ohaus	AR2140	Wet Chem	11951225111722P	2002: new	2002
NA	Balance	Mettler	PG2002-S	Wet Chem	1122131298	2002:new	2002
NA	Balance	Mettler	AB204-S/FACT	Wet Chem	1129393176	2009:new	2009
NA	Black light Device	Spectro Line	EA160	Microbiology	1498439	2003: new	2003
NA	BOD autosampler	Skalar	SP1000	BOD	Not Available	2008:new	2008
NA	Centrifuge	Becton Dickinson	Dynac 3	Wet Chem	4220003	2006:new	2006
COD-2	COD Digester	HACH	45600	COD	001200021380	2007:used	2007
COD-4	COD Digester	HACH	45600	COD	000400020398	1995: new	1995
COD-3	COD Digester	HACH	16500	COD	880811313	1988: new	1988
COD-5	COD Digester	Hach	DRB200	COD	12080C0057	2012: NEW	10/24/2012
NA	Colony Counter	Darkfield Quebec	3325	Microbiology	Not Available	1986: new	1986
SPECCO	Conductivity/pH Meter	VWR	SB80PC	Wet Chem	DO2888	2009: new	2009

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ANALYTICAL INSTRUMENTATION LIST

Instr ID #	Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
NA	Digester	LabConco	25 Place	Wet Chem	Not Available	2007: used	2007
NA	Digester	LabConco	25 Place	Wet Chem	010695394E	2001: new	2001
NA	Dissolved Oxygen Meter	YSI	5000	DO/BOD	07F100142	2007: new	2007
NA	Dissolved Oxygen Meter	YSI	5000	DO/BOD	09E100944	2009: new	2009
NA	Dissolved Oxygen Meter	YSI	5000	DO/BOD	08L101044	2008: new	2008
NA	Distillation Unit	Buchi	B323	Ammonia-Nitrogen	1258434	1993: new	1993
NA	Distillation Unit	Buchi	B324	Ammonia-Nitrogen	4.16877E+11	2002: new	2002
TKN-TIT-01	K-370/371 Kjeldahl sample System	Buchi	K370 and K371	TKN/Ammonia	0400000314 and 0700001073	11/2010: new	01/2011
BODIN01	Incubator (AIR)	Fisher	304	BOD, CBOD	1520080704565	2008: new	2008
BODIN02	Incubator (AIR)	VWR	2030	BOD, CBOD	0900703	2002: new	2002
BODIN03	Incubator (AIR)	Fisher	307C	BOD, CBOD	1519060996323	2007: used	2007
BODIN04	Incubator (AIR)	VWR	2020	BOD, CBOD	1200492	Prior to 1997	1997
BODIN05	Incubator (AIR)	Fisher	304	BOD, CBOD	1520081209925	2007: used	2007
BODIN07	Incubator (AIR)	Thermo Scientific	3721	BOD, CBOD	316968-1215	2011:new	2011
BODIN08	Incubator (AIR)	Thermo Scientific	3721	BOD, CBOD	390628-2203	2012:new	03/29/12
NA	Incubator (AIR)	American Scientific	IS-61	Microbiology	Not Available	1986: new	1986
NA	Incubator (AIR)	Fisher	503	Microbiology	Not Available	2007: used	2007
NA	Incubator (Water Bath)	Precision Scientific	251	Microbiology	Not Available	1986: new	1996
NA	Incubator (Water Bath)	Precision Scientific	Not Available	Wet Chem	10AX-11	Prior to 1997	1997
NA	Incubator (Water Bath)	Precision Scientific	251	Microbiology	604081209	2005: new	2005
IC-1	Ion Chromatographer	Dionex	DX-500/LC20	D6919-03/Cr6	99120566	2004: new	2004
IC-2	Ion Chromatographer	Dionex	DX-120	300.0/300.1/314.0	00110303	1999: new	1999
IC-4	Ion Chromatographer	Dionex	ICS-2100	300.0/300.1/314.1	11060838	2011:new	7/2011
IC-5	Ion Chromatographer	Dionex	ICS-2000	300.0/300.1/314.1	08640079	2008:new	2008
IC-6	Ion Chromatography System	Dionex/Thermo	ICS-2100/AS-DV	Ammonia D6919-03	12031443/12031331	4/9/12: new	5/2012
NA	Ion Chromatographer DX-500 Conductivity Detector	Dionex	CD20	D6919-03/Cr6	99120554	2004: new	2004
NA	Ion Chromatographer DX-500 Gradient Pump	Dionex	GP50	D6919-03/Cr6	99100132	2004: new	2004
NA	Ion Chromatographer Autosampler	Dionex	AS40	300.0/300.1/314.0	00100638	2005: new	2005
NA	Ion Chromatographer Autosampler	Dionex	AS40	300.0/300.1/314.0	0406340	2004: new	2004
NA	Ion Chromatographer Autosampler	Dionex	AS40	D6919-03	99120688	2004: new	2004
NA	Ion Chromatographer Autosampler	Dionex	AS40	D6919-03	08040644	2008:new	2008
NA	Ion Analyzer	Orion	EA940	Ammonia-N/Fluoride/pH	2562	1995: new	1995
NA	Ion Analyzer	Thermo	Orion 720A+	ISE/pH	092033	2007: used	2008
NA	Microscope	Micromater	Not Available	Microbiology	Not Available	1988: new	1988
NA	Midi Distillation Unit	Andrews Glass Co.	110-10	Cyanide	Not Available	**:NA	NA
NA	Midi Distillation Unit	Andrews Glass Co.	110-10	Cyanide	Not Available	**:NA	NA
OIFlow	OI Flow Inject Autoanalyzer (FS3100)	OI Analytical	322689	Phenol/Cyanide/Phosphate/Nitrate by 353.2/ LL ammonia and TKN	616831029	2007: new	2007
OIFlow	OI Flow Inject Autoanalyzer (Pump)	Ismates	ISM938C	Phenol/Cyanide/Phosphate/Nitrate by 353.2/ LL ammonia and TKN	16236-0001	2007: new	2007
OIFlow	OI Flow Inject Autoanalyzer (Autosampler)	Celac	ASX-130	Phenol/Cyanide/Phosphate/Nitrate by 353.2/ LL ammonia and TKN	050611A130	2007: new	2007
NA	Osmometer	Advanced Instruments	3W2	Wet Chem	38948	1990: new	1990
TOC	OV-Persulfate TOC Analyzer	Dohvmann	Pheonix 8000	TOC	97172006	2008: used	NA
TOC	OV-Persulfate Autosampler	Not Available	223	TOC	Not Available	2008: used	NA

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ANALYTICAL INSTRUMENTATION LIST

Instr ID #	Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
NA	Muffle Furnace	Neytech	3-1750	Wet Chem	Not Available	1988: new	1988
WC Oven 1	Oven	Precision Scientific	Not Available	Wet Chem	4993	2007:used	2007
WC Oven 2	Oven	Lab Line	Imperial V	Wet Chem	9604362	1988: new	1988
WC Oven 4	Oven	Fisher Scientific	OV02F	Wet Chem	2153100436982	2010: new	2010
WC Oven 5	Oven	Fisher Scientific	13247750F	Wet Chem	611081339	2012:new	2012
WC Oven 6	Oven	VWR	Symphony E191047	solids	4113061226010	2012: new	2012
PENSKY	Closed Cup Flash Point Apparatus	Koehler	K16200	Wet Chem	R61091664	1991: new	1991
1ph	pH Meters	Thermo	Orion 720A+	Wet Chem	079669	2009: used	2009
2ph	pH Meters	Corning	350	Wet Chem	C2802	1988: new	1988
3ph	Quanti-Tray Sealer	IDEXX	Model 2X	Microbiology	3589	2005:new	2005
4ph	Quanti-Tray Sealer	IDEXX	Model 2X	Microbiology	Not Available	2005: new	2005
NA	Rapidstill (2)	LabConco	65200	TKN Distillation	Not Available	2007: used	2007
NA	Rapid Still II (Rapid Kjeldahl System)	Labconco	Rapidstill II	Phenol Distillation	41010	Prior to 1997	1997
NA	Ultrasonic Cleaner	Branson	5210	Wet Chem	5210R-DTH	1994: new	1994
NA	Ultrasonic Cleaner	Branson	2510	Wet Chem	RLA020020383D	1994: new	1994
HACHDR	Spectrophotometer	HACH	DR2000	COD	9.305E+11	1994: new	1994
SHIM50	TOC Autosampler	Shimadzu	ASI5000A	TOC	34N18857	1996: new	1996
SHIM50	Total Organic Carbon Analyzer	Shimadzu	5000A	TOC	34801035A	1996: new	1996
SHIM50	Total Organic Carbon Analyzer (Soil Module)	Shimadzu	SSM-5000A	TOC	40440748	2003: new	2003
TOX-10E	Total Organic Halogen Analyzer	Mitsubishi	TOX-10E	TOX	75C03775	1991: new	1991
TOX-100	Total Organic Halogen Analyzer	Mitsubishi	TOX-100	TOX	A7M 42636	2010:new	2010
TOX-100	Total Organic Halogen Automatic Boat Controller	Mitsubishi	ABC-100	TOX	A7B 33056	2010:new	2010
TOX-100	Total Organic Halogen Sample Preparater	Mitsubishi	TXA-03	TOX	A7A 30849	2010:new	2020
TOX-100	Total Organic Halogen Absorber	Mitsubishi	TXA02	TOX	75A31593	1991: new	1991
TOX-100	Total Organic Halogen Stirrer	Mitsubishi	TOX10E-S	TOX	75S14865	1991: new	1991
NA	Tunable Abs Detector	Waters	M486	Cr6	486 PRD 499	1998: used	2008
TURBID	Turbidimeter	HF Scientific	DRT 100B	Turbidity	18485	1994: new	1994
NA	Universal Chrom. Int.	Dionex	UCI-50	Cr6	8011100	2008: new	2008
SPECTR	UV/Visible Spectrophotometer	Shimadzu	UV-1201	Wet Chem	30034J	1997: new	1997

N.A.-- Information Not Available
** - listed as 1991 manufacture, acquisition date, condition and date of implementation not known*
*** - acquisition date, condition and date of implementation unknown*

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Appendix F- Orientation Summary

QA ORIENTATION CHECKLIST

Welcome to ALS-Middletown

Employee's Name: _____ Date of Orientation: _____
Job Title: _____ Date of Hire: _____

1. The information, policies and procedures checked below have been reviewed with me during QA Orientation:
Check only those that apply.

- ❑ ALS Organizational Chart- Corporate and Local Facility
- ❑ Employee Education & Experience Form
- ❑ Signature Documentation
- ❑ Basic Lab Training
- ❑ LIMS Training Requirements
- ❑ Ethics Protocol Reading
- ❑ SOP Required Reading
- ❑ Demonstration of Capability (DOC)

2. Return the following within one week to the QA Department:

- ❑ Employee Education & Experience Form
- ❑ Any Training Certificates you may have that apply to your ALS employment
- ❑ Basic Lab Training Form
- ❑ LIMS Training Certification
- ❑ SOP Required Reading Form

3. Return the following after your Quality Systems Training and Ethics & Data Integrity Training are complete:

- ❑ This QA Orientation Checklist

...AND REMEMBER:
If you have not already done so, a copy of your high school, college, or job specific training degree and a copy of your educational transcripts must be turned into QA.

You must complete an initial Documentation of Capability (DOC) and Initial Training form prior to independent analysis of samples. Annual recertification is required thereafter for all applicable laboratory testing.

Please sign and date below to indicate you are aware of this policy and understand that non-compliance may have impact on your annual review.

Employee Name: _____
Employee Signature: _____ **Date:** _____

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Figure 1 – Reagent Computerized Log

Chemical Receiving Report
11/8/2011 to 11/8/2011

Chemical Id Number	Chemical Name	Lot Number	Date Received	Expiration Date	Container Count	Receiver Initials	Storage Location	PO Number	Manufacturer
111108001	Hexanes	K34E27	11/8/2011	11/30/0012	24	KMS	Chemical Storage	37303	J. T. Baker
111108002	Methanol	K38E06	11/8/2011	11/8/2016	4	KMS	Chemical Storage	37303	J. T. Baker
111108003	Acetone	K18E69	11/8/2011	8/31/2012	4	KMS	Chemical Storage	37303	J. T. Baker
111108004	Methyl T-Butyl Ether	K13N51	11/8/2011	5/31/2012	4	KMS	Chemical Storage	37303	J. T. Baker
111108005	Dichloromethane	DF083	11/8/2011	11/8/2016	32	KAS	Chemical Storage	37305	Burdick & Jackson
111108006	M-Fecal Coliform	A1234	11/8/2011	8/22/2012	70	SSM	Micro	37298	Fisher
111108007	Phosphate Buffer(72/cs.)	21259B	11/8/2011	9/30/2013	6	SSM	Micro	37086	Whatman
111108008	Sulfuric Acid .02N Volumetric Solution	K14542	11/8/2011	4/30/2013	2	SSM	Wet Chem	37209	JT Baker
111108009	Diazald	63096MMV	11/8/2011	11/8/2016	10	SSM	Prep	37311	Aldrich
111108010	EC Medium/MUG Solution	A1299	11/8/2011	10/31/2012	9	SSM	Micro	37254	Hach Co.
111108011	ICP Standard Mg	S110218009	11/8/2011	3/31/2013	1	SSM	Metals	37225	SCP Science
111108012	Silica Gel(60-200 Mesh)	K08343	11/8/2011	11/8/2016	2	SSM	Wet Chem	37244	JT Baker
111108013	SM-1339-007 Solution B	1130627	11/8/2011	11/3/2012	1	SSM	Metals	37222	High-Purity Standards
111108014	SM-1339-006	1130629	11/8/2011	11/3/2012	1	SSM	Metals	3722	High-Purity Standards
111108015	SM-1339-007 Solution C	1130612	11/8/2011	11/3/2012	1	SSM	Metals	37222	High-Purity Standards
111108016	SM-1339-007 Solution A	1130608	11/8/2011	11/8/2012	1	SSM	Metals	37222	High-Purity Standards
111108017	Speeddisk Sax Quaternary Amine	K41N00	11/8/2011	11/8/2016	7	SSM	GC		JT Baker
111108018	Speeddisk Sax Quaternary Amine	K40N01	11/8/2011	11/8/2016	3	SSM	GC		JT Baker
111108019	Speedisk Octacedyl C18	K35N08	11/8/2011	11/8/2016	10	SSM	GC		JT Baker
111108020	WP200 COLILERT 100ML 200 PK	GG754	11/8/2011	8/20/2012	2	SSM	Micro	37286	IDEXX

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Figure 2 – Quality Verification Data Form

Figure 2 – Quality Verification Data Form

Quality Verification Data

Reagent ID # and Description: _____

Manufacturer: _____

Lot #: _____

Laboratory Use: _____

Requested Analysis: _____

Date Submitted for Analysis: _____

Technician Submitting Aliquot: _____

Department Submitting Aliquot: _____

Comments:

_____

_____

_____

_____

Analytical Results:

_____

_____

_____

_____

Analysts Approval (initials and date):

_____

_____

_____

_____

Revision Date: 11/18/07

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Figure 3 – Proposal Request Form

PROPOSAL REQUEST / PROJECT INFORMATION FORM

REQUEST FOR PROPOSAL GENERAL INFORMATION

☐ NEW / COMPLEX RFQ
☐ QUOTE PENDING (requires follow-up)
☐ QUOTE RECEIVED - Set Up Profile
☐ ROUTINE / REPETITIVE RFQ
☐ PART OF THIS PROJECT PROPOSED FOR YORK LAB
Proposal Type: _____
☐ REVISED QUOTE

Quote Requested By: _____ Date of Quote Request: _____
Quote Prepared By: _____ Date Quote Required: _____
Project Coordinator: _____ LIMS Proposal Number: _____
Time Required:

Version: PRF.102810.001

CLIENT INFORMATION SECTION:

☐ NEW CLIENT (If new client, complete information below.) ☐ EXISTING CLIENT ☐ Client Information in Horizon / LIMS

Company Name: _____ Report to Address: _____
Company Contact: _____
Client Email: _____ City: _____
Office Phone: _____ State: _____ Zip: _____
Office Fax: _____ Notes: _____
Cellular Phone: _____
Website Address: _____

INVOICING/PRICING INFORMATION SECTION:

☑ "INVOICE TO" Address Same As Above ☐ Address In LIMS

Invoice to Address: _____
City: _____
State: _____ Zip: _____

☐ P.O. REQUIRED P.O. NUMBER: _____

Pricing Sheet: _____ Specify: _____
Standard Discount: _____
Ref LIMS Profile/Project: _____
Special Pricing Forms? _____

If special pricing is required (i.e. - Bid response forms) for this proposal, please attach pricing requirements to this proposal request form. If "other", please note in Notes section below. All pricing required for this PRF must be attached at the back of this document.

NOTES:

Pricing Review:

Estimated Project Total: **$0.00**

(Manager's Review Required For ALL Proposals)

Is Pricing Accurate and Acceptable? _____
Sufficient Equipment Available to Perform Job? _____
Sufficient Personnel Available to Perform Job? _____
Manager Reviewing Proposal: _____
Date Proposal Reviewed: _____

MANAGER'S COMMENTS

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PROPOSAL REQUEST / PROJECT INFORMATION FORM

PROJECT INFORMATION SECTION:

Project Name: _____ Period of Performance: _____ to _____

Project Number: _____ Date of Event(s): _____

Contract Number: _____ Date of Sample Arrival: _____

Site Address: _____ Number of Samples: _____

☐ One-Time Job OR ☐ Undetermined

City: _____ ☐ Annual Contract? (Select Sampling Frequency Below)

☐ Annual Sampling ☐ Quarterly Sampling

State: _____ Zip: _____ ☐ Monthly Sampling ☐ Weekly Sampling

State of performance: _____ ► *If "OTHER", enter location of performance:* _____

PROJECT DESCRIPTION ***(Enter Detailed Description of the Project)*** **:**

RESULTS TURNAROUND INFORMATION:

Results Turnaround Time: _____ Special Date & Time Results Needed By: _____

"RUSH" request approved by: _____

"RUSH" SURCHARGE USED: _____ Special Surcharge Schedule: _____

FIELD SERVICES / COURIER REQUIREMENTS:

1. ALS Field Service Required? NO ► Date Needed: _____ ☐ No Fee ☐ Fee *Fee:* $0.00

If Field Services Required is "NO", Please see and answer questions 5 & 6 below.

2. ALS Field Equipment Rental? NO ► Date Needed: _____ ☐ No Fee ☐ Fee *Fee:* $0.00
3. ALS Courier Services Required? NO ► ☐ ALSI Pickup/Delivery ☐ No Fee ☐ Fee *Fee:* $0.00
4. ALS Courier Services Travel Time Fee? NO ► ☐ ALSI Pickup ☐ ALSI Delivery ☐ Fee *Fee:* $0.00
5. Outside Delivery Service Required? NO ► Anticipated Date to Receive Samples: _____
6. Delivery Service To Be Used: _____

SAMPLE CONTAINER REQUIREMENTS:

1. Sample Containers Required? NO ► *If "YES" to No. 1 then list Bottle Order Type:* _____

If "special" above, list requirements here: _____

2. Soil Samplers Required? NO ► *If "YES" to No. 1 then list Sampler Type:* _____

► *Is the Analysis High or Low Level:* _____

# of Samples: ____ *# of Vials:* 0 *# of Syringes:* 0 *# of Encores:* 0 *Fee:* $0.00

3. Will Blanks be Required for this Order? NO ► *Type:* ☐ Trip ☐ Field ☐ Equipment *Fee:* $0.00
4. SUMMA Canisters Required? NO ► ☐ Flow Controllers *Flow Rate:* _____ *Min.* *Fee:* $0.00
5. PUF Filters Required? NO ► ☐ Sampling Pump *Flow Rate:* _____ *Min.* *Fee:* $0.00

ALS ENVIRONMENTAL - MIDDLETOWN, PA

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UNCONTROLLED DOCUMENT

PROPOSAL REQUEST / PROJECT INFORMATION FORM

DATA DELIVERABLE REQUIREMENTS:

- [x] 1. Standard Deliverables Only ► *- Lab Report and COC Only*
- [ ] 2. LIMS QC Report ► Fee: $0.00
- [ ] 3. DATA Package ► Package Type: _____ Fee: $0.00
  - Custom Package Notes: _____
- [ ] 4. EDDs Required for this Project ► EDD Type: _____ Fee: $0.00
  - Custom EDD Notes: _____
- [ ] 5. CUSTOM Deliverables Package ► Custom Deliverables Specs must be attached. Fee: $0.00
- [ ] 6. Special QC Requirements ► Special Package Type: _____ Fee: $0.00

Requested Turnaround Time Required for Deliverables: _____ *(STD TAT is 28 calendar days from sample receipt)*

QC REQUIREMENTS:

- [x] Standard
- [ ] Trip Blank
- [ ] Equipment Blank
- [ ] Rinsate Blank
- [ ] Field Blank
- [ ] Field Duplicate
- [ ] MS / MSD
- [ ] Method Specific
- [ ] Other (Specify): _____

Associated Fee: $0.00

SAMPLE DISPOSAL REQUIREMENTS:

- [x] Standard
- [ ] Special Holding (Specify Number of Days): _____ *Days*

Associated Fee: $0.00

Certification Requirements: _____

IF SAMPLES ARE COLLECTED IN THE STATE OF NEW YORK: ***(All questions must be answered)***

1. [ ] If samples are from NY State, are they being taken from Federal Property (i.e. - Indian Reservation, Federal Building, Federal landmark)?
   If "yes" to No. 1, indicate Federal Property: _____
2. [ ] Were the most recent NY certifications reviewed to confirm certification for the required analytes?
   If "yes" to No. 2, who reviewed the certifications? _____
3. [ ] Was the client directed to complete the Chain-of-Custody in accordance with ALS requirements and to complete the information regarding NY samples and any required deliverable requirements?

/ _____ *agree that all questions above have been completed and answered to the best of my knowledge & accuracy.*

TECHNICAL REVIEW *(Required for all New / Complex RFQs):*

- [ ] Special Project Description *(See Attached)*
- [ ] Special Detection Limits *(See Attached)*
- [ ] SOW *(See Attached)*
- [ ] Special QC Limits *(See Attached)*
- [ ] New Method *(Method Development approved by Lab Manager and/or QA Manager)*

Reviewed by: _____

Technical Review Notes:

ALS ENVIRONMENTAL - MIDDLETOWN, PA

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PROPOSAL REQUEST / PROJECT INFORMATION FORM

GENERAL PROJECT SCHEDULE OF PRICES					
Parameter / Analysis	Method	Matrix	Quantity	Unit Price	Total Extended Price

PROPOSAL REQUEST / PROJECT INFORMATION FORM

SUBCONTACTING SCHEDULE OF ANALYSIS DETAILS			
Subcontracted Parameter / Analysis	Subcontract Lab Name	ALS Price	Fee Charged to Client
SHIPPING COSTS			

SUBCONTACTING SCHEDULE OF ANALYSIS DETAILS					
Subcontract Lab Name	ALS Approved Subcontract lab?	Is sub certified for specific analyses?	Specific Project Quote Received?		

SPECIAL NOTES OR COMMENTS FOR THIS PROPOSAL

ALS ENVIRONMENTAL - MIDDLETOWN, PA

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Figure 4 – Preservation Logbook

Container Number	pH Received	Adjustment Amount Needed	Final pH	Preservation Lot Number	Residual Chlorine (+ or -)	Date	Time	Initials	pH Recheck Date/Time/Recheck

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Figure 5 – Corrective Action Form

ALS Laboratory Group **Non-Conformance Corrective Action Report**

Non Conformity Observation

NCAR ID: MD0004 **Event:** lost sample

Instrument: **Method:** TSS **Lab:** Middletown

Issued To / Department: WETCHEM **Date Issued:** 07/17/2012 **Initiator:** Anna Milliken

Non Conformance Type: Missing samples

Nonconformance Type (Other):

Responsible Party : Helen Macminn **Response Due Date:** 07/31/2012

WorkOrder(s): TSS bottle was lost. Lost sample was not communicated to client in a timely manner.

Non-Conformance Details:

Initial Response Timeline: 07/24/2012

Corrective Action Findings and Response

Identify Root Cause: Lack of communication **CAP Implementation Timeline:** 07/31/2012

Details: Commincation failed between department and client

Corrective Action Plan(CAP): A formal system needs to be developed for handling missing samples

CAP Completion Details: QA developed and implemented a Missing Sample Protocol

Respondent: Helen Macminn **Date :** 07/31/2012

Supervisor Verification : Helen Macminn **Date :** 07/31/2012

Notification -Customer/Client - Internal/External (As Needed)

Action Taken to handle Out of control Data :

Project Manager Notified? YES **Date :** 07/13/2012

Customer Notification Necessary : YES **Date :** 07/24/2012

Report Revision Necessary: NO **Date :**

Notifier: Susan Scherer **Date :** 07/24/2012

Acceptance of Completed Corrective Action by QA

QA Signature : Amanda Donohu **Date :** 09/07/2012

QA Comments :

Recurring Nonconformance : **ID Previous Nonconformance :** 0

Verification of Completed Corrective Action by QA

Verifier: Amanda Donohu **Date :** 09/07/2012

Comments :

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Figure 6 – LIMS Computer-Generated Internal Chain of Custody

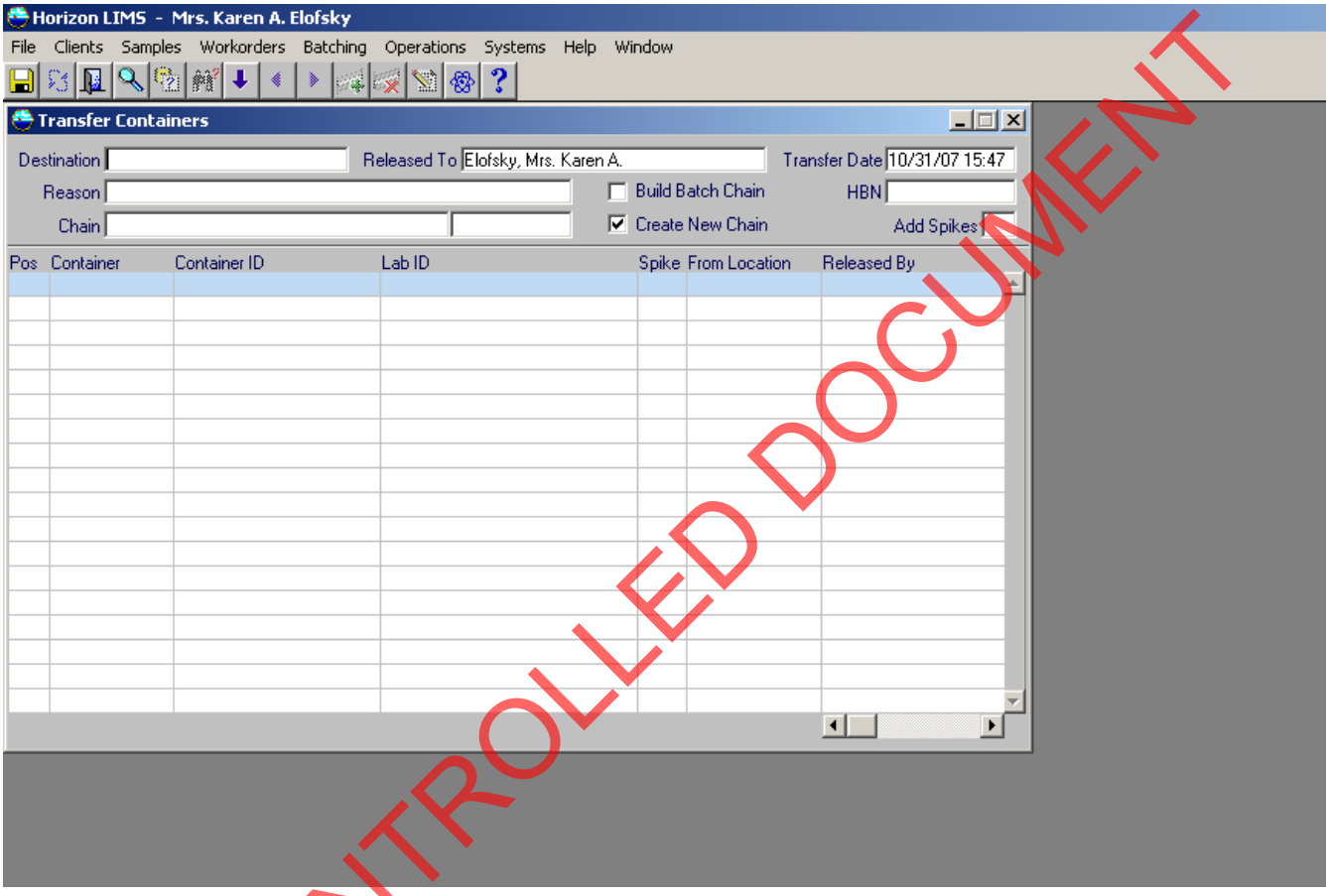

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Figure 7 – Sample Non Conformance Report

Analytical Laboratory Services, Inc.
Sample Nonconformance Report
To be Completed by Laboratory in Cases of QC Failure Due to Sample Matrix

Date: _____ ***Analyst:*** _____
Dept: _____ ***Supervisor:*** _____

Method No.: _____

Chain of Custody No.(s):

Type of QC Non-conformance:
_____ Surrogate Failure
_____ Matrix Spike Failure
_____ Matrix Spike Duplicate or Sample Duplicate Failure
_____ Internal Standard Failure
_____ Other _____

Supporting Evidence of Sample Matrix Effects as Cause of Failure in Analytical Batch:
Check all that apply:
_____ Non-detectable Blank
_____ Initial Calibration within Method Specifications
_____ Continuing Calibration or Calibration Verfication Standard within Method Specifications
_____ Laboratory Control Sample Recovered Within Acceptable Limits
_____ Appearance of sample is non-homogeneous
_____ Other: _____

Was Sample Re-extracted and/or Re-analyzed to confirm Matrix Effects? ***Yes*** ***No***

Are Matrix Effects evident in Historical Samples from this client and/or collection site? ***Yes*** ***No***

Comment Included on Final Lab Analysis Report:

This form is to be filed with associated sample(s) raw data.

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Figure 8 – External Complaint Form

ALSI External Complaint Form

Please be as specific and complete as possible.

Customer Name:		Complaint File Number:	
Client Contact:		Applicable COC Numbers:	
Date/Time:		ALSI Contact:	
Person Making Complaint:			

Specific Items Discussed:

Resolution:

Departments Involved with Complaint:

☐ Biomonitoring	☐ Microbiology		
☐ Client Services	☐ Prep Lab		
☐ Field Services	☐ QA/QC		
☐ GC/MS	☐ Sample Receiving		
☐ GC (Direct Inject)	☐ TOX/TOC		
☐ GC (Volatiles)	☐ Wet Chemistry	Report Reviewed By:	
☐ Metals	☐ Miscellaneous	Customer Service Informed:	

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Figure 9 – Internal Suggestion Form

ALS Middletown - Suggestion Form	
Employee Initiating Suggestion (Optional):	Department:
	Date:
Suggestion (Please be as specific as possible):	

QA Plan Revision Summary

Revision 23

Section No.	Section	Reason for Change
	Entire Document	Spelling, grammar, and formatting changes made for clarity, correctness, and site conformity.
	Entire Document	Updated format to Corporate format and updated position titles to titles designated by Corporate
	Signature page	Updated Laboratory Director
1	Document History	Cited previous revision
4.3.2	Operations Manager	Added Manage regional laboratory facilities and service centers
4.3.5	Organization & Management Structure	QA manager experience requirement from 1 to 2 years, deputy from Reporting Dept Supervisor to QA Officer
4.3.6	Organization & Management Structure	Reporting manager deputy from QA manager to Reporting Officer
4.3.9, 10	Organization & Management Structure	Added compliance to ISO17025 statement
5	Safety	Added "near miss" to reportable accidents; updated written safety program to Corporate program
6	Training	Added Corporate HR Manager
6.2	Training	Moved safety training from QA responsibilities to Health & Safety Officer
6.3	Training	Updated QA Plan location on server, changed employee review of records from regular intervals to annually
7.5	Document Control	Added electronic data is maintained when it is transferred to appropriate servers
7.8	Document Control	Updated SOP format to Corporate format
7.8.11	Document Control	Defined SOP review process
13	Control of Non-Conformance Testing	Added electronic NCAR program
14	Test Method Reference	Added Standard Methods 22nd edition; Updated NELAP to 2009

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Section No.	Section	Reason for Change
		Standard
14.2	Test Method Reference	Updated SOP concurrence procedure
17	Laboratory Facilities & Equipment	Added Accounting and Human Resources
17.6	Laboratory Facilities & Equipment	Clarified range of water resistivity and added monitoring system light indicator
18.3	Data Verification Procedures	Added PT prep step and recording of the prep step; removed IH Lead-In-Air PT from Program Chart
18.4	Data Verification Procedures	Updated Control Chart Program from NWA to Utility program
18.5	Data Verification Procedures	Added Access MDL program goal to be fully implemented into departments
18.6	Data Verification Procedures	Clarified 1st and 2nd review process
19	Corrective Actions	Added survey link attached to emails
22.1	Confidentiality, Proprietary Rights & Transfer of Ownership	Added reports may be sent via email
Appendix A		Updated Organizational Chart
Appendix B		Updated Container, Preservation, Storage, Hold Time Chart
Appendix E		Updated Instrument List
Appendix G		Updated QA orientation Checklist
Figure 5	Corrective Action Form	Updated form

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QA Plan Concurrence Form

For the Distribution and Revision of the Quality Assurance Plan

I have read, understood, and concurred with the Quality Assurance Plan (QAP) described above and will perform these procedures as they are written in the QA Plan.

Print Name	Signature	Date

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ARCADIS

Appendix E

Notification and Public Outreach Sign

PUBLIC NOTICE SIGN

BAYONNE BRIDGE
235 WEST 1ST STREET PROPERTY
BAYONNE, NJ 07002

ARCADIS

Appendix F

Draft Deed Notice

DRAFT DEED NOTICE

IN ACCORDANCE WITH N.J.S.A. 58:10B-13, THIS DOCUMENT IS TO BE RECORDED IN THE SAME MANNER AS ARE DEEDS AND OTHER INTERESTS IN REAL PROPERTY.

Prepared by: _____
[Signature]

_____
[Print name below signature]

Recorded by: _____
[Signature, Officer of County Recording Office]

_____
[Print name below signature]

DEED NOTICE

This Deed Notice is made as of the _____ day of _____, ____, by **The Port Authority of NY & NJ having its address as 235 West First St. Bayonne, New Jersey** (together with his/her/its/their successors and assigns, collectively "Owner").

1. THE PROPERTY. **The Port Authority of NY & NJ having its address as 235 West First St. Bayonne, New Jersey** is the owner in fee simple of certain real property designated as **Block(s) 373 Lot(s) 3**, on the tax map of the **City of Bayonne**, **Hudson County**; the New Jersey Department of Environmental Protection Program Interest Number (Preferred ID) for the contaminated site which includes this property is **G000021830**; and the property is more particularly described in Exhibit A, which is attached hereto and made a part hereof (the "Property").

2. REMEDIATION.

i. **Clint P. Catania, LSRP License No. 591315,** has approved this Deed Notice as an institutional control for the Property, which is part of the remediation of the Property.

ii. N.J.A.C. 7:26C-7 requires the Owner, among other persons, to obtain a soil remedial action permit for the soil remedial action at the Property. That permit will contain the monitoring, maintenance and biennial certification requirements that apply to the Property.

3. SOIL CONTAMINATION. **The Port Authority of NY & NJ** has remediated contaminated soil at the Property, such that soil contamination remains in certain areas of the Property that contains contaminants in concentrations that do not allow for the unrestricted use of the Property; this soil contamination is described, including the type, concentration and specific location of such contaminants, in Exhibit B, which is attached hereto and made a part hereof. As a result, there is a statutory requirement for this Deed Notice and engineering controls in accordance with N.J.S.A. 58:10B-13.

4. CONSIDERATION. In accordance with the remedial action for the site which included the Property, and in consideration of the terms and conditions of that remedial action, and other good and valuable consideration, Owner has agreed to subject the Property to certain statutory and regulatory requirements that impose restrictions upon the use of the Property, to restrict certain uses of the Property, and to provide notice to subsequent owners, lessees and operators of the restrictions and the monitoring, maintenance, and biennial certification requirements outlined in this Deed Notice and required by law, as set forth herein.

5A. RESTRICTED AREAS. Due to the presence of contamination remaining at concentrations that do not allow for unrestricted use, the Owner has agreed, as part of the remedial action for the Property, to restrict the use of certain parts of the Property (the "Restricted Areas"); a narrative description of these restrictions is provided in Exhibit C, which is attached hereto and made a part hereof. The Owner has also agreed to maintain a list of these restrictions on site for inspection by governmental officials.

5B. RESTRICTED LAND USES. The following statutory land use restrictions apply to the Restricted Areas:

i. The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(10), prohibits the conversion of a contaminated site, remediated to non-residential soil remediation standards that require the maintenance of engineering or institutional controls, to a child care facility, or public, private, or charter school without the Department’s prior written approval, unless a presumptive remedy is implemented; and

ii. The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(12), prohibits the conversion of a landfill, with gas venting systems and or leachate collection systems, to a single family residence or a child care facility without the Department’s prior written approval.

5C. ENGINEERING CONTROLS. Due to the presence and concentration of these contaminants, the Owner has also agreed, as part of the remedial action for the Property, to the placement of certain engineering controls on the Property; a narrative description of these engineering controls is provided in Exhibit C.

6A. CHANGE IN OWNERSHIP AND REZONING.

i. The Owner and the subsequent owners and lessees, shall cause all leases, grants, and other written transfers of an interest in the Restricted Areas to contain a provision expressly

requiring all holders thereof to take the Property subject to the restrictions contained herein and to comply with all, and not to violate any of the conditions of this Deed Notice. Nothing contained in this Paragraph shall be construed as limiting any obligation of any person to provide any notice required by any law, regulation, or order of any governmental authority.

ii. The Owner and the subsequent owners shall provide written notice to the Department of Environmental Protection on a form provided by the Department and available at www.nj.gov/srp/forms within thirty (30) calendar days after the effective date of any conveyance, grant, gift, or other transfer, in whole or in part, of the owner's interest in the Restricted Area.

iii. The Owner and the subsequent owners shall provide written notice to the Department, on a form available from the Department at www.nj.gov/srp/forms, within thirty (30) calendar days after the owner's petition for or filing of any document initiating a rezoning of the Property to residential.

6B. SUCCESSORS AND ASSIGNS. This Deed Notice shall be binding upon Owner and upon Owner's successors and assigns, and subsequent owners, lessees and operators while each is an owner, lessee, or operator of the Property.

7A. ALTERATIONS, IMPROVEMENTS, AND DISTURBANCES.

i. The Owner and all subsequent owners and lessees shall notify any person, including, without limitation, tenants, employees of tenants, and contractors, intending to conduct invasive work or excavate within the Restricted Areas, of the nature and location of contamination in the Restricted Areas, and, of the precautions necessary to minimize potential human exposure to contaminants.

ii. Except as provided in Paragraph 7B, below, no person shall make, or allow to be made, any alteration, improvement, or disturbance in, to, or about the Property which disturbs any engineering control at the Property without first obtaining a soil remedial action permit modification pursuant to N.J.A.C. 7:26C-7. Nothing herein shall constitute a waiver of the obligation of any person to comply with all applicable laws and regulations including, without limitation, the applicable rules of the Occupational Safety and Health Administration.

iii. Notwithstanding subparagraph 7Aii., above, a soil remedial action permit modification is not required for any alteration, improvement, or disturbance provided that the owner, lessee or operator:

(A) Notifies the Department of Environmental Protection of the activity by calling the DEP Hotline, at 1-877-WARN-DEP or 1-877-927-6337, within twenty-four (24) hours after the beginning of each alteration, improvement, or disturbance;

(B) Restores any disturbance of an engineering control to pre-disturbance conditions within sixty (60) calendar days after the initiation of the alteration, improvement or disturbance;

(C) Ensures that all applicable worker health and safety laws and regulations are followed during the alteration, improvement, or disturbance, and during the restoration;

(D) Ensures that human exposure to contamination in excess of the remediation standards does not occur; and

(E) Describes, in the next biennial certification the nature of the alteration, improvement, or disturbance, the dates and duration of the alteration, improvement, or disturbance, the name of key individuals and their affiliations conducting the alteration, improvement, or disturbance, a description of the notice the Owner gave to those persons prior to the disturbance.

7B. EMERGENCIES. In the event of an emergency which presents, or may present, an unacceptable risk to the public health and safety, or to the environment, or immediate environmental concern, see N.J.S.A. 58:10C-2, any person may temporarily breach an engineering control provided that that person complies with each of the following:

i. Immediately notifies the Department of Environmental Protection of the emergency, by calling the DEP Hotline at 1-877-WARNDEP or 1-877-927-6337;

ii. Hires a Licensed Site Remediation Professional (unless the Restricted Areas includes an unregulated heating oil tank) to respond to the emergency;

iii. Limits both the actual disturbance and the time needed for the disturbance to the minimum reasonably necessary to adequately respond to the emergency;

iv. Implements all measures necessary to limit actual or potential, present or future risk of exposure to humans or the environment to the contamination;

v. Notifies the Department of Environmental Protection when the emergency or immediate environmental concern has ended by calling the DEP Hotline at 1-877-WARNDEP or 1-877-927-6337; and

vi. Restores the engineering control to the pre-emergency conditions as soon as possible, and provides notification to the Department of Environmental Protection within sixty (60) calendar days after completion of the restoration of the engineering control, including: (a) the nature and likely cause of the emergency; (b) the potential discharges of or exposures to contaminants, if any, that may have occurred; (c) the measures that have been taken to mitigate the effects of the emergency on human health and the environment; (d) the measures completed or implemented to restore the engineering control; and (e) the changes to the engineering control or site operation and maintenance plan to prevent reoccurrence of such conditions in the future.

8. TERMINATION OF DEED NOTICE.

i. This Deed Notice may be terminated only upon filing of a Termination of Deed Notice, available at N.J.A.C. 7:26C Appendix C, with the office of the **Office of the County Clerk** of **Hudson County**, New Jersey, expressly terminating this Deed Notice.

ii. Within thirty (30) calendar days after the filing of a Termination of Deed Notice, the owner of the property shall apply to the Department for termination of the soil remedial action permit pursuant to N.J.A.C. 7:26C-7.

9. ACCESS. The Owner, and the subsequent owners, lessees and operators agree to allow the Department, its agents and representatives access to the Property to inspect and evaluate the continued protectiveness of the remedial action that includes this Deed Notice and to conduct additional remediation to ensure the protection of the public health and safety and of the environment if the subsequent owners, lessees and operators, during their ownership, tenancy, or operation, and the Owner fail to conduct such remediation pursuant to this Deed Notice as required by law. The Owner, and the subsequent owners and lessees, shall also cause all leases, subleases, grants, and other written transfers of an interest in the Restricted Areas to contain a provision expressly requiring that all holders thereof provide such access to the Department.

10. ENFORCEMENT OF VIOLATIONS.

i. This Deed Notice itself is not intended to create any interest in real estate in favor of the Department of Environmental Protection, nor to create a lien against the Property, but merely is intended to provide notice of certain conditions and restrictions on the Property and to reflect the regulatory and statutory obligations imposed as a conditional remedial action for this site.

ii. The restrictions provided herein may be enforceable solely by the Department against any person who violates this Deed Notice. To enforce violations of this Deed Notice, the Department may initiate one or more enforcement actions pursuant to N.J.S.A. 58:10-23.11, and N.J.S.A. 58:10C, and require additional remediation and assess damages pursuant to N.J.S.A. 58:10-23.11, and N.J.S.A. 58:10C.

11. SEVERABILITY. If any court of competent jurisdiction determines that any provision of this Deed Notice requires modification, such provision shall be deemed to have been modified automatically to conform to such requirements. If a court of competent jurisdiction determines that any provision of this Deed Notice is invalid or unenforceable and the provision is of such a nature that it cannot be modified, the provision shall be deemed deleted from this instrument as though the provision had never been included herein. In either case, the remaining provisions of this Deed Notice shall remain in full force and effect.

12A. EXHIBIT A. Exhibit A includes the following maps of the Property and the vicinity:

i. Exhibit A-1: Vicinity Map - A map that identifies by name the roads, and other important geographical features in the vicinity of the Property (for example, USGS Quad map, Hagstrom County Maps);

ii. Exhibit A-2: Metes and Bounds Description - A tax map of lots and blocks as wells as metes and bounds description of the Property, including reference to tax lot and block numbers for the Property;

iii. Exhibit A-3: Property Map - A scaled map of the Property, scaled at one inch to 200 feet or less, and if more than one map is submitted, the maps shall be presented as overlays, keyed to a base map; and the Property Map shall include diagrams of major surface topographical features such as buildings, roads, and parking lots.

12B. EXHIBIT B. Exhibit B includes the following descriptions of the Restricted Areas:

i. Exhibit B-1: Restricted Area Map - A separate map for each restricted area that includes:

(A) As-built diagrams of each engineering control, including caps, fences, slurry walls, (and, if any) ground water monitoring wells, extent of the ground water classification exception area, pumping and treatment systems that may be required as part of a ground water engineering control in addition to the deed notice

(B) As-built diagrams of any buildings, roads, parking lots and other structures that function as engineering controls; and

(C) Designation of all soil and sediment sample locations within the restricted areas that exceed any soil or sediment standard that are keyed into one of the tables described in the following paragraph.

ii. Exhibit B-2: Restricted Area Data Table - A separate table for each restricted area that includes either (A) or (B) through (F):

(A) Only for historic fill extending over the entire site or a portion of the site and for which analytical data are limited or do not exist, a narrative that states that historic fill is present at the site, a description of the fill material (e.g., ash, cinders, brick, dredge material), and a statement that such material may include, but is not limited to, contaminants such as PAHs and metals;

(B) Sample location designation from Restricted Area map (Exhibit B-1);

(C) Sample elevation based upon mean sea level;

(D) Name and chemical abstract service registry number of each contaminant with a concentration that exceeds the unrestricted use standard;

(E) The restricted and unrestricted use standards for each contaminant in the table; and

(F) The remaining concentration of each contaminant at each sample location at each elevation.

12C. EXHIBIT C. Exhibit C includes narrative descriptions of the institutional controls and engineering controls as follows:

i. Exhibit C-1: Deed Notice as Institutional Control: Exhibit C-1 includes a narrative description of the restriction and obligations of this Deed Notice that are in addition to those described above, as follows:

(A) Description and estimated size of the Restricted Areas as described above;

(B) Description of the restrictions on the Property by operation of this Deed Notice; and

(C) The objective of the restrictions.

ii. Exhibit C-2: Asphalt/Soil Cap & Retention Basin as Engineering Controls: Exhibit C-2 includes a narrative description of the asphalt/soil cap as follows:

(A) Description of the engineering control;

(B) The objective of the engineering control; and

(C) How the engineering control is intended to function.

13. SIGNATURES. IN WITNESS WHEREOF, Owner has executed this Deed Notice as of the date first written above.

[If Owner is an individual]

WITNESS: _____
[Signature]

_____
[Print name below signature]

STATE OF NEW JERSEY SS.:
COUNTY OF HUDSON

I certify that on _____, 20__, [Name of Owner] personally came before me, and this person acknowledged under oath, to my satisfaction, that this person [or if more than one person, each person]

(a) is named in and personally signed this document; and

(b) signed, sealed and delivered this document as his or her act and deed.

_____

_____, Notary Public
[Print Name and Title]

14. SIGNATURES. IN WITNESS WHEREOF, Owner has executed this Deed Notice as of the date first written above.

[If Owner is a corporation]

ATTEST: [Name of corporation]

_____ By_____

_____ _____
[Print name and title] [Signature]

STATE OF [State where document is executed] SS.:
COUNTY OF [County where document is executed]

I certify that on _____, 20__, [Name of person executing document on behalf of Owner] personally came before me, and this person acknowledged under oath, to my satisfaction, that:

(a) this person is the [secretary/assistant secretary] of [Owner], the corporation named in this document;

(b) this person is the attesting witness to the signing of this document by the proper corporate officer who is the [president/vice president] of the corporation;

(c) this document was signed and delivered by the corporation as its voluntary act and was duly authorized;

(d) this person knows the proper seal of the corporation which was affixed to this document; and

(e) this person signed this proof to attest to the truth of these facts.

_____
[Signature]

_____
[Print name and title of attesting witness]

Signed and sworn before me on _____, 20__

_____, Notary Public

_____
[Print name and title]

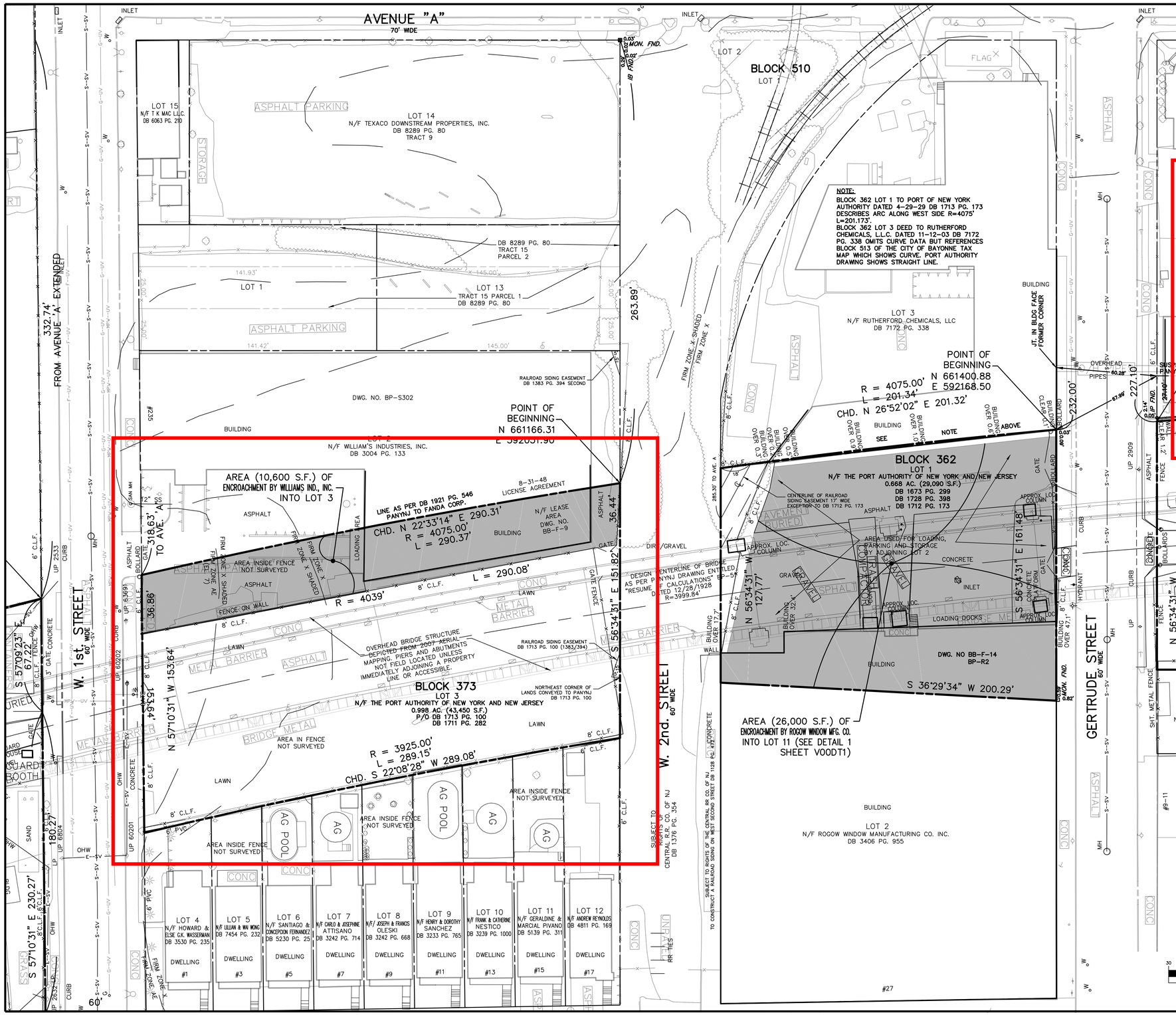
Exhibits A

A-1 Vicinity Map

A-2 Metes and Bounds Description

A-3 Property Map

SITE
NEWARK
BAYONNE
Bergen Point
Port Johnson
KILL VAN KULL
HUDSON CO
RICHMOND CO
BERGEN POINT WEST REACH
BERGEN PT EAST REACH
NEW YORK CITY BDY
SOUTH OF SHOOTERS ISLAND REACH
ISLAND REACH
Shooters Island
CONRAIL
Veterans Park
Pumping Sta
City Park
Tidal Flat
Playground
Ruins
Mariners Harbor
STATEN ISLAND
Elm Park
Arlington
Port Richmond
Graniteville
ISLAND
RICHMOND
Tollgates
Port Richmond Ps 8
Port Richmond Ps 19
Port Richmond Ps 20
Port Richmond Ps 21
Port Richmond Ps 44
Port Richmond High Sch
Port Richmond Cemetery
Port Richmond Library
Port Richmond Fire Sta
Port Richmond Park
Port Richmond Playground
Port Richmond Cemetery
Port Richmond Trinity Ch
Port Richmond Grace Ch
Port Richmond Zion Ch
Port Richmond Shiloh Ch
Port Richmond Fountain Cem
Port Richmond Staten Cem
Port Richmond Yellowship Ch
Port Richmond St Mary's Sch
Port Richmond St Alberts Sch
Port Richmond St Rocha Sch
Port Richmond St Luke's Ch
Port Richmond Holy Family Academy
Port Richmond Donovan Sch
Port Richmond Harris Sch
Port Richmond St Andrews Sch
Port Richmond Fire Sta
Port Richmond Sewage Disposal
Port Richmond Tidal Flat
Port Richmond Yacht Club
Port Richmond Police Sta
Port Richmond Sch No 1
Port Richmond Sch No 2
Port Richmond Sch No 12
Port Richmond Sch No 17
Port Richmond Sch No 27
Port Richmond Sch No 32
Port Richmond Sch No 33
Port Richmond Sch No 34
Port Richmond Sch No 35
Port Richmond Sch No 36
Port Richmond Sch No 37
Port Richmond Sch No 38
Port Richmond Sch No 39
Port Richmond Sch No



DEED DESCRIPTION BLOCK 373 LOT 3

Beginning at a point in the southerly line of W. 2nd. Street (60' wide), said point being S 56°34'31" E, 263.89' from the intersection of the southerly line of W. 2nd. Street (60' wide) with the easterly line of Avenue "A" (70' wide), said point of beginning having a coordinate value of N 661,166.31 E 592,051.90 in the coordinate system as noted in the drawings hereon, running thence;

1. Along the southerly line of W. 2nd. Street (60' wide), S 56°34'31" E, 151.82' to a point, thence;
2. Along the dividing line between Block 373 Lot 3 and Block 373 Lots 4 through 12, on a curve to the left having a radius of 3925.00', an arc length of 289.15' the chord bearing S 22°08'28" W, 289.08' to a point, thence;
3. Along the northerly line of W. 1st. Street (60' wide), N 57°10'31" W, 153.64' to a point, thence;
4. Along the dividing line between Block 373 Lot 3 and Block 373 Lot 2, on a curve to the right having a radius of 4075.00', an arc length of 290.37' the chord bearing N 22°33'14" E, 290.31' to the point of beginning.

DEED DESCRIPTION BLOCK 362 LOT 1

Beginning at a point in the southerly line of Gertrude Street (60' wide), said point being S 56°34'31" E, 232.00' from the intersection of the southerly line of Gertrude Street (60' wide) with the easterly line of Avenue "A" (70' wide), said point of beginning having a coordinate value of N 661,400.88 E 592,168.50 in the coordinate system as noted in the drawings hereon, running thence;

1. Along the southerly line of Gertrude Street (60' wide), S 56°34'31" E, 161.48' to a point, thence;
2. Along the dividing line between Block 362 Lot 1 and Block 362 Lot 2, S 36°29'34" W, 200.29' to a point, thence;
3. Along the northerly line of W. 2nd. Street (60' wide), N 56°34'31" W, 127.77' to a point, thence;
4. Along the dividing line between Block 362 Lot 1 and Block 362 Lot 3, on a curve to the right having a radius of 4075.00', an arc length of 201.34' the chord bearing N 26°52'02" E, 201.32' to the point of beginning.

NOTE:

1. SEE DWG. V001 FOR CERTIFICATION & GENERAL NOTES.

MAP REFERENCES

1. TAX MAP OF CITY OF BAYONNE, SHEET 98, 99.
2. OFFICIAL ASSESSMENT MAP OF THE CITY OF BAYONNE (1923).
3. PORT AUTHORITY NY/NJ DWG NOS. BP-22, BB-F-9, BP-S302, BB-F-14, BP-R2, BP-51.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

Sheet 6 of 16

THE PORT AUTHORITY OF NY & NJ

KUPPER, LLC
A JMT COMPANY

JMT JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

KUPPER, L.L.C., A JMT COMPANY
1200 LENOX DRIVE, TRENTON, N.J. 08648-2329
(609)512-3900
N.J. CERTIFICATE OF AUTHORIZATION #24GA28152000

AMBROSE E. GMEINER, II
N.J. Professional Land Surveyor #24GS04318400

No.	Date	Revision	Approved
1	9/14/11	UPDATED AERIAL MAPPING REFERENCED	

ENGINEERING DEPARTMENT

BAYONNE BRIDGE

Title ALTA/ACSM LAND TITLE SURVEY

BLOCK 302 LOTS 3 & 4, BLOCK 312 LOT 16
BLOCK 334 LOT 5, BLOCK 345 LOT 1
BLOCK 346 LOT 11, BLOCK 361 LOT 1
BLOCK 362 LOT 1, BLOCK 373 LOT 3
BLOCK 391 LOTS 3, 4 & 5
CITY OF BAYONNE
HUDSON COUNTY
NEW JERSEY

PLAN OF SURVEY - 4

THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE DATES INDICATED AND CAN BE CONSIDERED AS THE GENERAL CONDITIONS AT THAT TIME. BE ADVISED THAT ADDITIONAL INFORMATION MAY RESIDE ON DIGITAL FILES AND MAY NOT BE PLOTTED ON THIS MAP.

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Surveyed by	Drawn by	Checked by
KUPPER LLC/JMT	RL	PJM/AEG

Date **08/26/2011**

Contract Number **BBNCP**

Drawing Number **A-2**

Survey # 2011-065

Date\Time : Wed, 15 Jan 2014 - 5:29pm Current Plotstyle : ByColor Layout Tab: 2
Path\Name : G:\ENVCAD\Manchester\AET\04907098\00001\04907098001-A3.dwg

Acad Version : R18.1s (LMS Tech)
User Name : BSSmolli

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REV.	ISSUED	DATE	DESCRIPTION
-	-	-	-
-	-	-	-

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ARCADIS U.S., Inc.
6723 Towpath Road
Syracuse, New York 13214
T: 315.446.9120
F: 315.449.0017
www.arcadis-us.com

THE PORT AUTHORITY
OF NY & NJ
BAYONNE BRIDGE
REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
SITE MAP			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	A-3
			SHEET OF

Exhibits B

B-1 Restricted Area Map with Soil and Sediment Sample Exceedences

B-2 Restricted Area Data Table

Bayonne Bridge
Remedial Investigation
Arsenic Results - Soil

Sample ID	Sampling Depth	Sampling Date	Result (mg/kg)
PA-MW-1	0.0-2.0	12/01/03	**100**
PA-MW-1	2.0-4.0	12/01/03	**128**
PA-MW-2	0.0-2.0	12/01/03	**176**
PA-MW-2	2.0-3.0	12/01/03	**10,400**
PA-MW-3	0.0-2.0	12/01/03	**29.8**
PA-MW-3	6.0-8.0	12/01/03	**40.7**
PA-MW-4	0.0-2.0	11/26/03	**283**
PA-MW-4	2.0-4.0	11/26/03	**88.1**
PA-MW-5	0.0-2.0	11/26/03	**25.7**
PA-MW-5	2.0-4.0	11/26/03	**48.6**
PA-MW-6	0.0-2.0	12/01/03	**182**
PA-MW-6	2.0-4.0	12/01/03	**80.8**
PA-MW-7	0.0-0.5	06/28/04	**264**
PA-MW-7	1.5-2.0	06/28/04	**813**
PA-MW-8	0.0-0.5	05/20/04	**594**
PA-MW-8	0.5-1.0	05/20/04	**960**
PA-MW-9	0.0-0.5	05/21/04	**360**
PA-MW-9	2.0-2.5	05/21/04	**3,490**
PA-MW-10	0.0-0.5	05/20/04	**404**
PA-MW-10	1.5-2.0	05/20/04	**2,890**
PA-MW-11	0.0-0.5	05/21/04	**216**
PA-MW-11	2.0-2.5	05/21/04	**1,560**
PA-MW-12	0.0-0.5	11/24/09	**24.5**
PA-MW-12	3.0-3.5	11/24/09	**358**
PA-MW-13	0.0-0.5	11/24/09	**673**
PA-MW-13	3.0-4.0	11/24/09	**195**
PA-MW-14	0.0-0.5	11/24/09	**27.8**
PA-MW-14	0.5-1.0	11/24/09	18.3
PA-MW-15 *	0.0-2.0	11/25/09	**190**
PA-MW-15 *	2.0-4.0	11/25/09	**9,760**
PA-MW-15 *	4.0-6.0	11/25/09	**3,830**
PA-MW-15 *	6.0-8.0	11/25/09	**1,710**
PA-MW-15 *	8.0-10	11/25/09	**441**
PA-MW-15 *	10-12	11/25/09	**41.8**
PA-MW-16-01	0.0-0.5	01/09/12	**52.3**
PA-MW-16-02	2.0-2.5	01/09/12	**4,380**
PA-MW-16-2P (DUP)	2-2.5	01/09/12	**24,100**
PA-MW-16-03	4.0-4.5	01/09/12	**1,560**
PA-MW-16-04	6.0-8.0	01/09/12	14.3
PA-MW-16-05	8.0-10	01/09/12	1.6
PA-MW-17-01	0.0-0.5	01/03/12	**231**
PA-MW-17-02	2.0-2.5	01/03/12	**5,220**
PA-MW-17-03	4.0-4.5	01/03/12	**2,920**
PA-MW-17-04	6.0-6.5	01/03/12	**135**
PA-MW-17-05	8.0-8.2	01/03/12	**108**
PA-MW-18-01	0.0-0.5	01/05/12	**334**
PA-MW-18-02	2.0-2.5	01/05/12	**860**
PA-MW-18-03	4.0-4.5	01/05/12	**50.0**
PA-MW-18-04	6.0-8.0	01/05/12	**85.7**
PA-MW-18-05	8.0-10	01/05/12	**322**
PA-SB-19-01	0.0-0.5	01/10/12	**1,500**
PA-SB-19-02	2.0-2.5	01/10/12	**346**
PA-SB-19-03	4.0-4.5	01/10/12	**648**
PA-SB-19-04	7.0-7.5	01/10/12	**1,200**
PA-SB-19-05	9.0-9.5	01/10/12	**669**
PA-SB-20-01	0.0-0.5	01/11/12	**547**
PA-SB-20-02	2.0-2.5	01/11/12	**273**
PA-SB-20-03	4.0-4.5	01/11/12	**929**
PA-SB-20-3P (DUP)	4-4.5	01/11/12	**1,080**
PA-SB-20-04	7.0-7.5	01/11/12	**2,700**
PA-SB-20-05	9.0-9.5	01/11/12	**1,090**
PA-SB-21-01	0.0-0.5	01/10/12	**29.4**
PA-SB-21-02	2.0-2.5	01/10/12	**371**
PA-SB-21-03	4.0-4.6	01/10/12	**585**
PA-SB-21-04	5.0-5.5	01/10/12	**3,110**
PA-SB-21-05	6.0-6.5	01/10/12	**3,204**
PA-SB-22-01	0.0-0.5	01/09/12	**184**
PA-SB-22-1P (DUP)	0-0.5	01/09/12	**53.6**
PA-SB-22-02	2.0-2.5	01/09/12	**36.3**
PA-SB-22-03	4.0-4.5	01/09/12	7.4
PA-SB-22-04	6.0-8.0	01/09/12	6.8
PA-SB-22-05	8.0-10	01/09/12	5.7
PA-SB-23-01	0.0-0.5	01/11/12	**286**
PA-SB-23-02	2.0-2.5	01/11/12	**45.9**
PA-SB-23-03	4.0-4.5	01/11/12	**42.9**
PA-SB-23-04	7.0-7.5	01/11/12	6.0
PA-SB-23-05	9.0-9.5	01/11/12	2.7
PA-SB-24-01	0.0-0.5	01/11/12	**269**
PA-SB-24-02	2.0-2.5	01/11/12	**29.6**
PA-SB-24-03	4.0-4.5	01/11/12	4.7
PA-SB-24-04	7.0-7.5	01/11/12	5.1
PA-SB-24-05	9.0-9.5	01/11/12	2.3
PA-SB-25-01	0.0-0.5	01/05/12	**219**
PA-SB-25-02	2.0-2.5	01/05/12	**323**
PA-SB-25-03	4.0-4.5	01/05/12	**73.1**
PA-SB-25-04	6.0-8.0	01/05/12	**116**
PA-SB-25-05	8.0-10	01/05/12	**242**
PA-SB-26-01	0.0-0.5	01/11/12	**37.4**
PA-SB-26-02	2.0-2.5	01/11/12	**143**
PA-SB-26-03	4.0-4.5	01/11/12	5.6
PA-SB-26-04	7.0-7.5	01/11/12	3.2
PA-SB-26-05	9.0-9.5	01/11/12	1.8
WP-MW-12	0.0-2.0	August 2008	**1,600**
WP-MW-12	2.0-4.0	August 2008	**10,800**
WP-MW-13	0.0-2.0	August 2008	**644**
WP-MW-13	2.0-4.0	August 2008	**1,040**
WP-MW-14	0.0-2.0	August 2008	**131**
WP-MW-14	2.0-4.0	August 2008	**129**
WP-MW-15	0.0-2.0	August 2008	**240**
WP-MW-15	2.0-4.0	August 2008	**366**

Notes:
mg/kg - miligram per kilogram
NJDEP RDCSRS, NRDCSRS, and default IGWSRS - 19 mg/kg
Bolded values indicate exceedance of NJDEP RDCSRS, NRDCSRS, and default IGWSRS standard for arsenic (19 mg/kg)
Shading indicates samples to be excavated during soil source removal, excavation for new support piers, or excavation for storm water basin.

Acad Version : R18.1s (LMS Tech) User Name : BSSmall
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REV.	ISSUED	DATE	DESCRIPTION
-	-	-	
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KEYPLAN

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F: 315.449.0017
www.arcadis-us.com

THE PORT AUTHORITY
OF NY & NJ
BAYONNE BRIDGE
REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
RESTRICTED AREA MAP			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	B-1
			SHEET OF

Sample ID	Sampling Depth	Sampling Date	Result (mg/kg)
PA-MW-1	0.0-2.0	12/01/03	**100**
PA-MW-1	2.0-4.0	12/01/03	**128**
PA-MW-2	0.0-2.0	12/01/03	**176**
PA-MW-2	2.0-3.0	12/01/03	**10,400**
PA-MW-3	0.0-2.0	12/01/03	**29.8**
PA-MW-3	6.0-8.0	12/01/03	**40.7**
PA-MW-4	0.0-2.0	11/26/03	**283**
PA-MW-4	2.0-4.0	11/26/03	**88.1**
PA-MW-5	0.0-2.0	11/26/03	**25.7**
PA-MW-5	2.0-4.0	11/26/03	**48.6**
PA-MW-6	0.0-2.0	12/01/03	**182**
PA-MW-6	2.0-4.0	12/01/03	**80.8**
PA-MW-7	0.0-0.5	06/28/04	**264**
PA-MW-7	1.5-2.0	06/28/04	**813**
PA-MW-8	0.0-0.5	05/20/04	**594**
PA-MW-8	0.5-1.0	05/20/04	**960**
PA-MW-9	0.0-0.5	05/21/04	**360**
PA-MW-9	2.0-2.5	05/21/04	**3,490**
PA-MW-10	0.0-0.5	05/20/04	**404**
PA-MW-10	1.5-2.0	05/20/04	**2,890**
PA-MW-11	0.0-0.5	05/21/04	**216**
PA-MW-11	2.0-2.5	05/21/04	**1,560**
PA-MW-12	0.0-0.5	11/24/09	**24.5**
PA-MW-12	3.0-3.5	11/24/09	**358**
PA-MW-13	0.0-0.5	11/24/09	**673**
PA-MW-13	3.0-4.0	11/24/09	**195**
PA-MW-14	0.0-0.5	11/24/09	**27.8**
PA-MW-14	0.5-1.0	11/24/09	18.3
PA-MW-15 *	0.0-2.0	11/25/09	**190**
PA-MW-15 *	2.0-4.0	11/25/09	**9,760**
PA-MW-15 *	4.0-6.0	11/25/09	**3,830**
PA-MW-15 *	6.0-8.0	11/25/09	**1,710**
PA-MW-15 *	8.0-10	11/25/09	**441**
PA-MW-15 *	10-12	11/25/09	**41.8**
PA-MW-16-01	0.0-0.5	01/09/12	**52.3**
PA-MW-16-02	2.0-2.5	01/09/12	**4,380**
PA-MW-16-2P (DUP)	2-2.5	01/09/12	**24,100**
PA-MW-16-03	4.0-4.5	01/09/12	**1,560**
PA-MW-16-04	6.0-8.0	01/09/12	14.3
PA-MW-16-05	8.0-10	01/09/12	1.6
PA-MW-17-01	0.0-0.5	01/03/12	**231**
PA-MW-17-02	2.0-2.5	01/03/12	**5,220**
PA-MW-17-03	4.0-4.5	01/03/12	**2,920**
PA-MW-17-04	6.0-6.5	01/03/12	**135**
PA-MW-17-05	8.0-8.2	01/03/12	**108**

PA-MW-18-01	0.0-0.5	01/05/12	**334**
PA-MW-18-02	2.0-2.5	01/05/12	**860**
PA-MW-18-03	4.0-4.5	01/05/12	**50.0**
PA-MW-18-04	6.0-8.0	01/05/12	**85.7**
PA-MW-18-05	8.0-10	01/05/12	**322**
PA-SB-19-01	0.0-0.5	01/10/12	**1,500**
PA-SB-19-02	2.0-2.5	01/10/12	**346**
PA-SB-19-03	4.0-4.5	01/10/12	**648**
PA-SB-19-04	7.0-7.5	01/10/12	**1,200**
PA-SB-19-05	9.0-9.5	01/10/12	**669**
PA-SB-20-01	0.0-0.5	01/11/12	**547**
PA-SB-20-02	2.0-2.5	01/11/12	**273**
PA-SB-20-03	4.0-4.5	01/11/12	**929**
PA-SB-20-3P (DUP)	4-4.5	01/11/12	**1,080**
PA-SB-20-04	7.0-7.5	01/11/12	**2,700**
PA-SB-20-05	9.0-9.5	01/11/12	**1,090**
PA-SB-21-01	0.0-0.5	01/10/12	**29.4**
PA-SB-21-02	2.0-2.5	01/10/12	**371**
PA-SB-21-03	4.0-4.6	01/10/12	**585**
PA-SB-21-04	5.0-5.5	01/10/12	**3,110**
PA-SB-21-05	6.0-6.5	01/10/12	**3,204**
PA-SB-22-01	0.0-0.5	01/09/12	**184**
PA-SB-22-1P (DUP)	0-0.5	01/09/12	**53.6**
PA-SB-22-02	2.0-2.5	01/09/12	**36.3**
PA-SB-22-03	4.0-4.5	01/09/12	7.4
PA-SB-22-04	6.0-8.0	01/09/12	6.8
PA-SB-22-05	8.0-10	01/09/12	5.7
PA-SB-23-01	0.0-0.5	01/11/12	**286**
PA-SB-23-02	2.0-2.5	01/11/12	**45.9**
PA-SB-23-03	4.0-4.5	01/11/12	**42.9**
PA-SB-23-04	7.0-7.5	01/11/12	6.0
PA-SB-23-05	9.0-9.5	01/11/12	2.7
PA-SB-24-01	0.0-0.5	01/11/12	**269**
PA-SB-24-02	2.0-2.5	01/11/12	**29.6**
PA-SB-24-03	4.0-4.5	01/11/12	4.7
PA-SB-24-04	7.0-7.5	01/11/12	5.1
PA-SB-24-05	9.0-9.5	01/11/12	2.3
PA-SB-25-01	0.0-0.5	01/05/12	**219**
PA-SB-25-02	2.0-2.5	01/05/12	**323**
PA-SB-25-03	4.0-4.5	01/05/12	**73.1**
PA-SB-25-04	6.0-8.0	01/05/12	**116**
PA-SB-25-05	8.0-10	01/05/12	**242**
PA-SB-26-01	0.0-0.5	01/11/12	**37.4**
PA-SB-26-02	2.0-2.5	01/11/12	**143**
PA-SB-26-03	4.0-4.5	01/11/12	5.6
PA-SB-26-04	7.0-7.5	01/11/12	3.2
PA-SB-26-05	9.0-9.5	01/11/12	1.8

WP-MW-12	0.0-2.0	August 2008	**1,600**
WP-MW-12	2.0-4.0	August 2008	**10,800**
WP-MW-13	0.0-2.0	August 2008	**644**
WP-MW-13	2.0-4.0	August 2008	**1,040**
WP-MW-14	0.0-2.0	August 2008	**131**
WP-MW-14	2.0-4.0	August 2008	**129**
WP-MW-15	0.0-2.0	August 2008	**240**
WP-MW-15	2.0-4.0	August 2008	**366**

Notes:
mg/kg - miligram per kilogram
NJDEP RDCSRS, NRDCSRS, and default IGWSRS - 19 mg/kg
Bolded values indicate exceedance of NJDEP RDCSRS, NRDCSRS, and default IGWSRS standard for arsenic (19 mg/kg)
Shading indicates samples to be excavated during soil source removal, excavation for new support piers, or excavation for storm water basin.

Exhibits C

C-1 Deed Notice as Institutional Control

C-2 Asphalt/Soil Cap as Engineering Control

Exhibit C-1: Narrative Description of Deed Notice as Institutional Control

(A) Description and Size

The restricted area consists of Block #373, Lot #3 located at 235 West First St., Bayonne, Hudson County, New Jersey. The property is approximately one acre (including a small parcel of land measuring approximately 0.2-acres that is leased by Williams Industries, Inc.) and measures approximately 290 feet in length, 130 feet along West Second Street, and110 feet along West First Street.

(B) Restrictions

The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(10), prohibits the conversion of a contaminated site, remediated to non-residential soil remediation standards that require the maintenance of engineering or institutional controls, to a child care facility, or public, private, or charter school without the Department's prior written approval, unless a presumptive remedy is implemented.

(C) Objective of the Restrictions

The property is the current and future location of bridge piers (Bayonne Bridge).The deed notice on the property as part of the institutional controls pursuant to N.J.A.C. 7:26E-8.2 to protect the health and safety and environment at the Site for as long as the arsenic impacts exist above a concentration that would restrict use of the Site. The biennial certification will include a report that describes the protectiveness of the remedial action that includes this Deed Notice, including but not limited to the following elements:

1. Current land use on the Property is consistent with the restrictions in this Deed Notice;

2. The remedial action that includes this Deed Notice continues to be protective of the public health and safety and of the environment.

3. Any disturbances of the soil in the Restricted Areas did not result in the unacceptable exposure to the soil contamination;

4. There have been any land use changes subsequent to the filing of this Deed Notice or the most recent biennial certification, whichever is more recent; 5. Any newly

promulgated or modified requirements of applicable regulations or laws apply to the Site; and

6. Any new standards, regulations, or laws apply to the Site that might necessitate additional sampling in order to evaluate the protectiveness of the remedial action which includes this Deed Notice, and conduct the necessary sampling.

Exhibit C-2: Asphalt/Soil Cap & Retention Basin as Engineering Controls

(A) Description of the Engineering Controls

The cap will consist of the following, except in those areas where bridge piers and the storm water retention basin will be constructed:

Geotextile fabric
A 4-inch lift of crushed, ¾-inch diameter stone
3 to 4-inch asphalt cap

OR

Geotextile fabric
A 12-inch lift of crushed, ¾-inch diameter stone

A retention basin is also proposed for the Site and will act as a cap for this area. The retention basin will be lined with geosynthetic clay liner.

(B) Objective & Function of Engineering Controls

The cap is designed to limit/prevent the public's exposure to impacted soil & materials underneath it. The retention basin lined with geosynthetic clay liner will resist groundwater uplift pressures and prevent groundwater infiltration into the subsurface.

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Appendix G

Classification Exception Area

New Jersey Department of Environmental Protection
Site Remediation Program

CLASSIFICATION EXCEPTION AREA / WELL RESTRICTION AREA (CEA/WRA) FACT SHEET FORM

☒ LSRP ☐ Subsurface Evaluator

Date Stamp
(For Department use only)

SECTION A. SITE INFORMATION

Site Name: Bayonne Bridge

Program Interest (PI) Number(s): G000021830

Case Tracking Number(s): _____

1. Indicate the reason for submission of this form:

   ☒ New CEA ☐ Revise CEA ☐ Existing CEA with no changes ☐ CEA Lift/Removal

   If you are submitting this form for an existing CEA provide the CEA Subject Item ID: _____

2. Indicate the type of ground water Remedial Action (RA):

   ☒ Natural ☐ Active ☐ Final RA not yet selected

3. Has a Remedial Action Permit (RAP) application been submitted to the NJDEP? ..... ☐ Yes ☒ No

SECTION B. CEA COMPONENT INFORMATION

1. **Contaminant(s):** This CEA/WRA applies only to the contaminants above the applicable numeric values established by Ground Water Quality Standards (GWQS), N.J.A.C. 7:9C, listed in the table below. List below the maximum value for all contaminants included in Exhibit A using any well or sampling point used to establish the CEA.

Contaminant	Concentration (1)	GWQS (2)	SWQS(3)	GWSL(4)
Arsenic	306,000	3	Not applicable	Not applicable

Notes:
(1) Maximum concentration in Micrograms Per Liter
(2) New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C
(3) Surface Water Quality Standards, N.J.A.C. 7:9B - Applicable only where contaminants in the CEA may discharge to a surface water body.
(4) Current NJDEP Vapor Intrusion Ground Water Screening Levels available at http://www.nj.gov/dep/srp/guidance/vaporintrusion/

☐ Check if attaching an Addendum to list additional contaminants and associated information.

2. **CEA Boundaries:** Year of tax map used: 2012

For CEA revisions: ☐ check if CEA Boundary has changed (See instructions)

☐ check if Block and Lot numbers have changed (See instructions)

List the Block(s) and Lot(s) included in the areal extent of the Classification Exception Area:

Block(s)	Lot(s)	Check if off-site	Block(s)	Lot(s)	Check if off-site
373	3	☐			☐
		☐			☐
		☐			☐
		☐			☐
		☐			☐

☐ Check if attaching an Addendum to list additional Blocks/Lots and associated information.

Narrative description of proposed CEA:

The contaminant is associated with regional historic fill. Therefore, the site boundaries were used to define the horizontal extent of the CEA, and the vertical extent of the CEA is defined by the approximate location of the fill layer between 5 ft bgs to 8 ft bgs. See Exhibit A: Remedial Investigation Report for details on the remedial investigation of historic fill material.

Name(s) of the affected Geologic Formation(s)/Unit(s): Rahway Till/Shallow Overburden

Direction of ground water flow: S-W (If multiple water bearing zones exist within the CEA and/or there is no predominant flow direction, see instructions)

Ground Water Classification: Class II-A

Vertical Depth of CEA: 11 (ft bgs) **and** -2.0 (msl).

Horizontal Extent of CEA: 0.99 Indicate units: ☒ acres or ☐ square feet

3. Projected Term of CEA: (Based on modeling/calculations in Exhibit E)

Proposed Duration in Years: _____ Expected Expiration Date: _____

or ☒ Indeterminate

4. ATTACH THE FOLLOWING: (see instructions for additional information)

Exhibit A: Remedial Investigation Report – Per N.J.A.C 7:26C-7.3(a)3 submit the RIR;

Exhibit B: Site Location Maps – USGS Quadrangle Map;

Exhibit C: Site Map(s) and Cross Section – See N.J.A.C 7:26C- 7.3(c)1 and 2 and instructions regarding what to include on the map(s) and the cross-section figure.

Exhibit D: GIS Deliverables – CEA Boundary Extent and CEA/WRA Spreadsheet – The CEA/WRA spreadsheet contains the vertical contaminant depth data for each sampling point used to prepare the CEA maps and cross-section figure, required by N.J.A.C 7:26C-7.3(c). The CEA Boundary Extent and CEA/WRA Spreadsheet shall be submitted via email to srpgis_cea@dep.state.nj.us. The CEA/WRA Spreadsheet shall also be included on the CD submitted with this form. See the instructions for both this form and the instructions for the CEA/WRA spreadsheet for more details.

For revisions, does the revised CEA map differ from CEA map on NJ-GeoWeb? ☐ Yes ☐ No ☐ N/A

Identify the format of the CEA Boundary Extent Map: ☒ Shape File ☐ CAD File

Exhibit E: Fate and Transport Description and Model Documentation

Is all the ground water contamination associated with the site the result of Historic Fill?..... ☒ Yes ☐ No

If "Yes," Fate and Transport Description and Model Documentation is not required.
If "No," submit all information required pursuant to N.J.A.C. 7:26C-7.3(b)2.

SECTION C. CURRENT GROUND WATER USE DOCUMENTATION

1. Indicate the year of the most recent well search completed per N.J.A.C. 7:26E-1.14: 2013
2. If this Fact Sheet form is for a revised CEA or an existing CEA with no changes, have new wells been installed since the CEA was established? ..... ☐ Yes ☐ No ☒ N/A

SECTION D. WELL RESTRICTION INFORMATION

Certain well restrictions relevant to potable ground water use, such as "Double Case Wells", "Sample Potable Wells", and "Evaluate Production Wells", are consistently set within the boundaries of all CEAs established by the NJDEP in Class I and II-A areas (see instructions).

1. Are there any other site-specific well restrictions relevant to potable ground water use that should be set within or near the boundaries of the proposed CEA?..... ☐ Yes ☒ No

   If "Yes", describe below any such site-specific well restrictions proposed for this CEA:

SECTION E. PUBLIC NOTIFICATION REQUIREMENTS

1. Indicate which of the following entities have been notified pursuant to N.J.A.C. 7:26C-7.3(d). (check all that apply)

   ☒ Municipal and county clerk(s)
   ☒ Local, county or regional health department(s)
   ☒ Designated County Environmental Health Act agency (if applicable)
   ☒ County Planning Board
   ☐ Pinelands Commission (if applicable)
   ☒ Owners of real property overlying CEA foot print

2. **List of Names and Addresses** – List name/address of all persons notified pursuant to N.J.A.C. 7:26C-7.3(d) based on the proposed CEA extent. See instructions for detailed information.

   ☒ Check here if no volatile contaminants are in the CEA

Name	Notification Address Used	Date notification sent	Property was evaluated for vapor impacts ☒ if "Yes"
Rober F. Sloan, Esp., RMC	Bayonne Clerk, 630 Avenue C, Bayonne		☐
Barbara A. Netchert	Hudson Clerk, 257 Cornelison Ave-4th Floor, Jersey City		☐
Vincent Rivelli, M.S.	Hudson Health Officer, 630 Avenue C, Bayonne		☐
Massiel Ferrara, PP, AICP	Hudson Div. of Planning, 595 County Avenue, Secaucus		☐
Robert Pruno	PANYNJ, 2 Gateway Center, 14th Floor, Newark		☐
			☐
			☐
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			☐

SECTION F. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Port Authority of New York & New Jersey

Representative First Name: Robert Representative Last Name: Pruno

Title: Chief Environmental Engineer

Phone Number: (973) 565-7620 Ext: Fax:

Mailing Address: 2 Gateway Center, 14th Floor - Environmental

City/Town: Newark State: NJ Zip Code: 07102

Email Address: rpruno@panynj.gov

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date:

Name/Title: Robert Pruno/Chief Environmental Engineer

No changes to contact information since last submittal ☐

SECTION G. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 591315

First Name: Clint Last Name: Catania

Phone Number: (315) 671-9261 Ext: Fax:

Mailing Address: 621 Tynan Rd.

City/Town: Cleveland State: NY Zip Code: 13042

Email Address: Clint.Catania@arcadis-us.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: Date:

LSRP Name/Title: Clint P. Catania/Project Manager

Company Name: ARCADIS U.S., Inc.

No Changes To Contact Information Since Last Submittal ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

Exhibit A

Remedial Investigation Report

Exhibit B

Site Location Map

MAP SOURCE: USGS 7.5 MINUTE QUADRANGLE
ELIZABETH, NEW JERSEY, 2011

NEW JERSEY

QUADRANGLE LOCATION

0 2000' 4000'

GRAPHIC SCALE

BAYONNE BRIDGE
BAYONNE, NEW JERSEY

SITE LOCATION

ARCADIS

EXHIBIT
B-1

CITY:MAHWAH DIV/GROUP:ENVCAD DB:JG LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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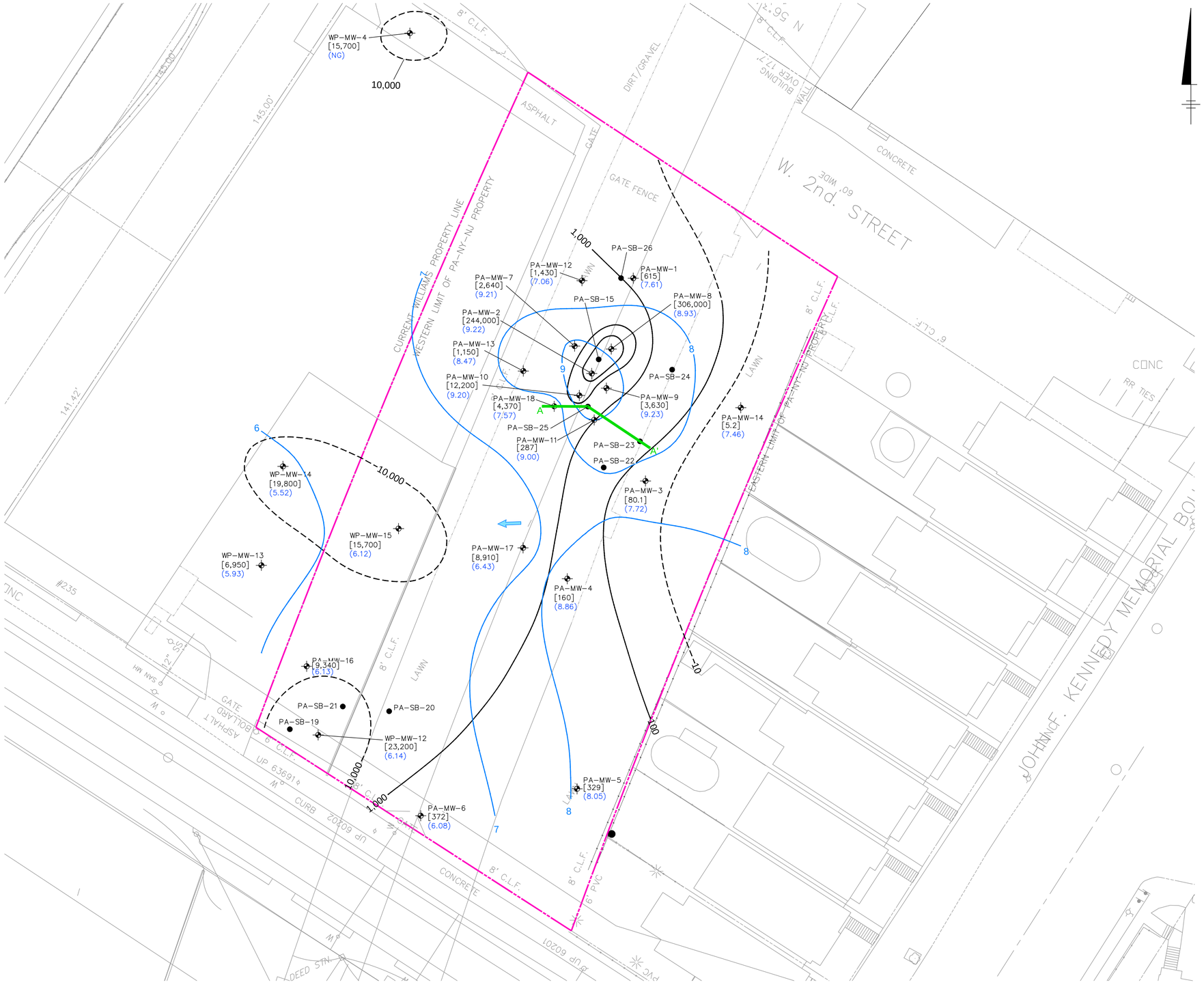
XREFS: 38403X01 IMAGES: PROJECTNAME: ----

Exhibit C

C-1 CEA Map

C-2 Cross Section A-A’



LEGEND:

- PROPERTY LINE/PROPOSED CEA BOUNDARY
- FENCE LINE
- PA-SB-15 ● SOIL BORING LOCATIONS
- PA-MW-1 ✛ MONITORING WELL LOCATIONS
- 10 ARSENIC ISOCONCENTRATION LINE (ug/L), DASHED WHERE INFERRED
- [5.2] ARSENIC CONCENTRATION (ug/L)
- (5.2) GROUNDWATER ELEVATION – (FEET ABOVE MEAN SEA LEVEL)
- (NG) NOT GAUGED
- 8 GROUNDWATER ELEVATION CONTOUR – JANUARY 2012 (FEET ABOVE MEAN SEA LEVEL)
- GROUNDWATER FLOW DIRECTION
- A A' GEOLOGIC CROSS SECTION LOCATION

0 20' 40'
GRAPHIC SCALE

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Acad Version : R18.1s (LMS Tech)
User Name : skowalczyk

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REV.	ISSUED	DATE	DESCRIPTION
–	–	–	–
–	–	–	–

KEYPLAN

SEAL

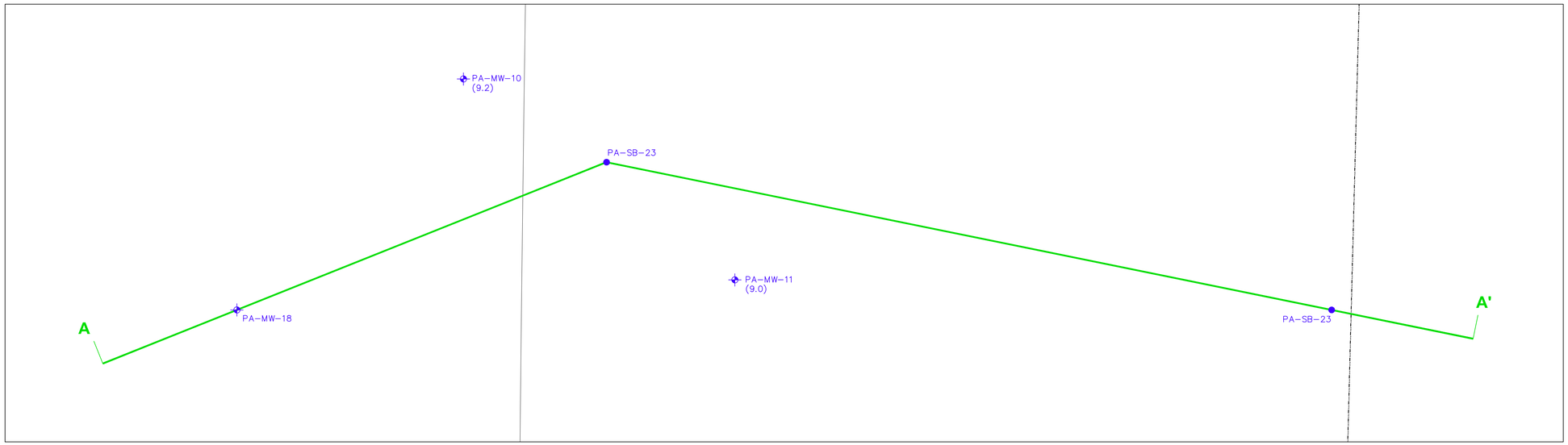
SEAL

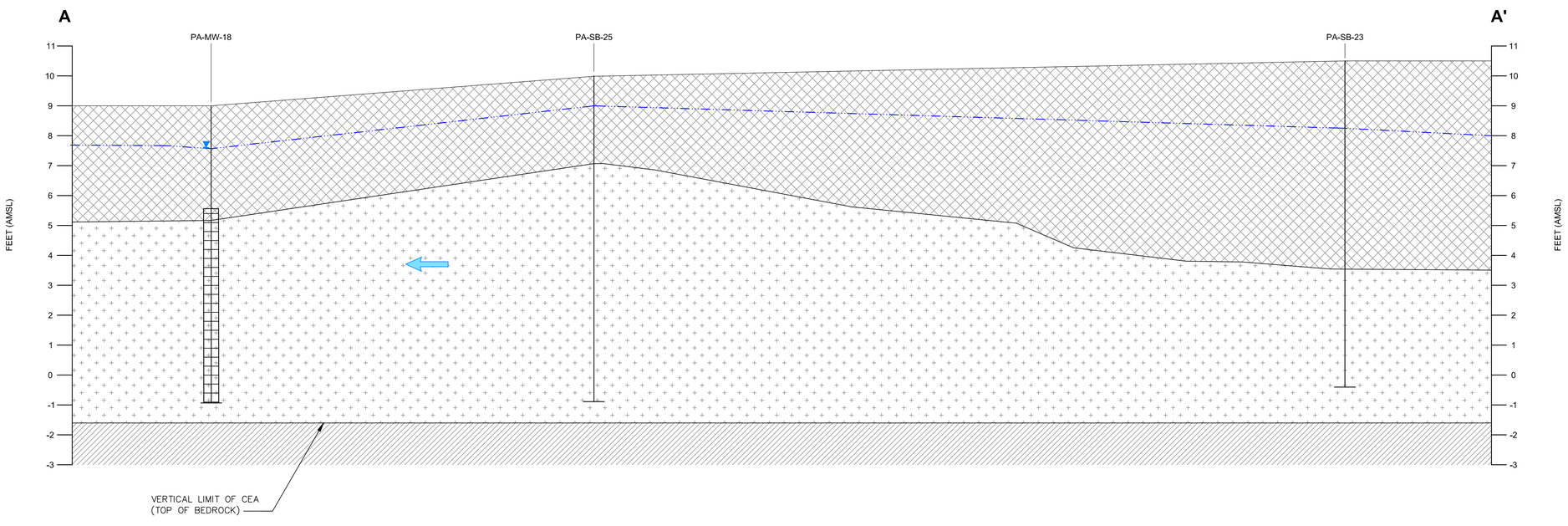
ARCADIS

ARCADIS U.S., Inc.
6723 Towpath Road
Syracuse, New York 13214
T: 315.446.9120
F: 315.449.0017
www.arcadis-us.com

THE PORT AUTHORITY
OF NY & NJ
BAYONNE BRIDGE
REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN-PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
CEA MAP			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	C-1
			SHEET OF





0 2' 4'
GRAPHIC SCALE

LITHOLOGY:

- GREY C–F SAND, SOME FINE GRAVEL, LITTLE SILT. TYPICAL FILL MATERIALS PRESENT: GLASS PIECES, BRICK PARTICLES
- GREY TO RED BROWN SILTY CLAY TO CLAYEY SILT, SOME C–F SAND, TRACE FINE GRAVEL, ORGANIC FIBERS.
- BEDROCK (APPROXIMATED)
- GROUNDWATER ELEVATION (JANUARY 2012 DATA)
- GROUNDWATER FLOW DIRECTION
- MONITORING WELL
- SOIL BORING

WELL CONSTRUCTION:

PA–MW–16 — MONITORING WELL ID
GROUND SURFACE
TOP OF CASING
SCREENED INTERVAL

NOTE:

1. C–F = COARSE TO FINE.
2. AMSL = ABOVE MEAN SEA LEVEL

SOURCES:

1. LITHOLOGY DESCRIPTIONS TRANSCRIBED FROM PANYNJ ENGINEERING DEPARTMENT'S BORING REPORTS. SEE APPENDIX A OF EXHIBIT A: REMEDIAL INVESTIGATION REPORT.
2. GROUND AND TOP OF CASING ELEVATIONS SURVEYED TO NEW JERSEY STATE PLANE COORDINATE SYSTEM BY STANTEC.
3. GROUNDWATER ELEVATIONS COMPUTED BY USING SURVEYED DATA AND DEPTH TO WATER DATA COLLECTED IN JANUARY 2012.

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Layout Tab: C-2
Acad Version : R18.1s (LMS Tech)
User Name : skowalczyk
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REV.	ISSUED	DATE	DESCRIPTION
–	–		–
–	–		–

KEYPLAN

SEAL

SEAL

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THE PORT AUTHORITY
OF NY & NJ
BAYONNE BRIDGE
REMEDIAL ACTION WORKPLAN

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
CLINT CATANIA		J. FREDERICK	G. JEAN–PEIRRE
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
CROSS SECTION A–A'			K. IAMICELLI
		PROJECT NUMBER	DRAWING NUMBER
		04907098.0001	C-2
			SHEET OF

Exhibit D

D-1 Well Search Result Figure, and GIS Deliverables including CEA Boundary Extent Shape Files, CEA/WRA Spreadsheet, and Well Search Spreadsheet to be submitted electronically

LEGEND:

- DOMESTIC
- INDUSTRIAL
- SITE BOUNDARY
- 0.5 MILE RADIUS
- 1 MILE RADIUS

2500018406 NJDEP WELL PERMIT NUMBER

NOTE:
* NORTHING AND EASTING DATA INACCURATE.
UNABLE TO OBTAIN ACTUAL LOCATION OF WELL.

SOURCE:
RESULTS DEPICTED BASED ON XY WELL SEARCH QUERY
OUTPUTS FROM THE NJDEP'S DATAMINER DATABASE.

0 1,400 2,800
Feet

BAYONNE BRIDGE
BAYONNE, NEW JERSEY

WELL SEARCH RESULTS

ARCADIS

EXHIBIT
D-1

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Exhibit E

Fate and Transport Description and Model Documentation (exempted per Section B-4 of CEA/WRA Fact Sheet Form for CEAs associated with historic fill)

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Attachments

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Attachment 1

CD with Report Files, Laboratory Data Packages, and Electronic Data Deliverables