Residential Well Sampling QA/QC Work Plan (Round 2)

Dimock Residential Groundwater Site

Dimock, Susquehanna County, Pennsylvania
TDD No: TL01-11-12-001
Contract No: EP-S3-10-04

May 16, 2012

EPA Region III

START IV - West

Superfund Technical Assessment and Response Team

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Prepared for:

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1.0 INTRODUCTION

On December 19, 2011, EPA Region III On-Scene Coordinator (OSC) Richard Fetzer tasked TechLaw, Inc. (TechLaw) Superfund Technical Assessment and Response Team (START) to perform a removal site evaluation at the Dimock Residential Groundwater Site (site) located at or near Pennsylvania (PA) Route 29 in Dimock, Susquehanna County, Pennsylvania. The purpose of the site evaluation was to provide information to EPA to assist in determining if residential home wells had been impacted by nearby gas well installation and development activities. Sampling activities were expected to include the collection of residential home well groundwater samples and surface water samples. These sampling activities were conducted under Technical Direction Document (TDD) No. TL01-11-12-001, START Contract No. EP-S3-10-04.

A Residential Well Sampling QA/QC Work Plan (dated January 9, 2012) was developed in preparation for the sampling event. Minor changes to the sampling procedures, to the bottle ware requirements, to the list of parameters to be analyzed, and to the laboratories performing the analyses have been made throughout the sampling effort. These changes have been documented and are included in Revision 01 and Revision 02 of the Residential Well Sampling QA/QC Work Plan.

On April 24, 2012, EPA requested TechLaw to prepare a sampling plan to address a second round of sampling to be conducted on a limited number of homes and for a reduced list of analytes. This Residential Well Sampling QA/QC Work Plan will address the round 2 sampling activities.

2.0 SITE DESCRIPTION

The Dimock Residential Groundwater Site is located in the rural community of Dimock Township in northeastern Pennsylvania (pop. 1,497 – 2010 Census). Degradation of drinking water and surface water quality from contamination claimed to be associated with Marcellus shale drilling and hydraulic fracturing (a.k.a. fracking) operations has been reported by local private well owners. Privately owned wells constitute the primary source of drinking water for residents in the area. Drilling and production activities involving deep shale gas extraction is prevalent throughout Susquehanna County.

The site includes affected and potentially affected media, namely ground water and surface waters, in the rural area surrounding the intersection of State Route 29 and County Route 2024 in Dimock Township. The coordinates for this location are 41.746411 north latitude, and 75.898498 west longitude. Surface waters in the area enter tributaries of Burdick Creek located east/southeast from the site. Burdick Creek flows to Meshoppen Creek also located east/southeast from the site. Meshoppen Creek flows southwest and confluences the Susquehanna River at Meshoppen, PA. Surface water impoundments and/or ponds and lakes are observed in aerial photos to be present near the site. Topographic relief in the vicinity of the site is approximately 400 feet ranging from approximately 1,100 feet to 1,500 feet above mean sea level (amsl). The site is located within the glaciated low plateaus section of the Appalachian Plateaus Province. Surficial bedrock is comprised of the Devonian Catskill Formation having sandstone, siltstone, shale, mudstone and conglomerate lithology.

The Pennsylvania Ground Water Information System database (PAGWIS) identifies 44 ground water withdrawal wells within a 2-mile radius of the site, although more wells are likely to be present. Most of the wells recorded in the PAGWIS are used for domestic purposes. Depths of 19 of these wells are recorded ranging from 125 to 700 feet deep with a median depth of about 250 feet. Yields from 42 of the wells are recorded as ranging from 1-50 gallons per minute (gpm) with a median yield of 13.7 gpm.

3.0 BACKGROUND

Since 2009, the site has received widespread publicity beginning with reports of methane migration into local domestic water supplies following Marcellus Shale drilling operations in the area. Ground water sampling activities have also identified the presence of other organic and inorganic contaminants in the private-use wells which may potentially be associated with nonconventional deep shale drilling activities. The origin of the contaminants has not been fully determined.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

EPA On-Scene Coordinator Richard Fetzer will provide overall direction to TechLaw (START) staff concerning project sampling requirements, objectives, and schedule. The START Site Leader is the primary point of contact with the EPA OSC. The Site Leader is responsible for the development and completion of the Sampling QA/QC Work Plan, project team organization, and supervision of all project tasks, including reports and deliverables.

5.0 PROJECT DESCRIPTION

5.1 Objectives

The objective of the sampling activity is:

- To assess for the presence and origin of substances that may present a threat to the health of persons ingesting, contacting or engaging in typical residential or recreational uses of groundwater or surface water. The analytical methods were selected as a follow-up to EPA's Round 1 sampling results, since metals were found in those results.

5.2 Scope of Work

The scope of work includes collection of residential home well samples from 4 homes in the vicinity of Dimock Township. These 4 homes are currently being provided drinking water from EPA. The samples will be collected and shipped to a laboratory for total and dissolved metals analysis.

6.0 DATA USE OBJECTIVES

The following data quality objectives apply to this project:

Program Area	Sampling Objectives	Data Type
Removal	Determine presence/concentration of contamination	Definitive

7.0 SAMPLING APPROACH AND ANALYTICAL PARAMETERS

Table 1, Field QC and Sampling Summary and Table 2, Sample Analytical Requirements Summary, include a summary of the numbers of samples, matrices, analytical parameters/methods, quality control (QC) samples, sample preservation, holding times, and containers. Samples will be collected using certified pre-cleaned sample bottles.

7.1 Residential Home Wells

Residential well samples will be collected in accordance with the EPA Environmental Response Team (ERT) Standard Operating Procedure (SOP) No. 2007 (ERT, 1995). Samples are anticipated to be collected from a valve closest to the well head (wellhead sample) and from the kitchen faucet (tap sample) within each home. Inspection of the water system may be required to identify the appropriate valve sampling location and to determine if it is downstream or upstream of any treatment apparatus. A water sample will be collected from the valve closest to the wellhead first and the sample from the kitchen faucet last.

7.1.1 Wellhead

7.1.1.1 Wellhead – Purge and Stabilization

For the sample closest to the wellhead, the spigot will first be examined to determine if it is equipped with an aerator. If the spigot is equipped with an aerator, it shall be removed before purging. A garden hose will be connected to the spigot to direct the purge water away from the home. The spigot will be allowed to purge for a target time of 1 hour with a target flow rate of approximately 3 gallons per minute. However, if one of the following conditions exists, different purging procedures will be followed: 1) the well is currently in routine use; 2) the well has a history of being pumped dry; 3) the pump is in poor operating condition. If any of these three conditions exist, the well will only be purged for approximately 15 minutes and then water quality parameter monitoring will begin following procedures presented below. The volume of the purge water will be measured periodically using a stop watch and a large graduated cylinder or equivalent container. Once the target time of 1 hour, or alternately 15 minutes, has been reached, water quality parameters will be recorded using an YSI 556 water quality meter, or equivalent, that is equipped with data logging capability and flow-through cell. The flow-through cell will be connected to the spigot using a dedicated, clean adapter and flexible tubing. The flow rate will be adjusted to maintain a target rate of approximately 1 liter per minute. Additionally, water quality parameters will be measured and recorded on field data sheets at approximately 3-5 minute intervals (in addition to instrument data

logging) to determine when parameters stabilize. Stabilization will be achieved after all parameters have stabilized for three consecutive readings using the following criteria:

pH ± 0.1 unit
Specific Conductance ± 3%
Dissolved Oxygen ± 10%
Oxidation Reduction Potential ± 10 mV
Temperature ± 3%

These criteria are initial guidelines; professional judgment in the field will be used to determine on a well-by-well basis when stabilization occurs. After parameter stabilization is achieved, purging at the spigot nearest the wellhead will be stopped.

7.1.1.2 Wellhead - Sample Collection

When purging and stabilization procedures are completed, sample collection will commence at the spigot nearest the wellhead. The water quality instrument, flow-through cell and tubing will be removed from the spigot. Note: if space limitations require continued use of the adapter and tubing to collect samples, a new piece of Teflon® tubing will be attached to the adapter and will be used to fill the sample bottles. The flow rate during sample collection will be maintained at approximately 1 liter per minute.

For the total metals analysis, a 1-L HDPE container will be filled. An additional 1-L HDPE container will be filled for dissolved metals analysis. This sample will be filtered using a peristaltic pump and an in-line high-capacity (0.45 micron) filter. At least 100 ml of water will be allowed to pass through the filter before the sample is collected.

7.1.2 Tap Sample

Homes which are being provided bulk water, will not have tap samples collected from them.

7.1.2.1 Tap – Purge and Stabilization

After the sample is collected from the spigot nearest the wellhead as described in the preceding section, purging of the internal building plumbing/piping system will be accomplished from the kitchen faucet (tap). The faucet will first be examined to determine if it is equipped with an aerator, which will be removed if present. The cold water faucet will be turned on and allowed to run for approximately 15 minutes to flush any water from within the indoor plumbing. After the 15-minute purge is completed, sampling will begin from the kitchen faucet.

7.1.2.2 Tap – Sample Collection

For the total metals analysis, a 1-L HDPE container will be filled. An additional 1-L HDPE container will be filled for dissolved metals analysis. This sample will be filtered using a peristaltic pump and an in-line high-capacity (0.45 micron) filter. At least 100 ml of water will be allowed to pass through the filter before the sample is collected.

All samples will be placed on ice after collection and will be brought to the sample management area to be prepared for shipment to approved laboratories.

Analytical services will be coordinated through EPA and include using the EPA Regional Laboratories.

7.2 Sample Identification Numbers

7.3.1 Station Location Numbers

Sample Station Location numbers will be assigned by the sampling team to correspond with the location and the type of sample collected. The sample station location No. format will be as follows:

XX##-PFz, where XX is:

HW	= a ground water sample from a Dimock residential well
TB	= trip blank
FB	= field blank
EB	= equipment blank
F	= indicates a sample is filtered for metal analysis
P	= indicates a post-treatment (i.e. kitchen faucet) filtration sample
z	= indicates a duplicate sample

and where ## is:

##	= the unique identifier for each residential well sampled. This identifier will be related in a separate database to the specific residence being sampled.

7.2.2 DAS Sample Numbers

Station location numbers will be used in lieu of DAS sample numbers for this project.

7.3 Sampling Equipment and Decontamination

Dedicated, disposable sampling equipment will be used by TechLaw whenever possible.

7.4 Investigation Derived Wastes

TechLaw field team members will make every effort to minimize the generation of investigation-derived wastes (IDW) throughout the field event. Purge water for residential home well samples will be discharged in accordance with the Groundwater Monitoring and Maintenance Manual (PADEP, 2001). Disposable personal protective clothing and/or any sampling equipment generated during field activities will be bagged in opaque plastic garbage bags, and disposed of appropriately.

8.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

8.1 Quality Control of Field Activities

The START Site Leader is responsible for ensuring that sample quality and integrity are maintained in accordance with the QA/QC Procedures, and that the sample labeling and documentation is performed as described in Section 8.2 of this sampling plan.

8.2 Sample Documentation

All sample documentation will be completed legibly using indelible black or blue ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing and dating the error.

At each sampling location GPS coordinates will be collected using a GPS unit. These coordinates are to be recorded on the field data sheet or in the field logbook. The field data sheet will be used to document pertinent field screening measurements and sample information. Photographs of each house and each sampling spigot/faucet will be collected. The date and time stamp option will be selected (if available) on each camera. The data logging option (if available) will be selected on each water quality instrument used.

8.2.1 Field Logbook

The use of field logbooks by START for site documentation will be consistent with TechLaw SOP 03-01-04, Maintaining a Field Logbook (TechLaw, 2011a). The field logbook is a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed. All entries will be dated and signed by the individual making the entries, and include (at a minimum) the following:

1. Site name and project number.
2. Name(s) of personnel on site.
3. Dates and times of all entries (military time preferred).
4. Descriptions of all site activities, including site entry and exit times.
5. Noteworthy events and discussions.
6. Weather conditions.
7. Site observations.
8. Identification and description of samples and locations.

9. Subcontractor information and names of on-site personnel.
10. Date and time of sample collections, along with chain of custody information.
11. Record of photographs.
12. Site sketches.

8.2.2 Sample Labels/Tags QC

Sample labels and tags must clearly identify the particular sample. Required information for sample labels and tags is presented in *Contract Laboratory Program Guidance for Field Samplers*, EPA Publication 540-R-09-03, Final (January 2011) and is provided below.

Sample bottle labels must include the following information:

1. Sample number, as applicable;
2. Case No.;
3. Preservative(s);
4. Analysis/fraction.

Additional information may be included on the label, such as the Station Location (Sampler-assigned sample No.), date and time collected, etc.

Sample tags must include the following information:
1. Sample number, as applicable;
2. Case No.;
3. Station No. and/or Station Location No. (assigned by sampler);
4. Date sample was collected (month, day, and year);
5. Time sample was collected (in military time);
6. Preservative, if any (specify "None" if sample is not preserved);
7. Type of sample (grab or composite);
8. Analysis/fraction requested;
9. Sampler's names/signature(s);

Sample labels will be securely affixed to the sample container. Tie-on sample tags will be properly secured around the neck of the container.

For this project, TechLaw was given an exemption by the EPA laboratories on affixing sample tags on each container. In lieu of affixing sample tags to each sample container, a sample bottle label will be adhered to each bottle. The information which is required on the sample tag will be included on the sample bottle label.

8.2.3 Chain of Custody Record QC

Proper chain of custody will be maintained from the time the sample is collected to its final deposition. Every transfer of custody will be noted and signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they will be stored in a locked container sealed with a Custody Seal.

The Chain of Custody record/EPA Traffic Report (COC/TR) will include (at minimum) the following information:

1. Sample number, as applicable;
2. Case No.;
3. Sample matrices;
4. Specify sample type (grab or composite);
5. Analyses requested;
6. Laboratory turnaround time (TAT) [*Note: This does not include the TAT for data validation. If preliminary results (PR) are required, this must be specified on the COC.*)
7. Preservative(s);
8. Station location identifier (sampler assigned sample No.);
9. Date and time sample collected;
10. Field QC information (identify trip/field/blanks only as "Field QC");
11. Specify samples to be used for laboratory QC (MS/MSD);
12. Name(s) and signature(s) of sampler(s);
13. Signature(s) of any individual(s) with control over samples;
14. Carrier, air bill No., and date of the shipment.

8.2.4 Custody seals QC

Custody seals will be used on all shipping containers used to ship samples. Custody Seals demonstrate that a container has not been tampered with or opened. The individual shipping the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook. EPA Region III does not require custody seals on individual sample containers and has specifically directed samplers not to use custody seals on individual sample containers containing samples for volatile organics analysis (VOA).

8.3 Sample Packaging, Storage, and Shipping

In accordance with TechLaw SOP 04-02-01, Packaging and Shipping Samples – Environmental Procedures (TechLaw, 2011b), and *Contract Laboratory Program Guidance for Field Samplers*, sample containers will be labeled and shipped with a label affixed to each container. Samples will be placed in plastic zipping bags. Bagged containers will be placed in appropriate transport containers and the containers will be packed with appropriate absorbent material and bubble wrap. All sample/traffic

reports/COC documents will be affixed to the underside of each transport container lid. The lid will be sealed with shipping tape and custody seals affixed to the transport container. Transport containers will be labeled with the origin and destination locations. Regulations for packaging, marking, labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation (DOT). Air carriers which transport hazardous materials, in particular, Federal Express, require compliance with the current International Air Transport Association (IATA) Regulations, which apply to the shipment and transport of hazardous materials by air carrier. TechLaw will follow IATA regulations to ensure compliance.

8.4 Field QC Samples

Field QC will consist of one field duplicate for every ten field samples, or one per matrix if fewer than ten are collected. Duplicate samples will be documented on the Field Data Sheet and on the Traffic Report (TR)/COC. The field duplicate will test the reproducibility of sampling procedures and analytical procedures. A field blank will be collected to ensure the cleanliness of sample containers and to ensure that no cross-contamination has occurred during sample collection, preservation, and shipment, as well as in the laboratory. One field blank will be collected each day that sampling is conducted. The field blank sample will include a sample collected each day from the in-line filter which is used to collect samples for the dissolved metals analysis. This field blank sample for the in-line filter will also be considered an equipment blank. An equipment blank will also be collected for any new piece of sampling equipment to be used, on a one-time basis.

8.5 Laboratory QC

Laboratory QC will be in accordance with the applicable method requirements. TechLaw will designate one sample per matrix in each batch/sample delivery group (SDG) submitted to the laboratory to be used for a matrix spike/matrix spike duplicate (MS/MSD) or appropriate QC sample required by the method. A batch/SDG is defined as up to 20 samples of a specific matrix submitted for a specific case; or all the samples of a specific matrix (up to a maximum of 20) received by the laboratory for a specific case within a 7 calendar day period (3 calendar day period for 7 day TAT), with the period beginning with the receipt of the last sample in the SDG.

8.6 Data Validation

Analytical data generated by the EPA OASQA laboratory will be reviewed and validated in accordance with OASQA standard procedures and/or standard procedures for the applicable EPA laboratories. Analytical data packages from EPA Regional Laboratories will undergo a QA review by the EPA Environmental Response Team's (ERT) Scientific, Engineering, Response, & Analytical Services (SERAS) contractor.

9.0 SCHEDULE OF ACTIVITIES

The projected schedule for the site is estimated to be as follows:

Task Description	Start Date	End Date
Mobilize to Site	5/21/2012	
Sample collection; sample packaging; sample shipping to laboratory	5/22/2012	5/25/2012
Demobilize from Site	5/26/2012	

10.0 DELIVERABLES

The following deliverables will be provided under this project:

Analytical Data

Three types of reports will be prepared under this project:

Preliminary – Initial laboratory data report consisting primarily of analytical test results. The data in this report will not have undergone internal laboratory QA review and will not include the full QA/QC documentation required in the final report.

Final – Final analytical data report provided by the respective laboratories. This report will contain the final analytical results following completion of the internal laboratory QA review. The Final data package will also include all necessary documentation required for data validation (Appendix A).

Validated – Final data that has undergone data validation review in accordance with the guidance documents referenced in Section 8.6.

Preliminary reports are submitted by each laboratory within 15 business days (or sooner) after receipt of a batch of samples at the laboratory. A batch is defined in Section 8.5. Each laboratory will then submit a final report within 21 business days of receipt. The final report is to include all results for all parameters associated with the assigned analyses for that particular laboratory. A Level IV (CLP-like) data package, or equivalent, will be included in the final report. Requirements for a Level IV data package are included in Appendix A.

Each laboratory will also provide an electronic data deliverable (EDD), where applicable. The EDD is to be submitted with the final report. EDD files will be uploaded to SCRIBE.

11.0 REFERENCES

EPA, 2011. U.S. Environmental Protection Agency, *Contract Laboratory Program (CLP) Guidance for Field Samplers, Final*, Office of Solid Waste and Emergency Response (OSWER) publication EPA540-R-07-006, Washington, D.C. January.

ERT, 1994. U.S. Environmental Protection Agency Environmental Response Team. Standard Operating Procedure for Surface Water Sampling, SOP# 2013. January 26.

ERT, 1995. U.S. Environmental Protection Agency Environmental Response Team. Standard Operating Procedure for Groundwater Well Sampling, SOP# 2007. January 26.

PADEP, 2001. Pennsylvania Department of Environmental Protection, *Groundwater Monitoring Guidance Manual,* Document number 383-3000-001, dated January 1st, 1999, revised December 1st, 2001.

TechLaw, 2011a. TechLaw, Inc., Standard Operating Procedures, *Field Documentation Procedures - Maintaining a Field Logbook, 03-01-04*, Chantilly, VA. March.

TechLaw, 2011b. Standard Operating Procedures, *Packaging and Shipping Samples-Environmental Procedures, 04-02-01,* Chantilly, VA. March.

TABLE 1 - 05/16/2012
FIELD AND QC SAMPLING SUMMARY
DIMOCK RESIDENTIAL GROUNDWATER SITE
DIMOCK, SUSQUEHANNA COUNTY, PENNSYLVANIA

Parameter/Method	Matrix	Field Samples	QC Sample Summary					Total Field and QA/QC Analyses (not including MS/MSD)
			Dup	Trip[1,] Blanks	Field[1,2] Blanks	Equip[1] Blanks	MS/MSD	
EPA R3 Lab								
Metals: Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Sn, Sr,Ti, Tl, U, V, Zn (200.7/200.8)	drinking water	8	1	-	2	-	1	11
Metals: Dissolved Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Sn, Sr,Ti, Tl, U, V, Zn (200.7/200.8)	filtered drinking water	8	1	-	2	-	1	11

Notes:

1. This QA sample will be an aqueous matrix.
2. Field blank samples will be collected at a rate of 1 per day and it is estimated to take 2 sample days.

Key:

Bkgd = Background
MS/MSD = Matrix Spike/Matrix Spike Duplicate
QA/QC = Quality assurance/quality control
Dup = Duplicate

TABLE 2 - 05/16/2012
SAMPLE ANALYTICAL REQUIREMENTS SUMMARY
DIMOCK RESIDENTIAL GROUNDWATER SITE
DIMOCK, SUSQUEHANNA COUNTY, PENNSYLVANIA

Analytical parameter and Method	Matrix	Sample Preservation	Holding Time (Days)	Sample Container(s)			
				Qty	Vol (ml)	Bottle Type	Comments
EPA R3 Lab							
Metals: Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Sn, Sr,Ti, Tl, U, V, Zn (200.7/200.8)	drinking water	pH<2 with HNO3 and cool with ice, 4°C	180	1	500	HDPE	
Metals: Dissolved Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sb, Se, Sn, Sr,Ti, Tl, U, V, Zn (200.7/200.8)	filtered drinking water	pH<2 with HNO3 and cool with ice, 4°C	180	1	500	HDPE	

KEY:

°C = degrees Celsius
CLP = Contract Lab Program
QL = Quantitation Limit
HN03 = Nitric Acid
ml = milliliter
pH = - Log [H+]
HDPE = High density polyethylene

Appendix A
Deliverable Requirements for Level IV Data Packages

The following summary forms are required to meet the deliverable requirements for both the Full Data Package (Level IV CLP-like) and the Results Only Data Package. The CLP equivalent form number is listed in [ ] after the deliverable as an example of the information that is required. Use of the CLP form is not required. All deliverables must include a Case Narrative describing any analytical problems and observations. As part of the Case Narrative, the laboratory must provide a table cross referencing the TechLaw and Lab sample numbers. The deliverable must include copies of all correspondence (both verbal and written) with TechLaw personnel concerning the project. All deliverables must include Chain-of-Custody documentation. Full Data Packages will include all raw instrument data. Results Only Data Packages will include the summary forms only.

DELIVERABLE REQUIREMENTS FOR VOLATILE ORGANICS

CLP form number is listed in [ ] after the deliverable.

*1. Sample Results Summary [1A] TICs (if requested) [1E] (also used for method blank, MS and MSD results)
*2. System Monitoring Compound Recoveries [2A, 2B]
*3. Matrix Spike/Matrix Spike Duplicate Summary [3A, 3B]
*4. Method Blank Summary [4A]
5. Instrument Performance Check (Bromofluorobenzene, BFB tuning) [5A]
6. Initial Calibration Data [6A]
7. Continuing Calibration Data [7A]
8. Internal Standard Area and Retention Time Summary [8A]
9. Target compound identification
10. Quantitation limits.
11. System performance
12. Raw instrument data for all samples, method blanks, matrix spikes, matrix spike duplicates, instrument tunings and calibrations.

DELIVERABLE REQUIREMENTS FOR SEMI-VOLATILE ORGANICS

CLP form number is listed in [ ] after the deliverable.

*1. Sample Results Summary [1B, 1C] TICs (if requested) [1F] (also used for method blank, MS and MSD results)
*2. Surrogate Recoveries [2C, 2D]
*3. Matrix Spike/Matrix Spike Duplicate Summary [3C, 3D]
*4. Method Blank Summary [4B]
5. Instrument Performance Check (DFTPP tuning) [5B]
6. Initial Calibration Data [6B, 6C]
7. Continuing Calibration Data [7B, 7C]
8. Internal Standard Area and Retention Time Summary [8B, 8C]
#9. Raw instrument data for all samples, method blanks, matrix spikes, matrix spike duplicates, instrument tunings and calibrations

Appendix A
Deliverable Requirements for Level IV Data Packages

DELIVERABLE REQUIREMENTS FOR METALS AND CYANIDE

CLP form number is listed in [ ] after the deliverable.

*1. Analysis Data Sheet [1] for all samples
2. Initial and Continuing Calibration Verification [2A]
3. RDL standard for AA and ICP [2B]
*4. Blanks [3]
5. Interference Check Sample [4]
*6. Matrix Spike Sample Recovery [5A]
7. Post Digestion Spike Recovery [5B]
*8. Duplicates [6]
9. Laboratory Control Sample (if applicable) [7]
10. Standard Addition Results (if applicable) [8]
11. ICP Serial Dilution [9]
12. Instrument Detection Limits [10]
13. CP Interelement Correction Factors [11A, 11B]
14. ICP Linear Ranges [12]
15. Sample preparation log [13]
16. Analysis run log [14]
17. Raw instrument data for all samples, method blanks, matrix spikes, matrix spike duplicates, instrument calibrations and control samples.