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## Environmental Programs Directorate

### Standard Operating Procedure

# Quality Checks for Preparation of Data Sets from the Project Technical Databases

#### APPROVAL SIGNATURES:

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## 1.0 PURPOSE AND SCOPE

- 1.1 This standard operating procedure (SOP) describes the process and responsibilities for performing quality checks for the preparation of data sets retrieved from the Los Alamos National Laboratory (LANL) Environmental Programs (EP) Directorate (ADEP) project databases. Data sets are prepared once automated computer software checks, verification, and routine validation have been performed.
- 1.2 ADEP's Engineering and Technology (ET) Division Data Stewards, and/or project team members in the Environmental Remediation Group, have the primary responsibilities of performing quality checks and preparing final electronic data sets. These checks are performed on field-specific information, analytical data, and summary reports ensuring the completeness, accuracy, and correctness of a data set.
- 1.3 All ET Division personnel are required to use this procedure when performing quality checks on samples obtained from waste characterization, ground and surface water, food stuff and biota, soil vapor, soil, and tuff. This procedure integrates multimedia functional support for various regulatory programs and is not applicable to all work the data team members support. Therefore, this SOP should only be used when applicable.
- 1.4 This procedure does not provide specific instructions on web-based applications, Microsoft software, and reporting tools used to produce electronic data sets. The user should seek applicable online instruction or tutorial information regarding these applications.
- 1.5 This procedure does not cover specific instructions for requesting, handling, and managing a data set. See SOP-01.13, Initiating and Managing Data Set Requests.

## 2.0 BACKGROUND, PRECAUTIONS, AND DEFINITIONS OF TERMS

### 2.1 Background

- 2.1.1 Most of the work specified in this procedure is driven by the Compliance Order on Consent and, when applicable, personnel perform quality reviews. Data sets produced as a result of this procedure are provided to the end user and presented in technical publications including waste management documentation, environmental surveillance and monitoring reports, work plans, and investigation reports and submitted as deliverables to the New Mexico Environment Department (NMED).

**NOTE:** Data presented in technical publications require a quality check before release of the deliverable or document to the public or regulator. Data sets that have not undergone a quality check are considered preliminary and are available for internal use only.

- 2.1.2 Before data can be retrieved from project technical databases, Waste and Environmental Service Division – Environmental Data Analysis Group personnel enter data into the database system and perform the following data checks to determine the quality and/or usability of data based on established data quality objectives:
- 2.1.2.1 Electronic data deliverables (EDDs) from external laboratories are checked for completeness using an automated computer system software checker and are electronically entered into the database using an EDD loader. The automated check ensures that all analyses were performed on each sample submitted to the contract analytical laboratory. Any discrepancies are resolved with the project field teams through the Sample Management Office (SMO) or the laboratory before the data can be accessed.

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- 2.1.2.2 Electronic data undergo 100% verification performed by contract technical service personnel to ensure analytical measurements match the EDD in the database.
- 2.1.2.3 Analytical data undergo 100% routine validation performed by independent contractors using LANL validation SOPs that are based on National Functional Guidelines or Health and Safety Laboratory 300 (HASL-300) for radionuclides.
- 2.1.2.4 All field data are verified against sample collection logs performed by contract technical service personnel.

## 2.2 Precautions

- 2.2.1 Location x- and y-coordinates must be entered into the system before data can be accessed from the project databases. For pre-SMO2 vintage data (see Section 4.3), investigative sample locations must have x- and y-coordinates; waste samples do not require unique x- and y-coordinates.
- 2.2.2 The data steward performs data quality checks for preparation of the All Analyses Decision-Level Data Table (All Analyses Table) for site-specific screening or evaluation. In the process of preparing the All Analyses Table, certain data types must be excluded. Excluded data types should be entered into separate tables within the Microsoft Access database. For example, waste characterization, excavated samples, and field quality control (QC) samples should be removed prior to data evaluation. To maintain a complete data set for the end user, the removed data should be grouped separately.

## 2.3 Definitions of Terms

**Data Steward:** A member of the Environmental Remediation Group Data Stewardship Team who is trained to this SOP and is responsible for performing tasks described within.

**Verification:** Establishment of the correctness of a fact. For analytical data, verification is ensuring that the information on the analytical laboratory Form 1 (sample data summary form) matches the information in the analytical laboratory EDD.

**Validation:** The process to give legal force or official confirmation to or declare legally valid. For analytical data, validation is a specific set of checks applied to the analytical laboratory QC parameters/samples to ensure the analytical data are legally defensible. Data validation is performed using LANL procedures based on the following:

- **For inorganic data.** U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review
- **For organic data.** EPA CLP National Functional Guidelines for Organic Data Review
- **For radionuclides.** HASL-300 Environmental Measurements Laboratory guidelines

The data validation process assigns qualifiers to the analytical data. Data rejected during validation as *unusable* are assigned an R qualifier.

## 3.0 EQUIPMENT AND TOOLS

- 3.1.1 A computer work station with internet access to web-based application(s) and reporting tools with import and export functions and equipped with standard commercial software and an open database connectivity link.

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3.1.2 Access to project technical databases that warehouse field information and analytical data.

3.1.3 Access to a controlled copy of the Automated Waste Determination (AWD) Microsoft Excel workbook for waste data sets.

## 4.0 STEP-BY-STEP PROCESS DESCRIPTION

### 4.1 Completeness Check

**Data Steward**

1. Following a data request, check new Sample Events status for completeness. If Sample Events are complete in the project database, export analytical results for review to Microsoft Access or Excel.

**NOTE:** A Sample Event is complete when all laboratory analyses have been received, verified, and validated for each sample and are accessible from the project database.

**NOTE:** A completeness check may indicate that requested analyses have not been received. If data are missing, ask requestor if evaluation is acceptable. If missing data are required, contact SMO staff and/or coordinate verification and validation services with a project chemist to recover missing data.

**NOTE:** Track samples collected and analyses returned by analytical laboratory.

2. Identify the number of samples and analytical results in the All Analyses Table and record the total record count.

3. If applicable, complete Attachment 1, Data Exports Checks and Balances Sheet.

### 4.2 Field Data Checks

**Data Steward**

1. Ensure field data checks have been performed by the SMO on all new samples collected within the Sample Event. Review sample collection logs for pre-SMO2 vintage data and new samples only if there is a problem with field information.

**NOTE:** If the SMO has not completed the sample collection log review process, data cannot be accessed. Please coordinate secondary review process with SMO staff.

2. Check that "Media Code" field entries are correct and consistent for sample locations and depth. Refer to media code look-up table for acceptable values.

3. Check that "Field Matrix" and "Media Code" entries are consistent and correct. Check field entries to ensure location, depth, and date match parent sample. Refer to media code and field matrix look-up table for acceptable values.

4. Check "Sample Usage Code" field entries to identify the data types in the data set. Refer to sample usage code look-up table for acceptable values.

**NOTE:** It is important that nondecision level or exclusionary data types (i.e., waste, screening data, excavated samples, etc.) are correctly identified and removed from the All Analyses Table.

### 4.3 Analytical Quality Checks

**Data Steward** 1. For pre-SMO2 vintage data, perform an analyte count per analytical method for completeness. See table below for acceptable range for a given analytical suite count:

Analytical Suite	Analyte Count
Metals	23–27
Gamma Spectroscopy Radionuclides	25–27
Alpha Spectroscopy Radionuclides	2-3
Beta	1
Volatile Organic Analytes	60–64
Semivolatile Organic Analytes	62–69
Pesticides	21
PCBs	7
High Explosives (EPA 8330)	14
High Explosives (EPA 8321 NMED List)	20
High Explosives (RDX degradation products)	3
Dioxin/Furans	25
Volatile Organic Analytes (Gas)	62
PCB Congeners	~177

2. For pre-SMO2 vintage data, check that each analyte is correctly assigned a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) Class (organic, inorganic, or radionuclide) and an analytical suite. Possible analytical suites include the following:

- AM-241
- Anion
- DIOXIN/FURAN
- GrossAB
- GrossG
- Gamma Spec
- HERB
- HEXP
- H3
- ISO\_PU
- ISO\_TH
- ISO\_U
- METALS
- PAH
- PCB CONG
- PCB
- PEST
- PEST/PCB
- Perchlorate
- SR-90
- SVOC
- TCLP
- TPH
- Uranium
- VOC
- WET\_CHEM
- Cyanide
- Nitrate
- pH
- Particle Size

3. For pre-SMO2 vintage data, check dates (collection vs. shipping vs. analysis).

4. For pre-SMO2 vintage data, assess the data quality by using vintage codes. Possible vintage codes include the following:
  - CST SCN (mobile rad and chem van laboratory screen data)
  - CSTOnsite (former RFI data quality, screening only)
  - CSTOffsite (former RFI data quality, screening only)
  - AN-95 (former RFI data quality, screening only)
  - CSTROUT03 (former RFI data quality, revalidated, decision level)
  - Transition (decision level)
  - SMO (decision level)
  - VVM (decision level)
  - SMO2 (decision level)

5. Check for redundant records or those having the same sample/analyte. If redundant records exist and do not have the \*88 reason code assigned, consult a project chemist.

#### 4.4 Results and Unit Checks

- Data Steward**
1. For pre-SMO2 vintage data, check that the unit is correctly reported for each field matrix. See table below for standard unit abbreviations.

Matrix	Unit	Unit Description
Gas	ppbv	parts per billion by volume
Gas	µg/m <sup>3</sup>	micrograms per cubic meter
Gas	pCi/L	pico Curies per liter
Soil or solid	%	Percent
Soil or solid	mg/kg	milligrams per kilogram
Soil or solid	pCi/g	pico Curies per gram
Soil or solid	µg/kg	micrograms per kilogram
Soil or solid (TCLP extract)	mg/L	milligrams per liter
Soil or solid (TCLP extract)	µg/L	micrograms per liter
Water	CFS	cubic feet per second
Water	GPM	gallons per minute
Water	NTU	nephelometric turbidity units
Water	SU	standard pH units
Water	deg C	degrees Celsius
Water	mg/L	milligrams per liter
Water	pCi/L	pico Curies per liter
Water	µS/cm <sup>2</sup>	microSiemens per centimeter squared
Water	µg/L	micrograms per liter

2. For pre-SMO2 vintage data, check for zero and/or null standard results. Consult a project chemist to determine if data should be rejected.

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- For pre-SMO2 vintage data, check radionuclide results to ensure either minimum detectable activity or uncertainty value is reported. If both are missing, consult a project chemist to determine if data should be rejected.

- For pre-SMO2 vintage data, check inorganic and organic analytical results to ensure method detection limit and estimated quantitation limit are reported. If both are missing, consult a project chemist.

#### 4.5 Validation Checks

##### Data Steward

- Perform a general review of the qualifier flags in the data set. Check detection status for consistency. Refer to inorganic, organic, and radionuclide validation SOPs and/or consult with a project chemist for final review.

**NOTE:** New Sample Event (post-SMO2 vintage) data does not require a final chemist review unless data quality issues are warranted.

- Verify that qualifier flag and/or reason code changes performed by the chemist have been updated in the database.

#### 4.6 Export All Analyses and Exclusion (Noninvestigative) Data Tables

##### Data Steward

- Export all analyses and exclusionary data tables from database to Microsoft Access or Excel for final reporting. If applicable, prepare and exclude data as shown in Attachment 1, Data Exports Checks and Balances Sheet.

- To ensure that all requested records have been reported, compare the sum of excluded data plus the sum of the remaining data to the initial record count obtained during completeness check.

#### 4.7 Inorganic, Organic, and Radionuclide Frequency of Detect and Sample Identification Detect Table Reviews

##### Data Steward

- Generate and check the Inorganic Frequency of Detect (FD) Table for correctness and completeness. Verify that the number of detects and number of detects above LANL background values (BVs) are correct for the analytes listed. See Attachment 2, Inorganic FD Table.

- Generate and check Inorganic Sample Identification Detect (SID) Table for correctness and completeness. Verify that results are compared correctly to LANL BVs and results include correct sample, location, depth, media, analyte, and site. See Attachment 3, Inorganic SID Table.

**NOTE:** The Inorganic SID Table contains both detected results and nondetected results above LANL BVs. If BVs do not apply, detected results should be reported.

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3. Generate and check Organic FD Table for completeness and correctness. Verify the number of detects is correct for analytes listed.

Generate and check Organic SID Table for correctness and completeness. Verify detected results are correct and results include correct sample, location, depth, media, analyte, and site.

**NOTE:** LANL BVs do not apply to organic results.

4. Generate and check Radionuclide (RAD) FD Table for correctness and completeness. Verify the number of detects, and verify number of detects above LANL BVs are correct for analytes listed.

**NOTE:** BVs for fallout analytes (americium-241, cesium-137, plutonium-238, plutonium-239, and strontium-90) apply only at the surface or from 0 to 12 inches. Refer to LANL Background report.

5. Generate and check RAD SID Table for correctness and completeness. Verify results are compared correctly to LANL BVs and results include correct sample, location, depth, media, analyte, and site.

**NOTE:** The RAD SID Table contains only detected results above LANL BVs. If LANL BVs do not apply, detected results should be reported.

6. Generate and check Samples Taken Table for correctness and completeness. Verify all analyses, samples, media, locations, depths, sites, and analytical request numbers are correct. See Attachment 4, Samples Taken Table.

#### 4.8 Waste Determination Using the AWD Workbook

- |                     |  |
|---------------------|--|
| <b>Data Steward</b> | <ol style="list-style-type: none"> <li>1. Following a waste data request, export analytical results from the project database to a text file and add ".txt" extension to the exported file name.</li> </ol>  |
|                     | <ol style="list-style-type: none"> <li>2. For the same event (or set of events) go to Print &gt; Where are my data reports? in SMO2 database and export to an Excel file.</li> </ol>   |
|                     | <ol style="list-style-type: none"> <li>3. Open the AWD master file called "ww_xxx.xlms." An official copy of the master file is available in the project directory.<br/><br/><b>NOTE:</b> In the file name "ww_xxx.xlms," ww stands for water waste, and xxx is the current version number. If an evaluation of solids is required, the "ww_xxx.xlsm" workbook will automatically link to all necessary files. For quality purposes, the AWD workbook automatically collects information about the starting point, evaluations, and subsequent opening/saving/name changes.</li> </ol> |
|                     | <ol style="list-style-type: none"> <li>4. In the AWD workbook, allow macros and select the "Start" command button. When prompted, choose the data file to be imported to the AWD workbook (i.e., the text file generated above in step #1).</li> </ol>   |
|                     | <ol style="list-style-type: none"> <li>5. Follow the prompts from the AWD workbook. After data are imported, select the "Evaluate" command button. At the end of evaluation, return to the "Start" sheet (select the "Start" tab at the bottom of the screen, or use the pink "Go To Start" comment button from the "Results" sheet).</li> </ol>   |



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6. Select the “Set-up completeness check” command button. When prompted, choose an Excel report file (from p. 2). At the end of the completeness check, the workbook automatically switches view to the “Results” sheet.

**NOTE:** A completeness check subroutine may indicate that requested analyses have not been received. If data are missing, ask the requestor if evaluation is acceptable. If missing data are required, contact SMO staff and/or the analytical laboratory to recover missing data.

7. Save resulting workbook using Excel’s “Save as” command. Do not save over the master file or in the master file directory. Log AWD into the Data Tracking Spreadsheet.

8. From the “Results” sheet, review “Detects,” “RCRA,” and “RAD” forms. Ensure comment fields in all three forms are highlighted in green. Cells without green highlight indicate that the given data point did not pass the validation and verification process. Ask requestor if invalidated or partially validated data are acceptable. If requestor requires validated data, run an AWD the next day to check validation status.

**NOTE:** Some data points are calculated automatically, and in the case of calculated data, a white background in the comments field is acceptable.

9. E-mail resulting spreadsheet to data requestor.

#### 4.9 Records

- |                     |  |
|---------------------|--|
| <b>Data Steward</b> | 1. Save and maintain applicable electronic records on project servers. These electronic records become part of reports that are reviewed according to SOP-4005, Environmental Programs Standard Operating Procedure for Peer Review Process ( <a href="http://int.lanl.gov/environment/all/docs/ga/ep_ga/SOP-4005.pdf">http://int.lanl.gov/environment/all/docs/ga/ep_ga/SOP-4005.pdf</a> ). Final data tables are included as part of deliverable documents; deliverable documents are submitted by the ADEP Deliverables Compliance Team to the Records Processing Facility according to EP-DIR-SOP-4004, Records Transmittal and Retrieval Process. |
|---------------------|--|

## 5.0 ACRONYMS

ADEP = Environmental Programs Directorate

AWD = Automatic Waste Determination

BV = background value

CLP = Contract Laboratory Program

EDD = electronic data deliverable

EP = Environmental Programs (Directorate)

EPA = U.S. Environmental Protection Agency

ET = Engineering and Technology (Division)

FD = frequency of detect

HASL-300 = Health and Safety Laboratory 300

LANL = Los Alamos National Laboratory

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NMED = New Mexico Environment Department  
PAH = polycyclic aromatic hydrocarbon  
PCB = polychlorinated biphenyl  
RAD = radionuclide  
RCRA = Resource Conservation and Recovery Act  
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine  
RFI = RCRA facility investigation  
RPF = Records Processing Facility  
SID = Sample ID Detect  
SMO = Sample Management Office  
SOP = standard operating procedure  
SVOC = semivolatile organic compound  
TCLP = toxicity characteristic leaching procedure  
TPH = total petroleum hydrocarbons  
VOC = volatile organic compound

## 6.0 PROCESS FLOWCHART

Not applicable.

## 7.0 ATTACHMENTS

Attachment 1: Data Exports Checks and Balances Sheet

Attachment 2: Inorganic FD Table

Attachment 3: Inorganic SID Table

Attachment 4: Samples Taken Table


## 8.0 REVISION HISTORY

Revision No. <i>[Enter current revision number, beginning with Rev.0]</i>	Effective Date <i>[DCC inserts effective date for revision]</i>	Description of Changes <i>[List specific changes made since the previous revision]</i>	Type of Change <i>[Technical (T) or Editorial (E)]</i>
0	1/26/2011	New procedure	T/E

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**ATTACHMENT 1**

<b>EP-DIR-SOP-10007-1</b>		
<b>Data Exports Checks and Balances Sheet</b>		
1	All Analyses – final reported table.	Record/Count
<b>Excluded Data</b>		
2	CST SCREEN – remove mobile screening and other field screening data.	Record/Count
3	CST ONSITE - historical data identified as screening only.	Record/Count
4	CST OFFSITE – historical data identified as screening unless re-verified and – validated.	Record/Count
5	AN-95 – historical data identified as screening unless re-verified and -validated	Record/Count
6	Excavated – sample location(s) removed during environmental cleanup.	Record/Count
7	Field QC – field quality control rinsate, trip blank, and duplicate sample.	Record/Count
8	Reanalysis/Dilutions/Duplicates - duplicate runs for samples diluted or reanalyzed.	Record/Count
9	Gamma Spec with Alpha - gamma spec removed if alpha spec analyzed.	Record/Count
10	Rad Not Evaluated – radionuclides not evaluated.	Record/Count
11	TCLP/WASTE - remove TCLP analyses and samples identified as waste.	Record/Count
12	RFI CLASS OTHER – “OTHER” classification is assigned to non-evaluated data.	Record/Count
13	REJECTED DATA - analytical results rejected by project chemist for data quality reasons.	Record/Count
	TOTAL	Record/Count

**ATTACHMENT 2**

**EP-DIR-SOP-10007-2**

**Inorganic FD Table**



SWMU	Analyte	Media	Number of Analyses	Number of Detects	Concentration Range	Std Result UOM	Background Value (mg/kg)	Frequency of Detects Above Background Value	Frequency of Non-Detects Above Background Value	Min Detected Result	Max Detected Result
20-001(a)	Aluminum	QBT3	24	24	2640 to 5420	mg/kg	7340	0/24	0/24	2640	5420
20-001(a)	Antimony	QBT3	24	0	[0.955 to 1.05]	mg/kg	0.5	0/24	24/24	0	0
20-001(a)	Arsenic	QBT3	24	24	0.738 to 1.91	mg/kg	2.79	0/24	0/24	0.738	1.91
20-001(a)	Barium	QBT3	24	24	54.9 to 108	mg/kg	46	24/24	0/24	54.9	108
20-001(a)	Beryllium	QBT3	24	24	0.536 to 1.05	mg/kg	1.21	0/24	0/24	0.536	1.05
20-001(a)	Cadmium	QBT3	24	19	0.102 to [0.518]	mg/kg	1.63	0/24	0/24	0.102	0.267
20-001(a)	Calcium	QBT3	24	24	1090 to 3120	mg/kg	2200	3/24	0/24	1090	3120
20-001(a)	Chromium	QBT3	24	24	3.13 to 6.23	mg/kg	7.14	0/24	0/24	3.13	6.23
20-001(a)	Cobalt	QBT3	24	24	1.53 to 2.78	mg/kg	3.14	0/24	0/24	1.53	2.78
20-001(a)	Copper	QBT3	24	24	3.1 to 7.75	mg/kg	4.66	16/24	0/24	3.1	7.75
20-001(a)	Cyanide (Total)	QBT3	24	0	[0.225 to 0.264]	mg/kg	0.5	0/24	0/24	0	0
20-001(a)	Iron	QBT3	24	24	6540 to 9890	mg/kg	14500	0/24	0/24	6540	9890
20-001(a)	Lead	QBT3	24	24	9.19 to 12.1	mg/kg	11.2	6/24	0/24	9.19	12.1
20-001(a)	Magnesium	QBT3	24	24	879 to 1430	mg/kg	1690	0/24	0/24	879	1430
20-001(a)	Manganese	QBT3	24	24	263 to 395	mg/kg	482	0/24	0/24	263	395
20-001(a)	Mercury	QBT3	24	8	0.00432 to [0.0126]	mg/kg	0.1	0/24	0/24	0.00432	0.00654
20-001(a)	Nickel	QBT3	24	24	3.58 to 6.66	mg/kg	6.58	1/24	0/24	3.58	6.66
20-001(a)	Nitrate	QBT3	24	7	0.938 to [1.07]	mg/kg	na	7/24	na	0.938	1.02
20-001(a)	Perchlorate	QBT3	24	22	0.000765 to 0.00345	mg/kg	na	22/24	na	0.000765	0.00345
20-001(a)	Potassium	QBT3	24	24	771 to 1340	mg/kg	3500	0/24	0/24	771	1340
20-001(a)	Selenium	QBT3	24	0	[0.957 to 1.05]	mg/kg	0.3	0/24	24/24	0	0
20-001(a)	Silver	QBT3	24	23	0.191 to 0.731	mg/kg	1	0/24	0/24	0.191	0.731
20-001(a)	Sodium	QBT3	24	22	71.9 to 205	mg/kg	2770	0/24	0/24	71.9	205
20-001(a)	Thallium	QBT3	24	20	0.0978 to [0.238]	mg/kg	1.1	0/24	0/24	0.0978	0.135
20-001(a)	Vanadium	QBT3	24	24	6.48 to 13.1	mg/kg	17	0/24	0/24	6.48	13.1
20-001(a)	Zinc	QBT3	24	24	31 to 43	mg/kg	63.5	0/24	0/24	31	43

**ATTACHMENT 3**

**EP-DIR-SOP-10007-3**

**Inorganic SID Table**



SWMU	Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Calcium	Copper	Lead	Nickel	Nitrate	Perchlorate	Selenium
Inorganic Chemicals Above Background per Sample, Standard UOM = mg/kg													
Obt2, 3, 4 Background Value					0.5	46	2200	4.66	11.2	6.58	na	na	0.3
Construction Worker SSL					124	4350	na	12400	800	6190	496000	217	1550
Industrial SSL					454	224000	na	45400	800	22700	1820000	795	5680
Recreational SSL					317	158000	na	31700	560	15800	1260000	555	3960
Residential SSL					31.3	15600	na	3130	400	1560	125000	54.8	391
20-001(a)	RE20-10-22666	20-612556	5-6	QBT3	1.04 (U)	68.3	-	5.52	-	-	-	-	1.04 (U)
	RE20-10-22667	20-612556	10-11	QBT3	1.02 (U)	72.2	-	-	-	-	0.94 (J)	0.00113 (J)	1.03 (U)
	RE20-10-22668	20-612556	14-15	QBT3	1.02 (U)	72.3	-	4.8	-	-	0.938 (J)	0.000852 (J)	0.999 (U)
	RE20-10-22669	20-612557	5-6	QBT3	1.03 (U)	82.3	-	5.61	11.8	-	1.02 (J)	0.00279	1.05 (U)
	RE20-10-22670	20-612557	10-11	QBT3	1.05 (U)	79.3	-	5.54	12.1	-	0.988 (J)	0.00243	1.05 (U)
	RE20-10-22671	20-612557	14-15	QBT3	1.02 (U)	80	-	5.56	11.9	-	1.01 (J)	0.0015 (J)	1.05 (U)
	RE20-10-22672	20-612558	5-6	QBT3	1.03 (U)	86.6	-	7.32	11.6	6.66	0.98 (J)	0.00201 (J)	1.04 (U)
	RE20-10-22673	20-612558	10-11	QBT3	1.04 (U)	78.5	-	5.06	-	-	-	0.00137 (J)	1.04 (U)
	RE20-10-22674	20-612558	14-15	QBT3	0.99 (U)	72	-	5.44	-	-	0.961 (J)	0.00345	1.02 (U)
	RE20-10-22675	20-612559	5-6	QBT3	1.02 (U)	89.3 (J-)	2700	6.01	-	-	-	0.000765 (J)	0.98 (U)
	RE20-10-22676	20-612559	10-11	QBT3	1.03 (U)	75.8 (J-)	-	5.04	-	-	-	0.00193 (J)	1.04 (U)
	RE20-10-22677	20-612559	14-15	QBT3	1.04 (U)	71.3 (J-)	-	-	-	-	-	0.00151 (J)	0.957 (U)
	RE20-10-22678	20-612560	5-6	QBT3	1.03 (U)	87 (J-)	-	6.25	-	-	-	-	1.02 (U)
	RE20-10-22679	20-612560	10-11	QBT3	0.97 (U)	87.9 (J-)	-	6.12	-	-	-	0.00102 (J)	1.03 (U)
	RE20-10-22680	20-612560	14-15	QBT3	0.955 (U)	65.6 (J-)	-	-	-	-	-	0.00161 (J)	1.04 (U)
	RE20-10-22681	20-612561	5-6	QBT3	1.05 (U)	72.2 (J-)	-	5.46	-	-	-	0.000979 (J)	1.04 (U)
	RE20-10-22682	20-612561	10-11	QBT3	1.04 (U)	75.8 (J-)	-	6.74	11.3	-	-	0.000886 (J)	1.02 (U)
	RE20-10-22683	20-612561	14-15	QBT3	1.02 (U)	84.2 (J-)	-	5.56	11.9	-	-	0.00116 (J)	1.01 (U)
	RE20-10-22684	20-612562	5-6	QBT3	1.05 (U)	108 (J-)	3120	7.75	-	-	-	0.00115 (J)	1.02 (U)
	RE20-10-22685	20-612562	10-11	QBT3	1.02 (U)	54.9 (J-)	-	-	-	-	-	0.000835 (J)	0.997 (U)
	RE20-10-22686	20-612562	14-15	QBT3	1.02 (U)	55.6 (J-)	-	-	-	-	-	0.000947 (J)	0.981 (U)
	RE20-10-22687	20-612563	5-6	QBT3	0.998 (U)	63.5 (J-)	-	-	-	-	-	0.00126 (J)	1.02 (U)
RE20-10-22688	20-612563	10-11	QBT3	1.04 (U)	78.6 (J-)	2590	-	-	-	-	0.00146 (J)	1.04 (U)	
RE20-10-22689	20-612563	14-15	QBT3	1.03 (U)	60.9 (J-)	-	-	-	-	-	0.00217	0.999 (U)	

**ATTACHMENT 4**

**EP-DIR-SOP-10007-4**

**Samples Taken Table**



SWMU	Sample ID	Location ID	Depth (ft)	Media	Field QC Type	ANION	GAMMA_SPEC	HEXP	ISO_U	METALS	PCB	PERCHLORATE	SR_90	SVOC	VOC	WET_CHEM
20-001(a)	RE20-10-22666	20-612556	5-6	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22667	20-612556	10-11	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22668	20-612556	14-15	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22669	20-612557	5-6	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22670	20-612557	10-11	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22671	20-612557	14-15	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22672	20-612558	5-6	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22673	20-612558	10-11	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22674	20-612558	14-15	QBT3	na	10-3800	10-3801	10-3799	10-3801	10-3800	10-3799	10-3800	10-3801	10-3799	10-3799	10-3800
	RE20-10-22675	20-612559	5-6	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22676	20-612559	10-11	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22677	20-612559	14-15	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22678	20-612560	5-6	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22679	20-612560	10-11	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22680	20-612560	14-15	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22681	20-612561	5-6	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22682	20-612561	10-11	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22683	20-612561	14-15	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22684	20-612562	5-6	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22685	20-612562	10-11	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22686	20-612562	14-15	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22687	20-612563	5-6	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22688	20-612563	10-11	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826
	RE20-10-22689	20-612563	14-15	QBT3	na	10-3826	10-3827	10-3825	10-3827	10-3826	-	10-3826	10-3827	10-3825	10-3825	10-3826