Identifier: EP-DIR-SOP-10007	Revision: 1	Los Alamos NATIONAL LABORATORY —EST.1943—
Effective Date: 9/8/2011	Next Review Date: 9/8/2014	

Environmental Programs Directorate
Engineering & Technology

Standard Operating Procedure

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

APPROVAL SIGNATURES:			
Subject Matter Expert:	**Organization**	**Signature**	**Date**
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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 Directorate (ADEP) project databases. Data sets are prepared once automated computer software checks, verification, and routine validation have been performed.

1.2   Data stewards and/or project team members of the ADEP's Engineering and Technology (ET) Division – 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, surface, and storm 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.

1.4   This procedure does not provide specific instructions on all web-based applications, Microsoft software, and reporting tools used to produce electronic data sets. When needed, 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 reports, monitoring reports, work plans, investigation reports, and peer-reviewed journal articles and are submitted as deliverables to federal, state, local, and tribal goverments and citizen's groups.

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, Engineering and Technology (ET) Division – Environmental Remediation 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.

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) guidelines for radionuclides.

2.1.2.4 All field data are verified against sample collection logs 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 sampling 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 final data tables used for site-specific screening or evaluation, such as the all analyses tables. During preparation of final data tables, certain data types must be excluded, depending on programmatic and/or regulatory requirements. Excluded data types should be entered into separate tables. For example, waste characterization, excavated, and field quality control (QC) samples are routinely provided in separate tables for surveillance, monitoring, and investigations reports.

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.

Project Chemist - A member of the ADEP who is trained to this SOP and is responsible for performing chemistry reviews and related data steward functions.

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 of giving legal force to or official confirmation of, or declaring 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 results in the assignment of 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 equipped 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.

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 (required for waste characterization related data preparation only.)

4.0   STEP-BY-STEP PROCESS DESCRIPTION

4.1   Completeness Check

Data Steward

1. Following a data request, track sample event(s) status for completeness manually or using tools such as the sample event tracking status macro in Excel. If sample event(s) are complete in the project database, export analytical results for review to Excel or Access.

   NOTE: A sample event is complete when all submitted 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.

2. Identify the number of samples and analytical results in the final data set 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.

   NOTE: Review sample collection log if there is a problem/discrepancy with sample text-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.

   NOTE: Ensure the spatial reference (i.e., solid waste management unit, technical area, reach, etc.) is correct for each new sample that has been collected.

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 tables 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 exclusionary data types (i.e., waste characterization, screening data, excavated samples, etc.) are correctly identified and removed from the final data tables as required by programmatic or regulatory requirements.

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 (polychlorinated biphenyls)	7
High Explosives (EPA 8330)	14
High Explosives (EPA 8321 NMED List)	20
High Explosives (RDX [hexahydro-1,3,5-trinitro-1,3,5-triazine] 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 suite codes 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).

Data Steward (cont.)

4. For pre-SMO2 vintage data, assess the data quality 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/method. If redundant records exist and do not have the *88 reason code assigned or if there is concern that these codes were applied incorrectly, 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	$\mu g/m^3$	micrograms per cubic meter
Gas	pCi/L	picocuries per liter
Soil or solid	%	percent
Soil or solid	mg/kg	milligrams per kilogram
Soil or solid	pCi/g	picocuries 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	picocuries per liter
Water	$\mu S/cm^2$	microsiemens per square centimeter
Water	µg/L	micrograms per liter

Data Steward (cont.)	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.
	3.	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.
	4.	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	1.	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 identified.
	2.	Verify that qualifier flag and/or reason code changes requested by the chemist have been updated in the database.

4.6   Export All Analyses and Exclusion (Noninvestigative) Data Tables

Data Steward	1.	Generate and export all analyses and exclusionary data tables from database to Excel or Access for final reporting. If applicable, prepare and exclude data as shown in Attachment 1, Data Exports Checks and Balances Sheet.
	2.	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	1.	Generate and check the Inorganic Frequency of Detect (FD) Table or equivalent as required by the program for correctness and completeness. When applicable 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.
		NOTE: Refer to Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory, September 1998, LA-UR-98-4847.

Data Steward (cont.)	2.	Generate and check Inorganic Sample Identification Detect (SID) Table or equivalent for correctness and completeness. Verify that results are compared correctly to LANL BVs as applicable and results correspond to the final data set. 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.
	3.	Generate and check Organic FD Table or equivalent for completeness and correctness. Verify the number of detects is correct for analytes listed.
		Generate and check Organic SID Table or equivalent for correctness and completeness. Verify detected results are correct and results correspond to the final data set.
		NOTE: LANL BVs do not apply to organic results.
	4.	Generate and check Radionuclide (RAD) FD Table or equivalent for correctness and completeness. Verify the number of detects, and verify number of detects above LANL BVs are correct for analytes listed.
		NOTE: Refer to Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory, September 1998, LA-UR-98-4847.
	5.	Generate and check RAD SID Table for correctness and completeness. Verify results are compared correctly to LANL BVs and results correspond to the final data set.
		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 or equivalent for correctness and completeness. Verify meta data are consistent with final data set.

4.8   Waste Determination Using the AWD Workbook

Data Steward	1.	For a waste characterization data request, export analytical results from the project database to a text file and add a ".txt" extension to the exported file name.
	2.	For the same event (or set of events) go to Print > Where are my data reports? in SMO2 database and export to an Excel file.
	3.	Open the AWD master file called "ww_xxx.xlsm." An official copy of the master file is available in the project directory.
		NOTE: 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 assurance purposes, the AWD workbook automatically collects information about the starting point, evaluations, and subsequent opening/saving/name changes.

Data Steward (cont.)

4. In the AWD workbook, allow macros and select the "Start" command button. When prompted, choose the data file to be imported into the AWD workbook (i.e., the text file generated above in step #1).

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).

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 Management

Data Steward

1. Maintains and submits applicable electronic records and/or documents generated using this procedure on project servers to the Records Processing Facility according to EP-DIR-AP-10003, Records Management Procedure for ADEP Employees.

   - Electronic records included in ADEP deliverables reviewed according to SOP-4005, Peer Review Process;

   - Final data tables included in ADEP deliverables submitted by the ADEP Deliverables Compliance Team.

5.0 ACRONYMS

ADEP - Environmental Programs Directorate

AWD - Automated 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

NMED - New Mexico Environment Department

PAH - Polycyclic aromatic hydrocarbon

PCB - Polychlorinated biphenyl

QC - Quality control

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

N/A.

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. *[Enter current revision number, beginning with Rev.0]*	Effective Date *[DCC inserts effective date for revision]*	Description of Changes *[List specific changes made since the previous revision]*	Type of Change *[Technical (T) or Editorial (E)]*
0	1/26/2011	New procedure	T/E
1	9/82011	Changes made throughout the document and sections; Added Storm Water requirements.	T/E

Click here for "Required Read" credit.

ATTACHMENT 1

EP-DIR-SOP-10007-1 **DATA EXPORTS CHECKS AND BALANCES SHEET**	Los Alamos NATIONAL LABORATORY — EST.1943 —

Data Exports Checks and Balances Sheet	
1.	All Analyses – final reported table.	Record/Count

Excluded Data		
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

Los Alamos
NATIONAL LABORATORY
— EST. 1943 —

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

Los Alamos NATIONAL LABORATORY — EST.1943

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													
Qbt2, 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

Los Alamos NATIONAL LABORATORY — EST.1943 —

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