ENVIRONMENTAL® STANDARDS

Setting the Standards for Innovative Environmental Solutions

Data Validation Report
Tennessee Valley Authority
John Sevier Fossil Plant
Environmental Investigation Plan
Groundwater Samples
Chain-of-Custody Number: JSF_GW_20190814_1B

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the four groundwater samples and one aqueous blank collected on August 14, 2019, at the Tennessee Valley Authority (TVA) John Sevier Fossil Plant facility. These samples were collectively analyzed by GEL Laboratories LLC (GEL), of Charleston, South Carolina, for total radium-226 by US EPA Method 903.0 and for total radium-228 by US EPA Method 904.0.

This review was performed in accordance with the Environmental Investigation Plan for the Tennessee Valley Authority John Sevier Fossil Plant Environmental Investigation (JSF EIP, Revision 3, October 2018). This review was performed with guidance from the National Functional Guidelines for Inorganic Data Review (US EPA, October 2004); the US EPA Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (November 2001); and the US EPA Region IV Data Validation Standard Operating Procedures. These validation guidance documents specifically address analyses performed in accordance with the Contract Laboratory Program (CLP) analytical methods and are not completely applicable to the type of analyses and analytical protocols performed for the US EPA Methods utilized by the laboratory for these samples. Environmental Standards, Inc. (Environmental Standards) used professional judgment to determine the usability of the analytical results and compliance relative to the US EPA Methods utilized by the laboratory.

Summary

The analytical results and associated laboratory quality control (QC) samples were reviewed to determine the integrity of the reported analytical results and to ensure that the data met the established data quality objectives. This QA review includes all samples in GEL Sample Delivery Group 487777.

The samples that have undergone Stage 4 data validation are listed below:

Sample Identification	Laboratory Sample Identification	Job Number	Matrix	Date Sample Collected	Parameters Examined
JSF-GW-023-20190814	487777001	487777	Aq	8/14/19	Ra-226, Ra-228, Ra-226/228
JSF-GW-024-20190814	487777002	487777	Aq	8/14/19	Ra-226, Ra-228, Ra-226/228
JSF-GW-025-20190814	487777003	487777	Aq	8/14/19	Ra-226, Ra-228, Ra-226/228
JSF-GW-FB03-20190814 (Field Blank)	487777004	487777	Aq	8/14/19	Ra-226, Ra-228, Ra-226/228
JSF-GW-031-20190814	487777005	487777	Aq	8/14/19	Ra-226, Ra-228, Ra-226/228

Parameters Examined

Ra-226 - Total Radium-226 by US EPA Method 903.0.
Ra-228 - Total Radium-228 by US EPA Method 904.0.
Ra-226/228 - Radium-226/228 Calculation by US EPA Method 903.0/US EPA Method 904.0.
Aq - Aqueous.

Items Reviewed	
Holding Times	Calibrations
Sample Preservation	Blank Results
Chain-of-Custody (COC) Record and Case Narrative	Sample Preparation
Laboratory Control Sample (LCS) Results	Laboratory Duplicate Results
Chemical Yield	Quantitation of Positive Results

Comments and Exceptions

- All analyses performed for the sampling event were in compliance with the requirements set forth in the EIP.

- Radium-226+228 was reported as the summation of the calculated activities for radium-226 and radium-228. The reported results for radium-226+228 for the samples included in this report may have been adjusted and/or qualified in accordance with the TVA reporting protocols and assigned an “S” reason code.

Qualifier Summary

- Any radium-226+228 result reported from the summation of one isotope activity less than the MDA (non-negative value) and one isotope activity greater than the MDA should be considered estimated and have been flagged “J” on the data tables.

Review performed by: Danielle Coles, Quality Assurance Chemist
Review reviewed by: Ammie L. Martin, Senior Quality Assurance Chemist
Review approved by: Andrew L. Piasecki, Senior Quality Assurance Chemist
Review approved by: Rock J. Vitale, CEAC, Technical Director of Chemistry/Principal
Date review completed: 10/9/19

SECTION 2

ANALYTICAL RESULTS

INORGANIC DATA QUALIFIERS

U* This result should be considered “not-detected” because it was detected in a rinsate blank or laboratory blank at a similar level.

UR Unreliable reporting limit; analyte may or may not be present in sample.

R Unreliable positive result; analyte may or may not be present in sample.

J Quantitation is approximate due to limitations identified during data validation.

UJ This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation.

REASON CODES AND EXPLANATIONS

Reason Code	Explanation
BE	Equipment blank contamination. The result should be considered “not-detected.”
BF	Field blank contamination. The result should be considered “not-detected.”
BL	Laboratory blank contamination. The result should be considered “not-detected.”
BN	Negative laboratory blank contamination.
C	Initial and/or Continuing Calibration issue, indeterminate bias.
C+	Initial and/or Continuing Calibration issue. The result may be biased high.
C-	Initial and/or Continuing Calibration issue. The result may be biased low.
FD	Field duplicate imprecision.
FG	Total versus Dissolved Imprecision.
H	Holding time exceeded.
I	Internal standard recovery outside of acceptance limits.
L	LCS and LCSD recoveries outside of acceptance limits, indeterminate bias.
L+	LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased high.
L-	LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased low.
LD	Laboratory duplicate imprecision.
LP	LCS/LCSD imprecision.
M	MS and MSD recoveries outside of acceptance limits, indeterminate bias.
M+	MS and/or MSD recoveries outside of acceptance limits. The result may be biased high.
M-	MS and/or MSD recoveries outside of acceptance limits. The result may be biased low.
MP	MS/MSD imprecision.
P	Post-digestion spike recoveries outside of acceptance limits, indeterminate bias.
P+	Post-digestion spike recovery outside of acceptance limits. The result may be biased high.
P-	Post-digestion spike recovery outside of acceptance limits. The result may be biased low.
Q	Chemical Preservation issue.
R	RL standards outside of acceptance limits, indeterminate bias.
R+	RL standard(s) outside of acceptance limits. The result may be biased high.
R-	RL standard(s) outside of acceptance limits. The result may be biased low.
RL	Reported result between the MDL and the QL.
S	Radium-226+228 flagged due to reporting protocol for combined results.
T	Temperature preservation issue.
SD	Serial Dilution imprecision.
X	Percent solids < 50%.
Y+	Chemical Yield outside of acceptance limits. The result may be biased high.
Y-	Chemical yield outside of acceptance limits. The result may be biased low.
Z	ICP or ICP/MS Interference.
ZZ	Other.

TVA CCR Program
Facility: John Sevier Fossil Plant
SDG: 487777

Lab Sample ID	487777001
Sys Sample Code	JSF-GW-023-20190814
Sample Name	JSF-GW-023-20190814
Sample Date	8/14/2019 8:18:00 AM
Location	JSF-107
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
CALC	Radium-226+228	RA226/228	T	PCI/L	0.884	J	S	0.668				Y	Yes	1	NA
EPA 903.0	Radium-226	13982-63-3	T	PCI/L	0.763			0.562	0.702	0.702	1.00	Y	Yes	1	NA
EPA 904.0	Radium-228	15262-20-1	T	PCI/L	0.120	U		0.360	0.640	0.640	1.00	N	Yes	1	NA

TVA CCR Program
Facility: John Sevier Fossil Plant
SDG: 487777

Lab Sample ID	487777002
Sys Sample Code	JSF-GW-024-20190814
Sample Name	JSF-GW-024-20190814
Sample Date	8/14/2019 11:05:00 AM
Location	JSF-108
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
CALC	Radium-226+228	RA226/228	T	PCI/L	0.472	U		0.603				N	Yes	1	NA
EPA 903.0	Radium-226	13982-63-3	T	PCI/L	0.392	U		0.435	0.671	0.671	1.00	N	Yes	1	NA
EPA 904.0	Radium-228	15262-20-1	T	PCI/L	0.0808	U		0.418	0.751	0.751	1.00	N	Yes	1	NA

TVA CCR Program
Facility: John Sevier Fossil Plant
SDG: 487777

Lab Sample ID	487777003
Sys Sample Code	JSF-GW-025-20190814
Sample Name	JSF-GW-025-20190814
Sample Date	8/14/2019 1:05:00 PM
Location	JSF-109
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
CALC	Radium-226+228	RA226/228	T	PCI/L	0.761	J	S	0.694				Y	Yes	1	NA
EPA 903.0	Radium-226	13982-63-3	T	PCI/L	0.761			0.577	0.740	0.740	1.00	Y	Yes	1	NA
EPA 904.0	Radium-228	15262-20-1	T	PCI/L	-0.195	U		0.386	0.750	0.750	1.00	N	Yes	1	NA

TVA CCR Program
Facility: John Sevier Fossil Plant
SDG: 487777

Lab Sample ID	487777004
Sys Sample Code	JSF-GW-FB03-20190814
Sample Name	JSF-GW-FB03-20190814
Sample Date	8/14/2019 2:25:00 PM
Location	JSF-210
Sample Type	FB
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
CALC	Radium-226+228	RA226/228	T	PCI/L	0.436	U	S	0.657				N	Yes	1	NA
EPA 903.0	Radium-226	13982-63-3	T	PCI/L	0.436	U		0.538	0.887	0.887	1.00	N	Yes	1	NA
EPA 904.0	Radium-228	15262-20-1	T	PCI/L	-0.183	U		0.378	0.731	0.731	1.00	N	Yes	1	NA

TVA CCR Program
Facility: John Sevier Fossil Plant
SDG: 487777

Lab Sample ID	487777005
Sys Sample Code	JSF-GW-031-20190814
Sample Name	JSF-GW-031-20190814
Sample Date	8/14/2019 2:45:00 PM
Location	JSF-210
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
CALC	Radium-226+228	RA226/228	T	PCI/L	0.673	U		0.569				N	Yes	1	NA
EPA 903.0	Radium-226	13982-63-3	T	PCI/L	0.581	U		0.510	0.702	0.702	1.00	N	Yes	1	NA
EPA 904.0	Radium-228	15262-20-1	T	PCI/L	0.0917	U		0.253	0.455	0.455	1.00	N	Yes	1	NA

SECTION 3

SUPPORTING DOCUMENTATION FOR QUALIFIERS

ENVIRONMENTAL STANDARDS

RADIOLOGICAL ANALYSIS SUPPORT DOCUMENTATION

ESI project name:	TVA JSF EI Implementation	Reviewed by:	Danielle Coles
Sample Collection Dates:	8/14/19	Approved by:	Aem
Job Number:	**20188396.A000**	Completion Date:	10/2019
Project Manager:	AJC		
Laboratory:	GEL		

Applicable Sample No's (X) — Refer to Table 1 in the Quality Assurance Review

Deliverable:			Sample No.	Lab Control No.
	Level IV (Full)	(X)	488741	
	Limited	( )		
	Other:			

The following table indicates criteria that were examined, the identified problems, and support documentation attachments

	Criteria Examined in Detail Check (√) if Yes or Footnote Letter for Comments Below					Problems Identified Check (√) if Yes or Footnote Letter for Comments Below					Support Documentation Attachments Check (√) if Yes or Footnote Letter for Comments Below				
	903.0	904.0				903.0	904.0				903.0	904.0			
Holding Times	X	X													
Blank Analysis Results	X	X													
Laboratory Control Standard (LCS)	X	X													
Tracer/Chemical Yield	X	X													
Duplicate Analysis: ( ) Field (X) Lab	X	X													
Matrix Spike Results															
Quantitation of Results	X	X													
Detection Limit															
Efficiency/Energy Calibrations	X	X													
Initial Calibration Verifications	X	X													
Annual Calibration Verifications															
Continuing Calibration Checks	X	X													
Continuing Calibration Backgrounds	X	X													
Sample Preservation	X	X													
Condition on Receipt	X	X													
Others:															

Comments: All results are usable unless otherwise qualified.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482

Report Date: August 29, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-023-20190814
Sample ID: 487777001
Matrix: GW
Collect Date: 14-AUG-19
Receive Date: 15-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
GFPC Radium-226, Liquid "As Received"														
Radium-226		0.763	+/-0.547	0.702	+/-0.562	1.00	pCi/L			KSD1	08/20/19	1613	1907789	1
GFPC Radium-228, Liquid "As Received"														
Radium-228	U	0.120	+/-0.359	0.640	+/-0.360	1.00	pCi/L			LXB3	08/21/19	1322	1907787	2
Radium-226 + Radium-228 Calculation "See Parent Products"														
Radium-226+228 Sum	J,S	0.884	+/-0.654		+/-0.668		pCi/L		1	AEA	08/22/19	0836	1907785	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1907789	94.7	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1907787	84.7	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482

Report Date: August 29, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-025-20190814
Sample ID: 487777003
Matrix: GW
Collect Date: 14-AUG-19
Receive Date: 15-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date Time	Batch	Mtd.
Rad Gas Flow Proportional Counting													
GFPC Radium-226, Liquid "As Received"													
Radium-226		0.761	+/-0.562	0.740	+/-0.577	1.00	pCi/L			KSD1	08/20/19 1613	1907789	1
GFPC Radium-228, Liquid "As Received"													
Radium-228	U	-0.195	+/-0.386	0.750	+/-0.386	1.00	pCi/L			LXB3	08/21/19 1322	1907787	2
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum	J,S	0.761	+/-0.682		+/-0.694		pCi/L		1	AEA	08/22/19 0836	1907785	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1907789	91	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1907787	79.4 ✓	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Environmental Standards, Inc.
Address : 1140 Valley Forge Road

Valley Forge, Pennsylvania 19482

Report Date: August 29, 2019

Contact: TVA Deliverables
Project: JSF EIP GW

Client Sample ID: JSF-GW-FB03-20190814
Sample ID: 487777004
Matrix: AQ
Collect Date: 14-AUG-19
Receive Date: 15-AUG-19
Collector: Client

Project: TVAC00105
Client ID: TVAC008

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date Time	Batch	Mtd.
Rad Gas Flow Proportional Counting													
GFPC Radium-226, Liquid "As Received"													
Radium-226	U	0.436	+/-0.532	0.887	+/-0.538	1.00	pCi/L			KSD1	08/20/19 1613	1907789	1
GFPC Radium-228, Liquid "As Received"													
Radium-228	U	-0.183	+/-0.378	0.731	+/-0.378	1.00	pCi/L			LXB3	08/21/19 1322	1907787	2
Radium-226+ Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum	U,S	0.436	+/-0.653		+/-0.657		pCi/L		1	AEA	08/22/19 0836	1907785	3

The following Analytical Methods were performed

Method	Description
1	EPA 903.0
2	EPA 904.0
3	Calculation

all ND, no qual

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Barium Carrier	GFPC Radium-226, Liquid "As Received"	1907789	92.1	(30%-110%)
Barium-133 Tracer	GFPC Radium-228, Liquid "As Received"	1907787	78.3 ✓	(30%-110%)

Notes:

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Case Narrative

Case Narrative
for
Tennessee Valley Authority (13723)
SDG: 487777

August 28, 2019

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary

Sample Receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on August 15, 2019 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

Laboratory ID	Client ID
487777001	JSF-GW-023-20190814
487777002	JSF-GW-024-20190814
487777003	JSF-GW-025-20190814
487777004	JSF-GW-FB03-20190814
487777005	JSF-GW-031-20190814

Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Erin B Trent

Erin Trent
Project Manager

Radiochemistry
Technical Case Narrative
Tennessee Valley Authority
SDG #: 487777

Product: **GFPC Radium-228, Liquid**
Analytical Method: EPA 904.0
Analytical Procedure: GL-RAD-A-009 REV# 17
Analytical Batch: 1907787

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
487777001	JSF-GW-023-20190814
487777002	JSF-GW-024-20190814
487777003	JSF-GW-025-20190814
487777004	JSF-GW-FB03-20190814
487777005	JSF-GW-031-20190814
1204358679	Method Blank (MB)
1204358681	487777003(JSF-GW-025-20190814) Sample Duplicate (DUP)
1204358684	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: **GFPC Radium-226, Liquid**
Analytical Method: EPA 903.0
Analytical Procedure: GL-RAD-A-010 REV# 18
Analytical Batch: 1907789

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
487777001	JSF-GW-023-20190814
487777002	JSF-GW-024-20190814
487777003	JSF-GW-025-20190814
487777004	JSF-GW-FB03-20190814
487777005	JSF-GW-031-20190814
1204358685	Method Blank (MB)
1204358687	487777005(JSF-GW-031-20190814) Sample Duplicate (DUP)
1204358690	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 1204358685 (MB) was recounted due to high MDC. The recount is reported.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

TVAC008 Tennessee Valley Authority (13723)

Client SDG: 487777 GEL Work Order: 487777

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Heather M. McCarty **Name: Heather McCarty**

Date: 29 AUG 2019 **Title: Analyst II**

Chain of Custody and Supporting Documentation

TVA Environmental Investigations

Tennessee Valley Authority

487777

COOLER No.:	1	of	2
COC No:	JSF_GW_20190814_1B		
1 of 1 Pages			
Task Desc:	JSF_GW		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	GEL Laboratories LLC	Site ID #:	John Sevier Fossil Plant	Sampler:	A. Wilson / S. Stahl
Lab Address:	2040 Savage Road	Project #:	175568225	Sampling Company:	Stantec
	Charleston, SC 29407	Site Address	PLANT 011 OLD HWY 70 S	Address	601 Grassmere Park Rd, Suite 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone: (615) 885-1144
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Erin Trent	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	843-769-7374/843-766-1178	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below _____

24 Hours

3 Business Days

5 Business Days

10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Start Depth (Depth Unit)	Sample Depth End Depth (Select Unit)	MATRIX CODE	G=GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis GW_RAD	Preserve HNO3	Filtered N	Analysis Wet Chem
1	JSF-GW-023-20190814	JSF-107	37.5'	NA	GW	G	N	8/14/2019	0818	3	pH: 6.30	C	X			
2	JSF-GW-024-20190814	JSF-108	50.0'	NA	GW	G	N	8/14/2019	1105	3	pH: 6.85	C	X			
3	JSF-GW-025-20190814	JSF-109	45.0'	NA	GW	G	N	8/14/2019	1305	3	pH: 6.45	C	X			
4	JSF-GW-FB03-20190814	JSF-210	NA	NA	AQ	G	FB	8/14/2019	1425	3	None	C	X			
5	JSF-GW-031-20190814	JSF-210	46.5'	NA	GW	G	N	8/14/2019	1445	3	pH: 7.01	C	X			

AW 8-14-19

AW 8-14-19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Anna Wilson / Stantec	8/14/2019	1700		8/15/19	0830

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Fedex	Anna Wilson /
	Stefan Stahl /

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Form TVA 30097A

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	2 of 2
COC No:	JSF_GW_20190814_1B
1 of 1 Pages	
Task Desc:	JSF_GW

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	GEL Laboratories LLC	Site ID #:	John Sevier Fossil Plant	Sampler:	A. Wilson / S. Stahl
Lab Address:	2040 Savage Road	Project #:	175568225	Sampling Company:	Stantec
	Charleston, SC 29407	Site Address	PLANT 611 OLD HWY 70 S	Address	601 Grassmere Park Rd, Suite 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone: (615) 885-1144
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Erin Trent	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	843-769-7374/843-766-1178	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below _____

24 Hours

3 Business Days

5 Business Days

✓ 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit Start Depth	Sample Depth: Select Unit End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Filtered Y/N	Preserve HNO3	Analysis GW_NAD
1	JSF-GW-023-20190814	JSF-107	37.5'	NA	GW	G	N	8/14/2019	0818	3	pH: 6.30	☐			X
2	JSF-GW-024-20190814	JSF-108	50.0'	NA	GW	G	N	8/14/2019	1105	3	pH: 6.85	☐			X
3	JSF-GW-025-20190814	JSF-109	45.0'	NA	GW	G	N	8/14/2019	1305	3	pH: 6.45	☐			X
4	JSF-GW-FB03-20190814	JSF-210	NA	NA	AQ	G	FB	8/14/2019	1425	3	None	☐			X
5	JSF-GW-031-20190814	JSF-210	46.5'	NA	GW	G	N	8/14/2019	1445	3	pH: 7.01	☐			X

AW 8-14-19

AW 8-14-19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Anna Wilson / Stantec	8/14/2019	1700		8/15/19	8:45

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Fedex	Anna Wilson /
	Stefan Stahl /

Sample Receipt Conditions			
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?

Form TVA 30067A

GEL Laboratories

ET

SAMPLE RECEIPT & REVIEW FORM

Client: TVAC	SDG/AR/COC/Work Order: 487777
Received By: AA	Date Received: 8/15/19
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other 7909 7442 3153 7909 7442 3164

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A)Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#: If UN2910, Is the Radioactive Shipment Survey Compliant? Yes___ No___
B) Did the client designate the samples are to be received as radioactive?		✓	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr ✓ Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		✓	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		✓	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	✓			Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		✓		Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius ✓ TEMP: 1°
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR4-16 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	✓			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, are Encores or Soil Kits present for solids? Yes___ No___ NA___(If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes___ No___ NA___(If unknown, select No) Are liquid VOA vials free of headspace? Yes___ No___ NA___ Sample ID's and containers affected:
8	Samples received within holding time?	✓			ID's and tests affected
9	Sample ID's on COC match ID's on bottles?	✓			ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	✓			Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KO Date 8/16 Page 1 of 1 ✓

GL-CHL-SR-001 Rev 6

Work Order Containers

Sample ID: 487777001
Client Sample ID: JSF-GW-023-20190814
Description: JSF-107 Ground Water

Label: 487777001.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:22:52	Lois Buist	Changed batch_id from 1907789 to
20-AUG-19 09:22:52	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
20-AUG-19 11:56:59	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Label: 487777001.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:22:52	Lois Buist	Changed batch_id from 1907789 to
20-AUG-19 09:22:52	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
20-AUG-19 09:43:19	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Radiochemistry Storage

Label: 487777001.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Sample ID: 487777002
Client Sample ID: JSF-GW-024-20190814
Description: JSF-108 Ground Water

Label: 487777002.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789

Work Order Containers

Sample ID: 487777002
Client Sample ID: JSF-GW-024-20190814
Description: JSF-108 Ground Water

Label: 487777002.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:22:52	Lois Buist	Changed batch_id from 1907789 to
20-AUG-19 09:22:52	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
20-AUG-19 11:56:59	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Label: 487777002.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Label: 487777002.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:43:20	Caroline Gause	Changed batch_id from 1907789 to
20-AUG-19 09:43:20	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage

Sample ID: 487777003
Client Sample ID: JSF-GW-025-20190814
Description: JSF-109 Ground Water

Label: 487777003.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:43:19	Caroline Gause	Changed batch_id from 1907789 to

Work Order Containers

Sample ID: 487777003
Client Sample ID: JSF-GW-025-20190814
Description: JSF-109 Ground Water

Label: 487777003.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

20-AUG-19 09:43:19	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage

Label: 487777003.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:22:52	Lois Buist	Changed batch_id from 1907789 to
20-AUG-19 09:22:52	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
20-AUG-19 11:56:59	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Label: 487777003.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:22:52	Lois Buist	Changed batch_id from 1907789 to
20-AUG-19 09:22:52	Lois Buist	Changed sample location from Radiochemistry Prep Laboratory to Return Shelf Radiochemisty Samples
20-AUG-19 11:56:59	Caroline Gause	Changed sample location from Return Shelf Radiochemisty Samples to Consumed By Analysis/Laboratory

Sample ID: 487777004
Client Sample ID: JSF-GW-FB03-20190814
Description: JSF-210 Water

Label: 487777004.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory

Work Order Containers

Sample ID: 487777004
Client Sample ID: JSF-GW-FB03-20190814
Description: JSF-210 Water

Label: 487777004.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:43:20	Caroline Gause	Changed batch_id from 1907789 to
20-AUG-19 09:43:20	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage

Label: 487777004.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage

Label: 487777004.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 11:56:59	Caroline Gause	Changed batch_id from 1907789 to
20-AUG-19 11:56:59	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Consumed By Analysis/Laboratory

Sample ID: 487777005
Client Sample ID: JSF-GW-031-20190814
Description: JSF-210 Ground Water

Label: 487777005.01 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:43:19	Caroline Gause	Changed batch_id from 1907789 to
20-AUG-19 09:43:19	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage

Work Order Containers

Sample ID: 487777005
Client Sample ID: JSF-GW-031-20190814
Description: JSF-210 Ground Water

Label: 487777005.02 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 11:56:59	Caroline Gause	Changed batch_id from 1907789 to
20-AUG-19 11:56:59	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Consumed By Analysis/Laboratory

Label: 487777005.03 **Type: Plastic 1000 mL** **Preservative: Nitric pH<2**

15-AUG-19 16:05:53	Alexandra Almers	Changed sample location from Barcode Generated to Radiochemistry Staging
16-AUG-19 08:01:47	Stacy Boone	Changed sample location from Radiochemistry Staging to Radiochemistry Storage
16-AUG-19 15:08:43	Lois Buist	Transfered custody to batch 1907789
16-AUG-19 15:08:43	Lois Buist	Changed sample location from Radiochemistry Storage to Radiochemistry Prep Laboratory
16-AUG-19 15:09:36	Lois Buist	Transfered custody to batch 1907787
19-AUG-19 11:47:21	Lois Buist	Transfered custody to batch 1907789
20-AUG-19 09:43:19	Caroline Gause	Changed batch_id from 1907789 to
20-AUG-19 09:43:19	Caroline Gause	Changed sample location from Radiochemistry Prep Laboratory to Radiochemistry Storage