The Boeing Company
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 91304-1148

February 15, 2019
In reply, refer to SHEA-115986

Mr. Mark Malinowski, P.G.
DTSC Performance Manager – SSFL
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Subject: Revised Technical Memorandum – The Boeing Company's Radiological Air Monitoring Data Associated with the Woolsey Fire, *Santa Susana Field Laboratory, Ventura County, California.*

Dear Mr. Malinowski:

The Boeing Company (Boeing) is submitting the attached revised package to the "*Technical Memorandum – Boeing's Radiological Air Monitoring Data Associated with the Woolsey Fire*". This memorandum was sent to the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) under a cover letter dated January 4, 2019. After the letter was submitted, further evaluation of the Boeing air monitoring radiological data showed that there were minor errors in the number of radiological sampling events reported and in the presentation of radiological data in the version of this report submitted to DTSC on January 4. This revised memorandum includes the following changes to Appendix A for gross alpha and gross beta:

- Include one additional month of post-fire baseline data,
- Include measurement uncertainties, and
- Correct previously reported minimum detectable concentrations (MDC).

None of these errors change any of the conclusions or discussions presented in the Technical Memorandum. Please replace the memorandum submitted to DTSC on January 7, 2019 with the attached.

If you have any questions regarding this submittal, please contact me at (818) 466-8776.

Sincerely,

Michael O. Bower, P.E.
Associate Technical Fellow
The Boeing Company

Cc: Roger Paulson, DTSC (3 copies)
DTSC Chatsworth Regional Records Office (1 copy)
Alexa Stamets, Jacobs (electronic only)
Dixie Hambrick, Stantec (electronic only)

Technical Memorandum
Boeing's Radiological Air Monitoring Data Associated with the Woolsey Fire

To: Michael Bower, Boeing SSFL Remediation Project Manager
From: Phil Rutherford, Phil Rutherford *Consulting*, under contract to Stantec
Date: February 8, 2019
Project: 185865220.100
Task Order: T30753-N

Boeing operates six air monitoring stations as part of a Baseline Air Monitoring Program at the Santa Susana Field Laboratory (SSFL)[1]. These monitoring stations have been operating since April 2018 establishing baseline data. Two of these stations (#4, #5) collect airborne particulates on glass fiber filters that are changed approximately twice a week and are counted for gross alpha and gross beta radioactivity. These air monitors were operational during the Woolsey Fire that burned across portions of SSFL in November 2018. The design of the samplers, sampler locations and procedures are described in the referenced Workplan.

Gross alpha and gross beta data for the period 4/9/2018 through 1/14/2019, including the period of the fire[2], are provided in Appendix A[3]. As shown in Appendix A, gross beta concentrations during the fire are consistent with the level of gross beta concentrations before and after the fire, indicating that the fire had no significant impact on gross beta concentrations. There was an increase in gross alpha concentrations during the fire consistent with increases that are seen during any forest or brush fire when increased airborne particulate matter from smoke is present.

[1] NASA, The Boeing Company and the Department of Energy, "Baseline Air Monitoring Workplan, Santa Susana Field Laboratory, Ventura County, California", September 2017.

[2] The principal burn days at SSFL were 11/8/2018 and 11/9/2018 that are included in the sampling period, 11/8/2018 to 11/13/2018.

[3] Appendix A for gross alpha and beta data has been revised to (1) include one extra month of post-fire baseline data, (2) include measurement uncertainties, and (3) correct previously reported minimum detectable concentrations (MDC).

In order to evaluate the data collected during the fire, isotopic analysis of the filters collected during the fire period was conducted by an independent, State-certified laboratory for sixty-one radionuclides, including those radionuclides specified in the referenced Workplan. Results are reported in Appendix B and C. Appendix B includes analysis protocols and QA/QC procedures, in addition to sample results. Data validation of this isotopic data is provided in Appendix D. Reported activities per filter (pCi/filter) are converted to air concentrations (μCi/mL) in Appendix E.

Isotopic analysis confirmed that only naturally-occurring radioactive material (NORM), including alpha-emitting radionuclides (^{210}Po, ^{230}Th, and ^{232}Th) and beta-emitting ^{7}Be were detected. No anthropogenic (man-made), nuclear by-product radionuclides were detected in these samples, indicating residual contamination from site operations at SSFL had no impact on radionuclide air concentrations due to the fire.

Appendices

A. Gross Alpha and Gross Beta Air Concentrations
B. Letter from GEL Laboratories to Stantec Consulting, "SSFL Post Woolsey Sampling - Work Order 465305", December 7, 2018
C. Electronic Data Deliverable (EDD) - Work Order 465305
D. Data Validation of Isotopic Results
E. Conversion of Filter Paper Activity to Air Concentrations for Detected Radionuclides

Phil Rutherford *Consulting*

Appendix A

Gross Alpha and Gross Beta Air Concentrations

Table 1. Gross Alpha and Beta Airborne Concentrations at the Boeing #4 Sampling Station							
Start Date/Time	End Date/Time	Gross Alpha (μCi/mL)			Gross Beta (μCi/mL)		
		Concentration[1]	Uncertainty[2]	MDC[3]	Concentration[1]	Uncertainty[2]	MDC[3]
4/9/18 9:31	4/12/18 10:29	-3.66E-15	1.94E-15	8.12E-15	3.52E-14	1.02E-14	3.22E-14
4/12/18 10:33	4/16/18 8:55	4.42E-16	1.77E-15	6.36E-15	3.25E-14	7.96E-15	2.48E-14
4/16/18 9:00	4/20/18 8:31	-1.75E-16	1.48E-15	5.59E-15	3.76E-15	7.42E-15	2.47E-14
4/20/18 8:40	4/24/18 10:16	1.45E-15	1.54E-15	5.30E-15	3.21E-14	8.04E-15	2.53E-14
4/24/18 10:22	4/27/18 9:10	-1.18E-15	2.37E-15	8.75E-15	3.67E-14	1.04E-14	3.29E-14
4/27/18 10:16	4/30/18 10:32	5.69E-16	2.28E-15	8.20E-15	2.56E-14	9.79E-15	3.16E-14
4/30/18 10:42	5/4/18 9:05	-4.42E-16	1.50E-15	5.57E-15	3.15E-14	7.78E-15	2.45E-14
5/4/18 9:03	5/8/18 9:27	-1.04E-15	1.73E-15	6.40E-15	4.15E-14	8.22E-15	2.52E-14
5/8/18 9:38	5/10/18 7:52	2.71E-15	3.79E-15	1.30E-14	2.54E-14	1.55E-14	5.12E-14
5/10/18 18:05	5/14/18 10:49	-1.27E-15	1.60E-15	6.24E-15	1.35E-15	7.17E-15	2.41E-14
5/14/18 10:54	5/17/18 9:16	-2.62E-15	2.14E-15	8.45E-15	2.12E-14	1.00E-14	3.25E-14
5/17/18 9:23	5/21/18 9:11	8.71E-16	1.65E-15	5.75E-15	2.38E-14	7.58E-15	2.43E-14
5/21/18 9:19	5/25/18 7:38	-1.33E-15	1.41E-15	5.48E-15	2.27E-14	7.78E-15	2.49E-14
5/25/18 7:41	5/29/18 10:06	4.24E-16	1.44E-15	5.26E-15	7.55E-15	7.29E-15	2.42E-14
5/29/18 10:10	6/1/18 9:24	-2.34E-15	1.87E-15	7.61E-15	-4.45E-15	9.84E-15	3.34E-14
6/1/18 9:33	6/4/18 9:12	-8.15E-16	2.21E-15	8.38E-15	1.57E-14	1.02E-14	3.36E-14
6/4/18 9:16	6/7/18 9:33	-2.31E-15	2.08E-15	8.20E-15	5.19E-14	9.70E-15	2.95E-14
6/7/18 9:39	6/11/18 10:05	8.65E-16	1.64E-15	5.71E-15	4.18E-14	7.79E-15	2.37E-14
6/11/18 10:09	6/14/18 9:14	5.87E-16	2.00E-15	7.28E-15	2.78E-14	1.03E-14	3.33E-14
6/14/18 9:26	6/18/18 9:08	2.18E-15	1.74E-15	5.75E-15	2.61E-14	7.85E-15	2.49E-14
6/18/18 9:11	6/21/18 8:09	-1.18E-15	1.88E-15	7.41E-15	2.54E-14	9.99E-15	3.22E-14
6/21/18 8:16	6/25/18 10:58	4.23E-16	1.44E-15	5.32E-15	3.24E-14	7.61E-15	2.38E-14
6/25/18 11:03	6/28/18 8:46	8.02E-15	2.51E-15	7.30E-15	2.18E-14	1.02E-14	3.31E-14
6/28/18 12:16	7/2/18 9:51	2.15E-15	1.55E-15	5.25E-15	1.94E-14	7.40E-15	2.38E-14
7/2/18 9:55	7/5/18 10:02	0.00E+00	1.85E-15	7.06E-15	3.35E-14	1.01E-14	3.20E-14
7/5/18 10:07	7/9/18 12:00	8.52E-16	1.45E-15	5.20E-15	3.42E-14	7.59E-15	2.36E-14
7/9/18 12:35	7/12/18 7:54	1.86E-15	2.11E-15	7.56E-15	4.44E-14	1.09E-14	3.43E-14
7/12/18 7:57	7/16/18 9:29	1.88E-15	1.54E-15	5.22E-15	3.69E-14	7.70E-15	2.37E-14
7/16/18 9:40	7/19/18 8:12	-2.37E-16	2.25E-15	8.40E-15	2.72E-14	1.01E-14	3.25E-14
7/19/18 8:17	7/23/18 10:30	1.27E-15	1.70E-15	5.95E-15	4.11E-14	7.81E-15	2.39E-14
7/23/18 10:36	7/26/18 9:34	1.41E-15	2.35E-15	8.23E-15	6.08E-14	1.09E-14	3.30E-14
7/26/18 9:23	7/30/18 9:39	2.17E-15	1.65E-15	5.46E-15	4.87E-14	7.89E-15	2.37E-14
7/30/18 10:04	8/2/18 9:35	2.33E-16	1.98E-15	7.35E-15	4.90E-14	1.03E-14	3.16E-14
8/2/18 9:44	8/6/18 10:30	-1.03E-15	1.90E-15	6.98E-15	4.22E-14	7.85E-15	2.38E-14
8/6/18 10:37	8/10/18 9:21	-1.06E-15	1.94E-15	7.13E-15	4.85E-14	8.10E-15	2.43E-14
8/10/18 9:25	8/14/18 10:14	-4.31E-16	1.64E-15	6.20E-15	3.86E-14	7.76E-15	2.39E-14
8/14/18 12:30	8/16/18 11:35	1.77E-15	3.01E-15	1.08E-14	1.49E-14	1.51E-14	5.00E-14
8/16/18 9:31	8/20/18 11:35	1.87E-15	1.45E-15	4.85E-15	3.73E-14	7.66E-15	2.36E-14
8/20/18 13:38	8/23/18 12:47	3.74E-15	2.37E-15	7.86E-15	2.97E-14	1.09E-14	3.49E-14
8/28/18 11:23	8/31/18 9:02	-2.87E-16	2.87E-15	1.05E-14	3.74E-14	1.24E-14	3.94E-14
8/31/18 9:06	9/4/18 10:50	1.02E-15	1.95E-15	6.76E-15	3.65E-14	9.22E-15	2.91E-14
9/4/18 10:54	9/6/18 13:10	-3.98E-16	3.78E-15	1.37E-14	7.57E-15	1.63E-14	5.48E-14
9/6/18 13:14	9/10/18 9:57	7.56E-16	2.05E-15	7.23E-15	5.33E-14	1.00E-14	3.06E-14
9/10/18 9:58	9/13/18 9:35	8.74E-16	2.50E-15	8.74E-15	4.85E-14	1.11E-14	3.48E-14
9/13/18 9:41	9/17/18 11:04	9.07E-16	1.72E-15	5.99E-15	3.17E-14	8.25E-15	2.59E-14
9/17/18 11:08	9/20/18 10:45	-7.03E-15	2.47E-15	1.02E-14	5.82E-14	1.11E-14	3.39E-14
9/20/18 11:15	9/24/18 10:05	2.01E-15	1.64E-15	5.57E-15	3.99E-14	8.39E-15	2.59E-14
9/24/18 10:06	9/27/18 10:22	-3.21E-15	2.26E-15	8.79E-15	1.99E-14	1.04E-14	3.40E-14
9/27/18 10:28	10/1/18 10:27	3.75E-15	1.79E-15	5.54E-15	5.14E-14	8.22E-15	2.45E-14
10/1/18 10:31	10/4/18 9:24	1.45E-15	2.18E-15	7.50E-15	3.21E-14	1.02E-14	3.22E-14
10/4/18 9:45	10/8/18 9:31	4.21E-15	1.52E-15	4.48E-15	2.37E-14	7.62E-15	2.43E-14
10/8/18 9:36	10/11/18 10:11	8.28E-16	2.36E-15	5.91E-15	4.32E-14	1.03E-14	3.20E-14
10/11/18 10:13	10/15/18 11:15	2.08E-16	1.87E-15	6.66E-15	3.56E-14	9.27E-15	2.93E-14

Table 1. Gross Alpha and Beta Airborne Concentrations at the Boeing #4 Sampling Station							
Start Date/Time	End Date/Time	Gross Alpha (μCi/mL)			Gross Beta (μCi/mL)		
		Concentration[1]	Uncertainty[2]	MDC[3]	Concentration[1]	Uncertainty[2]	MDC[3]
10/15/18 11:21	10/19/18 10:10	6.33E-16	1.72E-15	6.15E-15	4.88E-14	8.51E-15	2.60E-14
10/19/18 10:11	10/23/18 10:45	-8.89E-16	1.69E-15	6.40E-15	5.42E-14	8.53E-15	2.54E-14
10/23/18 9:59	10/25/18 9:22	-1.27E-15	3.26E-15	1.23E-14	5.60E-14	1.67E-14	5.31E-14
10/25/18 11:23	10/29/18 9:16	6.33E-16	1.72E-15	6.15E-15	9.40E-14	9.49E-15	2.60E-14
10/29/18 9:05	11/1/18 9:50	5.54E-15	2.24E-15	6.84E-15	3.55E-14	1.05E-14	3.34E-14
11/1/18 9:08	11/5/18 10:45	0.00E+00	1.76E-15	6.33E-15	4.26E-14	8.26E-15	2.53E-14
11/5/18 10:50	11/8/18 10:15	-2.40E-16	2.40E-15	8.65E-15	3.95E-14	1.09E-14	3.46E-14
11/8/18 10:59	11/13/18 10:30	8.73E-15	1.80E-15	4.80E-15	6.32E-14	6.80E-15	1.89E-14
11/13/18 12:25	11/16/18 10:30	-2.45E-15	2.20E-15	8.82E-15	1.85E-14	1.08E-14	3.53E-14
11/16/18 11:08	11/19/18 9:32	5.12E-15	2.44E-15	7.80E-15	7.45E-14	1.17E-14	3.49E-14
11/19/18 9:38	11/21/18 8:50	8.00E-15	3.64E-15	1.16E-14	9.40E-14	1.71E-14	5.20E-14
11/21/18 8:57	11/26/18 12:15	2.07E-15	1.54E-15	4.99E-15	3.41E-14	6.99E-15	2.16E-14
11/26/18 12:19	11/30/18 9:15	1.38E-15	1.94E-15	6.83E-15	1.50E-14	7.94E-15	2.59E-14
11/30/18 9:17	12/3/18 9:05	-8.03E-16	2.06E-15	7.80E-15	-8.49E-15	9.41E-15	3.21E-14
12/3/18 9:05	12/7/18 9:25	-7.95E-16	2.16E-15	7.95E-15	1.77E-14	9.77E-15	3.19E-14
12/7/18 9:31	12/10/18 10:42	1.76E-15	2.11E-15	7.27E-15	1.66E-14	9.97E-15	3.25E-14
12/10/18 10:47	12/13/18 10:28	-1.44E-15	2.15E-15	8.02E-15	7.46E-14	1.10E-14	3.23E-14
12/13/18 10:30	12/17/18 8:00	2.02E-15	1.74E-15	5.87E-15	4.98E-14	8.26E-15	2.46E-14
12/17/18 7:55	12/20/18 8:20	8.29E-16	2.37E-15	8.29E-15	3.93E-14	1.02E-14	3.22E-14
12/20/18 8:34	1/2/19 9:35	1.15E-15	6.30E-16	2.00E-15	2.99E-14	2.88E-15	7.73E-15
1/2/19 9:36	1/4/19 8:35	-3.65E-16	3.65E-15	1.33E-14	1.41E-14	1.57E-14	5.20E-14
1/4/19 8:40	1/8/19 10:10	5.06E-15	1.94E-15	5.92E-15	1.77E-14	9.26E-15	3.02E-14
1/8/19 10:14	1/10/19 9:45	-1.26E-15	3.43E-15	1.30E-14	1.99E-15	1.50E-14	5.04E-14
1/10/19 9:43	1/14/19 11:28	2.61E-15	1.78E-15	5.95E-15	2.90E-14	8.98E-15	2.88E-14

[1] Negative numbers result from subtraction of blank filter background

[2] Uncertainty is at the 1 sigma (σ) level

[3] MDC = minimum detectable concentration

Yellow highlight represents sampling period that includes the burn period

Table 2. Gross Alpha and Beta Airborne Concentrations at the Boeing #5 Sampling Station							
Start Date/Time	End Date/Time	Gross Alpha (μCi/mL)			Gross Beta (μCi/mL)		
		Concentration[1]	Uncertainty[2]	MDC[3]	Concentration[1]	Uncertainty[2]	MDC[3]
4/9/18 10:23	4/12/18 9:26	-2.52E-16	2.39E-15	8.93E-15	2.78E-14	1.09E-14	3.55E-14
4/12/18 9:32	4/16/18 8:10	-2.60E-16	2.60E-15	9.35E-15	3.73E-14	1.14E-14	3.65E-14
4/16/18 8:33	4/20/18 8:05	1.80E-16	1.62E-15	5.75E-15	6.10E-15	7.63E-15	2.54E-14
4/20/18 8:13	4/24/18 9:55	6.15E-16	1.49E-15	5.44E-15	1.52E-14	7.90E-15	2.60E-14
4/24/18 10:05	4/27/18 8:20	-1.22E-15	2.44E-15	9.04E-15	5.01E-14	1.10E-14	3.39E-14
4/27/18 8:22	4/30/18 9:57	-2.33E-16	2.33E-15	8.40E-15	2.90E-14	1.01E-14	3.24E-14
4/30/18 10:02	5/4/18 8:43	4.82E-15	2.60E-15	8.20E-15	2.46E-14	1.11E-14	3.61E-14
5/4/18 8:50	5/8/18 9:14	-1.78E-16	1.78E-15	6.58E-15	3.63E-14	8.27E-15	2.59E-14
5/8/18 9:20	5/10/18 9:15	3.58E-15	3.76E-15	1.29E-14	6.55E-14	1.61E-14	5.08E-14
5/10/18 9:18	5/14/18 10:04	-1.06E-15	1.77E-15	6.56E-15	7.09E-16	7.53E-15	2.54E-14
5/14/18 10:07	5/17/18 8:54	6.06E-16	2.42E-15	8.60E-15	4.22E-14	1.05E-14	3.31E-14
5/17/18 9:00	5/21/18 8:50	1.34E-15	1.70E-15	5.91E-15	1.52E-14	7.61E-15	2.50E-14
5/21/18 8:57	5/25/18 7:15	1.36E-15	1.64E-15	5.64E-15	2.60E-14	8.01E-15	2.57E-14
5/25/18 7:21	5/29/18 9:31	-1.75E-16	1.49E-15	5.42E-15	2.36E-15	7.43E-15	2.50E-14
5/29/18 10:10	6/1/18 9:24	1.41E-15	2.23E-15	7.61E-15	7.61E-15	1.01E-14	3.34E-14
6/1/18 9:07	6/4/18 8:50	0.00E+00	2.39E-15	8.61E-15	2.62E-14	1.06E-14	3.46E-14
6/4/18 8:55	6/7/18 9:02	-1.19E-15	2.26E-15	8.45E-15	4.07E-14	9.75E-15	3.04E-14
6/7/18 9:08	6/11/18 9:33	3.92E-15	1.87E-15	5.87E-15	3.36E-14	7.83E-15	2.44E-14
6/11/18 9:38	6/14/18 8:54	5.27E-15	2.51E-15	7.78E-15	3.14E-14	1.10E-14	3.56E-14
6/14/18 9:01	6/18/18 8:44	-1.08E-15	1.52E-15	5.91E-15	2.78E-14	8.07E-15	2.56E-14
6/18/18 8:47	6/21/18 7:52	3.86E-15	2.29E-15	7.61E-15	2.44E-14	1.03E-14	3.31E-14
6/21/18 7:59	6/25/18 10:18	3.49E-15	1.75E-15	5.50E-15	2.29E-14	7.68E-15	2.45E-14
6/25/18 10:26	6/28/18 8:23	2.08E-15	2.21E-15	7.48E-15	3.63E-14	1.07E-14	3.40E-14
6/28/18 8:31	7/2/18 9:20	3.46E-15	1.68E-15	5.40E-15	1.90E-14	7.62E-15	2.45E-14
7/2/18 9:22	7/5/18 9:38	3.56E-15	2.14E-15	7.24E-15	8.07E-15	9.85E-15	3.29E-14
7/5/18 9:42	7/9/18 11:17	1.76E-15	1.58E-15	5.36E-15	4.93E-14	8.09E-15	2.44E-14
7/9/18 12:23	7/12/18 7:36	1.26E-15	2.14E-15	7.67E-15	4.74E-14	1.12E-14	3.48E-14
7/12/18 8:03	7/16/18 9:14	1.77E-15	1.59E-15	5.38E-15	3.71E-14	7.86E-15	2.45E-14
7/16/18 9:19	7/19/18 7:47	-8.52E-16	2.31E-15	8.65E-15	4.29E-14	1.07E-14	3.35E-14
7/19/18 7:51	7/23/18 9:57	2.36E-15	1.84E-15	6.12E-15	2.86E-14	7.78E-15	2.46E-14
7/23/18 10:02	7/26/18 9:08	1.81E-15	2.41E-15	8.45E-15	4.34E-14	1.09E-14	3.39E-14
7/26/18 9:18	7/30/18 9:21	6.25E-16	1.61E-15	5.62E-15	4.39E-14	8.03E-15	2.45E-14
7/30/18 10:22	8/2/18 8:53	3.60E-15	2.28E-15	7.55E-15	4.48E-14	1.04E-14	3.25E-14
8/2/18 8:59	8/6/18 9:59	0.00E+00	2.03E-15	7.16E-15	5.87E-14	8.31E-15	2.44E-14
8/6/18 10:04	8/10/18 8:59	-3.16E-15	1.90E-15	7.32E-15	5.61E-14	8.40E-15	2.49E-14
8/10/18 9:06	8/14/18 9:40	-6.22E-16	1.69E-15	6.40E-15	3.86E-14	7.99E-15	2.46E-14
8/14/18 11:28	8/16/18 10:32	5.47E-15	3.28E-15	1.11E-14	5.47E-15	1.53E-14	5.14E-14
8/16/18 8:56	8/20/18 10:32	3.69E-15	1.58E-15	5.01E-15	2.69E-14	7.65E-15	2.43E-14
8/20/18 12:30	8/23/18 12:34	-8.33E-16	2.02E-15	7.50E-15	4.15E-14	1.06E-14	3.33E-14
8/23/18 12:31	8/27/18 9:45	5.24E-15	2.12E-15	6.71E-15	4.03E-14	8.18E-15	2.52E-14
8/27/18 9:56	8/31/18 8:38	0.00E+00	1.81E-15	6.61E-15	3.65E-14	7.97E-15	2.48E-14
8/31/18 8:41	9/4/18 10:16	-1.32E-15	1.49E-15	5.80E-15	4.40E-14	8.18E-15	2.50E-14
9/4/18 10:22	9/6/18 13:29	1.68E-15	3.36E-15	1.16E-14	1.86E-14	1.39E-14	4.61E-14
9/6/18 13:34	9/10/18 9:29	1.86E-16	1.77E-15	6.25E-15	5.17E-14	8.76E-15	2.64E-14
9/10/18 9:34	9/13/18 8:52	6.02E-16	2.41E-15	8.42E-15	5.93E-14	1.09E-14	3.36E-14
9/13/18 8:57	9/17/18 10:47	1.31E-15	1.67E-15	5.78E-15	3.23E-14	7.98E-15	2.50E-14
9/17/18 10:50	9/20/18 10:14	-3.24E-15	2.64E-15	9.97E-15	6.35E-14	1.09E-14	3.30E-14
9/20/18 10:38	9/24/18 9:40	4.24E-15	1.80E-15	5.50E-15	5.19E-14	8.48E-15	2.56E-14
9/24/18 9:45	9/27/18 10:06	1.42E-15	2.48E-15	8.75E-15	4.22E-14	1.08E-14	3.38E-14
9/27/18 10:09	10/1/18 9:49	2.86E-15	1.70E-15	5.55E-15	6.41E-14	8.50E-15	2.45E-14
10/1/18 9:56	10/4/18 9:08	0.00E+00	2.05E-15	7.47E-15	5.52E-14	1.05E-14	3.20E-14
10/4/18 9:13	10/8/18 9:06	3.75E-15	1.52E-15	4.47E-15	3.53E-14	7.77E-15	2.42E-14
10/8/18 9:12	10/11/18 9:58	-1.76E-15	2.23E-15	5.88E-15	3.41E-14	1.01E-14	3.19E-14

Table 2. Gross Alpha and Beta Airborne Concentrations at the Boeing #5 Sampling Station							
Start Date/Time	End Date/Time	Gross Alpha (μCi/mL)			Gross Beta (μCi/mL)		
		Concentration[1]	Uncertainty[2]	MDC[3]	Concentration[1]	Uncertainty[2]	MDC[3]
10/11/18 9:58	10/15/18 10:38	7.33E-16	1.89E-15	6.71E-15	3.33E-14	9.32E-15	2.94E-14
10/15/18 10:42	10/19/18 9:51	1.80E-15	1.80E-15	6.12E-15	5.17E-14	8.55E-15	2.58E-14
10/19/18 9:53	10/23/18 10:12	-8.89E-16	1.69E-15	6.40E-15	6.73E-14	8.80E-15	2.54E-14
10/23/18 11:16	10/25/18 10:16	-3.64E-16	3.46E-15	1.24E-14	7.67E-14	1.71E-14	5.34E-14
10/25/18 9:30	10/29/18 8:42	1.80E-16	1.71E-15	6.12E-15	9.24E-14	9.46E-15	2.58E-14
10/29/18 8:39	11/1/18 9:15	4.13E-15	2.13E-15	6.85E-15	5.63E-14	1.09E-14	3.34E-14
11/1/18 8:28	11/5/18 10:13	1.49E-15	1.84E-15	6.32E-15	3.97E-14	8.16E-15	2.53E-14
11/5/18 10:15	11/8/18 9:53	2.40E-16	2.40E-15	8.62E-15	5.79E-14	1.13E-14	3.45E-14
11/8/18 10:56	11/13/18 11:00	1.34E-14	2.14E-15	5.15E-15	6.84E-14	7.29E-15	2.02E-14
11/13/18 10:08	11/16/18 10:45	0.00E+00	2.36E-15	8.50E-15	-1.20E-14	9.92E-15	3.40E-14
11/16/18 10:51	11/19/18 8:50	8.58E-16	2.21E-15	7.85E-15	7.63E-14	1.18E-14	3.51E-14
11/19/18 8:55	11/21/18 8:21	3.62E-15	3.44E-15	1.16E-14	7.67E-14	1.66E-14	5.17E-14
11/21/18 8:25	11/26/18 11:47	1.14E-15	1.45E-15	4.95E-15	2.11E-14	6.70E-15	2.14E-14
11/26/18 11:51	11/30/18 8:40	-3.20E-15	1.90E-15	7.40E-15	1.74E-14	8.60E-15	2.80E-14
11/30/18 8:41	12/3/18 8:40	-5.96E-16	2.15E-15	8.10E-15	-9.53E-16	9.89E-15	3.34E-14
12/3/18 8:44	12/7/18 9:50	-5.91E-16	2.25E-15	8.27E-15	8.04E-15	9.93E-15	3.32E-14
12/7/18 9:56	12/10/18 10:24	-1.18E-15	1.89E-15	7.34E-15	2.78E-14	1.02E-14	3.28E-14
12/10/18 10:29	12/13/18 10:08	1.79E-15	2.27E-15	8.02E-15	7.55E-14	1.10E-14	3.23E-14
12/13/18 10:13	12/17/18 7:45	1.83E-15	1.74E-15	5.87E-15	5.58E-14	8.35E-15	2.46E-14
12/17/18 7:45	12/20/18 8:05	3.20E-15	2.49E-15	8.30E-15	1.33E-14	9.72E-15	3.22E-14
12/20/18 8:15	1/2/19 9:05	1.37E-16	5.76E-16	2.00E-15	3.13E-14	2.91E-15	7.73E-15
1/2/19 9:07	1/4/19 8:18	-2.73E-15	3.45E-15	1.33E-14	1.69E-14	1.56E-14	5.18E-14
1/4/19 8:16	1/8/19 9:30	2.84E-15	1.79E-15	5.79E-15	2.89E-14	9.27E-15	2.96E-14
1/8/19 9:44	1/10/19 9:25	-3.96E-15	3.24E-15	1.30E-14	5.40E-15	1.49E-14	5.02E-14
1/10/19 9:21	1/14/19 10:55	5.26E-15	2.04E-15	6.12E-15	2.51E-14	9.23E-15	2.96E-14

[1] Negative numbers result from subtraction of blank filter background

[2] Uncertainty is at the 1 sigma (σ) level

[3] MDC = minimum detectable concentration

Yellow highlight represents sampling period that includes the burn period

Appendix B

Letter from GEL Laboratories to Stantec Consulting, "SSFL Post Woolsey Sampling - Work Order 465305", December 7, 2018

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

December 07, 2018

Stantec Consulting
5800 Woolsey Canyon Rd.
Canoga Park, California 91304

Re: SSFL Post-Woolsey Sampling
Work Orders: 465305

Dear Ms. VonRaesfeld:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 23, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4289.

Sincerely,

Julie Robinson

Julie Robinson
Project Manager

Enclosures

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis Report
for

SNTC001 Stantec Consulting

Client SDG: 465305 GEL Work Order: 465305

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

** Analyte is a surrogate compound

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

UI Gamma Spectroscopy−−Uncertain identification

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Julie Robinson.

Reviewed by Julie Robinson

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

Certificate of Analysis

Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-4
Sample ID: 465305001
Matrix: Filter
Collect Date: 13-NOV-18 10:30
Receive Date: 23-NOV-18
Collector: Client

Project: SNTC00118
Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
AlphaSpec Ra226, Filter "As Received"													
Radium-226	U	1.12	+/-1.24	1.89	28.4	pCi/Filter			BXA4	12/05/18	0910	1826522	1
Alphaspec Am241, Filter "As Received"													
Americium-241	U	0.0181	+/-0.117	0.240	0.630	pCi/Filter			BXA4	12/04/18	2118	1826529	2
Alphaspec Po210, Filter "As Received"													
Polonium-210		1.84	+/-1.28	1.11	28.4	pCi/Filter			BXA4	12/06/18	1001	1826520	3
Alphaspec Pu, Filter "As Received"													
Plutonium-238	U	0.00431	+/-0.218	0.473	0.630	pCi/Filter			BXA4	12/05/18	0925	1826533	4
Plutonium-239/240	U	0.0279	+/-0.185	0.379	0.630	pCi/Filter							
Alphaspec Th, Filter "As Received"													
Thorium-228	U	0.0317	+/-0.0888	0.159	0.630	pCi/Filter			BXA4	12/05/18	1403	1826534	5
Thorium-230	U	0.108	+/-0.110	0.169	0.630	pCi/Filter							
Thorium-232		0.148	+/-0.0842	0.0479	0.126	pCi/Filter							
Alphaspec U, Filter "As Received"													
Uranium-233/234	U	0.230	+/-0.231	0.310	1.58	pCi/Filter			BXA4	12/05/18	0924	1826536	6
Uranium-235/236	U	0.0611	+/-0.168	0.292	1.89	pCi/Filter							
Uranium-238	U	0.0402	+/-0.137	0.254	1.89	pCi/Filter							
Liquid Scint Pu241, Filter "As Received"													
Plutonium-241	U	-8.14	+/-11.8	20.4	25.2	pCi/Filter			BXA4	12/06/18	0652	1826538	7
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Filter (Standard List) "As Received"													
Actinium-228	U	-2.67	+/-3.65	6.50		pCi/Filter			MXR1	11/28/18	1116	1826402	8
Antimony-124	U	0.0949	+/-2.07	4.43		pCi/Filter							
Antimony-125	U	0.947	+/-1.60	3.25		pCi/Filter							
Barium-133	U	0.934	+/-1.06	1.62		pCi/Filter							
Barium-140	U	2.78	+/-4.36	9.20		pCi/Filter							
Beryllium-7		26.9	+/-11.7	11.0	94500	pCi/Filter							
Bismuth-212	U	-1.73	+/-10.5	19.1		pCi/Filter							
Bismuth-214	U	-0.251	+/-2.07	3.61		pCi/Filter							
Cerium-139	U	0.356	+/-0.454	0.862		pCi/Filter							
Cerium-141	U	-0.998	+/-1.09	1.73		pCi/Filter							
Cerium-144	U	-0.149	+/-3.22	5.63		pCi/Filter							
Cesium-134	U	-0.537	+/-0.726	1.17		pCi/Filter							
Cesium-136	U	-1.79	+/-2.24	3.86		pCi/Filter							
Cesium-137	U	-0.49	+/-0.715	1.19	6300	pCi/Filter							

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

Certificate of Analysis

Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-4 Project: SNTC00118
Sample ID: 465305001 Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Filter (Standard List) "As Received"													
Chromium-51	U	-2.84	+/-7.00	11.3		pCi/Filter							
Cobalt-56	U	0.502	+/-0.923	1.87		pCi/Filter							
Cobalt-57	U	-0.0923	+/-0.375	0.648		pCi/Filter							
Cobalt-58	U	-0.39	+/-1.06	1.73		pCi/Filter							
Cobalt-60	U	-0.388	+/-1.04	1.75	1580	pCi/Filter							
Europium-152	U	-0.495	+/-1.62	2.98		pCi/Filter							
Europium-154	U	-1.82	+/-2.29	3.82		pCi/Filter							
Europium-155	U	1.86	+/-1.52	3.00		pCi/Filter							
Iridium-192	U	-0.21	+/-0.582	1.07		pCi/Filter							
Iron-59	U	0.923	+/-2.05	4.36		pCi/Filter							
Lead-210	U	-13.2	+/-31.7	53.2		pCi/Filter							
Lead-212	U	0.868	+/-1.68	1.50		pCi/Filter							
Lead-214	U	-0.514	+/-1.88	3.10		pCi/Filter							
Manganese-54	U	0.0502	+/-0.748	1.43		pCi/Filter							
Mercury-203	U	0.619	+/-0.712	1.34		pCi/Filter							
Neodymium-147	U	-1.79	+/-9.34	17.4		pCi/Filter							
Neptunium-239	U	-2.67	+/-4.13	6.83		pCi/Filter							
Niobium-94	U	0.196	+/-0.779	1.49		pCi/Filter							
Niobium-95	U	0.549	+/-0.880	1.80		pCi/Filter							
Potassium-40	U	5.84	+/-14.5	30.8	18900	pCi/Filter							
Promethium-144	U	0.293	+/-0.846	1.62		pCi/Filter							
Promethium-146	U	-1.07	+/-0.797	1.23		pCi/Filter							
Radium-228	U	-2.67	+/-3.65	6.50	63.0	pCi/Filter							
Ruthenium-106	U	0.167	+/-7.58	12.7		pCi/Filter							
Silver-110m	U	-0.764	+/-1.01	1.60		pCi/Filter							
Sodium-22	U	-0.643	+/-0.808	1.35		pCi/Filter							
Thallium-208	U	0.629	+/-1.18	1.25		pCi/Filter							
Thorium-234	U	1.87	+/-16.5	29.9		pCi/Filter							
Tin-113	U	0.558	+/-0.841	1.69		pCi/Filter							
Uranium-235	U	-1.53	+/-3.98	5.98		pCi/Filter							
Uranium-238	U	1.87	+/-16.5	29.9		pCi/Filter							
Yttrium-88	U	-0.0756	+/-0.648	1.44		pCi/Filter							
Zinc-65	U	-0.334	+/-2.07	3.51		pCi/Filter							
Zirconium-95	U	0.133	+/-1.44	2.77		pCi/Filter							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Filter "As Received"													

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Certificate of Analysis

Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-4 Project: SNTC00118
Sample ID: 465305001 Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Filter "As Received"													
Strontium-90	U	0.257	+/-0.936	1.67	1.89	pCi/Filter			KSD1	12/05/18	0942	1826813	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Filter Prep	Filter Prep	CXC1	11/30/18	1110	1826500

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	Eichrom Industries, AN-1421	
2	DOE EML HASL-300, Am-05-RC Modified	
3	DOE EML HASL-300, Po-01-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, U-02-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE HASL 300, 4.5.2.3/Ga-01-R	
9	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	AlphaSpec Ra226, Filter "As Received"			83.9	(15%-125%)
Americium-243 Tracer	Alphaspec Am241, Filter "As Received"			83.3	(15%-125%)
Polonium-209 Tracer	Alphaspec Po210, Filter "As Received"			50.4	(15%-125%)
Plutonium-242 Tracer	Alphaspec Pu, Filter "As Received"			70.7	(15%-125%)
Thorium-229 Tracer	Alphaspec Th, Filter "As Received"			73.5	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Filter "As Received"			76.2	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Filter "As Received"			70.7	(15%-125%)
Strontium Carrier	GFPC, Sr90, Filter "As Received"			82.8	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: December 7, 2018

Company :	Stantec Consulting
Address :	5800 Woolsey Canyon Rd.
	Canoga Park, California 91304
Contact:	Ms. Sarah VonRaesfeld
Project:	SSFL Post-Woolsey Sampling

Client Sample ID:	20181113-BOEING-4	Project:	SNTC00118
Sample ID:	465305001	Client ID:	SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-5
Sample ID: 465305002
Matrix: Filter
Collect Date: 13-NOV-18 11:00
Receive Date: 23-NOV-18
Collector: Client

Project: SNTC00118
Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
AlphaSpec Ra226, Filter "As Received"													
Radium-226	U	0.580	+/-0.930	1.55	28.4	pCi/Filter			BXA4	12/05/18	0910	1826522	1
Alphaspec Am241, Filter "As Received"													
Americium-241	U	-0.0201	+/-0.0891	0.232	0.630	pCi/Filter			BXA4	12/04/18	2118	1826529	2
Alphaspec Po210, Filter "As Received"													
Polonium-210		2.43	+/-1.65	1.55	28.4	pCi/Filter			BXA4	12/06/18	1001	1826520	3
Alphaspec Pu, Filter "As Received"													
Plutonium-238	U	0.0333	+/-0.149	0.292	0.630	pCi/Filter			BXA4	12/04/18	2118	1826533	4
Plutonium-239/240	U	-0.0449	+/-0.183	0.432	0.630	pCi/Filter							
Alphaspec Th, Filter "As Received"													
Thorium-228	U	0.037	+/-0.0917	0.163	0.630	pCi/Filter			BXA4	12/05/18	1403	1826534	5
Thorium-230		0.146	+/-0.0917	0.112	0.630	pCi/Filter							
Thorium-232		0.101	+/-0.0709	0.0738	0.126	pCi/Filter							
Alphaspec U, Filter "As Received"													
Uranium-233/234	U	0.0872	+/-0.156	0.260	1.58	pCi/Filter			BXA4	12/05/18	0924	1826536	6
Uranium-235/236	U	0.177	+/-0.190	0.216	1.89	pCi/Filter							
Uranium-238	U	0.137	+/-0.169	0.245	1.89	pCi/Filter							
Liquid Scint Pu241, Filter "As Received"													
Plutonium-241	U	-9.52	+/-11.5	19.9	25.2	pCi/Filter			BXA4	12/06/18	0855	1826538	7
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Filter (Standard List) "As Received"													
Actinium-228	U	-0.287	+/-3.43	6.72		pCi/Filter			MXR1	11/28/18	1117	1826402	8
Antimony-124	U	1.18	+/-2.44	5.82		pCi/Filter							
Antimony-125	U	0.429	+/-1.76	3.47		pCi/Filter							
Barium-133	U	0.137	+/-0.851	1.64		pCi/Filter							
Barium-140	U	2.07	+/-6.86	12.4		pCi/Filter							
Beryllium-7		22.2	+/-12.4	12.5	94500	pCi/Filter							
Bismuth-212	U	-8.2	+/-11.3	18.7		pCi/Filter							
Bismuth-214	U	0.260	+/-2.03	3.56		pCi/Filter							
Cerium-139	U	0.00371	+/-0.586	0.940		pCi/Filter							
Cerium-141	U	-2.28	+/-1.35	1.76		pCi/Filter							
Cerium-144	U	0.606	+/-3.91	6.92		pCi/Filter							
Cesium-134	U	-0.221	+/-0.666	1.23		pCi/Filter							
Cesium-136	U	1.66	+/-2.15	5.12		pCi/Filter							
Cesium-137	U	-0.121	+/-0.897	1.59	6300	pCi/Filter							

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Certificate of Analysis

Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-5 Project: SNTC00118
Sample ID: 465305002 Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Filter (Standard List) "As Received"													
Chromium-51	U	5.15	+/-7.61	15.4		pCi/Filter							
Cobalt-56	U	-0.283	+/-0.796	1.43		pCi/Filter							
Cobalt-57	U	-0.194	+/-0.419	0.703		pCi/Filter							
Cobalt-58	U	1.11	+/-0.980	1.48		pCi/Filter							
Cobalt-60	U	0.188	+/-0.800	1.83	1580	pCi/Filter							
Europium-152	U	-0.692	+/-2.19	3.67		pCi/Filter							
Europium-154	U	0.474	+/-2.37	5.29		pCi/Filter							
Europium-155	U	-1.93	+/-1.97	3.11		pCi/Filter							
Iridium-192	U	-0.187	+/-0.687	1.27		pCi/Filter							
Iron-59	U	-0.0658	+/-1.67	3.53		pCi/Filter							
Lead-210	UI	0.00	+/-384	332		pCi/Filter							
Lead-212	U	1.87	+/-1.80	2.00		pCi/Filter							
Lead-214	U	-0.985	+/-1.97	3.27		pCi/Filter							
Manganese-54	U	-0.0178	+/-0.757	1.46		pCi/Filter							
Mercury-203	U	0.889	+/-0.767	1.60		pCi/Filter							
Neodymium-147	U	-3.47	+/-11.2	20.5		pCi/Filter							
Neptunium-239	U	-0.506	+/-5.04	8.78		pCi/Filter							
Niobium-94	U	0.143	+/-0.856	1.64		pCi/Filter							
Niobium-95	U	-0.813	+/-1.22	1.73		pCi/Filter							
Potassium-40	U	-1.44	+/-12.7	27.1	18900	pCi/Filter							
Promethium-144	U	0.181	+/-0.879	1.69		pCi/Filter							
Promethium-146	U	-0.256	+/-0.860	1.58		pCi/Filter							
Radium-228	U	-0.287	+/-3.43	6.72	63.0	pCi/Filter							
Ruthenium-106	U	-2.76	+/-6.51	11.6		pCi/Filter							
Silver-110m	U	0.810	+/-1.18	2.55		pCi/Filter							
Sodium-22	U	-0.00893	+/-0.854	1.81		pCi/Filter							
Thallium-208	U	-0.122	+/-0.882	1.60		pCi/Filter							
Thorium-234	U	6.65	+/-41.1	70.8		pCi/Filter							
Tin-113	U	-0.372	+/-0.968	1.75		pCi/Filter							
Uranium-235	U	-0.435	+/-4.41	7.06		pCi/Filter							
Uranium-238	U	6.65	+/-41.1	70.8		pCi/Filter							
Yttrium-88	U	-0.213	+/-0.861	1.78		pCi/Filter							
Zinc-65	U	-0.185	+/-1.76	3.58		pCi/Filter							
Zirconium-95	U	0.793	+/-1.39	2.93		pCi/Filter							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Filter "As Received"													

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Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-5 Project: SNTC00118
Sample ID: 465305002 Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Filter "As Received"													
Strontium-90	U	-0.319	+/-0.771	1.47	1.89	pCi/Filter			KSD1	12/05/18	0943	1826813	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Filter Prep	Filter Prep	CXC1	11/30/18	1110	1826500

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	Eichrom Industries, AN-1421	
2	DOE EML HASL-300, Am-05-RC Modified	
3	DOE EML HASL-300, Po-01-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, U-02-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE HASL 300, 4.5.2.3/Ga-01-R	
9	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	AlphaSpec Ra226, Filter "As Received"			91	(15%-125%)
Americium-243 Tracer	Alphaspec Am241, Filter "As Received"			63.8	(15%-125%)
Polonium-209 Tracer	Alphaspec Po210, Filter "As Received"			42.9	(15%-125%)
Plutonium-242 Tracer	Alphaspec Pu, Filter "As Received"			71.9	(15%-125%)
Thorium-229 Tracer	Alphaspec Th, Filter "As Received"			75.2	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Filter "As Received"			95.2	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Filter "As Received"			71.9	(15%-125%)
Strontium Carrier	GFPC, Sr90, Filter "As Received"			94.7	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Certificate of Analysis

Report Date: December 7, 2018

Company :	Stantec Consulting
Address :	5800 Woolsey Canyon Rd.
	Canoga Park, California 91304
Contact:	Ms. Sarah VonRaesfeld
Project:	SSFL Post-Woolsey Sampling

Client Sample ID:	20181113-BOEING-5	Project:	SNTC00118
Sample ID:	465305002	Client ID:	SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: December 7, 2018

Company :	Stantec Consulting
Address :	5800 Woolsey Canyon Rd.
	Canoga Park, California 91304
Contact:	Ms. Sarah VonRaesfeld
Project:	SSFL Post-Woolsey Sampling

Client Sample ID:	20181113-BOEING-BLANK	Project:	SNTC00118
Sample ID:	465305003	Client ID:	SNTC001
Matrix:	Filter		
Collect Date:	13-NOV-18 15:00		
Receive Date:	23-NOV-18		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
AlphaSpec Ra226, Filter "As Received"													
Radium-226	U	0.705	+/-0.874	1.27	28.4	pCi/Filter			BXA4	12/05/18	0910	1826522	1
Alphaspec Am241, Filter "As Received"													
Americium-241	U	0.0998	+/-0.208	0.367	0.630	pCi/Filter			BXA4	12/04/18	2118	1826529	2
Alphaspec Po210, Filter "As Received"													
Polonium-210	U	0.494	+/-0.802	1.14	28.4	pCi/Filter			BXA4	12/06/18	1247	1826520	3
Alphaspec Pu, Filter "As Received"													
Plutonium-238	U	0.00153	+/-0.113	0.252	0.630	pCi/Filter			BXA4	12/04/18	2118	1826533	4
Plutonium-239/240	U	-0.119	+/-0.101	0.362	0.630	pCi/Filter							
Alphaspec Th, Filter "As Received"													
Thorium-228	U	-0.0104	+/-0.0694	0.140	0.630	pCi/Filter			BXA4	12/05/18	1403	1826534	5
Thorium-230	U	0.0659	+/-0.0912	0.151	0.630	pCi/Filter							
Thorium-232	U	0.0157	+/-0.0429	0.0708	0.126	pCi/Filter							
Alphaspec U, Filter "As Received"													
Uranium-233/234	U	0.0327	+/-0.290	0.613	1.58	pCi/Filter			BXA4	12/06/18	0854	1826536	6
Uranium-235/236	U	0.066	+/-0.290	0.525	1.89	pCi/Filter							
Uranium-238	U	0.200	+/-0.330	0.475	1.89	pCi/Filter							
Liquid Scint Pu241, Filter "As Received"													
Plutonium-241	U	-13.2	+/-11.7	20.4	25.2	pCi/Filter			BXA4	12/06/18	1059	1826538	7
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Filter (Standard List) "As Received"													
Actinium-228	U	-0.105	+/-4.82	8.96		pCi/Filter			MXR1	11/28/18	1132	1826402	8
Antimony-124	U	-0.969	+/-2.13	4.13		pCi/Filter							
Antimony-125	U	-0.925	+/-2.04	3.62		pCi/Filter							
Barium-133	U	0.498	+/-1.31	1.90		pCi/Filter							
Barium-140	U	3.95	+/-5.91	12.4		pCi/Filter							
Beryllium-7	U	5.63	+/-7.14	15.0	94500	pCi/Filter							
Bismuth-212	U	-2.53	+/-11.0	20.4		pCi/Filter							
Bismuth-214	U	0.418	+/-2.14	3.93		pCi/Filter							
Cerium-139	U	0.333	+/-0.554	1.09		pCi/Filter							
Cerium-141	U	0.155	+/-1.19	2.26		pCi/Filter							
Cerium-144	U	1.02	+/-3.93	7.52		pCi/Filter							
Cesium-134	U	-0.247	+/-0.920	1.69		pCi/Filter							
Cesium-136	U	2.26	+/-2.79	6.24		pCi/Filter							
Cesium-137	U	0.506	+/-0.721	1.61	6300	pCi/Filter							

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Certificate of Analysis

Report Date: December 7, 2018

Company : Stantec Consulting
Address : 5800 Woolsey Canyon Rd.
Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-BLANK
Sample ID: 465305003
Project: SNTC00118
Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Filter (Standard List) "As Received"													
Chromium-51	U	7.01	+/-8.92	17.8		pCi/Filter							
Cobalt-56	U	-0.206	+/-1.02	1.88		pCi/Filter							
Cobalt-57	U	0.308	+/-0.480	0.950		pCi/Filter							
Cobalt-58	U	-0.476	+/-1.04	1.69		pCi/Filter							
Cobalt-60	U	0.387	+/-0.970	2.35	1580	pCi/Filter							
Europium-152	U	-0.489	+/-2.13	3.70		pCi/Filter							
Europium-154	U	-1.3	+/-2.85	5.42		pCi/Filter							
Europium-155	U	1.31	+/-2.22	3.66		pCi/Filter							
Iridium-192	U	-0.396	+/-0.745	1.32		pCi/Filter							
Iron-59	U	-0.20	+/-2.15	4.39		pCi/Filter							
Lead-210	U	-84.2	+/-128	207		pCi/Filter							
Lead-212	U	0.885	+/-2.20	2.73		pCi/Filter							
Lead-214	U	-0.813	+/-2.00	3.14		pCi/Filter							
Manganese-54	U	0.156	+/-1.01	1.96		pCi/Filter							
Mercury-203	U	-0.208	+/-0.804	1.47		pCi/Filter							
Neodymium-147	U	-3.49	+/-13.1	23.9		pCi/Filter							
Neptunium-239	U	1.34	+/-5.07	9.78		pCi/Filter							
Niobium-94	U	0.0708	+/-0.904	1.72		pCi/Filter							
Niobium-95	U	-0.525	+/-1.15	2.00		pCi/Filter							
Potassium-40	U	8.77	+/-10.1	25.1	18900	pCi/Filter							
Promethium-144	U	0.539	+/-1.05	2.07		pCi/Filter							
Promethium-146	U	-0.0764	+/-0.702	1.36		pCi/Filter							
Radium-228	U	-0.105	+/-4.82	8.96	63.0	pCi/Filter							
Ruthenium-106	U	-5.75	+/-7.49	12.4		pCi/Filter							
Silver-110m	U	-0.156	+/-1.37	2.56		pCi/Filter							
Sodium-22	U	-0.562	+/-1.05	1.94		pCi/Filter							
Thallium-208	U	-1.11	+/-1.09	1.62		pCi/Filter							
Thorium-234	U	52.3	+/-66.5	72.2		pCi/Filter							
Tin-113	U	0.390	+/-0.939	1.87		pCi/Filter							
Uranium-235	U	-0.658	+/-4.52	7.72		pCi/Filter							
Uranium-238	U	52.3	+/-66.5	72.2		pCi/Filter							
Yttrium-88	U	1.10	+/-1.28	3.28		pCi/Filter							
Zinc-65	U	-1.4	+/-2.04	3.66		pCi/Filter							
Zirconium-95	U	1.83	+/-2.56	3.75		pCi/Filter							
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Filter "As Received"													

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Certificate of Analysis

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Company : Stantec Consulting
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Canoga Park, California 91304
Contact: Ms. Sarah VonRaesfeld
Project: SSFL Post-Woolsey Sampling

Client Sample ID: 20181113-BOEING-BLANK
Sample ID: 465305003
Project: SNTC00118
Client ID: SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC, Sr90, Filter "As Received"													
Strontium-90	U	-0.349	+/-0.871	1.66	1.89	pCi/Filter			KSD1	12/05/18	0943	1826813	9

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Filter Prep	Filter Prep	CXC1	11/30/18	1110	1826500

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	Eichrom Industries, AN-1421	
2	DOE EML HASL-300, Am-05-RC Modified	
3	DOE EML HASL-300, Po-01-RC Modified	
4	DOE EML HASL-300, Pu-11-RC Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, U-02-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE HASL 300, 4.5.2.3/Ga-01-R	
9	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	AlphaSpec Ra226, Filter "As Received"			91.4	(15%-125%)
Americium-243 Tracer	Alphaspec Am241, Filter "As Received"			74.1	(15%-125%)
Polonium-209 Tracer	Alphaspec Po210, Filter "As Received"			49.5	(15%-125%)
Plutonium-242 Tracer	Alphaspec Pu, Filter "As Received"			72.7	(15%-125%)
Thorium-229 Tracer	Alphaspec Th, Filter "As Received"			76.4	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Filter "As Received"			85.9	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Filter "As Received"			72.7	(15%-125%)
Strontium Carrier	GFPC, Sr90, Filter "As Received"			85.2	(25%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

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Company :	Stantec Consulting
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Contact:	Ms. Sarah VonRaesfeld
Project:	SSFL Post-Woolsey Sampling

Client Sample ID:	20181113-BOEING-BLANK	Project:	SNTC00118
Sample ID:	465305003	Client ID:	SNTC001

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

QC Summary

Report Date: December 7, 2018

Stantec Consulting
5800 Woolsey Canyon Rd.
Canoga Park, California

Contact: **Ms. Sarah VonRaesfeld**

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch 1826520											
QC1204168605 LCS											
Polonium-210	28.6			31.8	pCi/Filter		111	(75%-125%)	BXA4	12/06/18	10:01
QC1204168606 LCSD											
Polonium-210	28.6			28.7	pCi/Filter	10.2	100	(0%-20%)		12/06/18	12:47
QC1204168604 MB											
Polonium-210			U	0.152	pCi/Filter					12/06/18	10:01
Batch 1826522											
QC1204168610 LCS											
Radium-226	61.8			66.6	pCi/Filter		108	(75%-125%)	BXA4	12/05/18	09:10
QC1204168611 LCSD											
Radium-226	61.8			61.5	pCi/Filter	8.02	99.4	(0%-20%)		12/05/18	09:10
QC1204168609 MB											
Radium-226			U	0.948	pCi/Filter					12/05/18	09:10
Batch 1826529											
QC1204168636 LCS											
Americium-241	9.71			9.22	pCi/Filter		94.9	(75%-125%)	BXA4	12/04/18	21:18
QC1204168637 LCSD											
Americium-241	9.71			9.97	pCi/Filter	7.75	103	(0%-20%)		12/04/18	21:18
QC1204168635 MB											
Americium-241			U	-0.191	pCi/Filter					12/04/18	21:18

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826533										
QC1204168639 LCS										
Plutonium-238			U	-0.0136	pCi/Filter				BXA4	12/04/18 21:18
Plutonium-239/240	9.90			8.63	pCi/Filter		87.2	(75%-125%)		
QC1204168640 LCSD										
Plutonium-238			U	-0.0384	pCi/Filter	0				12/04/18 21:18
Plutonium-239/240	9.90			10.5	pCi/Filter	19.2	106	(0%-20%)		
QC1204168638 MB										
Plutonium-238			U	-0.0531	pCi/Filter					12/04/18 21:18
Plutonium-239/240			U	-0.0283	pCi/Filter					
Batch 1826534										
QC1204168646 LCS										
Thorium-228				10.3	pCi/Filter				BXA4	12/05/18 14:03
Thorium-230				1.30	pCi/Filter			(75%-125%)		
Thorium-232	9.81			10.2	pCi/Filter		104	(75%-125%)		
QC1204168647 LCSD										
Thorium-228				9.29	pCi/Filter	9.88				12/05/18 14:03
Thorium-230				1.08	pCi/Filter	18.5		(0%-20%)		
Thorium-232	9.81			9.91	pCi/Filter	2.66	101	(0%-20%)		
QC1204168645 MB										
Thorium-228			U	0.048	pCi/Filter					12/05/18 14:03

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826534										
Thorium-230			U	0.0177	pCi/Filter				BXA4	12/05/18 14:03
Thorium-232			U	0.0306	pCi/Filter					
Batch 1826536										
QC1204168649 LCS										
Uranium-233/234				11.9	pCi/Filter				BXA4	12/05/18 09:24
Uranium-235/236				0.839	pCi/Filter					
Uranium-238	13.5			12.8	pCi/Filter		95	(75%-125%)		
QC1204168650 LCSD										
Uranium-233/234				12.8	pCi/Filter	7.07				12/05/18 09:24
Uranium-235/236				0.667	pCi/Filter	22.8				
Uranium-238	13.5			13.1	pCi/Filter	2.62	97.5	(0%-20%)		
QC1204168648 MB										
Uranium-233/234			U	-0.0878	pCi/Filter					12/05/18 09:24
Uranium-235/236			U	0.0517	pCi/Filter					
Uranium-238			U	0.0915	pCi/Filter					
Batch 1826538										
QC1204168652 LCS										
Plutonium-241	677			564	pCi/Filter		83.3	(75%-125%)	BXA4	12/07/18 10:32
QC1204168653 LCSD										
Plutonium-241	677			485	pCi/Filter	15.1	71.6*	(0%-20%)		12/07/18 10:49

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826538										
QC1204168651 MB										
Plutonium-241			U	-8.75	pCi/Filter				BXA4	12/06/18 13:03
Rad Gamma Spec										
Batch 1826402										
QC1204168354 465305001 DUP										
Actinium-228	U	-2.67	U	-1.87	pCi/Filter	N/A		N/A	MXR1	11/28/18 13:27
Antimony-124	U	0.0949	U	1.56	pCi/Filter	N/A		N/A		
Antimony-125	U	0.947	U	0.477	pCi/Filter	N/A		N/A		
Barium-133	U	0.934	U	0.412	pCi/Filter	N/A		N/A		
Barium-140	U	2.78	U	4.30	pCi/Filter	N/A		N/A		
Beryllium-7		26.9	U	10.9	pCi/Filter	75.1		(0% - 100%)		
Bismuth-212	U	-1.73	U	11.3	pCi/Filter	N/A		N/A		
Bismuth-214	U	-0.251	U	-0.012	pCi/Filter	N/A		N/A		
Cerium-139	U	0.356	U	-0.318	pCi/Filter	N/A		N/A		
Cerium-141	U	-0.998	U	-0.796	pCi/Filter	N/A		N/A		
Cerium-144	U	-0.149	U	-0.429	pCi/Filter	N/A		N/A		
Cesium-134	U	-0.537	U	0.288	pCi/Filter	N/A		N/A		
Cesium-136	U	-1.79	U	-1.03	pCi/Filter	N/A		N/A		

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Cesium-137	U	-0.49	U	0.597	pCi/Filter	N/A		N/A	MXR1	11/28/18	13:27
Chromium-51	U	-2.84	U	-1.72	pCi/Filter	N/A		N/A			
Cobalt-56	U	0.502	U	0.365	pCi/Filter	N/A		N/A			
Cobalt-57	U	-0.0923	U	-0.209	pCi/Filter	N/A		N/A			
Cobalt-58	U	-0.39	U	-0.356	pCi/Filter	N/A		N/A			
Cobalt-60	U	-0.388	U	0.488	pCi/Filter	N/A		N/A			
Europium-152	U	-0.495	U	0.485	pCi/Filter	N/A		N/A			
Europium-154	U	-1.82	U	0.648	pCi/Filter	N/A		N/A			
Europium-155	U	1.86	U	-0.174	pCi/Filter	N/A		N/A			
Iridium-192	U	-0.21	U	-0.686	pCi/Filter	N/A		N/A			
Iron-59	U	0.923	U	-1.83	pCi/Filter	N/A		N/A			
Lead-210	U	-13.2	U	3.49	pCi/Filter	N/A		N/A			
Lead-212	U	0.868	U	0.958	pCi/Filter	N/A		N/A			
Lead-214	U	-0.514	U	1.63	pCi/Filter	N/A		N/A			
Manganese-54	U	0.0502	U	0.0043	pCi/Filter	N/A		N/A			

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Mercury-203	U	0.619	U	0.056	pCi/Filter	N/A		N/A	MXR1	11/28/18	13:27
Neodymium-147	U	-1.79	U	-8.54	pCi/Filter	N/A		N/A			
Neptunium-239	U	-2.67	U	-2.16	pCi/Filter	N/A		N/A			
Niobium-94	U	0.196	U	-0.582	pCi/Filter	N/A		N/A			
Niobium-95	U	0.549	U	0.443	pCi/Filter	N/A		N/A			
Potassium-40	U	5.84	U	-15.1	pCi/Filter	N/A		N/A			
Promethium-144	U	0.293	U	0.122	pCi/Filter	N/A		N/A			
Promethium-146	U	-1.07	U	0.276	pCi/Filter	N/A		N/A			
Radium-228	U	-2.67	U	-1.87	pCi/Filter	N/A		N/A			
Ruthenium-106	U	0.167	U	2.40	pCi/Filter	N/A		N/A			
Silver-110m	U	-0.764	U	0.0365	pCi/Filter	N/A		N/A			
Sodium-22	U	-0.643	U	0.150	pCi/Filter	N/A		N/A			
Thallium-208	U	0.629	U	0.290	pCi/Filter	N/A		N/A			
Thorium-234	U	1.87	U	1.84	pCi/Filter	N/A		N/A			
Tin-113	U	0.558	U	0.506	pCi/Filter	N/A		N/A			

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Uranium-235		U -1.53	U	-2.13	pCi/Filter	N/A		N/A	MXR1	11/28/18	13:27
Uranium-238		U 1.87	U	1.84	pCi/Filter	N/A		N/A			
Yttrium-88		U -0.0756	U	-0.692	pCi/Filter	N/A		N/A			
Zinc-65		U -0.334	U	-0.824	pCi/Filter	N/A		N/A			
Zirconium-95		U 0.133	U	1.69	pCi/Filter	N/A		N/A			
QC1204168355 LCS											
Americium-241	30600			29200	pCi/Filter		95.6	(75%-125%)		11/28/18	13:41
Actinium-228			U	-52	pCi/Filter						
Antimony-124			U	12.2	pCi/Filter						
Antimony-125			U	45.2	pCi/Filter						
Barium-133			U	32.5	pCi/Filter						
Barium-140			U	41.7	pCi/Filter						
Beryllium-7			U	-127	pCi/Filter						
Bismuth-212			U	106	pCi/Filter						
Bismuth-214			U	30.0	pCi/Filter						
Cerium-139			U	-3.97	pCi/Filter						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Cerium-141			U	8.18	pCi/Filter				MXR1	11/28/18	13:41
Cerium-144			U	-21.4	pCi/Filter						
Cesium-134			U	-13.2	pCi/Filter						
Cesium-136			U	-11.5	pCi/Filter						
Cesium-137	9730			9620	pCi/Filter		98.9	(75%-125%)			
Chromium-51			U	-45.2	pCi/Filter						
Cobalt-56			U	2.57	pCi/Filter						
Cobalt-57			U	-9.6	pCi/Filter						
Cobalt-58			U	-12	pCi/Filter						
Cobalt-60	5670			5570	pCi/Filter		98.4	(75%-125%)			
Europium-152			U	35.7	pCi/Filter						
Europium-154			U	27.5	pCi/Filter						
Europium-155			U	-29.8	pCi/Filter						
Iridium-192			U	-4.43	pCi/Filter						
Iron-59			U	-56.5	pCi/Filter			(75%-125%)			

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Lead-210				2.56E+05	pCi/Filter				MXR1	11/28/18	13:41
Lead-212			U	-9.93	pCi/Filter						
Lead-214			U	18.4	pCi/Filter						
Manganese-54			U	13.6	pCi/Filter						
Mercury-203			U	3.84	pCi/Filter						
Neodymium-147			U	21.4	pCi/Filter						
Neptunium-239			U	-38.7	pCi/Filter						
Niobium-94			U	2.63	pCi/Filter						
Niobium-95			U	1.34	pCi/Filter						
Potassium-40			U	116	pCi/Filter						
Promethium-144			U	-16.2	pCi/Filter						
Promethium-146			U	9.18	pCi/Filter						
Radium-228			U	-52	pCi/Filter						
Ruthenium-106			U	43.7	pCi/Filter						
Silver-110m			U	13.6	pCi/Filter						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Sodium-22			U	1.40	pCi/Filter				MXR1	11/28/18	13:41
Thallium-208			U	4.56	pCi/Filter						
Thorium-234			U	-133	pCi/Filter						
Tin-113			U	-18.8	pCi/Filter						
Uranium-235			U	13.7	pCi/Filter						
Uranium-238			U	-133	pCi/Filter						
Yttrium-88			U	-4.44	pCi/Filter						
Zinc-65			U	-30.1	pCi/Filter						
Zirconium-95			U	-16.2	pCi/Filter						
QC1204168353 MB											
Actinium-228			U	-0.286	pCi/Filter					11/28/18	11:32
Antimony-124			U	0.285	pCi/Filter						
Antimony-125			U	0.238	pCi/Filter						
Barium-133			U	-0.183	pCi/Filter						
Barium-140			U	-0.373	pCi/Filter						
Beryllium-7			U	1.89	pCi/Filter						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Bismuth-212			U	-3.85	pCi/Filter				MXR1	11/28/18	11:32
Bismuth-214			U	-0.493	pCi/Filter						
Cerium-139			U	-0.285	pCi/Filter						
Cerium-141			U	-1.24	pCi/Filter						
Cerium-144			U	-0.0736	pCi/Filter						
Cesium-134			U	0.247	pCi/Filter						
Cesium-136			U	-1.61	pCi/Filter						
Cesium-137			U	-0.472	pCi/Filter						
Chromium-51			U	-2.52	pCi/Filter						
Cobalt-56			U	0.0933	pCi/Filter						
Cobalt-57			U	-0.103	pCi/Filter						
Cobalt-58			U	0.625	pCi/Filter						
Cobalt-60			U	0.510	pCi/Filter						
Europium-152			U	-1.29	pCi/Filter						
Europium-154			U	-0.609	pCi/Filter						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 1826402											
Europium-155			U	0.124	pCi/Filter				MXR1	11/28/18	11:32
Iridium-192			U	0.117	pCi/Filter						
Iron-59			U	1.19	pCi/Filter						
Lead-210			U	-120	pCi/Filter						
Lead-212			U	2.38	pCi/Filter						
Lead-214			U	0.353	pCi/Filter						
Manganese-54			U	0.580	pCi/Filter						
Mercury-203			U	-0.022	pCi/Filter						
Neodymium-147			U	2.99	pCi/Filter						
Neptunium-239			U	-0.163	pCi/Filter						
Niobium-94			U	0.461	pCi/Filter						
Niobium-95			U	0.318	pCi/Filter						
Potassium-40			U	1.51	pCi/Filter						
Promethium-144			U	0.0894	pCi/Filter						
Promethium-146			U	0.0347	pCi/Filter						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
Radium-228			U	-0.286	pCi/Filter				MXR1	11/28/18 11:32
Ruthenium-106			U	-0.106	pCi/Filter					
Silver-110m			U	0.175	pCi/Filter					
Sodium-22			U	-0.0686	pCi/Filter					
Thallium-208			U	-0.152	pCi/Filter					
Thorium-234			U	19.5	pCi/Filter					
Tin-113			U	0.283	pCi/Filter					
Uranium-235			U	0.546	pCi/Filter					
Uranium-238			U	19.5	pCi/Filter					
Yttrium-88			U	-0.448	pCi/Filter					
Zinc-65			U	-0.318	pCi/Filter					
Zirconium-95			U	-0.113	pCi/Filter					
Rad Gas Flow										
Batch 1826813										
QC1204169237 LCS										
Strontium-90	172			185	pCi/Filter		107	(75%-125%)	KSD1	12/05/18 09:42
QC1204169460 LCSD										
Strontium-90	172			175	pCi/Filter	5.75	101	(0%-20%)		12/05/18 09:42

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch 1826813											
QC1204169235 MB											
Strontium-90			U	1.20	pCi/Filter				KSD1	12/05/18	09:42

Notes:

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Client : **Stantec Consulting**
5800 Woolsey Canyon Rd.
Canoga Park, California
Contact: **Ms. Sarah VonRaesfeld**
Workorder: **465305**

Report Date: December 7, 2018

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826520										
QC1204168605 LCS										
Polonium-210	28.6			31.8	pCi/Filter		111	(75%-125%)	BXA4	12/06/1810:01
	Uncert:			+/-5.32						
	TPU:			+/-9.14						
QC1204168606 LCSD										
Polonium-210	28.6			28.7	pCi/Filter	10.2	100	(0%-20%)	BXA4	12/06/1812:47
	Uncert:			+/-4.31						
	TPU:			+/-7.22						
QC1204168604 MB										
Polonium-210			U	0.152	pCi/Filter				BXA4	12/06/1810:01
	Uncert:			+/-0.660						
	TPU:			+/-0.662						
Batch 1826522										
QC1204168610 LCS										
Radium-226	61.8			66.6	pCi/Filter		108	(75%-125%)	BXA4	12/05/1809:10
	Uncert:			+/-6.60						
	TPU:			+/-14.8						
QC1204168611 LCSD										
Radium-226	61.8			61.5	pCi/Filter	8.02	99.4	(0%-20%)	BXA4	12/05/1809:10
	Uncert:			+/-6.23						
	TPU:			+/-15.7						
QC1204168609 MB										
Radium-226			U	0.948	pCi/Filter				BXA4	12/05/1809:10
	Uncert:			+/-1.03						
	TPU:			+/-1.04						
Batch 1826529										
QC1204168636 LCS										
Americium-241	9.71			9.22	pCi/Filter		94.9	(75%-125%)	BXA4	12/04/1821:18
	Uncert:			+/-1.22						
	TPU:			+/-1.74						
QC1204168637 LCSD										
Americium-241	9.71			9.97	pCi/Filter	7.75	103	(0%-20%)	BXA4	12/04/1821:18
	Uncert:			+/-1.28						
	TPU:			+/-1.87						
QC1204168635 MB										
Americium-241			U	-0.191	pCi/Filter				BXA4	12/04/1821:18
	Uncert:			+/-0.211						
	TPU:			+/-0.212						
Batch 1826533										
QC1204168639 LCS										
Plutonium-238			U	-0.0136	pCi/Filter				BXA4	12/04/1821:18

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826533										
	Uncert:			+/-0.205						
	TPU:			+/-0.205						
Plutonium-239/240	9.90			8.63	pCi/Filter		87.2	(75%-125%)		
	Uncert:			+/-1.53						
	TPU:			+/-2.17						
QC1204168640 LCSD										
Plutonium-238			U	-0.0384	pCi/Filter	0			BXA4	12/04/1821:18
	Uncert:			+/-0.130						
	TPU:			+/-0.130						
Plutonium-239/240	9.90			10.5	pCi/Filter	19.2	106	(0%-20%)		
	Uncert:			+/-1.30						
	TPU:			+/-1.98						
QC1204168638 MB										
Plutonium-238			U	-0.0531	pCi/Filter				BXA4	12/04/1821:18
	Uncert:			+/-0.101						
	TPU:			+/-0.101						
Plutonium-239/240			U	-0.0283	pCi/Filter					
	Uncert:			+/-0.167						
	TPU:			+/-0.167						
Batch 1826534										
QC1204168646 LCS										
Thorium-228				10.3	pCi/Filter				BXA4	12/05/1814:03
	Uncert:			+/-0.550						
	TPU:			+/-1.17						
Thorium-230				1.30	pCi/Filter			(75%-125%)		
	Uncert:			+/-0.208						
	TPU:			+/-0.247						
Thorium-232	9.81			10.2	pCi/Filter		104	(75%-125%)		
	Uncert:			+/-0.543						
	TPU:			+/-1.16						
QC1204168647 LCSD										
Thorium-228				9.29	pCi/Filter	9.88			BXA4	12/05/1814:03
	Uncert:			+/-0.490						
	TPU:			+/-1.03						
Thorium-230				1.08	pCi/Filter	18.5		(0%-20%)		
	Uncert:			+/-0.181						
	TPU:			+/-0.210						
Thorium-232	9.81			9.91	pCi/Filter	2.66	101	(0%-20%)		
	Uncert:			+/-0.505						
	TPU:			+/-1.09						
QC1204168645 MB										
Thorium-228			U	0.048	pCi/Filter				BXA4	12/05/1814:03
	Uncert:			+/-0.140						
	TPU:			+/-0.140						
Thorium-230			U	0.0177	pCi/Filter					
	Uncert:			+/-0.133						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826534										
	TPU:			+/-0.133						
Thorium-232			U	0.0306	pCi/Filter					
	Uncert:			+/-0.0786						
	TPU:			+/-0.0787						
Batch 1826536										
QC1204168649 LCS										
Uranium-233/234				11.9	pCi/Filter				BXA4	12/05/1809:24
	Uncert:			+/-1.15						
	TPU:			+/-1.93						
Uranium-235/236				0.839	pCi/Filter					
	Uncert:			+/-0.351						
	TPU:			+/-0.367						
Uranium-238	13.5			12.8	pCi/Filter		95	(75%-125%)		
	Uncert:			+/-1.19						
	TPU:			+/-2.05						
QC1204168650 LCSD										
Uranium-233/234				12.8	pCi/Filter	7.07			BXA4	12/05/1809:24
	Uncert:			+/-1.20						
	TPU:			+/-2.05						
Uranium-235/236				0.667	pCi/Filter	22.8				
	Uncert:			+/-0.317						
	TPU:			+/-0.329						
Uranium-238	13.5			13.1	pCi/Filter	2.62	97.5	(0%-20%)		
	Uncert:			+/-1.22						
	TPU:			+/-2.10						
QC1204168648 MB										
Uranium-233/234			U	-0.0878	pCi/Filter				BXA4	12/05/1809:24
	Uncert:			+/-0.0774						
	TPU:			+/-0.0776						
Uranium-235/236			U	0.0517	pCi/Filter					
	Uncert:			+/-0.142						
	TPU:			+/-0.142						
Uranium-238			U	0.0915	pCi/Filter					
	Uncert:			+/-0.148						
	TPU:			+/-0.149						
Batch 1826538										
QC1204168652 LCS										
Plutonium-241	677			564	pCi/Filter		83.3	(75%-125%)	BXA4	12/07/1810:32
	Uncert:			+/-52.7						
	TPU:			+/-136						
QC1204168653 LCSD										
Plutonium-241	677			485	pCi/Filter	15.1	71.6 *	(0%-20%)	BXA4	12/07/1810:49
	Uncert:			+/-45.7						
	TPU:			+/-116						
QC1204168651 MB										
Plutonium-241			U	-8.75	pCi/Filter				BXA4	12/06/1813:03

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1826538										
	Uncert:			+/-13.0						
	TPU:			+/-13.0						
Rad Gamma Spec										
Batch 1826402										
QC1204168354 465305001 DUP										
Actinium-228	U	-2.67	U	-1.87	pCi/Filter	0		N/A	MXR1	11/28/18 13:27
	Uncert:	+/-3.65		+/-3.61						
	TPU:	+/-3.86		+/-3.72						
Antimony-124	U	0.0949	U	1.56	pCi/Filter	0		N/A		
	Uncert:	+/-2.07		+/-2.29						
	TPU:	+/-2.07		+/-2.40						
Antimony-125	U	0.947	U	0.477	pCi/Filter	0		N/A		
	Uncert:	+/-1.60		+/-2.06						
	TPU:	+/-1.66		+/-2.07						
Barium-133	U	0.934	U	0.412	pCi/Filter	0		N/A		
	Uncert:	+/-1.06		+/-0.741						
	TPU:	+/-1.14		+/-0.765						
Barium-140	U	2.78	U	4.30	pCi/Filter	0		N/A		
	Uncert:	+/-4.36		+/-5.24						
	TPU:	+/-4.54		+/-5.61						
Beryllium-7		26.9	U	10.9	pCi/Filter	75.1		(0% - 100%)		
	Uncert:	+/-11.7		+/-15.9						
	TPU:	+/-12.0		+/-15.9						
Bismuth-212	U	-1.73	U	11.3	pCi/Filter	0		N/A		
	Uncert:	+/-10.5		+/-11.8						
	TPU:	+/-10.5		+/-13.0						
Bismuth-214	U	-0.251	U	-0.012	pCi/Filter	0		N/A		
	Uncert:	+/-2.07		+/-2.16						
	TPU:	+/-2.07		+/-2.16						
Cerium-139	U	0.356	U	-0.318	pCi/Filter	0		N/A		
	Uncert:	+/-0.454		+/-0.587						
	TPU:	+/-0.488		+/-0.608						
Cerium-141	U	-0.998	U	-0.796	pCi/Filter	0		N/A		
	Uncert:	+/-1.09		+/-1.38						
	TPU:	+/-1.18		+/-1.43						
Cerium-144	U	-0.149	U	-0.429	pCi/Filter	0		N/A		
	Uncert:	+/-3.22		+/-3.86						
	TPU:	+/-3.22		+/-3.86						
Cesium-134	U	-0.537	U	0.288	pCi/Filter	0		N/A		
	Uncert:	+/-0.726		+/-0.816						
	TPU:	+/-0.769		+/-0.827						
Cesium-136	U	-1.79	U	-1.03	pCi/Filter	0		N/A		
	Uncert:	+/-2.24		+/-2.38						
	TPU:	+/-2.39		+/-2.43						
Cesium-137	U	-0.49	U	0.597	pCi/Filter	0		N/A		
	Uncert:	+/-0.715		+/-0.933						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
	TPU:	+/-0.752		+/-0.973						
Chromium-51	U	-2.84	U	-1.72	pCi/Filter	0			N/A	
	Uncert:	+/-7.00		+/-8.07						
	TPU:	+/-7.12		+/-8.11						
Cobalt-56	U	0.502	U	0.365	pCi/Filter	0			N/A	
	Uncert:	+/-0.923		+/-0.889						
	TPU:	+/-0.952		+/-0.905						
Cobalt-57	U	-0.0923	U	-0.209	pCi/Filter	0			N/A	
	Uncert:	+/-0.375		+/-0.484						
	TPU:	+/-0.378		+/-0.494						
Cobalt-58	U	-0.39	U	-0.356	pCi/Filter	0			N/A	
	Uncert:	+/-1.06		+/-0.840						
	TPU:	+/-1.07		+/-0.857						
Cobalt-60	U	-0.388	U	0.488	pCi/Filter	0			N/A	
	Uncert:	+/-1.04		+/-0.727						
	TPU:	+/-1.05		+/-0.762						
Europium-152	U	-0.495	U	0.485	pCi/Filter	0			N/A	
	Uncert:	+/-1.62		+/-2.14						
	TPU:	+/-1.64		+/-2.15						
Europium-154	U	-1.82	U	0.648	pCi/Filter	0			N/A	
	Uncert:	+/-2.29		+/-2.42						
	TPU:	+/-2.44		+/-2.44						
Europium-155	U	1.86	U	-0.174	pCi/Filter	0			N/A	
	Uncert:	+/-1.52		+/-2.00						
	TPU:	+/-1.74		+/-2.00						
Iridium-192	U	-0.21	U	-0.686	pCi/Filter	0			N/A	
	Uncert:	+/-0.582		+/-0.692						
	TPU:	+/-0.589		+/-0.760						
Iron-59	U	0.923	U	-1.83	pCi/Filter	0			N/A	
	Uncert:	+/-2.05		+/-1.98						
	TPU:	+/-2.09		+/-2.16						
Lead-210	U	-13.2	U	3.49	pCi/Filter	0			N/A	
	Uncert:	+/-31.7		+/-205						
	TPU:	+/-32.3		+/-205						
Lead-212	U	0.868	U	0.958	pCi/Filter	0			N/A	
	Uncert:	+/-1.68		+/-1.80						
	TPU:	+/-1.68		+/-1.86						
Lead-214	U	-0.514	U	1.63	pCi/Filter	0			N/A	
	Uncert:	+/-1.88		+/-3.42						
	TPU:	+/-1.89		+/-3.50						
Manganese-54	U	0.0502	U	0.0043	pCi/Filter	0			N/A	
	Uncert:	+/-0.748		+/-0.762						
	TPU:	+/-0.748		+/-0.762						
Mercury-203	U	0.619	U	0.056	pCi/Filter	0			N/A	
	Uncert:	+/-0.712		+/-0.722						
	TPU:	+/-0.766		+/-0.723						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
Neodymium-147	U	-1.79	U	-8.54	pCi/Filter	0			N/A	
	Uncert:	+/-9.34		+/-9.98						
	TPU:	+/-9.38		+/-10.7						
Neptunium-239	U	-2.67	U	-2.16	pCi/Filter	0			N/A	
	Uncert:	+/-4.13		+/-4.88						
	TPU:	+/-4.31		+/-4.98						
Niobium-94	U	0.196	U	-0.582	pCi/Filter	0			N/A	
	Uncert:	+/-0.779		+/-0.836						
	TPU:	+/-0.785		+/-0.879						
Niobium-95	U	0.549	U	0.443	pCi/Filter	0			N/A	
	Uncert:	+/-0.880		+/-0.866						
	TPU:	+/-0.918		+/-0.891						
Potassium-40	U	5.84	U	-15.1	pCi/Filter	0			N/A	
	Uncert:	+/-14.5		+/-13.2						
	TPU:	+/-14.8		+/-14.9						
Promethium-144	U	0.293	U	0.122	pCi/Filter	0			N/A	
	Uncert:	+/-0.846		+/-0.823						
	TPU:	+/-0.858		+/-0.825						
Promethium-146	U	-1.07	U	0.276	pCi/Filter	0			N/A	
	Uncert:	+/-0.797		+/-1.17						
	TPU:	+/-0.940		+/-1.18						
Radium-228	U	-2.67	U	-1.87	pCi/Filter	0			N/A	
	Uncert:	+/-3.65		+/-3.61						
	TPU:	+/-3.86		+/-3.72						
Ruthenium-106	U	0.167	U	2.40	pCi/Filter	0			N/A	
	Uncert:	+/-7.58		+/-6.97						
	TPU:	+/-7.59		+/-7.06						
Silver-110m	U	-0.764	U	0.0365	pCi/Filter	0			N/A	
	Uncert:	+/-1.01		+/-0.860						
	TPU:	+/-1.07		+/-0.860						
Sodium-22	U	-0.643	U	0.150	pCi/Filter	0			N/A	
	Uncert:	+/-0.808		+/-0.830						
	TPU:	+/-0.860		+/-0.833						
Thallium-208	U	0.629	U	0.290	pCi/Filter	0			N/A	
	Uncert:	+/-1.18		+/-0.863						
	TPU:	+/-1.19		+/-0.874						
Thorium-234	U	1.87	U	1.84	pCi/Filter	0			N/A	
	Uncert:	+/-16.5		+/-46.5						
	TPU:	+/-16.5		+/-46.5						
Tin-113	U	0.558	U	0.506	pCi/Filter	0			N/A	
	Uncert:	+/-0.841		+/-0.829						
	TPU:	+/-0.879		+/-0.861						
Uranium-235	U	-1.53	U	-2.13	pCi/Filter	0			N/A	
	Uncert:	+/-3.98		+/-4.41						
	TPU:	+/-4.05		+/-4.52						
Uranium-238	U	1.87	U	1.84	pCi/Filter	0			N/A	

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
	Uncert:	+/-16.5		+/-46.5						
	TPU:	+/-16.5		+/-46.5						
Yttrium-88	U	-0.0756	U	-0.692	pCi/Filter	0		N/A		
	Uncert:	+/-0.648		+/-0.994						
	TPU:	+/-0.649		+/-1.04						
Zinc-65	U	-0.334	U	-0.824	pCi/Filter	0		N/A		
	Uncert:	+/-2.07		+/-1.80						
	TPU:	+/-2.08		+/-1.84						
Zirconium-95	U	0.133	U	1.69	pCi/Filter	0		N/A		
	Uncert:	+/-1.44		+/-1.46						
	TPU:	+/-1.44		+/-1.66						
QC1204168355 LCS										
Americium-241	30600			29200	pCi/Filter		95.6	(75%-125%)	MXR1	11/28/1813:41
	Uncert:			+/-552						
	TPU:			+/-2420						
Actinium-228			U	-52	pCi/Filter					
	Uncert:			+/-120						
	TPU:			+/-122						
Antimony-124			U	12.2	pCi/Filter					
	Uncert:			+/-30.7						
	TPU:			+/-31.2						
Antimony-125			U	45.2	pCi/Filter					
	Uncert:			+/-65.5						
	TPU:			+/-68.8						
Barium-133			U	32.5	pCi/Filter					
	Uncert:			+/-24.5						
	TPU:			+/-28.6						
Barium-140			U	41.7	pCi/Filter					
	Uncert:			+/-73.7						
	TPU:			+/-76.3						
Beryllium-7			U	-127	pCi/Filter					
	Uncert:			+/-215						
	TPU:			+/-223						
Bismuth-212			U	106	pCi/Filter					
	Uncert:			+/-304						
	TPU:			+/-308						
Bismuth-214			U	30.0	pCi/Filter					
	Uncert:			+/-40.5						
	TPU:			+/-42.8						
Cerium-139			U	-3.97	pCi/Filter					
	Uncert:			+/-10.6						
	TPU:			+/-10.8						
Cerium-141			U	8.18	pCi/Filter					
	Uncert:			+/-18.2						
	TPU:			+/-18.6						
Cerium-144			U	-21.4	pCi/Filter					

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
	Uncert:			+/-76.9						
	TPU:			+/-77.6						
Cesium-134			U	-13.2	pCi/Filter					
	Uncert:			+/-26.0						
	TPU:			+/-26.8						
Cesium-136			U	-11.5	pCi/Filter					
	Uncert:			+/-42.2						
	TPU:			+/-42.5						
Cesium-137	9730			9620	pCi/Filter		98.9	(75%-125%)		
	Uncert:			+/-165						
	TPU:			+/-1390						
Chromium-51			U	-45.2	pCi/Filter					
	Uncert:			+/-135						
	TPU:			+/-137						
Cobalt-56			U	2.57	pCi/Filter					
	Uncert:			+/-26.3						
	TPU:			+/-26.3						
Cobalt-57			U	-9.6	pCi/Filter					
	Uncert:			+/-10.3						
	TPU:			+/-11.2						
Cobalt-58			U	-12	pCi/Filter					
	Uncert:			+/-24.3						
	TPU:			+/-25.0						
Cobalt-60	5670			5570	pCi/Filter		98.4	(75%-125%)		
	Uncert:			+/-163						
	TPU:			+/-529						
Europium-152			U	35.7	pCi/Filter					
	Uncert:			+/-79.1						
	TPU:			+/-80.8						
Europium-154			U	27.5	pCi/Filter					
	Uncert:			+/-46.3						
	TPU:			+/-48.0						
Europium-155			U	-29.8	pCi/Filter					
	Uncert:			+/-52.6						
	TPU:			+/-54.4						
Iridium-192			U	-4.43	pCi/Filter					
	Uncert:			+/-16.0						
	TPU:			+/-16.1						
Iron-59			U	-56.5	pCi/Filter			(75%-125%)		
	Uncert:			+/-58.6						
	TPU:			+/-64.2						
Lead-210				2.56E+05	pCi/Filter					
	Uncert:			+/-8330						
	TPU:			+/-24600						
Lead-212			U	-9.93	pCi/Filter					
	Uncert:			+/-27.8						
	TPU:									

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
				+/-28.1						
Lead-214			U	18.4	pCi/Filter					
	Uncert:			+/-41.5						
	TPU:			+/-42.4						
Manganese-54			U	13.6	pCi/Filter					
	Uncert:			+/-26.3						
	TPU:			+/-27.1						
Mercury-203			U	3.84	pCi/Filter					
	Uncert:			+/-14.4						
	TPU:			+/-14.5						
Neodymium-147			U	21.4	pCi/Filter					
	Uncert:			+/-143						
	TPU:			+/-143						
Neptunium-239			U	-38.7	pCi/Filter					
	Uncert:			+/-114						
	TPU:			+/-116						
Niobium-94			U	2.63	pCi/Filter					
	Uncert:			+/-18.7						
	TPU:			+/-18.8						
Niobium-95			U	1.34	pCi/Filter					
	Uncert:			+/-22.6						
	TPU:			+/-22.6						
Potassium-40			U	116	pCi/Filter					
	Uncert:			+/-131						
	TPU:			+/-141						
Promethium-144			U	-16.2	pCi/Filter					
	Uncert:			+/-18.8						
	TPU:			+/-20.3						
Promethium-146			U	9.18	pCi/Filter					
	Uncert:			+/-36.7						
	TPU:			+/-36.9						
Radium-228			U	-52	pCi/Filter					
	Uncert:			+/-120						
	TPU:			+/-122						
Ruthenium-106			U	43.7	pCi/Filter					
	Uncert:			+/-188						
	TPU:			+/-189						
Silver-110m			U	13.6	pCi/Filter					
	Uncert:			+/-39.5						
	TPU:			+/-40.0						
Sodium-22			U	1.40	pCi/Filter					
	Uncert:			+/-17.0						
	TPU:			+/-17.0						
Thallium-208			U	4.56	pCi/Filter					
	Uncert:			+/-19.4						
	TPU:			+/-19.5						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
Thorium-234			U	-133	pCi/Filter					
	Uncert:			+/-869						
	TPU:			+/-872						
Tin-113			U	-18.8	pCi/Filter					
	Uncert:			+/-25.8						
	TPU:			+/-27.2						
Uranium-235			U	13.7	pCi/Filter					
	Uncert:			+/-77.4						
	TPU:			+/-77.6						
Uranium-238			U	-133	pCi/Filter					
	Uncert:			+/-869						
	TPU:			+/-872						
Yttrium-88			U	-4.44	pCi/Filter					
	Uncert:			+/-17.2						
	TPU:			+/-17.3						
Zinc-65			U	-30.1	pCi/Filter					
	Uncert:			+/-61.8						
	TPU:			+/-63.3						
Zirconium-95			U	-16.2	pCi/Filter					
	Uncert:			+/-35.6						
	TPU:			+/-36.4						
QC1204168353 MB										
Actinium-228			U	-0.286	pCi/Filter				MXR1	11/28/1811:32
	Uncert:			+/-4.74						
	TPU:			+/-4.75						
Antimony-124			U	0.285	pCi/Filter					
	Uncert:			+/-2.30						
	TPU:			+/-2.30						
Antimony-125			U	0.238	pCi/Filter					
	Uncert:			+/-2.11						
	TPU:			+/-2.12						
Barium-133			U	-0.183	pCi/Filter					
	Uncert:			+/-0.820						
	TPU:			+/-0.824						
Barium-140			U	-0.373	pCi/Filter					
	Uncert:			+/-2.50						
	TPU:			+/-2.51						
Beryllium-7			U	1.89	pCi/Filter					
	Uncert:			+/-6.66						
	TPU:			+/-6.72						
Bismuth-212			U	-3.85	pCi/Filter					
	Uncert:			+/-11.8						
	TPU:			+/-11.9						
Bismuth-214			U	-0.493	pCi/Filter					
	Uncert:			+/-2.37						
	TPU:			+/-2.38						

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
Cerium-139			U	-0.285	pCi/Filter					
	Uncert:			+/-0.462						
	TPU:			+/-0.483						
Cerium-141			U	-1.24	pCi/Filter					
	Uncert:			+/-1.03						
	TPU:			+/-1.17						
Cerium-144			U	-0.0736	pCi/Filter					
	Uncert:			+/-3.76						
	TPU:			+/-3.76						
Cesium-134			U	0.247	pCi/Filter					
	Uncert:			+/-0.920						
	TPU:			+/-0.927						
Cesium-136			U	-1.61	pCi/Filter					
	Uncert:			+/-1.10						
	TPU:			+/-1.34						
Cesium-137			U	-0.472	pCi/Filter					
	Uncert:			+/-0.874						
	TPU:			+/-0.902						
Chromium-51			U	-2.52	pCi/Filter					
	Uncert:			+/-4.92						
	TPU:			+/-5.05						
Cobalt-56			U	0.0933	pCi/Filter					
	Uncert:			+/-1.04						
	TPU:			+/-1.04						
Cobalt-57			U	-0.103	pCi/Filter					
	Uncert:			+/-0.425						
	TPU:			+/-0.428						
Cobalt-58			U	0.625	pCi/Filter					
	Uncert:			+/-1.55						
	TPU:			+/-1.56						
Cobalt-60			U	0.510	pCi/Filter					
	Uncert:			+/-0.910						
	TPU:			+/-0.940						
Europium-152			U	-1.29	pCi/Filter					
	Uncert:			+/-1.95						
	TPU:			+/-2.04						
Europium-154			U	-0.609	pCi/Filter					
	Uncert:			+/-2.67						
	TPU:			+/-2.68						
Europium-155			U	0.124	pCi/Filter					
	Uncert:			+/-1.94						
	TPU:			+/-1.94						
Iridium-192			U	0.117	pCi/Filter					
	Uncert:			+/-0.621						
	TPU:			+/-0.624						
Iron-59			U	1.19	pCi/Filter					

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
	Uncert:			+/-2.76						
	TPU:			+/-2.81						
Lead-210			U	-120	pCi/Filter					
	Uncert:			+/-184						
	TPU:			+/-192						
Lead-212			U	2.38	pCi/Filter					
	Uncert:			+/-2.19						
	TPU:			+/-2.45						
Lead-214			U	0.353	pCi/Filter					
	Uncert:			+/-1.61						
	TPU:			+/-1.62						
Manganese-54			U	0.580	pCi/Filter					
	Uncert:			+/-0.746						
	TPU:			+/-0.795						
Mercury-203			U	-0.022	pCi/Filter					
	Uncert:			+/-0.568						
	TPU:			+/-0.568						
Neodymium-147			U	2.99	pCi/Filter					
	Uncert:			+/-4.56						
	TPU:			+/-4.76						
Neptunium-239			U	-0.163	pCi/Filter					
	Uncert:			+/-4.63						
	TPU:			+/-4.63						
Niobium-94			U	0.461	pCi/Filter					
	Uncert:			+/-0.791						
	TPU:			+/-0.820						
Niobium-95			U	0.318	pCi/Filter					
	Uncert:			+/-0.748						
	TPU:			+/-0.763						
Potassium-40			U	1.51	pCi/Filter					
	Uncert:			+/-12.3						
	TPU:			+/-12.3						
Promethium-144			U	0.0894	pCi/Filter					
	Uncert:			+/-0.845						
	TPU:			+/-0.846						
Promethium-146			U	0.0347	pCi/Filter					
	Uncert:			+/-0.899						
	TPU:			+/-0.900						
Radium-228			U	-0.286	pCi/Filter					
	Uncert:			+/-4.74						
	TPU:			+/-4.75						
Ruthenium-106			U	-0.106	pCi/Filter					
	Uncert:			+/-7.03						
	TPU:			+/-7.03						
Silver-110m			U	0.175	pCi/Filter					
	Uncert:			+/-1.22						
	TPU:									

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 1826402										
				+/-1.22						
Sodium-22			U	-0.0686	pCi/Filter					
	Uncert:			+/-0.886						
	TPU:			+/-0.887						
Thallium-208			U	-0.152	pCi/Filter					
	Uncert:			+/-1.05						
	TPU:			+/-1.05						
Thorium-234			U	19.5	pCi/Filter					
	Uncert:			+/-64.9						
	TPU:			+/-65.7						
Tin-113			U	0.283	pCi/Filter					
	Uncert:			+/-0.770						
	TPU:			+/-0.781						
Uranium-235			U	0.546	pCi/Filter					
	Uncert:			+/-4.31						
	TPU:			+/-4.32						
Uranium-238			U	19.5	pCi/Filter					
	Uncert:			+/-64.9						
	TPU:			+/-65.7						
Yttrium-88			U	-0.448	pCi/Filter					
	Uncert:			+/-1.31						
	TPU:			+/-1.32						
Zinc-65			U	-0.318	pCi/Filter					
	Uncert:			+/-1.70						
	TPU:			+/-1.70						
Zirconium-95			U	-0.113	pCi/Filter					
	Uncert:			+/-1.37						
	TPU:			+/-1.37						
Rad Gas Flow										
Batch 1826813										
QC1204169237 LCS										
Strontium-90	172			185	pCi/Filter		107	(75%-125%)	KSD1	12/05/1809:42
	Uncert:			+/-10.8						
	TPU:			+/-49.2						
QC1204169460 LCSD										
Strontium-90	172			175	pCi/Filter	5.75	101	(0%-20%)	KSD1	12/05/1809:42
	Uncert:			+/-10.6						
	TPU:			+/-46.7						
QC1204169235 MB										
Strontium-90			U	1.20	pCi/Filter				KSD1	12/05/1809:42
	Uncert:			+/-0.986						
	TPU:			+/-1.03						

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

QC Summary

Workorder: **465305**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
FA	Failed analysis.
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Project #
GEL Quote #:
COC Number (1):
PO Number:

405305

GEL Laboratories LLC
gel.com
Chemistry | Radiochemistry | Radiobioassay | Specialty Analytics

Chain of Custody and Analytical Request

GEL Work Order Number: ***GEL Project Manager: Julie Robinson***

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Stantec Consulting — Phone # 818-466-8864 (Earl)

Project/Site Name: SSFL Post-Woolsey Sampling — Fax #

Address: 5800 Woolsey Canyon Rd. Canoga Park, 91304

Collected By: Earl Sorrels — Send Results To: Sarah.VonRaesfeld@stantec.com, Earl.Sorrels@Stantec.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive (If yes, please supply isotopic info.)	Should this sample be considered: (7) Known or possible Hazards	Total number of containers	Gamma Spec	Sr-90	Po-210	Am-241	U-234, U-235, U-238	Th-228, Th-230, Th-232	Pu-238, Pu-239	Pu-241	Ra-226	<-- Preservative Type (6)	Comments (Note: extra sample is required for sample specific QC)
20181113-BOEING-4	11/13/2018	10:30	N	--	F	N	--	1	X	X	X	X	X	X	X	X	X		Environmental Air Sample
20181113-BOEING-5	11/13/2018	11:00	N	--	F	N	--	1	X	X	X	X	X	X	X	X	X		Environmental Air Sample
20181113-BOEING-BLANK	11/13/2018	15:00	N	--	F	N	--	1	X	X	X	X	X	X	X	X	X		Environmental Air Sample

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	K [illegible]	11-21-18	16:48	1 FedEx	11-21-18	17:30
2	FedEX			2 L. Matthews	11/23/18	825
3				3		

TAT Requested: **Normal:** ____ Rush: 5 day **Specify:** ____ **(Subject to Surcharge)**

Fax Results: [ ] Yes [x] No

Select Deliverable: [ ] C of A [ ] QC Summary [ ] level 1 [x] Level 2 [ ] Level 3 [ ] Level 4

Additional Remarks: Provide BEDMS format EDD; MDA requirements to follow.

For Lab Receiving Use Only: *Custody Seal Intact?* [ ] *Yes* [ ] *No* ***Cooler Temp:*** ____ °C

> ***For sample shipping and delivery details, see Sample Receipt & Review form (SRR).***

Sample Collection Time Zone: [ ] Eastern [x] Pacific [ ] Central [ ] Mountain [ ] Other:

1.) Chain of Custody Number = Client Determined

2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite

3.) Field Filtered: For liquid matrices, indicate with a **- Y -** for yes the sample was field filtered or **- N -** for sample was not field filtered.

4.) Matrix Codes: **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, **ML**=Misc Liquid, **SO**=Soil, **SD**=Sediment, **SL**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal

5.) Sample Analysis Requested: Analytical method requested (i.e. **8260B, 6010B/7470A)** and number of containers provided for each (i.e. *8260B* - **3**, *6010B/7470A* - **1**).

6.) Preservative Type: **HA** = Hydrochloric Acid, **NI** = Nitric Acid, **SH** = Sodium Hydroxide, **SA** = Sulfuric Acid, **AA** = Ascorbic Acid, **HX** = Hexane, **ST** = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) **KNOWN OR POSSIBLE HAZARDS**

RCRA Metals
As = Arsenic **Hg**= Mercury
Ba = Barium **Se**= Selenium
Cd = Cadmium **Ag**= Silver
Cr = Chromium **MR**= Misc. RCRA metals
Pb = Lead

Characteristic Hazards
FL = Flammable/Ignitable
CO = Corrosive
RE = Reactive

TSCA Regulated
PCB = Polychlorinated biphenyls

Listed Waste
LW= Listed Waste
(F,K,P and U-listed wastes.)
Waste code(s):

Other
OT= Other / Unknown
(i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)
Description:

Please provide any additional details below regarding handling and/or disposal concerns. *(i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)*

Please handle the filters as non-radioactive, environmental samples

GEL Laboratories LLC JR

SAMPLE RECEIPT & REVIEW FORM

Client: SNTC	SDG/AR/COC/Work Order: 405305
Received By: LM	Date Received: 11/23/18
Carrier and Tracking Number	Circle Applicable: (FedEx Express) FedEx Ground UPS Field Services Courier Other 7737 8721 2781

Suspected Hazard Information	Yes	No	
			*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 (CPM) mR/Hr Classified as: Rad 1 Rad 2 Rad 3
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. 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?	✓			
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: 23C
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR4-F7 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? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes No___ N/A 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?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KG Date 11/23/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

Radiochemistry
Technical Case Narrative
Stantec Consulting (SNTC)
SDG #: 465305

Product: **Alphaspec Po210, Filter**
Analytical Method: DOE EML HASL-300, Po-01-RC Modified
Analytical Procedure: GL-RAD-A-016 REV# 18
Analytical Batch: 1826520

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204168604	Method Blank (MB)
1204168605	Laboratory Control Sample (LCS)
1204168606	Laboratory Control Sample Duplicate (LCSD)

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 465305003 (20181113-BOEING-BLANK) was recounted due to a peak shift. The recount is reported.
Sample 1204168606 (LCSD) was recounted due to detector error. The recount is reported.

Product: **AlphaSpec Ra226, Filter**
Analytical Method: Eichrom Industries, AN-1421
Analytical Procedure: GL-RAD-A-046 REV# 10
Analytical Batch: 1826522

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204168609	Method Blank (MB)
1204168610	Laboratory Control Sample (LCS)
1204168611	Laboratory Control Sample Duplicate (LCSD)

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: **Alphaspec Am241, Filter**
Analytical Method: DOE EML HASL-300, Am-05-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1826529

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204168635	Method Blank (MB)
1204168636	Laboratory Control Sample (LCS)
1204168637	Laboratory Control Sample Duplicate (LCSD)

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.

Quality Control (QC) Information

RDL Met
The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204168635 (MB)	Americium-241	Result -0.191 < MDA 0.644 > RDL 0.63 pCi/Filter

Product: **Alphaspec Pu, Filter**
Analytical Method: DOE EML HASL-300, Pu-11-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1826533

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204168638	Method Blank (MB)
1204168639	Laboratory Control Sample (LCS)
1204168640	Laboratory Control Sample Duplicate (LCSD)

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 465305001 (20181113-BOEING-4) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Product: **Alphaspec Th, Filter**
Analytical Method: DOE EML HASL-300, Th-01-RC Modified
Analytical Procedure: GL-RAD-A-038 REV# 17
Analytical Batch: 1826534

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17

Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204168645	Method Blank (MB)
1204168646	Laboratory Control Sample (LCS)
1204168647	Laboratory Control Sample Duplicate (LCSD)

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.

Quality Control (QC) Information

RDL Met
The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204168645 (MB)	Thorium-232	Result 0.0306 < MDA 0.128 > RDL 0.126 pCi/Filter

Miscellaneous Information

Manual Integration
Manual integrations of alpha spectroscopy spectra 1204168646 (LCS) and 1204168647 (LCSD) were performed to fully separate counts in Regions of Interest which would have been biased.

Product: **Alphaspec U, Filter**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1826536

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5

465305003	20181113-BOEING-BLANK
1204168648	Method Blank (MB)
1204168649	Laboratory Control Sample (LCS)
1204168650	Laboratory Control Sample Duplicate (LCSD)

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 465305003 (20181113-BOEING-BLANK) was recounted due to a suspected false positive. The recount is reported.

Miscellaneous Information

Additional Comments
The tracer peak centroid for sample 1204168648 (MB) is greater than 50 keV from the expected library energy value for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest.

Product: **Gammaspec, Gamma, Filter (Standard List)**
Analytical Method: DOE HASL 300, 4.5.2.3/Ga-01-R
Analytical Procedure: GL-RAD-A-013 REV# 27
Analytical Batch: 1826402

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204168353	Method Blank (MB)
1204168354	465305001(20181113-BOEING-4) Sample Duplicate (DUP)
1204168355	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.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
UI	Results are considered a false positive due to high counting uncertainty.	Lead-210	465305002	20181113-BOEING-5

Product: **GFPC, Sr90, Filter**
Analytical Method: EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
Analytical Procedure: GL-RAD-A-004 REV# 20
Analytical Batch: 1826813

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5
465305003	20181113-BOEING-BLANK
1204169235	Method Blank (MB)
1204169237	Laboratory Control Sample (LCS)
1204169460	Laboratory Control Sample Duplicate (LCSD)

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: **Liquid Scint Pu241, Filter**
Analytical Method: DOE EML HASL-300, Pu-11-RC Modified
Analytical Procedure: GL-RAD-A-035 REV# 20
Analytical Batch: 1826538

Preparation Method: Filter Prep
Preparation Procedure: GL-RAD-A-026 REV# 17
Preparation Batch: 1826500

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

GEL Sample ID#	Client Sample Identification
465305001	20181113-BOEING-4
465305002	20181113-BOEING-5

465305003	20181113-BOEING-BLANK
1204168651	Method Blank (MB)
1204168652	Laboratory Control Sample (LCS)
1204168653	Laboratory Control Sample Duplicate (LCSD)

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.

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery
The Laboratory Control Sample Duplicate (see below) does not meet the recovery requirement, however, the Laboratory Control Sample does meet the recovery requirement and they meet the duplication criteria. There is not enough sample remaining for a re-analysis.

Sample	Analyte	Value
1204168653 (LCSD)	Plutonium-241	71.6* (75%-125%)

Technical Information

Recounts
Samples 1204168652 (LCS) and 1204168653 (LCSD) were recounted due to low recovery. The recounts are 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.

List of current GEL Certifications as of 07 December 2018

State	Certification
Alaska	17−018
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122019−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−27
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Appendix C

Electronic Data Deliverable (EDD) - Work Order 465305

Electronic Data Deliverable (EDD) 465305
Air Sample Filters from Boeing Stations #4 and #5 for period 11/08/2018 to 11/13/2018

Sample Name	Sample Date	Lab Sample Name	Result Type	SDG Number	Code Description	Analysis Method	Analyte	Result Value	Result Value Units	Project Qualifier Code	Lab Qualifier Code	Lab Qualifier Description	1.96σ Uncertainty	Uncertainty Units	MDA	MDA Units	Lower Limit	Upper Limit	Report Date	Lab Batch No
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,EPA 905.0 Modified/DOE RP501 Rev. 1 Modified,GFPC, Sr90, Filter	905	Strontium-90	0.257	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.936	pCi/Filter	1.67	pCi/Filter			12/7/2018	1826813
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Am-05-RC Modified,Alphaspec Am241, Filter	EH300 M	Americium-241	0.0181	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.117	pCi/Filter	0.24	pCi/Filter			12/7/2018	1826529
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Alphaspec Pu, Filter	EH300 M	Plutonium-238	0.00431	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.218	pCi/Filter	0.473	pCi/Filter			12/7/2018	1826533
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Alphaspec Pu, Filter	EH300 M	Plutonium-239/240	0.0279	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.185	pCi/Filter	0.379	pCi/Filter			12/7/2018	1826533
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Liquid Scint Pu241, Filter	EH300 M	Plutonium-241	-8.14	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	11.8	pCi/Filter	20.4	pCi/Filter			12/7/2018	1826538
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Po-01-RC Modified,Alphaspec Po210, Filter	EH300 M	Polonium-210	1.84	pCi/Filter				1.28	pCi/Filter	1.11	pCi/Filter			12/7/2018	1826520
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-228	0.0317	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0888	pCi/Filter	0.159	pCi/Filter			12/7/2018	1826534
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-230	0.108	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.11	pCi/Filter	0.169	pCi/Filter			12/7/2018	1826534
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-232	0.148	pCi/Filter				0.0842	pCi/Filter	0.0479	pCi/Filter			12/7/2018	1826534
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-233/234	0.23	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.231	pCi/Filter	0.31	pCi/Filter			12/7/2018	1826536
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-235	0.0611	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.168	pCi/Filter	0.292	pCi/Filter			12/7/2018	1826536
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-238	0.0402	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.137	pCi/Filter	0.254	pCi/Filter			12/7/2018	1826536
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Actinium-228	-2.67	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.65	pCi/Filter	6.5	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Antimony-124	0.0949	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.07	pCi/Filter	4.43	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Antimony-125	0.947	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.6	pCi/Filter	3.25	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Barium-133	0.934	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.06	pCi/Filter	1.62	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Barium-140	2.78	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.36	pCi/Filter	9.2	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Beryllium-7	26.9	pCi/Filter				11.7	pCi/Filter	11	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Bismuth-212	-1.73	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	10.5	pCi/Filter	19.1	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Bismuth-214	-0.251	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.07	pCi/Filter	3.61	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cerium-139	0.356	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.454	pCi/Filter	0.862	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cerium-141	-0.998	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.09	pCi/Filter	1.73	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cerium-144	-0.149	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.22	pCi/Filter	5.63	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cesium-134	-0.537	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.726	pCi/Filter	1.17	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cesium-136	-1.79	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.24	pCi/Filter	3.86	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cesium-137	-0.49	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.715	pCi/Filter	1.19	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Chromium-51	-2.84	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	7	pCi/Filter	11.3	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-56	0.502	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.923	pCi/Filter	1.87	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-57	-0.0923	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.375	pCi/Filter	0.648	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-58	-0.39	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.06	pCi/Filter	1.73	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-60	-0.388	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.04	pCi/Filter	1.75	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Europium-152	-0.495	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.62	pCi/Filter	2.98	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Europium-154	-1.82	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.29	pCi/Filter	3.82	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Europium-155	1.86	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.52	pCi/Filter	3	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Iridium-192	-0.21	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.582	pCi/Filter	1.07	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Iron-59	0.923	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.05	pCi/Filter	4.36	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Lead-210	-13.2	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	31.7	pCi/Filter	53.2	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Lead-212	0.868	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.68	pCi/Filter	1.5	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Lead-214	-0.514	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.88	pCi/Filter	3.1	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Manganese-54	0.0502	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.748	pCi/Filter	1.43	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Mercury-203	0.619	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.712	pCi/Filter	1.34	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Neodymium-147	-1.79	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	9.34	pCi/Filter	17.4	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Neptunium-239	-2.67	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.13	pCi/Filter	6.83	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Niobium-94	0.196	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.779	pCi/Filter	1.49	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Niobium-95	0.549	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.88	pCi/Filter	1.8	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Potassium-40	5.84	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	14.5	pCi/Filter	30.8	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Promethium-144	0.293	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.846	pCi/Filter	1.62	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Promethium-146	-1.07	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.797	pCi/Filter	1.23	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Radium-228	-2.67	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.65	pCi/Filter	6.5	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Ruthenium-106	0.167	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	7.58	pCi/Filter	12.7	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Silver-110m	-0.764	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.01	pCi/Filter	1.6	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Sodium-22	-0.643	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.808	pCi/Filter	1.35	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Thallium-208	0.629	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.18	pCi/Filter	1.25	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Thorium-234	1.87	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	16.5	pCi/Filter	29.9	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Tin-113	0.558	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.841	pCi/Filter	1.69	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Uranium-235	-1.53	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.98	pCi/Filter	5.98	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Uranium-238	1.87	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	16.5	pCi/Filter	29.9	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Yttrium-88	-0.0756	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.648	pCi/Filter	1.44	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Zinc-65	-0.334	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.07	pCi/Filter	3.51	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Zirconium-95	0.133	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.44	pCi/Filter	2.77	pCi/Filter			12/7/2018	1826402
20181113-BOEING-4	11/13/2018 10:30	465305001	Primary Result	465305	FILTER,Eichrom Industries, AN-1421,AlphaSpec Ra226, Filter		Radium-226	1.12	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.24	pCi/Filter	1.89	pCi/Filter			12/7/2018	1826522
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,EPA 905.0 Modified/DOE RP501 Rev. 1 Modified,GFPC, Sr90, Filter	905	Strontium-90	-0.319	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.771	pCi/Filter	1.47	pCi/Filter			12/7/2018	1826813
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Am-05-RC Modified,Alphaspec Am241, Filter	EH300 M	Americium-241	-0.0201	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0891	pCi/Filter	0.232	pCi/Filter			12/7/2018	1826529
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Alphaspec Pu, Filter	EH300 M	Plutonium-238	0.0333	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.149	pCi/Filter	0.292	pCi/Filter			12/7/2018	1826533
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Alphaspec Pu, Filter	EH300 M	Plutonium-239/240	-0.0449	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.183	pCi/Filter	0.432	pCi/Filter			12/7/2018	1826533
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Liquid Scint Pu241, Filter	EH300 M	Plutonium-241	-9.52	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	11.5	pCi/Filter	19.9	pCi/Filter			12/7/2018	1826538
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Po-01-RC Modified,Alphaspec Po210, Filter	EH300 M	Polonium-210	2.43	pCi/Filter				1.65	pCi/Filter	1.55	pCi/Filter			12/7/2018	1826520
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-228	0.037	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0917	pCi/Filter	0.163	pCi/Filter			12/7/2018	1826534
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-230	0.146	pCi/Filter				0.0917	pCi/Filter	0.112	pCi/Filter			12/7/2018	1826534
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-232	0.101	pCi/Filter				0.0709	pCi/Filter	0.0738	pCi/Filter			12/7/2018	1826534
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-233/234	0.0872	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.156	pCi/Filter	0.26	pCi/Filter			12/7/2018	1826536
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-235	0.177	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.19	pCi/Filter	0.216	pCi/Filter			12/7/2018	1826536
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-238	0.137	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.169	pCi/Filter	0.245	pCi/Filter			12/7/2018	1826536
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Actinium-228	-0.287	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.43	pCi/Filter	6.72	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Antimony-124	1.18	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.44	pCi/Filter	5.82	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE EML HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (

Electronic Data Deliverable (EDD) 465305
Air Sample Filters from Boeing Stations #4 and #5 for period 11/08/2018 to 11/13/2018

Sample Name	Sample Date	Lab Sample Name	Result Type	SDG Number	Code Description	Analysis Method	Analyte	Result Value	Result Value Units	Project Qualifier Code	Lab Qualifier Code	Lab Qualifier Description	1.96σ Uncertainty	Uncertainty Units	MDA	MDA Units	Lower Limit	Upper Limit	Report Date	Lab Batch No
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Mercury-203	0.889	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.767	pCi/Filter	1.6	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Neodymium-147	-3.47	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	11.2	pCi/Filter	20.5	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Neptunium-239	-0.506	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	5.04	pCi/Filter	8.78	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Niobium-94	0.143	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.856	pCi/Filter	1.64	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Niobium-95	-0.813	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.22	pCi/Filter	1.73	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Potassium-40	-1.44	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	12.7	pCi/Filter	27.1	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Promethium-144	0.181	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.879	pCi/Filter	1.69	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Promethium-146	-0.256	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.86	pCi/Filter	1.58	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Radium-228	-0.287	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.43	pCi/Filter	6.72	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Ruthenium-106	-2.76	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	6.51	pCi/Filter	11.6	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Silver-110m	0.81	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.18	pCi/Filter	2.55	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Sodium-22	-0.00893	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.854	pCi/Filter	1.81	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Thallium-208	-0.122	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.882	pCi/Filter	1.6	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Thorium-234	6.65	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	41.1	pCi/Filter	70.8	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Tin-113	-0.372	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.968	pCi/Filter	1.75	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Uranium-235	-0.435	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.41	pCi/Filter	7.06	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Uranium-238	6.65	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	41.1	pCi/Filter	70.8	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Yttrium-88	-0.213	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.861	pCi/Filter	1.78	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Zinc-65	-0.185	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.76	pCi/Filter	3.58	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Zirconium-95	0.793	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.39	pCi/Filter	2.93	pCi/Filter			12/7/2018	1826402
20181113-BOEING-5	11/13/2018 11:00	465305002	Primary Result	465305	FILTER,Eichrom Industries, AN-1421,AlphaSpec Ra226, Filter		Radium-226	0.58	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.93	pCi/Filter	1.55	pCi/Filter			12/7/2018	1826522
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,EPA 905.0 Modified/DOE RP501 Rev. 1 Modified,GFPC, Sr90, Filter	905	Strontium-90	-0.349	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.871	pCi/Filter	1.66	pCi/Filter			12/7/2018	1826813
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Am-05-RC Modified,Alphaspec Am241, Filter	EH300 M	Americium-241	0.0998	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.208	pCi/Filter	0.367	pCi/Filter			12/7/2018	1826529
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Alphaspec Pu, Filter	EH300 M	Plutonium-238	0.00153	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.113	pCi/Filter	0.252	pCi/Filter			12/7/2018	1826533
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Alphaspec Pu, Filter	EH300 M	Plutonium-239/240	-0.119	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.101	pCi/Filter	0.362	pCi/Filter			12/7/2018	1826533
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Pu-11-RC Modified,Liquid Scint Pu241, Filter	EH300 M	Plutonium-241	-13.2	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	11.7	pCi/Filter	20.4	pCi/Filter			12/7/2018	1826538
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Po-01-RC Modified,Alphaspec Po210, Filter	EH300 M	Polonium-210	0.494	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.802	pCi/Filter	1.14	pCi/Filter			12/7/2018	1826520
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-228	-0.0104	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0694	pCi/Filter	0.14	pCi/Filter			12/7/2018	1826534
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-230	0.0659	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0912	pCi/Filter	0.151	pCi/Filter			12/7/2018	1826534
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, Th-01-RC Modified,Alphaspec Th, Filter	EH300 M	Thorium-232	0.0157	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0429	pCi/Filter	0.0708	pCi/Filter			12/7/2018	1826534
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-233/234	0.0327	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.29	pCi/Filter	0.613	pCi/Filter			12/7/2018	1826536
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-235	0.066	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.29	pCi/Filter	0.525	pCi/Filter			12/7/2018	1826536
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE EML HASL-300, U-02-RC Modified,Alphaspec U, Filter	EH300 M	Uranium-238	0.2	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.33	pCi/Filter	0.475	pCi/Filter			12/7/2018	1826536
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Actinium-228	-0.105	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.82	pCi/Filter	8.96	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Antimony-124	-0.969	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.13	pCi/Filter	4.13	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Antimony-125	-0.925	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.04	pCi/Filter	3.62	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Barium-133	0.498	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.31	pCi/Filter	1.9	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Barium-140	3.95	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	5.91	pCi/Filter	12.4	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Beryllium-7	5.63	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	7.14	pCi/Filter	15	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Bismuth-212	-2.53	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	11	pCi/Filter	20.4	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Bismuth-214	0.418	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.14	pCi/Filter	3.93	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cerium-139	0.333	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.554	pCi/Filter	1.09	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cerium-141	0.155	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.19	pCi/Filter	2.26	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cerium-144	1.02	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.93	pCi/Filter	7.52	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cesium-134	-0.247	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.92	pCi/Filter	1.69	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cesium-136	2.26	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.79	pCi/Filter	6.24	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cesium-137	0.506	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.721	pCi/Filter	1.61	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Chromium-51	7.01	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	8.92	pCi/Filter	17.8	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-56	-0.206	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.02	pCi/Filter	1.88	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-57	0.308	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.48	pCi/Filter	0.95	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-58	-0.476	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.04	pCi/Filter	1.69	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Cobalt-60	0.387	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.97	pCi/Filter	2.35	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Europium-152	-0.489	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.13	pCi/Filter	3.7	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Europium-154	-1.3	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.85	pCi/Filter	5.42	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Europium-155	1.31	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.22	pCi/Filter	3.66	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Iridium-192	-0.396	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.745	pCi/Filter	1.32	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Iron-59	-0.2	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.15	pCi/Filter	4.39	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Lead-210	-84.2	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	128	pCi/Filter	207	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Lead-212	0.885	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.2	pCi/Filter	2.73	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Lead-214	-0.813	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2	pCi/Filter	3.14	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Manganese-54	0.156	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.01	pCi/Filter	1.96	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Mercury-203	-0.208	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.804	pCi/Filter	1.47	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Neodymium-147	-3.49	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	13.1	pCi/Filter	23.9	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Neptunium-239	1.34	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	5.07	pCi/Filter	9.78	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Niobium-94	0.0708	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.904	pCi/Filter	1.72	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Niobium-95	-0.525	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.15	pCi/Filter	2	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Potassium-40	8.77	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	10.1	pCi/Filter	25.1	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Promethium-144	0.539	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.05	pCi/Filter	2.07	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Promethium-146	-0.0764	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.702	pCi/Filter	1.36	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Radium-228	-0.105	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.82	pCi/Filter	8.96	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Ruthenium-106	-5.75	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	7.49	pCi/Filter	12.4	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Silver-110m	-0.156	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.37	pCi/Filter	2.56	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HASL 300-GA-01-R	Sodium-22	-0.562	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.05	pCi/Filter	1.94	pCi/Filter			12/7/2018	1826402
20181113-BOEING-BLANK	11/13/2018 15:00	465305003	Primary Result	465305	FILTER,DOE HASL 300, 4.5.2.3/Ga-01-R,Gammaspec, Gamma, Filter (Standard List)	HAS

Electronic Data Deliverable (EDD) 465305
Air Sample Filters from Boeing Stations #4 and #5 for period 11/08/2018 to 11/13/2018

Sample Name	Sample Date	Lab Sample Name	Result Type	SDG Number	Code Description	Analysis Method	Analyte	Result Value	Result Value Units	Project Qualifier Code	Lab Qualifier Code	Lab Qualifier Description	1.96σ Uncertainty	Uncertainty Units	MDA	MDA Units	Lower Limit	Upper Limit	Report Date	Lab Batch No
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Europium-152	-1.29	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.95	pCi/Filter	3.33	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Europium-154	-0.609	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.67	pCi/Filter	5.1	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Europium-155	0.124	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.94	pCi/Filter	3.43	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Iridium-192	0.117	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.621	pCi/Filter	1.18	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Iron-59	1.19	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.76	pCi/Filter	4.38	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Lead-210	-120	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	184	pCi/Filter	313	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Lead-212	2.38	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.19	pCi/Filter	2.77	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Lead-214	0.353	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.61	pCi/Filter	2.89	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Manganese-54	0.58	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.746	pCi/Filter	1.69	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Mercury-203	-0.022	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.568	pCi/Filter	1.06	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Neodymium-147	2.99	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.56	pCi/Filter	9.47	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Neptunium-239	-0.163	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.63	pCi/Filter	8.11	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Niobium-94	0.461	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.791	pCi/Filter	1.67	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Niobium-95	0.318	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.748	pCi/Filter	1.58	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Potassium-40	1.51	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	12.3	pCi/Filter	27.3	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Promethium-144	0.0894	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.845	pCi/Filter	1.66	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Promethium-146	0.0347	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.899	pCi/Filter	1.52	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Radium-228	-0.286	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.74	pCi/Filter	8.8	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Ruthenium-106	-0.106	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	7.03	pCi/Filter	13.8	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Silver-110m	0.175	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.22	pCi/Filter	2.45	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Sodium-22	-0.0686	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.886	pCi/Filter	1.78	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Thallium-208	-0.152	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.05	pCi/Filter	1.93	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Thorium-234	19.5	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	64.9	pCi/Filter	77.4	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Tin-113	0.283	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.77	pCi/Filter	1.52	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Uranium-235	0.546	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.31	pCi/Filter	7.15	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Uranium-238	19.5	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	64.9	pCi/Filter	77.4	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Yttrium-88	-0.448	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.31	pCi/Filter	2.48	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Zinc-65	-0.318	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.7	pCi/Filter	3.29	pCi/Filter			12/7/2018	1826402
1204168353_MB_465305	11/28/2018 9:15	1204168353	Lab Method Blank	465305		HASL 300-GA-01-R	Zirconium-95	-0.113	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.37	pCi/Filter	2.68	pCi/Filter			12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Actinium-228	-1.87	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.61	pCi/Filter	6.46	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Antimony-124	1.56	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.29	pCi/Filter	5.79	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Antimony-125	0.477	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.06	pCi/Filter	3.66	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Barium-133	0.412	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.741	pCi/Filter	1.42	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Barium-140	4.3	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	5.24	pCi/Filter	11.3	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Beryllium-7	10.9	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	15.9	pCi/Filter	12.2	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Bismuth-212	11.3	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	11.8	pCi/Filter	25.5	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Bismuth-214	-0.012	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.16	pCi/Filter	3.79	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cerium-139	-0.318	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.587	pCi/Filter	0.959	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cerium-141	-0.796	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.38	pCi/Filter	2.11	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cerium-144	-0.429	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.86	pCi/Filter	6.66	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cesium-134	0.288	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.816	pCi/Filter	1.58	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cesium-136	-1.03	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.38	pCi/Filter	3.86	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cesium-137	0.597	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.933	pCi/Filter	1.81	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Chromium-51	-1.72	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	8.07	pCi/Filter	14.9	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cobalt-56	0.365	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.889	pCi/Filter	1.84	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cobalt-57	-0.209	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.484	pCi/Filter	0.812	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cobalt-58	-0.356	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.84	pCi/Filter	1.48	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Cobalt-60	0.488	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.727	pCi/Filter	1.87	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Europium-152	0.485	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.14	pCi/Filter	3.97	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Europium-154	0.648	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2.42	pCi/Filter	5.45	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Europium-155	-0.174	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	2	pCi/Filter	3.5	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Iridium-192	-0.686	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.692	pCi/Filter	1.18	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Iron-59	-1.83	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.98	pCi/Filter	2.84	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Lead-210	3.49	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	205	pCi/Filter	373	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Lead-212	0.958	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.8	pCi/Filter	2.3	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Lead-214	1.63	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.42	pCi/Filter	2.87	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Manganese-54	0.0043	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.762	pCi/Filter	1.48	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Mercury-203	0.056	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.722	pCi/Filter	1.39	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Neodymium-147	-8.54	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	9.98	pCi/Filter	16.5	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Neptunium-239	-2.16	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.88	pCi/Filter	8.2	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Niobium-94	-0.582	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.836	pCi/Filter	1.4	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Niobium-95	0.443	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.866	pCi/Filter	1.81	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Potassium-40	-15.1	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	13.2	pCi/Filter	23.2	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Promethium-144	0.122	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.823	pCi/Filter	1.58	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Promethium-146	0.276	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.17	pCi/Filter	1.59	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Radium-228	-1.87	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	3.61	pCi/Filter	6.46	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Ruthenium-106	2.4	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	6.97	pCi/Filter	13.9	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Silver-110m	0.0365	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.86	pCi/Filter	1.76	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Sodium-22	0.15	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.83	pCi/Filter	1.85	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Thallium-208	0.29	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.863	pCi/Filter	1.67	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Thorium-234	1.84	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	46.5	pCi/Filter	69.4	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Tin-113	0.506	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.829	pCi/Filter	1.71	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Uranium-235	-2.13	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	4.41	pCi/Filter	6.83	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Uranium-238	1.84	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	46.5	pCi/Filter	69.4	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Yttrium-88	-0.692	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.994	pCi/Filter	1.65	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Zinc-65	-0.824	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.8	pCi/Filter	3.39	pCi/Filter	0	20	12/7/2018	1826402
1204168354_DUP_465305	11/13/2018 10:30	1204168354	Lab Duplicate	465305		HASL 300-GA-01-R	Zirconium-95	1.69	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.46	pCi/Filter	3.39	pCi/Filter	0	20	12/7/2018	1826402
1204168355_BS_465305	11/28/2018 9:15	1204168355	Laboratory Control Sample	465305		HASL 300-GA-01-R	Americium-241	95.6	%								75	125	12/7/2018	1826402
1204168355_BS_465305	11/28/2018 9:15	1204168355	Laboratory Control Sample	465305		HASL 300-GA-01-R	Cesium-137	98.9	%								75	125	12/7/2018	1826402
1204168355_BS_465305	11/28/2018 9:15	1204168355	Laboratory Control Sample	465305		HASL 300-GA-01-R	Cobalt-60	98.4	%								75	125	12/7/2018	1826402
1204168604_MB_465305	11/28/2018 10:50	1204168604	Lab Method Blank	465305		EH300 M	Polonium-210	0.152	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.66	pCi/Filter	1.29	pCi/Filter			12/7/2018	1826520
1204168605_BS_465305	11/28/2018 10:50	1204168605	Laboratory Control Sample	465305		EH300 M	Polonium-210	111	%								75	125	12/7/2018	1826520
1204168606_BSD_465305	11/28/2018 10:50	1204168606	Laboratory Control Sample Duplicate	465305		EH300 M	Polonium-210	100	%								75	125	12/7/2018	1826520
1204168609_MB_465305	11/28/2018 10:50	1204168609	Lab Method Blank	465305			Radium-226	0.948	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	1.03	pCi/Filter	1.47	pCi/Filter			12/7/2018	1826522
1204168610_BS_465305	11/28/2018 10:50	1204168610	Laboratory Control Sample	465305			Radium-226	108	%								75	125	12/7/2018	1826522
1204168611_BSD_465305	11/28/2018 10:50	1204168611	Laboratory Control Sample Duplicate	465305			Radium-226	99.4	%								75	125	12/7/2018	1826522
1204168635_MB_465305	11/28/2018 10:53	1204168635	Lab Method Blank	465305		EH300 M	Americium-241	-0.191	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.211	pCi/Filter	0.644	pCi/Filter			12/7/2018	1826529
1204168636_BS_465305	11/28/2018 10:53	1204168636	Laboratory Control Sample	465305		EH300 M	Americium-241	94.9	%								75	125	12/7/2018	1826529
1204168637_BSD_465305	11/28/2018 10:53	1204168637	Laboratory Control Sample Duplicate	465305		EH300 M	Americium-241	103	%								75	125	12/7/2018	1826529
1204168638_MB_465305	11/28/2018 10:54	1204168638	Lab Method Blank	465305		EH300 M	Plutonium-238	-0.0531	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.101	pCi/Filter	0.311	pCi/Filter			12/7/2018	1826533
1204168638_MB_465305	11/28/2018 10:54	1204168638	Lab Method Blank	465305		EH300 M	Plutonium-239/240	-0.0283	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.167	pCi/Filter	0.396	pCi/Filter			12/7/2018	1826533
1204168639_BS_465305	11/28/2018 10:54	1204168639	Laboratory Control Sample	465305		EH300 M	Plutonium-239/240	87.2	%								75	125	12/7/2018	1826533
1204168640_BSD_465305	11/28/2018 10:54	1204168640	Laboratory Control Sample Duplicate	465305		EH300 M	Plutonium-239/240	106	%								75	125	12/7/2018	1826533
1204168645_MB_465305	11/28/2018 10:55	1204168645	Lab Method Blank	465305		EH300 M	Thorium-228	0.048	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.14	pCi/Filter	0.252	pCi/Filter			12/7/2018	1826534
1204168645_MB_465305	11/28/2018 10:55	1204168645	Lab Method Blank	465305		EH300 M	Thorium-230	0.0177	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.133	pCi/Filter	0.251	pCi/Filter			12/7/2018	1826534
1204168645_MB_465305	11/28/2018 10:55	1204168645	Lab Method Blank	465305		EH300 M	Thorium-232	0.0306	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.0786	pCi/Filter	0.128	pCi/Filter			12/7/2018	1826534

Electronic Data Deliverable (EDD) 465305
Air Sample Filters from Boeing Stations #4 and #5 for period 11/08/2018 to 11/13/2018

Sample Name	Sample Date	Lab Sample Name	Result Type	SDG Number	Code Description	Analysis Method	Analyte	Result Value	Result Value Units	Project Qualifier Code	Lab Qualifier Code	Lab Qualifier Description	1.96σ Uncertainty	Uncertainty Units	MDA	MDA Units	Lower Limit	Upper Limit	Report Date	Lab Batch No
1204168649_BS_465305	11/28/2018 10:55	1204168649	Laboratory Control Sample	465305		EH300 M	Uranium-238	95	%								75	125	12/7/2018	1826536
1204168650_BSD_465305	11/28/2018 10:55	1204168650	Laboratory Control Sample Duplicate	465305		EH300 M	Uranium-238	97.5	%								75	125	12/7/2018	1826536
1204168651_MB_465305	11/28/2018 10:56	1204168651	Lab Method Blank	465305		EH300 M	Plutonium-241	-8.75	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	13	pCi/Filter	22.5	pCi/Filter			12/7/2018	1826538
1204168652_BS_465305	11/28/2018 10:56	1204168652	Laboratory Control Sample	465305		EH300 M	Plutonium-241	83.3	%								75	125	12/7/2018	1826538
1204168653_BSD_465305	11/28/2018 10:56	1204168653	Laboratory Control Sample Duplicate	465305		EH300 M	Plutonium-241	71.6	%	QC	*						75	125	12/7/2018	1826538
1204169235_MB_465305	11/29/2018 8:46	1204169235	Lab Method Blank	465305		905	Strontium-90	1.2	pCi/Filter	U	U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.	0.986	pCi/Filter	1.61	pCi/Filter			12/7/2018	1826813
1204169237_BS_465305	11/29/2018 8:46	1204169237	Laboratory Control Sample	465305		905	Strontium-90	107	%								75	125	12/7/2018	1826813
1204169460_BSD_465305	11/29/2018 11:37	1204169460	Laboratory Control Sample Duplicate	465305		905	Strontium-90	101	%								75	125	12/7/2018	1826813

Appendix D

Data Validation of Isotopic Results

DATA VALIDATION REPORT

Boeing SSFL RFI -Post-Woolsey Fire Sampling

SAMPLE DELIVERY GROUP: 465305

Prepared for

Stantec

21 December, 2018

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

1 – Sample Identification

2 – Data Qualifier Reference

3 - Reason Code Reference

I. INTRODUCTION

Task Order Title: Boeing SSFL RFI – Post Woolsey Fire Sampling

Contract: S10503977-100598 OF

MEC^X Project No.: 1261.500D.01.001

Sample Delivery Group: 465305

Project Manager: Dixie Hambrick

Matrix: Filter

QC Level: IV

No. of Samples: 3

No. of Reanalyses/Dilutions: 0

Laboratory: Gel Laboratories, LLC.

TABLE 1 - SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection	Method
20181113-BOEING-4	465305001	FILTER	11/13/2018 10:30	905, EH300 M, HASL 300-GA-01-R, AN-1421
20181113-BOEING-5	465305002	FILTER	11/13/2018 11:00	905, EH300 M, HASL 300-GA-01-R, AN-1421
20181113-BOEING-BLANK	465305003	FILTER	11/13/2018 15:00	905, EH300 M, HASL 300-GA-01-R, AN-1421

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 465305:

- The laboratory received samples in this SDG at ambient temperature, as is acceptable for radiochemistry analysis.
- The laboratory received the sample containers intact.
- Field and laboratory personnel signed and dated the COC.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected as noted in the quantitation section of each method reviewed.	The analyte was analyzed for, but was not detected as noted in the sample results verification section of each method reviewed.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may inaccurate or imprecise.	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may inaccurate or imprecise.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analyte has been "tentatively identified" or “presumptively” as present and the associated numerical value is the estimated concentration in the sample.	Not applicable.
T-I	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents an approximate concentration. The tentative identification represents a compound with a Chemical Abstract Service (CAS) number and fit greater than 80%.	Not applicable

T-II	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents an approximate concentration. The tentative identification represents a class of compound, and is not of sufficient identification quality to represent a specific compound.	Not applicable
T-III	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents an approximate concentration. The tentative identification represents an unknown compound.	Not applicable
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

TABLE 3 - REASON CODE REFERENCE

Reason Code	Organic	Inorganic
H	Holding time was exceeded.	Holding time was exceeded.
S	Surrogate recovery was outside control limits.	Not applicable.
C	Calibration percent relative standard deviation (%RSD) or percent deviation (%D) were noncompliant, or coefficient of determination (r^2) was <0.990.	Correlation coefficient (r) was <0.995.
R	Calibration relative response factor (RRF) was <0.05.	Percent recovery (%R) for calibration was outside control limits.
B	The analyte was detected in an associated blank as well as in the sample.	The analyte was detected in an associated blank as well as in the sample.
L	Laboratory control sample (LCS) or /LCS duplicate (LCSD) %R was outside the control limits.	LCS or LCSD %R was outside the control limits.
L1	LCS/LCSD relative percent difference (RPD) was outside the control limit.	LCS/LCSD RPD was outside the control limit.
Q	Matrix spike/matrix spike duplicate (MS/MSD) %R was outside control limits.	MS or MSD %R was outside the control limit.
Q1	MS/MSD RPD was outside the control limit.	MS/MSD RPD was outside the control limit.
E	Result was reported as an estimated maximum possible concentration (EMPC).	Laboratory duplicate RPD was outside the control limit.
I	Internal standard recovery was outside control limits.	Inductively coupled plasma (ICP) interference check standard (ICSA/ICSAB) result was outside control limits.
I1	Not applicable.	ICP mass spectrometer (ICPMS) internal standard recovery was outside control limits.
A	Not applicable.	Serial dilution %D was outside control limits.
M	Tuning (BFB or DFTPP) was not compliant.	ICPMS tune was not compliant.
T	The analyte was detected in an associated trip blank as well as in the sample.	Not applicable.

Reason Code	Organic	Inorganic
+	False positive – reported compound was not present.	False positive – reported compound was not present.
-	False negative – compound was present but not reported.	False negative – compound was present but not reported.
F	The analyte was detected in an associated field blank (FB) or equipment blank (EB) as well as in the sample.	The analyte was detected in an associated field blank (FB) or equipment blank (EB) as well as in the sample.
F1	Field duplicate RPD was outside the control limit.	Field duplicate RPD was outside the control limit.
$	The reviewer corrected the reported result and/or other information.	The reviewer corrected the reported result and/or other information.
D	The analysis was not used because another more technically sound analysis was available.	The analysis was not used because another more technically sound analysis was available.
P	Instrument performance not compliant.	Post digestion spike recovery was outside of control limits.
*II, *III	Other problems identified in the data are described in Section II, "Sample Management," or Section III, "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found.	Other problems identified in the data are described in Section II, "Sample Management," or Section III, "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found.

III. VARIOUS EPA METHOD —METHOD 905, DOE EML HASL 300 FOR ALPHA AND GAMMA SPECTROSCOPY AND AN-1421 FOR RADIUM 226

Elizabeth A. Wessling of MEC^X reviewed the SDG on December 21, 2018

The samples listed in Table 1 for these analyses were validated based on the guidelines outlined in the *EPA Method 905, DOE EML HASL-300 Alpha Spectroscopy Modified*, *DOE HASL-300 Gamma Spectroscopy, Eichrom Industries AN-1421 for Radium 226, Paar Evaluation of Radiochemical Data Usability* and the *National Functional Guidelines for Inorganic Data Review* (1/17).

III.1.HOLDING TIMES

The air samples were collected 11/8-13/2018. The samples were prepared on 11/28/2018 for gamma spec isotopes and on 12/4/2018 for the remaining isotopes. The samples were counted on 11/28/2018 for the gamma spec isotopes and between 12/4/2018 and 12/6/2018 for the remaining isotopes. The preparation and analysis times were acceptable as no short-lived target radionuclides were requested as target isotopes in these air filter samples.

III.2. CALIBRATION

Calibration verification was reviewed and found to be acceptable.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

Target isotopes were not detected in the method blanks above the MDA. However, a comparison normalized absolute difference of the sample results and the method blank results indicated the method blank and the sample results were not significantly different at the 1% level of confidence. All detected sample results were qualified as nondetects (U).

III.3.2. *BLANK SPIKES AND LABORATORY CONTROL SAMPLES*

The recoveries were within laboratory-established control limits with the exception of plutonium-241 in the LCSD. Plutonium-241 was recovered below the control limits of 75-125% at 71.6%. Nondetects for plutonium-241 in the site samples were qualified as estimated nondetects (UJ).

III.3.3. *LABORATORY DUPLICATES*

Laboratory duplicate analyses were performed on sample 20181113-BOEING-4 for the gamma spec method isotopes. The duplicate results were considered acceptable.

III.3.4. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

No MS/MSD analyses were performed on the samples in this SDG due to limited sample volume. Method accuracy and precision were evaluated based on the LCS/LCSD or LCS/DUP results.

III.3.5. *SAMPLE RESULT VERIFICATION*

Sample results were evaluated based upon the raw data. All samples were reported on an "As Received" basis. Reported nondetect values and MDAs are to be utilized in conjunction with the counting errors and TPU when assessing the data usability and interpretation.

Lead-210 in sample 111318-BOEING-5 exhibited high counting uncertainty resulting in lead-210 in the sample being flagged as a false positive by the laboratory. The reviewer verified the high counting uncertainty and qualified the sample as an estimated nondetect (UJ).

Several sample results and QC sample results were reported from recounts due to various counting anomalies. The reviewer verified the anomalies and supported the reporting of the recount data.

The air filter samples were collected over a five-day sampling period. Approximately 2.5E5 liters of air were passed through the filter. The filters visually appeared black and caked with smoke, ash and particulate matter. It could not be determined by the reviewer if enough mass was present on the filters to require self-absorption correction. It did not appear to the reviewer that a self-absorption correction factor was utilized by the laboratory.

III.4. FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. Any remaining detects were used to evaluate the associated site samples. Following are findings associated with field QC samples:

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Field blank, 11132018-BOEING-BLANK, was free from target compound contamination.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

Validated Sample Result Forms: 465305

Analysis Method

Sample Name 20181113-BOEING-4 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305001 **Sample Date:** 11/13/2018 10:30:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Radium-226	13982633	1.12	+/-1.24	1.89	pCi/Filter	U	U	

Sample Name 20181113-BOEING-5 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305002 **Sample Date:** 11/13/2018 11:00:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Radium-226	13982633	0.58	+/-0.93	1.55	pCi/Filter	U	U	

Sample Name 20181113-BOEING-BLA **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305003 **Sample Date:** 11/13/2018 3:00:00 PM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Radium-226	13982633	0.705	+/-0.874	1.27	pCi/Filter	U	U	

Analysis Method 905

Sample Name 20181113-BOEING-4 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305001 **Sample Date:** 11/13/2018 10:30:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Strontium-90	10098972	0.257	+/-0.936	1.67	pCi/Filter	U	U	

Sample Name 20181113-BOEING-5 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305002 **Sample Date:** 11/13/2018 11:00:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Strontium-90	10098972	-0.319	+/-0.771	1.47	pCi/Filter	U	U	

Sample Name 20181113-BOEING-BLA **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305003 **Sample Date:** 11/13/2018 3:00:00 PM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Strontium-90	10098972	-0.349	+/-0.871	1.66	pCi/Filter	U	U	

Analysis Method EH300 M

Sample Name 20181113-BOEING-4 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305001 **Sample Date:** 11/13/2018 10:30:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Uranium-233/234	E-13230	0.23	+/-0.231	0.31	pCi/Filter	U	U	

Analysis Method EH300 M

Uranium-235	15117961	0.0611	+/-0.168	0.292	pCi/Filter	U	U	
Thorium-232	7440291-R	0.148	+/-0.0842	0.0479	pCi/Filter		U	B
Thorium-230	14269637	0.108	+/-0.11	0.169	pCi/Filter	U	U	
Thorium-228	14274829	0.0317	+/-0.0888	0.159	pCi/Filter	U	U	
Polonium-210	13981527	1.84	+/-1.28	1.11	pCi/Filter		U	B
Plutonium-241	14119325	-8.14	+/-11.8	20.4	pCi/Filter	U	UJ	L
Plutonium-239/240	OER10070	0.0279	+/-0.185	0.379	pCi/Filter	U	U	
Plutonium-238	13981163	0.00431	+/-0.218	0.473	pCi/Filter	U	U	
Americium-241	14596102	0.0181	+/-0.117	0.24	pCi/Filter	U	U	
Uranium-238	7440611-R	0.0402	+/-0.137	0.254	pCi/Filter	U	U	

Sample Name 20181113-BOEING-5 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305002 **Sample Date:** 11/13/2018 11:00:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Thorium-230	14269637	0.146	+/-0.0917	0.112	pCi/Filter		U	B
Plutonium-239/240	OER10070	-0.0449	+/-0.183	0.432	pCi/Filter	U	U	
Americium-241	14596102	-0.0201	+/-0.0891	0.232	pCi/Filter	U	U	
Plutonium-238	13981163	0.0333	+/-0.149	0.292	pCi/Filter	U	U	
Thorium-228	14274829	0.037	+/-0.0917	0.163	pCi/Filter	U	U	
Thorium-232	7440291-R	0.101	+/-0.0709	0.0738	pCi/Filter		U	B
Uranium-233/234	E-13230	0.0872	+/-0.156	0.26	pCi/Filter	U	U	
Uranium-235	15117961	0.177	+/-0.19	0.216	pCi/Filter	U	U	
Uranium-238	7440611-R	0.137	+/-0.169	0.245	pCi/Filter	U	U	
Plutonium-241	14119325	-9.52	+/-11.5	19.9	pCi/Filter	U	UJ	L
Polonium-210	13981527	2.43	+/-1.65	1.55	pCi/Filter		U	B

Sample Name 20181113-BOEING-BLA **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305003 **Sample Date:** 11/13/2018 3:00:00 PM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Americium-241	14596102	0.0998	+/-0.208	0.367	pCi/Filter	U	U	
Uranium-233/234	E-13230	0.0327	+/-0.29	0.613	pCi/Filter	U	U	
Thorium-232	7440291-R	0.0157	+/-0.0429	0.0708	pCi/Filter	U	U	
Thorium-230	14269637	0.0659	+/-0.0912	0.151	pCi/Filter	U	U	
Thorium-228	14274829	-0.0104	+/-0.0694	0.14	pCi/Filter	U	U	
Polonium-210	13981527	0.494	+/-0.802	1.14	pCi/Filter	U	U	
Plutonium-241	14119325	-13.2	+/-11.7	20.4	pCi/Filter	U	UJ	L
Plutonium-238	13981163	0.00153	+/-0.113	0.252	pCi/Filter	U	U	
Uranium-238	7440611-R	0.2	+/-0.33	0.475	pCi/Filter	U	U	
Uranium-235	15117961	0.066	+/-0.29	0.525	pCi/Filter	U	U	
Plutonium-239/240	OER10070	-0.119	+/-0.101	0.362	pCi/Filter	U	U	

Analysis Method HASL 300-GA-01-R

Sample Name 20181113-BOEING-4 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305001 **Sample Date:** 11/13/2018 10:30:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Cerium-144	14762788	-0.149	+/-3.22	5.63	pCi/Filter	U	U	
Thallium-208	14913509	0.629	+/-1.18	1.25	pCi/Filter	U	U	
Thorium-234	15065108	1.87	+/-16.5	29.9	pCi/Filter	U	U	
Tin-113	13966068	0.558	+/-0.841	1.69	pCi/Filter	U	U	
Iron-59	14596124	0.923	+/-2.05	4.36	pCi/Filter	U	U	
Uranium-238	7440611-R	1.87	+/-16.5	29.9	pCi/Filter	U	U	
Radium-228	15262201	-2.67	+/-3.65	6.5	pCi/Filter	U	U	
Zinc-65	13982393	-0.334	+/-2.07	3.51	pCi/Filter	U	U	
Zirconium-95	13967710	0.133	+/-1.44	2.77	pCi/Filter	U	U	
Chromium-51	14392020	-2.84	+/-7	11.3	pCi/Filter	U	U	
Cesium-137	10045973	-0.49	+/-0.715	1.19	pCi/Filter	U	U	
Sodium-22	13966320	-0.643	+/-0.808	1.35	pCi/Filter	U	U	
Cesium-134	13967709	-0.537	+/-0.726	1.17	pCi/Filter	U	U	
Uranium-235	15117961	-1.53	+/-3.98	5.98	pCi/Filter	U	U	
Cerium-141	13967743	-0.998	+/-1.09	1.73	pCi/Filter	U	U	
Cerium-139	13982304	0.356	+/-0.454	0.862	pCi/Filter	U	U	
Bismuth-214	14733030	-0.251	+/-2.07	3.61	pCi/Filter	U	U	
Bismuth-212	14913496	-1.73	+/-10.5	19.1	pCi/Filter	U	U	
Beryllium-7	13966024	26.9	+/-11.7	11	pCi/Filter		U	B
Barium-140	14798084	2.78	+/-4.36	9.2	pCi/Filter	U	U	
Barium-133	13981414	0.934	+/-1.06	1.62	pCi/Filter	U	U	
Antimony-125	14234356	0.947	+/-1.6	3.25	pCi/Filter	U	U	
Antimony-124	14683104	0.0949	+/-2.07	4.43	pCi/Filter	U	U	
Actinium-228	14331830	-2.67	+/-3.65	6.5	pCi/Filter	U	U	
Cesium-136	14234298	-1.79	+/-2.24	3.86	pCi/Filter	U	U	
Promethium-146	14834743	-1.07	+/-0.797	1.23	pCi/Filter	U	U	
Mercury-203	13982780	0.619	+/-0.712	1.34	pCi/Filter	U	U	
Neodymium-147	14269740	-1.79	+/-9.34	17.4	pCi/Filter	U	U	
Neptunium-239	13968597	-2.67	+/-4.13	6.83	pCi/Filter	U	U	
Niobium-94	14681631	0.196	+/-0.779	1.49	pCi/Filter	U	U	
Niobium-95	13967765	0.549	+/-0.88	1.8	pCi/Filter	U	U	
Yttrium-88	13982360	-0.0756	+/-0.648	1.44	pCi/Filter	U	U	
Promethium-144	14834732	0.293	+/-0.846	1.62	pCi/Filter	U	U	
Silver-110m	378784248	-0.764	+/-1.01	1.6	pCi/Filter	U	U	
Iridium-192	14694690	-0.21	+/-0.582	1.07	pCi/Filter	U	U	
Europium-155	14391163	1.86	+/-1.52	3	pCi/Filter	U	U	
Cobalt-60	10198400	-0.388	+/-1.04	1.75	pCi/Filter	U	U	
Cobalt-56	14093039	0.502	+/-0.923	1.87	pCi/Filter	U	U	

Analysis Method HASL 300-GA-01-R

Potassium-40	13966002	5.84	+/-14.5	30.8	pCi/Filter	U	U
Europium-154	15585101	-1.82	+/-2.29	3.82	pCi/Filter	U	U
Ruthenium-106	13967481	0.167	+/-7.58	12.7	pCi/Filter	U	U
Cobalt-58	13981389	-0.39	+/-1.06	1.73	pCi/Filter	U	U
Europium-152	14683239	-0.495	+/-1.62	2.98	pCi/Filter	U	U
Lead-210	14255040	-13.2	+/-31.7	53.2	pCi/Filter	U	U
Lead-212	15092941	0.868	+/-1.68	1.5	pCi/Filter	U	U
Lead-214	15067284	-0.514	+/-1.88	3.1	pCi/Filter	U	U
Manganese-54	13966319	0.0502	+/-0.748	1.43	pCi/Filter	U	U
Cobalt-57	13981505	-0.0923	+/-0.375	0.648	pCi/Filter	U	U

Sample Name 20181113-BOEING-5 **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305002 **Sample Date:** 11/13/2018 11:00:00 AM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Actinium-228	14331830	-0.287	+/-3.43	6.72	pCi/Filter	U	U	
Cerium-139	13982304	0.00371	+/-0.586	0.94	pCi/Filter	U	U	
Bismuth-214	14733030	0.26	+/-2.03	3.56	pCi/Filter	U	U	
Cerium-141	13967743	-2.28	+/-1.35	1.76	pCi/Filter	U	U	
Bismuth-212	14913496	-8.2	+/-11.3	18.7	pCi/Filter	U	U	
Beryllium-7	13966024	22.2	+/-12.4	12.5	pCi/Filter		U	B
Barium-140	14798084	2.07	+/-6.86	12.4	pCi/Filter	U	U	
Barium-133	13981414	0.137	+/-0.851	1.64	pCi/Filter	U	U	
Antimony-124	14683104	1.18	+/-2.44	5.82	pCi/Filter	U	U	
Europium-152	14683239	-0.692	+/-2.19	3.67	pCi/Filter	U	U	
Cerium-144	14762788	0.606	+/-3.91	6.92	pCi/Filter	U	U	
Antimony-125	14234356	0.429	+/-1.76	3.47	pCi/Filter	U	U	
Thallium-208	14913509	-0.122	+/-0.882	1.6	pCi/Filter	U	U	
Niobium-95	13967765	-0.813	+/-1.22	1.73	pCi/Filter	U	U	
Potassium-40	13966002	-1.44	+/-12.7	27.1	pCi/Filter	U	U	
Promethium-144	14834732	0.181	+/-0.879	1.69	pCi/Filter	U	U	
Promethium-146	14834743	-0.256	+/-0.86	1.58	pCi/Filter	U	U	
Radium-228	15262201	-0.287	+/-3.43	6.72	pCi/Filter	U	U	
Ruthenium-106	13967481	-2.76	+/-6.51	11.6	pCi/Filter	U	U	
Niobium-94	14681631	0.143	+/-0.856	1.64	pCi/Filter	U	U	
Sodium-22	13966320	-0.00893	+/-0.854	1.81	pCi/Filter	U	U	
Tin-113	13966068	-0.372	+/-0.968	1.75	pCi/Filter	U	U	
Thorium-234	15065108	6.65	+/-41.1	70.8	pCi/Filter	U	U	
Uranium-235	15117961	-0.435	+/-4.41	7.06	pCi/Filter	U	U	
Yttrium-88	13982360	-0.213	+/-0.861	1.78	pCi/Filter	U	U	
Zinc-65	13982393	-0.185	+/-1.76	3.58	pCi/Filter	U	U	
Zirconium-95	13967710	0.793	+/-1.39	2.93	pCi/Filter	U	U	
Cesium-134	13967709	-0.221	+/-0.666	1.23	pCi/Filter	U	U	

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Cobalt-58	13981389	1.11	+/-0.98	1.48	pCi/Filter U	U	
Silver-110m	378784248	0.81	+/-1.18	2.55	pCi/Filter U	U	
Cobalt-57	13981505	-0.194	+/-0.419	0.703	pCi/Filter U	U	
Cesium-136	14234298	1.66	+/-2.15	5.12	pCi/Filter U	U	
Cesium-137	10045973	-0.121	+/-0.897	1.59	pCi/Filter U	U	
Uranium-238	7440611-R	6.65	+/-41.1	70.8	pCi/Filter U	U	
Neptunium-239	13968597	-0.506	+/-5.04	8.78	pCi/Filter U	U	
Cobalt-56	14093039	-0.283	+/-0.796	1.43	pCi/Filter U	U	
Cobalt-60	10198400	0.188	+/-0.8	1.83	pCi/Filter U	U	
Europium-154	15585101	0.474	+/-2.37	5.29	pCi/Filter U	U	
Europium-155	14391163	-1.93	+/-1.97	3.11	pCi/Filter U	U	
Lead-214	15067284	-0.985	+/-1.97	3.27	pCi/Filter U	U	
Iron-59	14596124	-0.0658	+/-1.67	3.53	pCi/Filter U	U	
Lead-210	14255040	0	+/-384	332	pCi/Filter UI	UJ	*III
Lead-212	15092941	1.87	+/-1.8	2	pCi/Filter U	U	
Neodymium-147	14269740	-3.47	+/-11.2	20.5	pCi/Filter U	U	
Iridium-192	14694690	-0.187	+/-0.687	1.27	pCi/Filter U	U	
Mercury-203	13982780	0.889	+/-0.767	1.6	pCi/Filter U	U	
Chromium-51	14392020	5.15	+/-7.61	15.4	pCi/Filter U	U	
Manganese-54	13966319	-0.0178	+/-0.757	1.46	pCi/Filter U	U	

Sample Name 20181113-BOEING-BLA **Matrix Type:** FILTER **Result Type:** Primary Result

Lab Sample Name: 465305003 **Sample Date:** 11/13/2018 3:00:00 PM **Validation Level:** IV

Analyte	CAS No	Result Value	Uncertainty	MDC	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
Promethium-146	14834743	-0.0764	+/-0.702	1.36	pCi/Filter U		U	
Promethium-144	14834732	0.539	+/-1.05	2.07	pCi/Filter U		U	
Potassium-40	13966002	8.77	+/-10.1	25.1	pCi/Filter U		U	
Niobium-95	13967765	-0.525	+/-1.15	2	pCi/Filter U		U	
Niobium-94	14681631	0.0708	+/-0.904	1.72	pCi/Filter U		U	
Neodymium-147	14269740	-3.49	+/-13.1	23.9	pCi/Filter U		U	
Mercury-203	13982780	-0.208	+/-0.804	1.47	pCi/Filter U		U	
Radium-228	15262201	-0.105	+/-4.82	8.96	pCi/Filter U		U	
Uranium-238	7440611-R	52.3	+/-66.5	72.2	pCi/Filter U		U	
Manganese-54	13966319	0.156	+/-1.01	1.96	pCi/Filter U		U	
Lead-214	15067284	-0.813	+/-2	3.14	pCi/Filter U		U	
Neptunium-239	13968597	1.34	+/-5.07	9.78	pCi/Filter U		U	
Ruthenium-106	13967481	-5.75	+/-7.49	12.4	pCi/Filter U		U	
Silver-110m	378784248	-0.156	+/-1.37	2.56	pCi/Filter U		U	
Sodium-22	13966320	-0.562	+/-1.05	1.94	pCi/Filter U		U	
Thallium-208	14913509	-1.11	+/-1.09	1.62	pCi/Filter U		U	
Thorium-234	15065108	52.3	+/-66.5	72.2	pCi/Filter U		U	
Uranium-235	15117961	-0.658	+/-4.52	7.72	pCi/Filter U		U	

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Yttrium-88	13982360	1.1	+/-1.28	3.28	pCi/Filter U	**U**
Zinc-65	13982393	-1.4	+/-2.04	3.66	pCi/Filter U	**U**
Zirconium-95	13967710	1.83	+/-2.56	3.75	pCi/Filter U	**U**
Lead-212	15092941	0.885	+/-2.2	2.73	pCi/Filter U	**U**
Bismuth-212	14913496	-2.53	+/-11	20.4	pCi/Filter U	**U**
Tin-113	13966068	0.39	+/-0.939	1.87	pCi/Filter U	**U**
Cesium-137	10045973	0.506	+/-0.721	1.61	pCi/Filter U	**U**
Actinium-228	14331830	-0.105	+/-4.82	8.96	pCi/Filter U	**U**
Antimony-124	14683104	-0.969	+/-2.13	4.13	pCi/Filter U	**U**
Antimony-125	14234356	-0.925	+/-2.04	3.62	pCi/Filter U	**U**
Barium-133	13981414	0.498	+/-1.31	1.9	pCi/Filter U	**U**
Barium-140	14798084	3.95	+/-5.91	12.4	pCi/Filter U	**U**
Beryllium-7	13966024	5.63	+/-7.14	15	pCi/Filter U	**U**
Bismuth-214	14733030	0.418	+/-2.14	3.93	pCi/Filter U	**U**
Cerium-141	13967743	0.155	+/-1.19	2.26	pCi/Filter U	**U**
Cerium-144	14762788	1.02	+/-3.93	7.52	pCi/Filter U	**U**
Cerium-139	13982304	0.333	+/-0.554	1.09	pCi/Filter U	**U**
Cesium-136	14234298	2.26	+/-2.79	6.24	pCi/Filter U	**U**
Lead-210	14255040	-84.2	+/-128	207	pCi/Filter U	**U**
Chromium-51	14392020	7.01	+/-8.92	17.8	pCi/Filter U	**U**
Cobalt-56	14093039	-0.206	+/-1.02	1.88	pCi/Filter U	**U**
Cobalt-57	13981505	0.308	+/-0.48	0.95	pCi/Filter U	**U**
Cobalt-58	13981389	-0.476	+/-1.04	1.69	pCi/Filter U	**U**
Cobalt-60	10198400	0.387	+/-0.97	2.35	pCi/Filter U	**U**
Europium-152	14683239	-0.489	+/-2.13	3.7	pCi/Filter U	**U**
Europium-154	15585101	-1.3	+/-2.85	5.42	pCi/Filter U	**U**
Europium-155	14391163	1.31	+/-2.22	3.66	pCi/Filter U	**U**
Iridium-192	14694690	-0.396	+/-0.745	1.32	pCi/Filter U	**U**
Iron-59	14596124	-0.2	+/-2.15	4.39	pCi/Filter U	**U**
Cesium-134	13967709	-0.247	+/-0.92	1.69	pCi/Filter U	**U**

Appendix E

Conversion of Filter Paper Activity to Air Concentrations for Detected Radionuclides

GEL Isotopic Analysis of Samples from Stations #4 and #5 Bounding the Fire Period										
Sampling Station	Sampling Period	Laboratory Sample Serial No.	Total Air Volume (mL)*	Radionuclide	Filter Activity (pCi/Filter)			Air Concentration (µCi/mL)		
					Activity	Uncertainty	MDA	Concentration	Uncertainty	MDC
#4	8 to 13 Nov 2018	465305001	2.70E+08	Polonium-210	1.84	1.28	1.11	2.73E-14	1.90E-14	1.64E-14
#4	8 to 13 Nov 2018	465305001	2.70E+08	Thorium-232	0.148	0.0842	0.0479	2.19E-15	1.25E-15	7.10E-16
#4	8 to 13 Nov 2018	465305001	2.70E+08	Beryllium-7	26.9	11.7	11	3.99E-13	1.73E-13	1.63E-13
			All other 58 radionuclides, including nuclear by-product materials, were not detected above the MDA or MDC							
#5	8 to 13 Nov 2018	465305002	2.52E+08	Polonium-210	2.43	1.65	1.55	3.86E-14	2.62E-14	2.46E-14
#5	8 to 13 Nov 2018	465305002	2.52E+08	Thorium-230	0.146	0.0917	0.112	2.32E-15	1.46E-15	1.78E-15
#5	8 to 13 Nov 2018	465305002	2.52E+08	Thorium-232	0.101	0.0709	0.0738	1.60E-15	1.13E-15	1.17E-15
#5	8 to 13 Nov 2018	465305002	2.52E+08	Beryllium-7	22.2	12.4	12.5	3.52E-13	1.97E-13	1.98E-13
			All other 57 radionuclides, including nuclear by-product materials, were not detected above the MDA or MDC							

* Total air volume reduced to 25% to reflect count of a 2" diameter filter vs a 4" diameter sample station filter