From: Mccray, Sean-Ryan CTR (USA) [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=B8349167BB194B8DA45DBABDB46684DB-SEAN-RYAN.M]
Sent: Monday, March 22, 2021 3:37 PM
To: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil]
CC: Roddy, Elizabeth A CIV USN NAVFAC SW SAN CA (USA) [elizabeth.roddy@navy.mil]
Subject: 211 / 253 Soil Reference
Attachments: TU 211-01 Survey Data Package FINAL Mar 2020.pdf

Paul,

Attached is the survey data package for TU 211-01, which includes as Attachment 5 the soil reference area data set in use for the Building 253/211 SS/SD removal. The soil reference area data set is comprised of samples collected in April 2006 in an area of the Building 813 parking lot in Parcel D-2. The average reference area activity for Ra-226 was determined to be 0.49 pCi/g. This places the RG for Ra-226 at 1.49 pCi/g (i.e., 1.0 pCi/g above background). No other soil reference area values are in use for other ROCs as part of the Building 253/211 SS/SD removal.

Looks like we may need to discuss this further, so let me know if you have the time.

Thanks,

SR

Gilbane

SURVEY UNIT DATA PACKAGE

Project Information

Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	HP Bldgs 211/253 Rad Remediation / San Francisco, CA	J310000100

Survey Unit Description

Survey Unit ID	Survey Type	Building		Elevation		
TU 211-01	☐ Building surface ☒ Excavated trench	☒ 211 ☐ 253	☒ Interior ☒ Exterior	☒ Ground ☐ 2nd floor	☐ 3rd floor ☐ 4th floor	☐ 5th floor ☐ 6th floor

Description and Boundaries:

Trench floor, side, and end wall surfaces resulting from the excavation and removal of sanitary sewer/storm drain (SSSD) lines remaining inside and outside (within approximately 15 ft that were left in-place during previous activities that removed the exterior portions of the SSSD lines) of Building 211. Seven trench segments compose TU-211-01. They are: 12-211-28-3Y, -4A/5H, -5B*, -5C, -5H, -5H*, and -5Z. (see Attachment 1 figure).

Removal/Remediation Summary

Summary of Activities Performed and As-Left Condition:

Soil overlying SSSD lines was excavated and transported to RSY to be screened and characterized for re-use/ disposal. SSSD lines and soil a minimum of 1 ft below and to the sides of each pipe were removed.

Description of Material/Equipment Remaining:

None; SSSD lines removed and exposed trench surfaces remain

Description/Qty of Low-Level Radioactive Waste Generated:

Removed SSSD lines; no trench surfaces required soil remediation.

Survey Unit Work Package Field Changes:

N/A

Radiological Data Summary (Post-Removal/Remediation)

Type of Data Collected	Parameter	Contiguous Statics		Smear Samples	
		Alpha	Beta	Alpha	Beta
☐ Contiguous statics	RG (dpm/100 cm^2)				
☐ Smear samples	Number of measurements				
☒ Gamma scans	Measurements > MDC				
☒ Soil samples	Measurements > RG		Not		
☐ Other:	Lowest MDC (dpm/100 cm^2)			Applicable	
	Highest MDC (dpm/100 cm^2)				
	Minimum (dpm/100 cm^2)				
	Maximum (dpm/100 cm^2)				

Gamma Scans	
Parameter	Value
Survey coverage (%)	100
No. of data points	732
Low counts (cpm)	---
High counts (cpm)	---
Mean (cpm)	---
Median (cpm)	---
Std deviation (cpm)	---

Soil (or Volumetric) Samples					
Parameter	Sr-90	Cs-137	Ra-226	Th-232	Pu-239
RG (pCi/g)	0.331	0.113	1.49	1.69	2.59
Samples Collected					
Random/systematic	3	20	20	20	---
Biased*	---	3	3	3	---
Samples Analyzed					
Samples > MDC	0	0	22	19	---
Sample exceedances	0	0	0	0	---
Lowest MDC (pCi/g)	0.110	0.049	0.097	0.147	---
Highest MDC (pCi/g)	0.162	0.068	0.171	0.310	---
Minimum (pCi/g)	---	---	0.171	0.228	---
Maximum (pCi/g)	---	---	1.200	1.370	---

Additional Information:

See gamma scan results by trench (Attachment 2), gamma scan instrument QC (Attachment 3), and soil sample analytical results (Attachment 4).

* based on gamma scan results
RG – remediation goal
MDC – minimum detectable concentration

Gilbane

SURVEY UNIT DATA PACKAGE

Project Information

Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	HP Bldgs 211/253 Rad Remediation / San Francisco, CA	J310000100

Reference Area

Type:
- ☐ None used
- ☐ Surface radio-activity (dpm/100 cm^2)
- ☒ Volumetric radioactivity (pCi/g)

Description:
Bldg 813 parking lot area in Parcel D-2; same reference area data set used for earlier SSSD removals around Bldg 211 (Source: SUPRA Abstract for SSSD Removal after 01 Sep 2012) – see Attachment 5.

Parameter	Sr-90	Cs-137	Ra-226	Th-232
Count	2	18	18	18
Minimum	0.194	0.017	0.331	0.416
Maximum	0.194	0.026	0.600	0.752
Mean	0.194	0.021	0.488	0.570
Std Dev	0.000	0.003	0.073	0.093

Statistical Test

Statistical Test Applied	Number of Measurements		Test Values	
☒ None (all measurements < RG)	Survey Unit		Decision error	
☐ Sign test	Reference Area		Critical value	
☐ WRS test			Test statistic	
			Pass (Yes/No)	

Additional Information:

Dose/Risk Modeling

Dose/Risk Model Used	Summary of Results		RESRAD Modeling Parameter	Default	Actual
☒ RESRAD-ONSITE	Max dose (mrem/yr)	2.2	Area of contaminated zone	10,000	154.7
☐ RESRAD-BUILD	Time (yr) @ maximum	0.0			
	Total risk @ maximum	4.5E-05			

Radionuclide (pCi/g)	Average	Reference	Net	Radionuclide (pCi/g)	Average	Reference	Net
Sr-90	0.142	0.194	0.000	Th-232	0.679	0.570	0.109
Cs-137	0.060	0.021	0.039	Pu-239	---	---	---
Ra-226	0.644	0.488	0.156				

Additional Information:
Modeling performed using mean soil concentrations calculated using reported sample concentrations or MDC values if reported sample concentration less than MDC. See dose results (Attachment 6) and risk results (Attachment 7).

Attached Information

- ☐ Survey unit work package
- ☒ Photos/maps
  - ☐ Pre-removal/remediation
  - ☐ As-left condition
  - ☒ Survey/sample locations
- ☒ Data summaries/analytical results
  - ☐ Continuous statics
  - ☐ Smear samples
  - ☒ Gamma scans
  - ☒ Soil samples
- ☒ Reference area data
- ☐ Statistical test results
- ☒ Dose/risk modeling reports
  - ☒ RESRAD dose
  - ☒ RESRAD risk

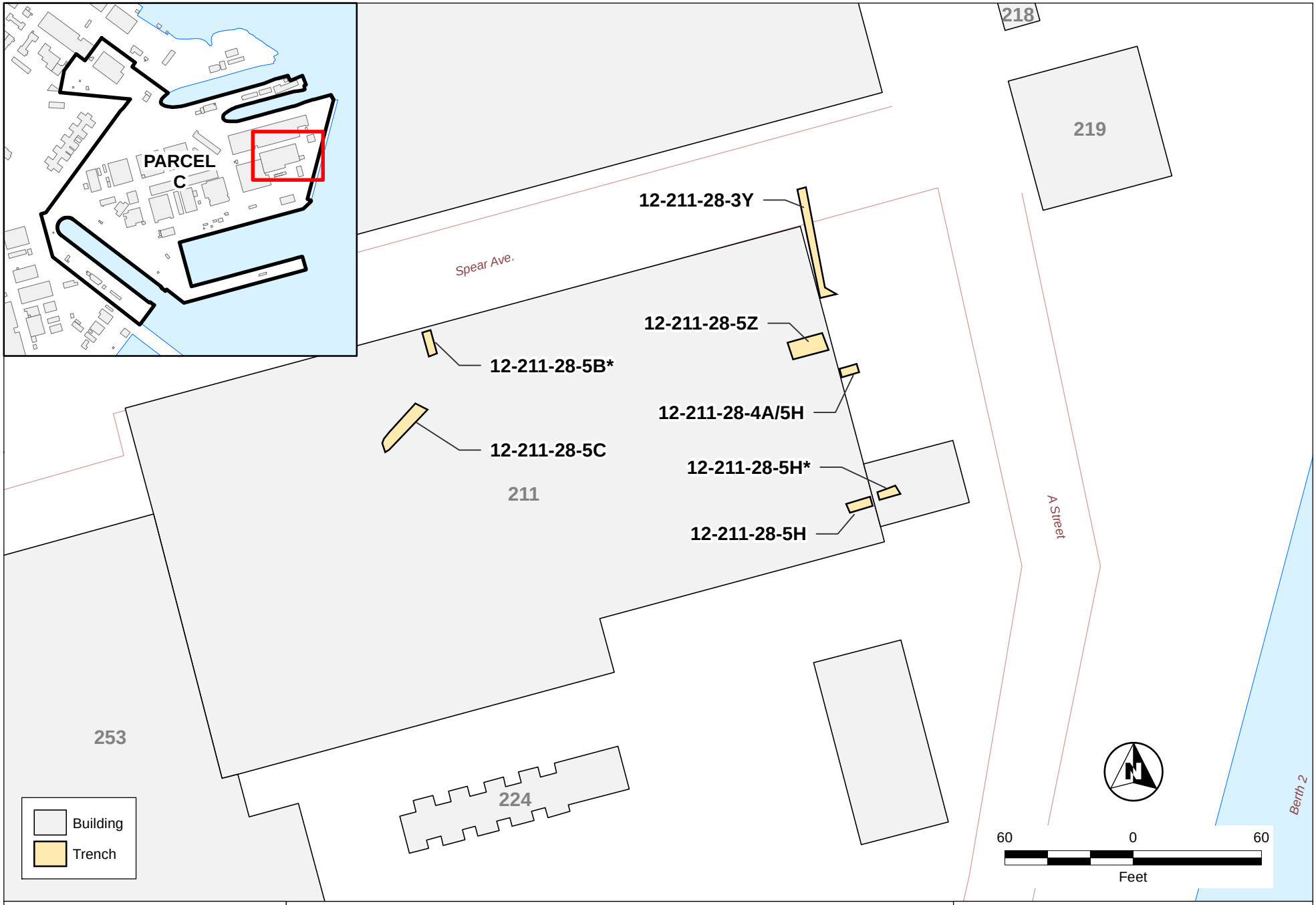
Conclusions

- ☒ Remediation goal satisfied – average total surface radioactivity and/or soil (or volumetric) radioactivity is less than radionuclide-specific remediation goals found in Table 5 of Parcel C Record of Decision.
- ☒ Dose criterion satisfied – dose to average individual reasonably expected to receive greatest exposure to residual radioactivity is less than 12 mrem/yr.
- ☒ Risk criterion satisfied – excess cancer risk to average individual reasonably expected to receive greatest exposure to residual radioactivity is in range of 10^{-4} to 10^{-6}.
- ☒ Survey unit demonstrates compliance with the release criteria and is suitable for radiological release to unrestricted use

Notes/Comments:
None.

Prepared by:	Name:	Signature:	Date:
Project Health Physicist	Jerry C Cooper	Jerry C Cooper	20 Mar 2020
Reviewed by:	**Name:**	**Signature:**	**Date:**
Project QC Manager	Kimberly Tom	Kimberly Tom	23 Mar 2020

ATTACHMENT 1
TU 211-01 Trench Segments
(1 page)



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Parcel C Buildings 253 and 211
Radiological Remediation and Survey
Former Hunters Point Naval Shipyard
San Franscisco, California

Figure 1
Selected Trenches
TU 1 Trench Segments
Buildings 211 and 253

G:\ArcGIS\Navy\HPS\PROJECTS\Parcel_C\RR_Survey_Bldg_253_211\Trench\Selected_Trenches.mxd 12/24/2019 azhuk, Gilbane

ATTACHMENT 2
TU 211-01 Gamma Scan Survey Results
(42 pages)

Gamma Scan Survey Data Summary
TU 211-01

Trench	Radiation Survey No.	Trench Depth Ave (m)	Floor Area (sq m)	Total Surface Area (sq m)
12-211-28-3Y	RS-0134, 0135	1.4	18.3	42.3
12-211-28-4A/5H	RS-0154	1.22	3.2	11.9
12-211-28-5B*	RS-0149, 0150	0.64	4.4	9.8
12-211-28-5C	RS-0160	1.6	18.9	46.7
12-211-28-5H	RS-0151, 0152	0.74	4.7	11.1
12-211-28-5H*	RS-0155	0.99	3.6	11.1
12-211-28-5Z	RS-0156	0.6	13.1	21.8
	Total:	Total:	66.2	154.7

		Net (cpm)				Gross (cpm)		Samples
Trench	Count	Low	High	Average	# > 10K	Average	Std Dev	Collected
12-211-28-3Y	196	593	14,660	4,992	12	8,713	2,799	10
12-211-28-4A/5H	113	2,559	10,023	6,218	8	9,635	2,499	3
12-211-28-5B*	40	-620	3,757	430	0	3,797	831	2
12-211-28-5C	151	670	4,711	2,342	0	5,650	769	3
12-211-28-5H	46	2,492	8,853	5,286	0	8,846	1,016	1
12-211-28-5H*	76	1,569	9,193	4,532	0	7,949	1,713	2
12-211-28-5Z	110	1,894	5,223	2,753	0	6,045	544	2
	732						Total:	23

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RADIOLOGICAL SURVEY FORM

Project Information

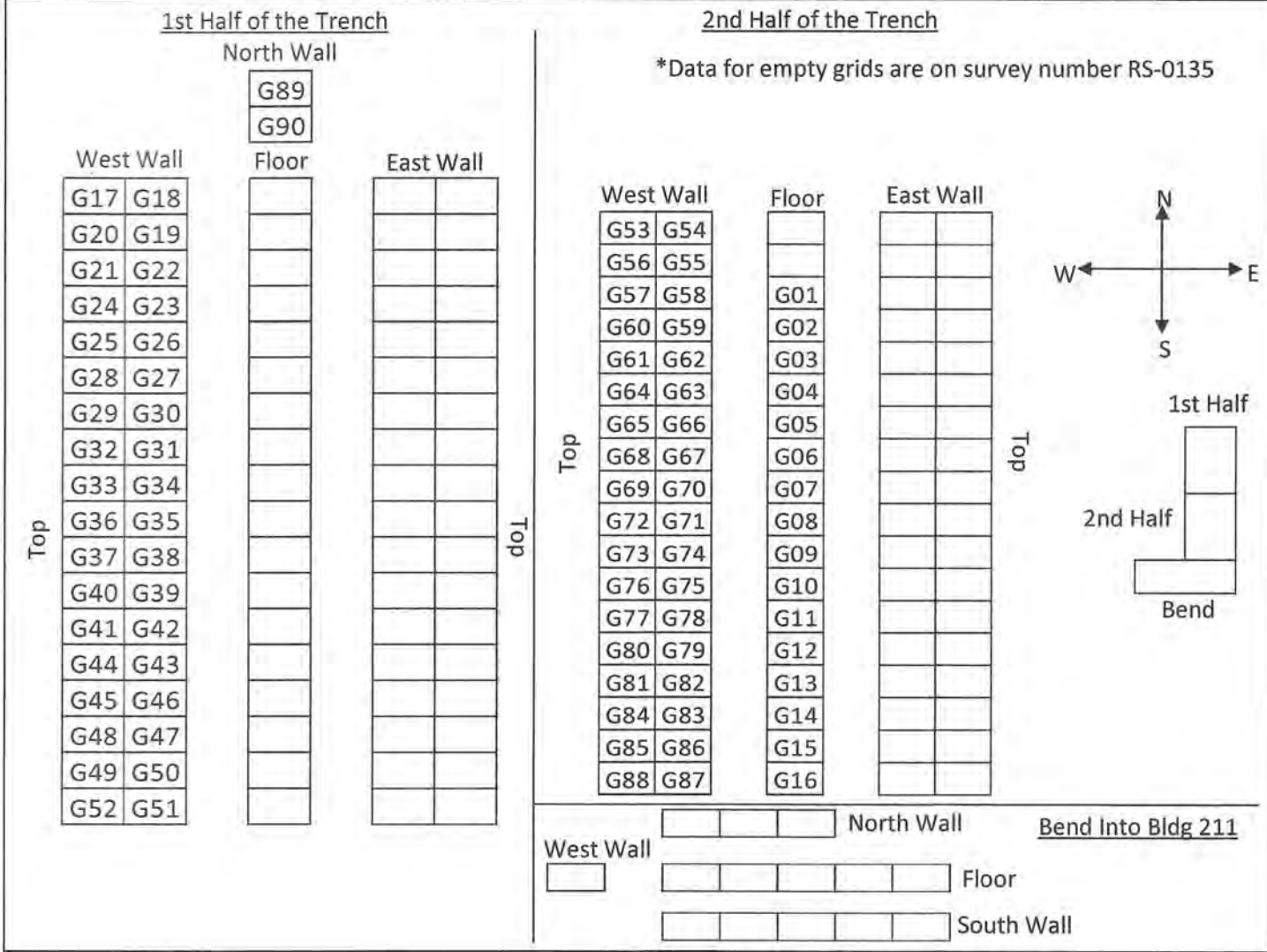
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0134	09/24/19	Contamination	Trench 12-211-28-3Y Part 1 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	90



Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

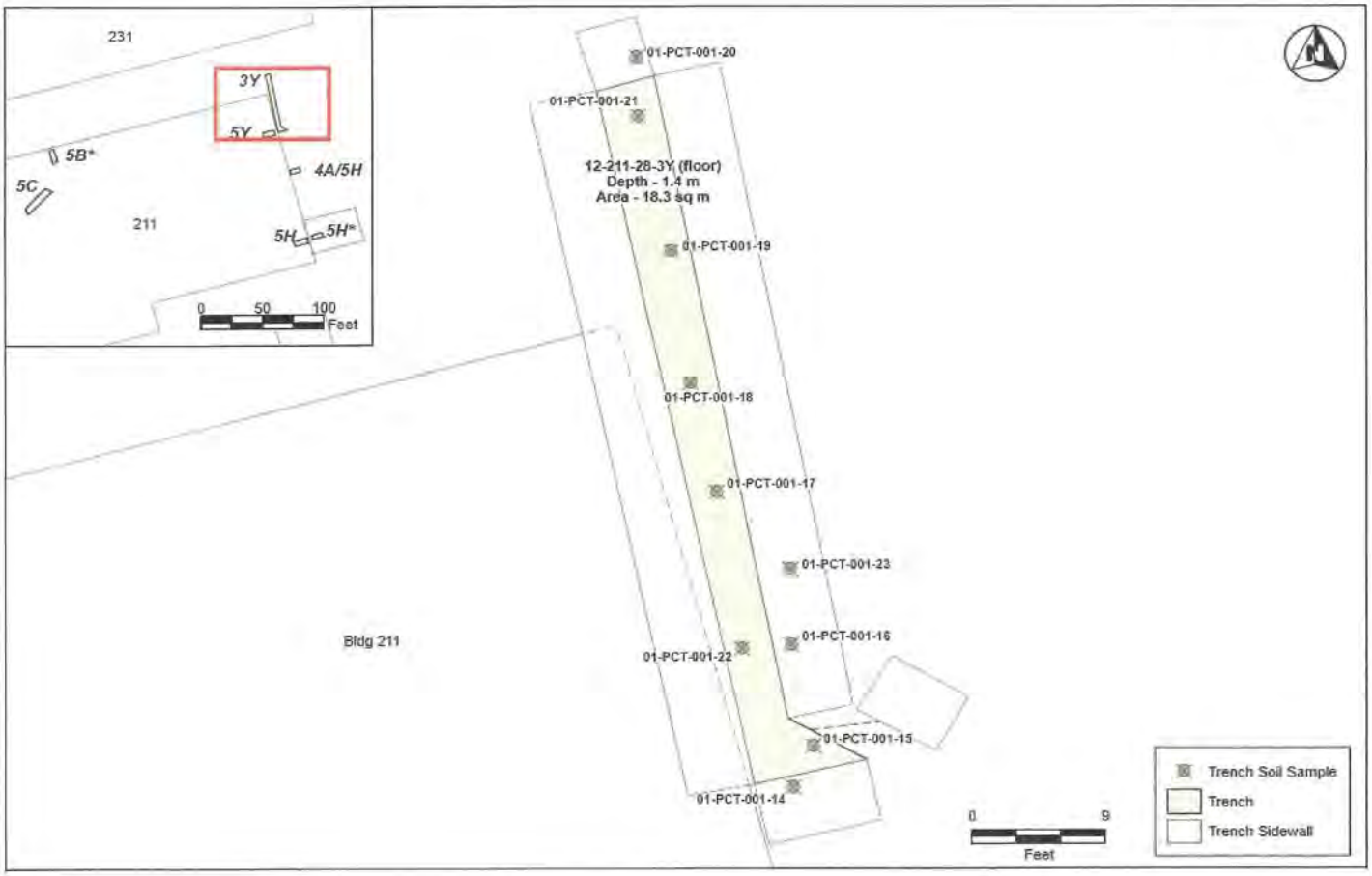
RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0134	Survey Date: 09/24/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-3Y Part 1 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:

*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0134	09/24/19	Contamination	Trench 12-211-28-3Y Part 1 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,721	10,000	11,401	Yes
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net	Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			10,826	7,105	G26	x			4,701	980
G02	x			8,728	5,007	G27	x			4,533	812
G03	x			7,935	4,214	G28	x			6,147	2,426
G04	x			10,367	6,646	G29	x			5,846	2,125
G05	x			9,607	5,886	G30	x			4,314	593
G06	x			7,512	3,791	G31	x			7,877	4,156
G07	x			6,462	2,741	G32	x			6,207	2,486
G08	x			8,566	4,845	G33	x			6,712	2,991
G09	x			11,386	7,665	G34	x			5,354	1,633
G10	x			14,375	10,654	G35	x			6,697	2,976
G11	x			14,587	10,866	G36	x			9,306	5,585
G12	x			14,395	10,674	G37	x			6,744	3,023
G13	x			13,299	**9,578**	G38	x			5,530	1,809
G14	x			15,122	11,401	G39	x			4,998	1,277
G15	x			14,647	10,926	G40	x			6,658	2,937
G16	x			14,139	10,418	G41	x			6,825	3,104
G17	x			6,223	2,502	G42	x			5,623	1,902
G18	x			5,556	1,835	G43	x			7,563	3,842
G19	x			6,345	2,624	G44	x			8,948	5,227
G20	x			6,194	2,473	G45	x			7,521	3,800
G21	x			5,854	2,133	G46	x			8,123	4,402
G22	x			6,321	2,600	G47	x			8,066	4,345
G23	x			4,585	864	G48	x			8,061	4,340
G24	x			5,492	1,771	G49	x			8,022	4,301
G25	x			5,841	2,120	G50	x			9,243	5,522

Shown on survey map? Yes

Values above 80% of limit appear bolded

Values above limit appear in red

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2799.092 CPM / Average Gross Count is 8713 CPM

*Net Limit is an arbitrary limit set to highlight survey grids for possible sampling

*Background value is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0134	09/24/19	Contamination	Trench 12-211-28-3Y Part 1 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,721	10,000	14,660	Yes
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net	Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G51	x			10,282	6,561	G76	x			10,201	6,480
G52	x			8,212	4,491	G77	x			9,997	6,276
G53	x			18,381	14,660	G78	x			12,218	**8,497**
G54	x			8,324	4,603	G79	x			9,941	6,220
G55	x			9,529	5,808	G80	x			9,827	6,106
G56	x			7,361	3,640	G81	x			9,969	6,248
G57	x			5,990	2,269	G82	x			10,458	6,737
G58	x			10,063	6,342	G83	x			8,203	4,482
G59	x			10,716	6,995	G84	x			10,101	6,380
G60	x			8,044	4,323	G85	x			10,176	6,455
G61	x			7,735	4,014	G86	x			10,800	7,079
G62	x			8,805	5,084	G87	x			15,395	11,674
G63	x			11,085	7,364	G88	x			10,800	7,079
G64	x			7,321	3,600	G89	x			4,710	989
G65	x			8,397	4,676	G90	x			6,921	3,200
G66	x			10,322	6,601	G91					
G67	x			7,759	4,038	G92					
G68	x			9,261	5,540	G93					
G69	x			8,434	4,713	G94					
G70	x			8,527	4,806	G95					
G71	x			8,893	5,172	G96					
G72	x			9,555	5,834	G97					
G73	x			9,277	5,556	G98					
G74	x			8,549	4,828	G99					
G75	x			9,633	5,912	G100					

Shown on survey map? Yes

Values above 80% of limit appear bolded

Values above limit appear in red

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2799.092 CPM / Average Gross Count is 8713 CPM

*Net Limit is an arbitrary limit set to highlight survey grids for possible sampling

*Background value is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

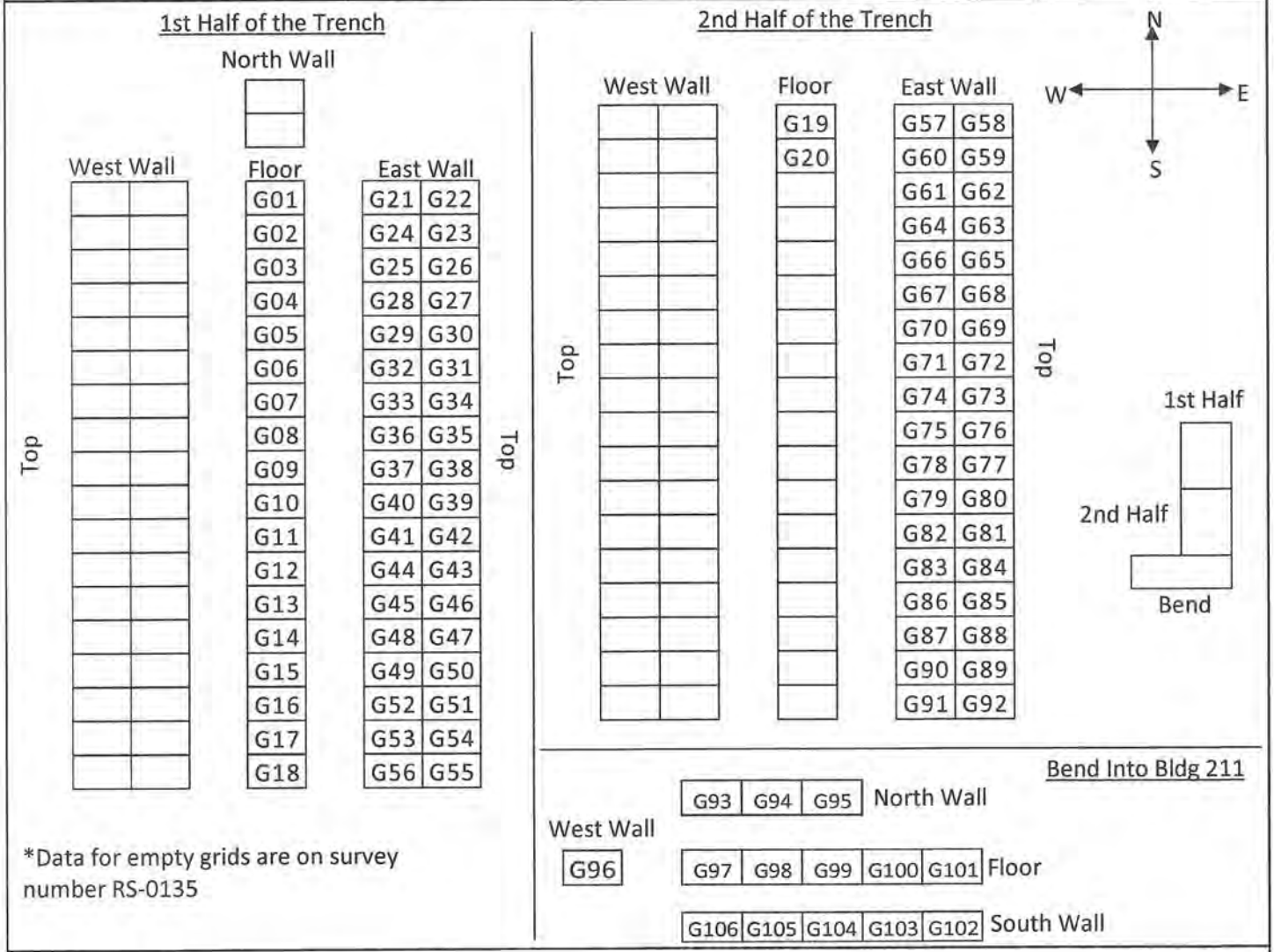
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0135	09/24/19	Contamination	Trench 12-211-28-3Y Part 2 of 2

Survey Map

Measurement Type	Symbol	Collected	Measurement Type	Symbol	Collected
Total Alpha Beta	□	0	Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0	Gross Gamma	G#	106



*Data for empty grids are on survey number RS-0135

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: David Berres / Dang Vo Tran	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

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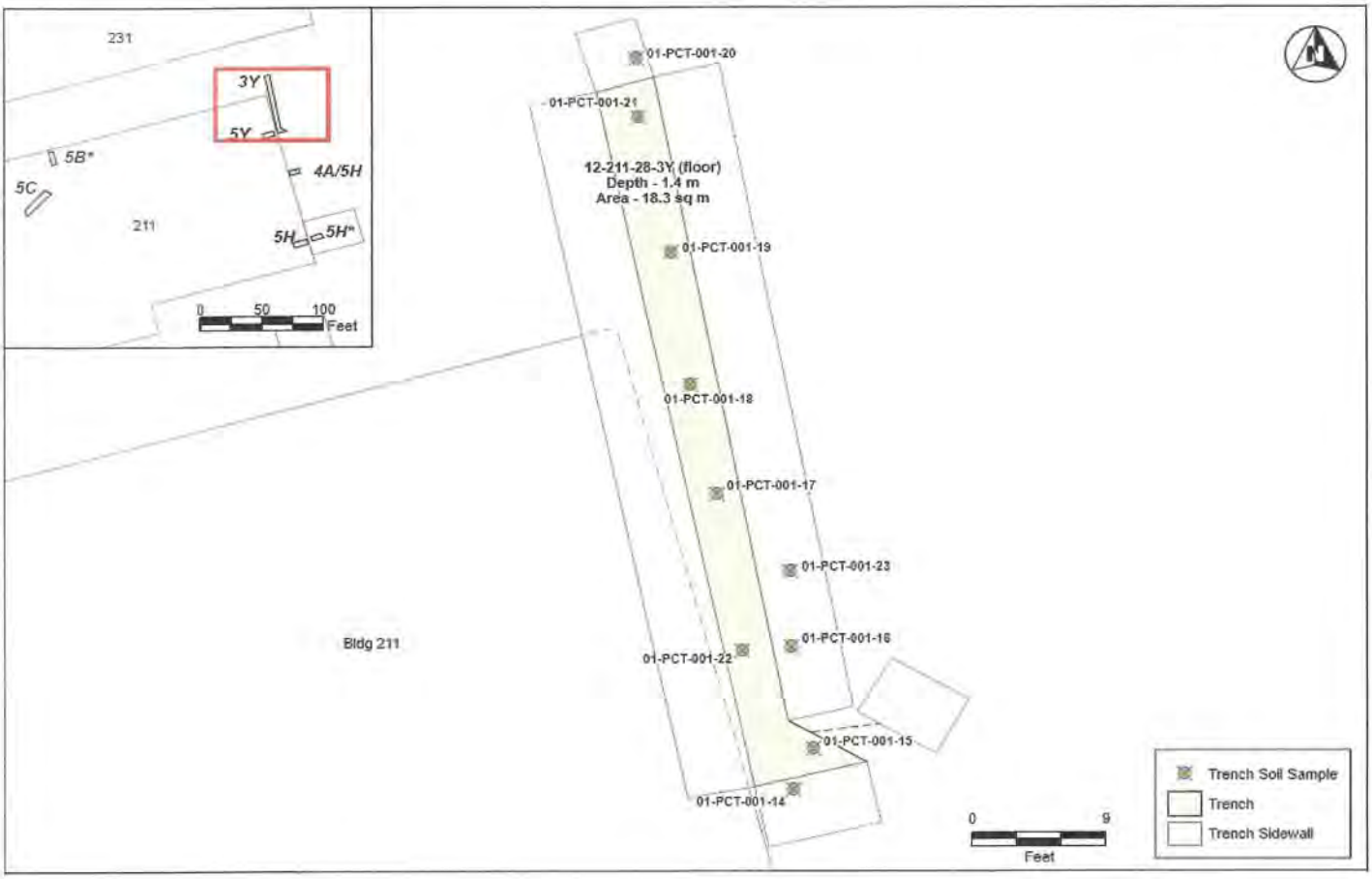
Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0135	09/24/19	Contamination	Trench 12-211-28-3Y Part 2 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	☐	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:

*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: David Berres / Dang Vo Tran	Signature:	Date: 09/24/19
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Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0135	09/24/19	Contamination	Trench 12-211-28-3Y Part 2 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,334	10,000	5,347	No
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net	Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			5,867	2,533	G26	x			6,559	3,225
G02	x			6,302	2,968	G27	x			6,554	3,220
G03	x			5,954	2,620	G28	x			6,403	3,069
G04	x			4,596	1,262	G29	x			6,136	2,802
G05	x			3,949	615	G30	x			6,529	3,195
G06	x			4,182	848	G31	x			6,650	3,316
G07	x			4,579	1,245	G32	x			6,669	3,335
G08	x			4,881	1,547	G33	x			7,168	3,834
G09	x			5,354	2,020	G34	x			7,649	4,315
G10	x			5,053	1,719	G35	x			6,888	3,554
G11	x			5,253	1,919	G36	x			6,277	2,943
G12	x			5,531	2,197	G37	x			6,022	2,688
G13	x			6,565	3,231	G38	x			8,681	5,347
G14	x			6,077	2,743	G39	x			8,176	4,842
G15	x			5,957	2,623	G40	x			6,353	3,019
G16	x			6,830	3,496	G41	x			6,752	3,418
G17	x			5,557	2,223	G42	x			7,320	3,986
G18	x			7,741	4,407	G43	x			7,072	3,738
G19	x			7,557	4,223	G44	x			6,825	3,491
G20	x			7,910	4,576	G45	x			7,615	4,281
G21	x			5,354	2,020	G46	x			7,143	3,809
G22	x			4,244	910	G47	x			7,954	4,620
G23	x			6,303	2,969	G48	x			8,298	4,964
G24	x			6,222	2,888	G49	x			8,641	5,307
G25	x			6,166	2,832	G50	x			6,905	3,571

Shown on survey map? Yes

Values above 80% of limit appear bolded

Values above limit appear in red

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2391.527 CPM / Average Gross Counts is 8038 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background value is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0135	09/24/19	Contamination	Trench 12-211-28-3Y Part 2 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,334	10,000	12,571	Yes
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G51	x			7,245	3,911	Shown on survey map? Yes	G76	x			8,273	4,939
G52	x			9,152	5,818		G77	x			8,974	5,640
G53	x			7,857	4,523		G78	x			8,016	4,682
G54	x			7,209	3,875		G79	x			9,018	5,684
G55	x			7,400	4,066		G80	x			8,941	5,607
G56	x			7,710	4,376		G81	x			9,296	5,962
G57	x			7,468	4,134		G82	x			10,587	7,253
G58	x			7,665	4,331		G83	x			9,506	6,172
G59	x			8,634	5,300		G84	x			9,660	6,326
G60	x			7,437	4,103		G85	x			9,743	6,409
G61	x			9,261	5,927	Values above 80% of limit appear bolded	G86	x			11,978	**8,644**
G62	x			8,696	5,362		G87	x			12,720	**9,386**
G63	x			10,212	6,878		G88	x			9,415	6,081
G64	x			8,967	5,633		G89	x			9,412	6,078
G65	x			8,465	5,131		G90	x			12,440	**9,106**
G66	x			8,778	5,444		G91	x			12,723	**9,389**
G67	x			7,104	3,770		G92	x			10,338	7,004
G68	x			8,620	5,286		G93	x			7,640	4,306
G69	x			8,723	5,389	Values above limit appear in red	G94	x			8,754	5,420
G70	x			6,894	3,560		G95	x			9,362	6,028
G71	x			6,687	3,353		G96	x			6,962	3,628
G72	x			8,876	5,542		G97	x			15,905	12,571
G73	x			8,617	5,283		G98	x			15,287	11,953
G74	x			7,296	3,962		G99	x			12,949	**9,615**
G75	x			7,544	4,210		G100	x			11,818	**8,484**

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2391.527 CPM / Average Gross Counts is 8038 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background value is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0135	09/24/19	Contamination	Trench 12-211-28-3Y Part 2 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,334	10,000	11,664	Yes
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G101	x			7,296	3,962	Shown on survey map? Yes	G126					
G102	x			7,563	4,229		G127					
G103	x			11,558	**8,224**		G128					
G104	x			12,793	**9,459**		G129					
G105	x			14,393	**11,059**		G130					
G106	x			14,998	**11,664**		G131					
G107							G132					
G108							G133					
G109							G134					
G110							G135					
G111							G136					
G112						Values above 80% of limit appear bolded	G137					
G113							G138					
G114							G139					
G115							G140					
G116							G141					
G117							G142					
G118							G143					
G119							G144					
G120						Values above limit appear in red	G145					
G121							G146					
G122							G147					
G123							G148					
G124							G149					
G125							G150					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2391.527 CPM / Average Gross Counts is 8038 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background value is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0154	10/10/19	Contamination	Trench 12-211-28-4A/5H

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	113

W
S N
E

West Wall

G01	G02	G03	G04
G08	G07	G06	G05
G09	G10	G11	G12
G16	G15	G14	G13
G17	G18	G19	

South Wall

Top

G77	G78	G79	G80	G81	G82	G83
G90	G89	G88	G87	G86	G85	G84
G91	G92	G93	G94	G95	G96	G97
G104	G103	G102	G101	G100	G99	G98
G105	G106	G107	G108	G109	G110	G111
					G113	G112

Bottom

G20
G21
G22
G23
G24
G25
G26
G27

North Wall

G28	G29	G30	G31	G32	G33	G34
G41	G40	G39	G38	G37	G36	G35
G42	G43	G44	G45	G46	G47	G48
G55	G54	G53	G52	G51	G50	G49
G56	G57	G58	G59	G60	G61	G62
G64	G63					

Top

East Wall

G65	G66	G67	G68
G72	G71	G70	G69
	G73	G74	
	G76	G75	

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Dang Vo Tran	Signature:	Date: 10/10/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

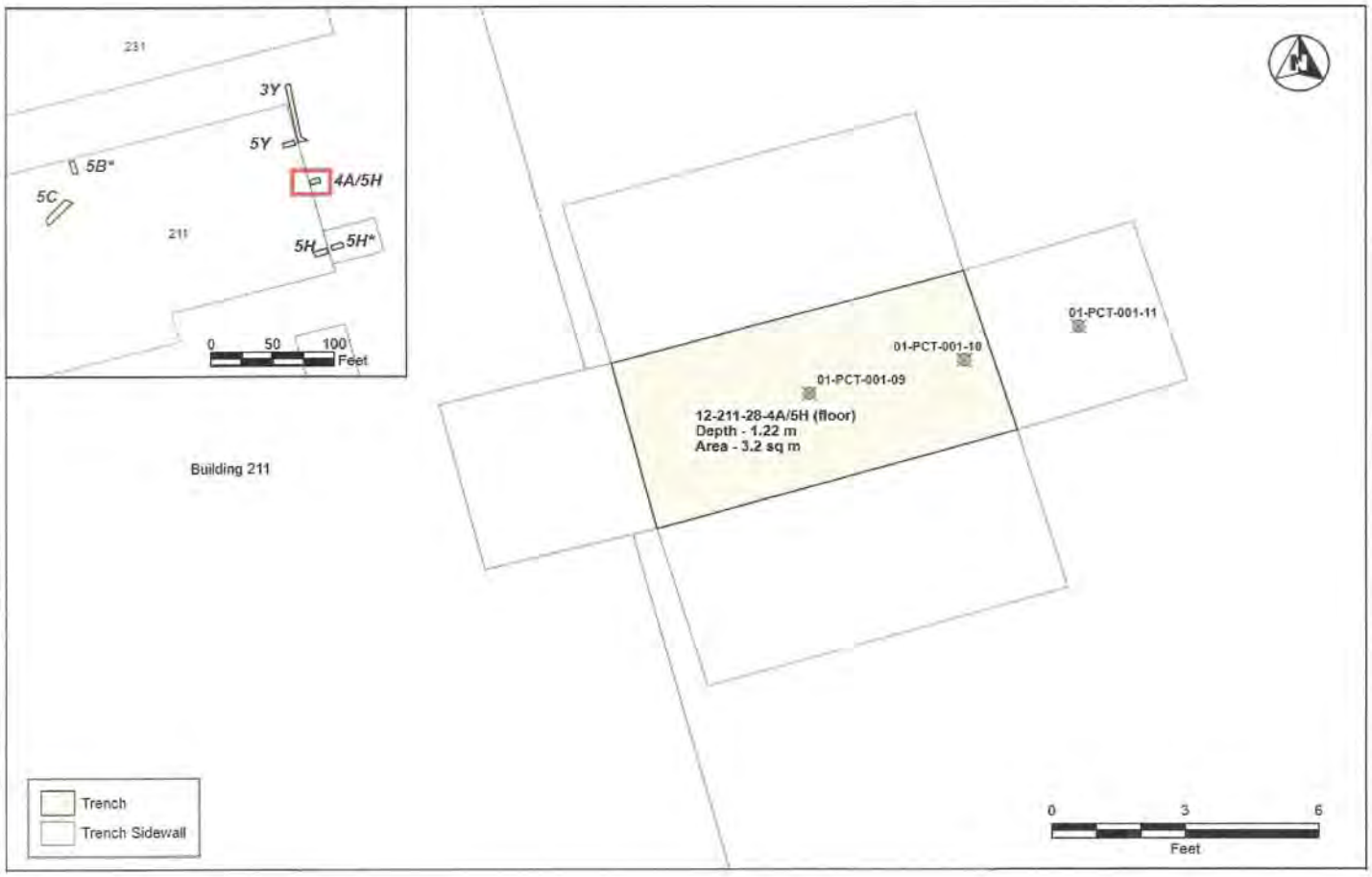
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0154	10/10/19	Contamination	Trench 12-211-28-4A/5H

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	☐	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:

*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Dang Vo Tran	Signature:	Date: 10/10/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0154	10/10/19	Contamination	Trench 12-211-28-4A/5H

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,417	10,000	10,023	Yes
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			6,403	2,986	Shown on survey map? Yes	G26	x			13,075	**9,658**
G02	x			5,976	2,559		G27	x			13,316	**9,899**
G03	x			6,083	2,666		G28	x			7,589	4,172
G04	x			6,669	3,252		G29	x			7,541	4,124
G05	x			6,998	3,581		G30	x			7,698	4,281
G06	x			7,012	3,595		G31	x			8,173	4,756
G07	x			6,845	3,428		G32	x			8,731	5,314
G08	x			6,556	3,139		G33	x			8,424	5,007
G09	x			6,718	3,301		G34	x			8,639	5,222
G10	x			6,770	3,353		G35	x			9,259	5,842
G11	x			6,937	3,520		G36	x			10,009	6,592
G12	x			6,787	3,370	Values above 80% of limit appear bolded	G37	x			10,083	6,666
G13	x			7,788	4,371		G38	x			9,366	5,949
G14	x			7,286	3,869		G39	x			7,365	3,948
G15	x			7,274	3,857		G40	x			7,191	3,774
G16	x			7,054	3,637		G41	x			6,880	3,463
G17	x			7,517	4,100		G42	x			6,554	3,137
G18	x			8,060	4,643		G43	x			7,253	3,836
G19	x			7,074	3,657		G44	x			9,664	6,247
G20	x			8,292	4,875	Values above limit appear in red	G45	x			11,274	7,857
G21	x			9,868	6,451		G46	x			11,630	**8,213**
G22	x			10,125	6,708		G47	x			11,834	**8,417**
G23	x			11,419	**8,002**		G48	x			10,690	7,273
G24	x			12,255	**8,838**		G49	x			13,440	10,023
G25	x			13,057	**9,640**		G50	x			13,089	**9,672**

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2498.975 CPM / Average Gross Count is 9635 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0154	10/10/19	Contamination	Trench 12-211-28-4A/5H

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,417	10,000	12,609	Yes
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G51	x			13,089	**9,672**	Shown on survey map? Yes	G76	x			16,026	12,609
G52	x			12,183	**8,766**		G77	x			8,485	5,068
G53	x			11,808	**8,391**		G78	x			8,890	5,473
G54	x			11,819	**8,402**		G79	x			8,523	5,106
G55	x			7,679	4,262		G80	x			8,850	5,433
G56	x			5,897	2,480		G81	x			8,207	4,790
G57	x			8,489	5,072		G82	x			8,137	4,720
G58	x			11,235	7,818		G83	x			7,500	4,083
G59	x			12,115	**8,698**		G84	x			6,713	3,296
G60	x			13,458	10,041		G85	x			7,208	3,791
G61	x			14,138	10,721		G86	x			8,621	5,204
G62	x			15,713	12,296	Values above 80% of limit appear bolded	G87	x			9,220	5,803
G63	x			9,584	6,167		G88	x			10,258	6,841
G64	x			9,599	6,182		G89	x			10,266	6,849
G65	x			8,954	5,537		G90	x			10,088	6,671
G66	x			9,383	5,966		G91	x			12,737	**9,320**
G67	x			9,065	5,648		G92	x			12,002	**8,585**
G68	x			9,807	6,390		G93	x			11,453	**8,036**
G69	x			10,050	6,633		G94	x			11,882	**8,465**
G70	x			10,012	6,595	Values above limit appear in red	G95	x			10,303	6,886
G71	x			10,071	6,654		G96	x			6,414	2,997
G72	x			9,407	5,990		G97	x			6,646	3,229
G73	x			13,226	**9,809**		G98	x			5,731	2,314
G74	x			13,368	**9,951**		G99	x			6,725	3,308
G75	x			15,050	11,633		G100	x			10,695	7,278

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2498.975 CPM / Average Gross Count is 9635 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0154	10/10/19	Contamination	Trench 12-211-28-4A/5H

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,417	10,000	10,323	Yes
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G101	x			11,872	**8,455**	Shown on survey map? Yes	G126					
G102	x			12,829	**9,412**		G127					
G103	x			12,900	**9,483**		G128					
G104	x			13,490	**10,073**		G129					
G105	x			13,740	**10,323**		G130					
G106	x			12,671	**9,254**		G131					
G107	x			12,696	**9,279**		G132					
G108	x			11,678	**8,261**		G133					
G109	x			10,528	7,111		G134					
G110	x			7,817	4,400		G135					
G111	x			7,093	3,676		G136					
G112	x			8,634	5,217	Values above 80% of limit appear bolded	G137					
G113	x			10,391	6,974		G138					
G114							G139					
G115							G140					
G116							G141					
G117							G142					
G118							G143					
G119							G144					
G120						Values above limit appear in red	G145					
G121							G146					
G122							G147					
G123							G148					
G124							G149					
G125							G150					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 2498.975 CPM / Average Gross Count is 9635 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0149	09/25/19	Contamination	Trench 12-211-28-5B* Part 1 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	20

North Wall

G20	

West Wall

G19
G18
G17
G16
G15
G14
G13
G12
G11

Floor

G01	
G02	
G03	
G04	
G05	
G06	
G07	
G08	
G09	

East Wall

South Wall

G10	

N
W E
S

*Data for empty grids are on survey number RS-0150

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: David Berres	Signature:	Date: 09/25/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0149	Survey Date: 09/25/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5B* Part 1 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta		N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta		N/A		Gross Gamma	G#	N/A

Notes/Comments:
*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: David Berres	Signature: David Berres	Date: 09/25/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature: CB	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0149	09/25/19	Contamination	Trench 12-211-28-5B* Part 1 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,358	10,000	3,757	No
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			4,137	779	Shown on survey map? Yes	G26					
G02	x			3,824	466		G27					
G03	x			3,271	-87		G28					
G04	x			3,299	-59		G29					
G05	x			3,320	-38		G30					
G06	x			3,940	582		G31					
G07	x			2,800	-558		G32					
G08	x			3,279	-79		G33					
G09	x			5,526	2,168		G34					
G10	x			7,115	3,757		G35					
G11	x			5,549	2,191		G36					
G12	x			3,403	45	Values above 80% of limit appear bolded	G37					
G13	x			2,746	-612		G38					
G14	x			2,882	-476		G39					
G15	x			3,184	-174		G40					
G16	x			3,337	-21		G41					
G17	x			3,525	167		G42					
G18	x			3,914	556		G43					
G19	x			3,867	509		G44					
G20	x			3,574	216	Values above limit appear in red	G45					
G21							G46					
G22							G47					
G23							G48					
G24							G49					
G25							G50					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 1076.81 CPM / Average Gross Count is 3825 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

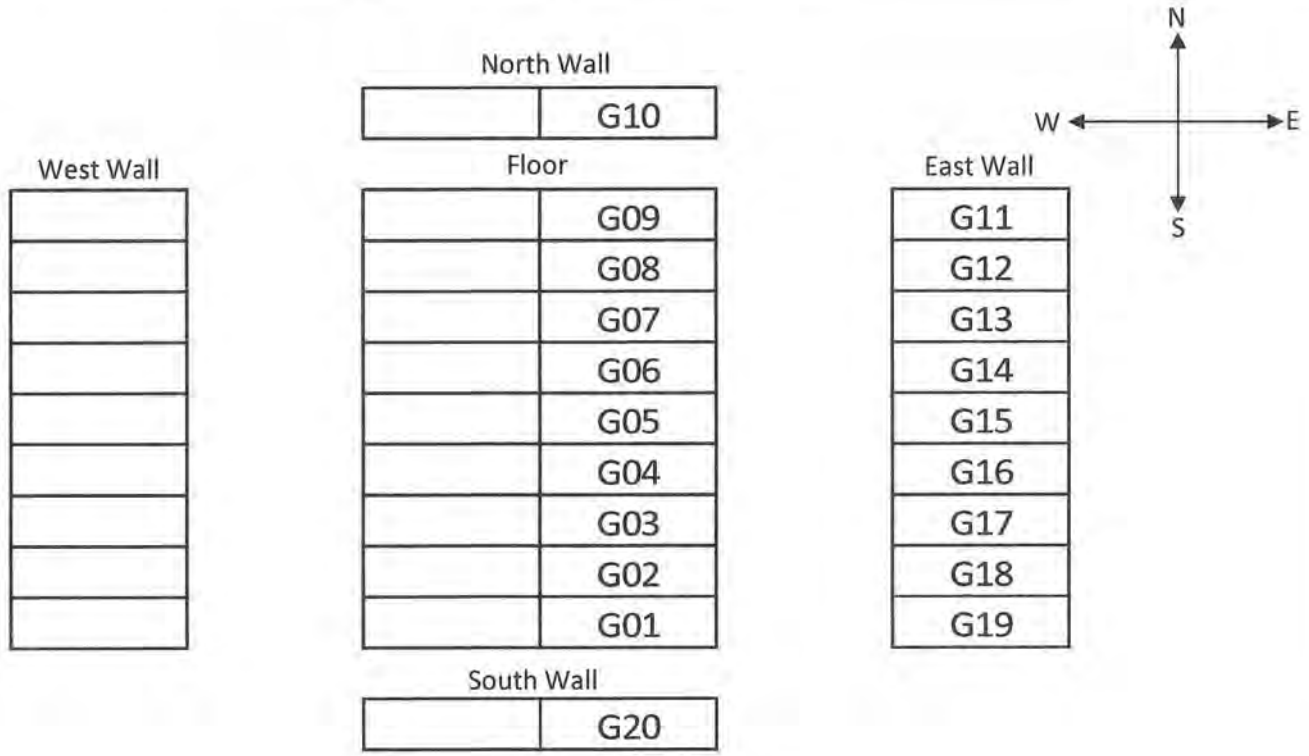
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0150	09/25/19	Contamination	Trench 12-211-28-5B* Part 2 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	20



*Data for empty grids are on survey number RS-0149

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/25/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0150	Survey Date: 09/25/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5B* Part 2 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta		N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta		N/A		Gross Gamma	G#	N/A

Notes/Comments:
*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/25/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0150	09/25/19	Contamination	Trench 12-211-28-5B* Part 2 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,376	10,000	2,948	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			5,218	1,842	Shown on survey map? Yes	G26					
G02	x			2,756	-620		G27					
G03	x			3,022	-354		G28					
G04	x			3,917	541		G29					
G05	x			4,114	738		G30					
G06	x			4,031	655		G31					
G07	x			3,364	-12		G32					
G08	x			4,031	655		G33					
G09	x			3,823	447		G34					
G10	x			3,872	496		G35					
G11	x			3,252	-124		G36					
G12	x			3,223	-153	Values above 80% of limit appear bolded	G37					
G13	x			2,868	-508		G38					
G14	x			3,073	-303		G39					
G15	x			3,326	-50		G40					
G16	x			3,636	260		G41					
G17	x			4,342	966		G42					
G18	x			3,745	369		G43					
G19	x			3,997	621		G44					
G20	x			6,324	2,948	Values above limit appear in red	G45					
G21							G46					
G22							G47					
G23							G48					
G24							G49					
G25							G50					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 830.6204 CPM / Average Gross Count is 3797 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

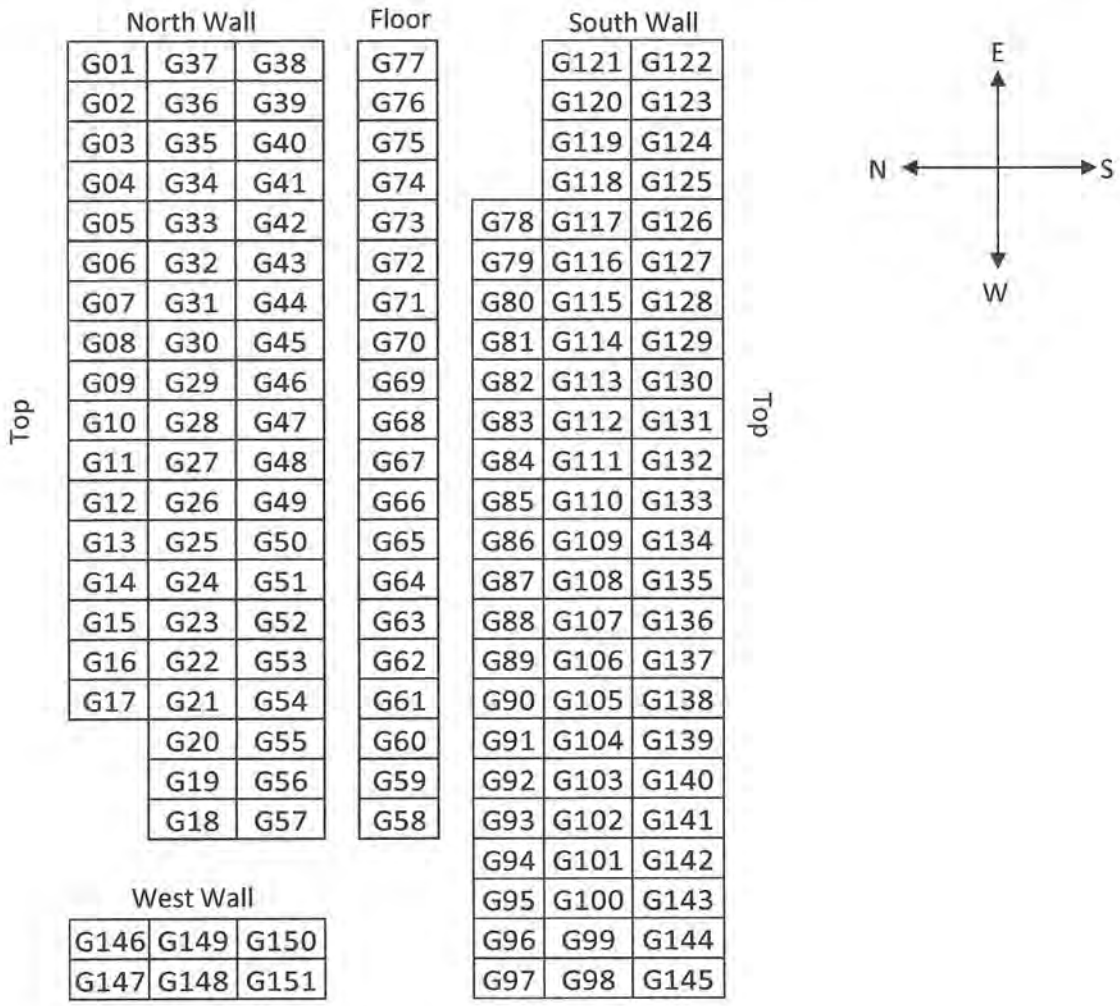
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0160	10/09/19	Contamination	Trench 12-211-28-5C

Survey Map

Measurement Type	Symbol	Collected	Measurement Type	Symbol	Collected
Total Alpha Beta	□	0	Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0	Gross Gamma	G#	151



Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 10/09/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

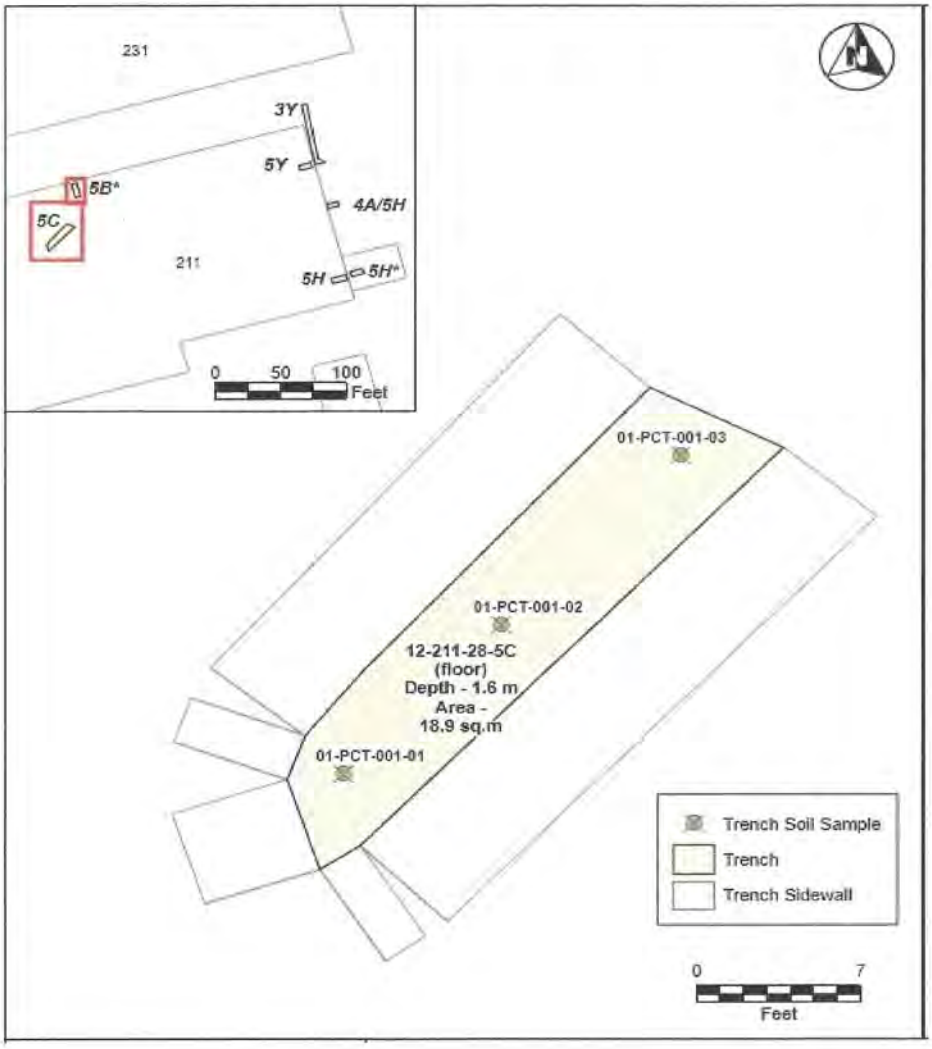
RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0160	Survey Date: 10/09/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5C

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:
*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 10/09/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0160	10/09/19	Contamination	Trench 12-211-28-5C

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,308	10,000	4,711	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			6,415	3,107	Shown on survey map? Yes	G26	x			5,991	2,683
G02	x			6,669	3,361		G27	x			5,632	2,324
G03	x			6,713	3,405		G28	x			5,492	2,184
G04	x			6,304	2,996		G29	x			5,810	2,502
G05	x			6,415	3,107		G30	x			5,170	1,862
G06	x			6,204	2,896		G31	x			4,757	1,449
G07	x			6,558	3,250		G32	x			5,333	2,025
G08	x			6,582	3,274		G33	x			5,239	1,931
G09	x			6,827	3,519		G34	x			5,028	1,720
G10	x			6,308	3,000		G35	x			5,467	2,159
G11	x			6,001	2,693		G36	x			5,470	2,162
G12	x			6,392	3,084	Values above 80% of limit appear bolded	G37	x			5,880	2,572
G13	x			6,421	3,113		G38	x			5,437	2,129
G14	x			6,173	2,865		G39	x			5,483	2,175
G15	x			7,323	4,015		G40	x			4,994	1,686
G16	x			6,540	3,232		G41	x			4,222	914
G17	x			5,534	2,226		G42	x			4,581	1,273
G18	x			7,772	4,464		G43	x			4,597	1,289
G19	x			8,019	4,711		G44	x			4,439	1,131
G20	x			6,870	3,562	Values above limit appear in red	G45	x			4,126	818
G21	x			7,022	3,714		G46	x			4,379	1,071
G22	x			6,078	2,770		G47	x			4,374	1,066
G23	x			6,063	2,755		G48	x			4,476	1,168
G24	x			6,031	2,723		G49	x			4,801	1,493
G25	x			6,198	2,890		G50	x			4,612	1,304

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 768.7474 CPM / Average Gross Count is 5650 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0160	10/09/19	Contamination	Trench 12-211-28-5C

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,308	10,000	3,964	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G51	x			5,462	2,154	Shown on survey map? Yes	G76	x			5,190	1,882
G52	x			5,535	2,227		G77	x			5,439	2,131
G53	x			6,193	2,885		G78	x			5,390	2,082
G54	x			7,156	3,848		G79	x			5,231	1,923
G55	x			7,272	3,964		G80	x			5,232	1,924
G56	x			7,113	3,805		G81	x			5,280	1,972
G57	x			6,431	3,123		G82	x			5,208	1,900
G58	x			6,198	2,890		G83	x			4,854	1,546
G59	x			6,445	3,137		G84	x			4,853	1,545
G60	x			6,474	3,166		G85	x			4,991	1,683
G61	x			6,307	2,999		G86	x			4,935	1,627
G62	x			5,676	2,368	Values above 80% of limit appear bolded	G87	x			5,313	2,005
G63	x			5,684	2,376		G88	x			5,523	2,215
G64	x			5,076	1,768		G89	x			5,544	2,236
G65	x			4,185	877		G90	x			5,737	2,429
G66	x			4,269	961		G91	x			6,065	2,757
G67	x			4,684	1,376		G92	x			6,195	2,887
G68	x			4,574	1,266		G93	x			6,490	3,182
G69	x			4,412	1,104		G94	x			6,495	3,187
G70	x			4,343	1,035	Values above limit appear in red	G95	x			6,587	3,279
G71	x			3,978	670		G96	x			6,462	3,154
G72	x			4,128	820		G97	x			6,191	2,883
G73	x			4,112	804		G98	x			5,752	2,444
G74	x			4,128	820		G99	x			5,498	2,190
G75	x			4,778	1,470		G100	x			5,492	2,184

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 768.7474 CPM / Average Gross Count is 5650 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0160	10/09/19	Contamination	Trench 12-211-28-5C

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,308	10,000	3,843	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net	Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G101	x			5,665	2,357	G126	x			5,880	2,572
G102	x			5,742	2,434	G127	x			5,921	2,613
G103	x			5,546	2,238	G128	x			5,713	2,405
G104	x			5,462	2,154	G129	x			6,128	2,820
G105	x			5,645	2,337	G130	x			5,548	2,240
G106	x			5,485	2,177	G131	x			5,653	2,345
G107	x			5,589	2,281	G132	x			5,657	2,349
G108	x			5,573	2,265	G133	x			5,877	2,569
G109	x			5,430	2,122	G134	x			5,632	2,324
G110	x			5,365	2,057	G135	x			5,490	2,182
G111	x			5,283	1,975	G136	x			5,527	2,219
G112	x			5,333	2,025	G137	x			5,606	2,298
G113	x			5,195	1,887	G138	x			5,553	2,245
G114	x			5,508	2,200	G139	x			5,591	2,283
G115	x			5,467	2,159	G140	x			5,996	2,688
G116	x			5,604	2,296	G141	x			5,953	2,645
G117	x			5,482	2,174	G142	x			5,492	2,184
G118	x			5,313	2,005	G143	x			5,569	2,261
G119	x			5,343	2,035	G144	x			5,605	2,297
G120	x			5,572	2,264	G145	x			5,422	2,114
G121	x			5,991	2,683	G146	x			6,301	2,993
G122	x			6,338	3,030	G147	x			4,722	1,414
G123	x			5,998	2,690	G148	x			5,933	2,625
G124	x			6,463	3,155	G149	x			7,151	3,843
G125	x			6,194	2,886	G150	x			5,600	2,292

Shown on survey map? Yes

Values above 80% of limit appear bolded

Values above limit appear in red

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 768.7474 CPM / Average Gross Count is 5650 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0160	10/09/19	Contamination	Trench 12-211-28-5C

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,308	10,000	1,918	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G151	x			5,226	1,918	Shown on survey map? Yes	G176					
G152							G177					
G153							G178					
G154							G179					
G155							G180					
G156							G181					
G157							G182					
G158							G183					
G159							G184					
G160							G185					
G161							G186					
G162						Values above 80% of limit appear bolded	G187					
G163							G188					
G164							G189					
G165							G190					
G166							G191					
G167							G192					
G168							G193					
G169							G194					
G170						Values above limit appear in red	G195					
G171							G196					
G172							G197					
G173							G198					
G174							G199					
G175							G200					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 768.7474 CPM / Average Gross Count is 5650 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

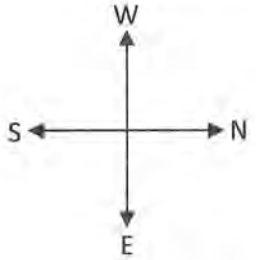
Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0151	09/24/19	Contamination	Trench 12-211-28-5H Part 1 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	32

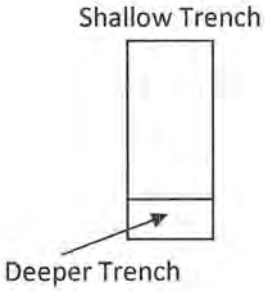
Shallow Trench



West Wall

G01

South Wall	Floor	North Wall
G02	G03	
G05	G04	
G06	G07	
G09	G08	
G10	G11	
G13	G12	



Deeper Trench

West Wall

G14

South Wall		Floor		North Wall	
G20	G19	G18	G17	G16	G15
G21	G22	G23	G24	G25	G26
G32	G31	G30	G29	G28	G27

*Data for empty grids are on survey number RS-0152

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: David Berres	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

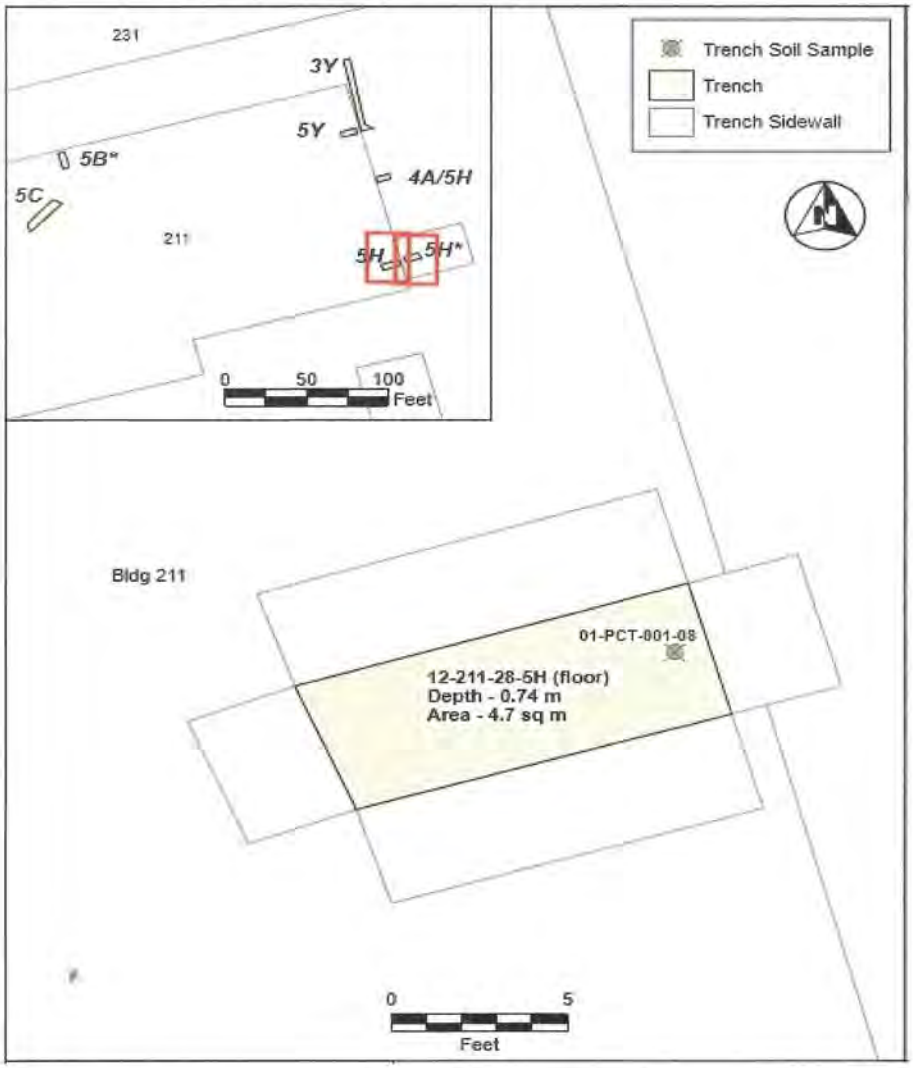
RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0151	Survey Date: 09/24/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5H Part 1 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:

*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: David Berres	Signature: David Ber	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature: CB	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0151	09/24/19	Contamination	Trench 12-211-28-5H Part 1 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,334	10,000	8,853	No
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			7,102	3,768	Shown on survey map? Yes	G26	x			8,512	5,178
G02	x			8,132	4,798		G27	x			8,522	5,188
G03	x			5,826	2,492		G28	x			9,796	6,462
G04	x			6,375	3,041		G29	x			9,769	6,435
G05	x			6,848	3,514		G30	x			9,154	5,820
G06	x			6,894	3,560		G31	x			8,889	5,555
G07	x			6,767	3,433		G32	x			6,844	3,510
G08	x			6,306	2,972		G33					
G09	x			7,118	3,784		G34					
G10	x			7,102	3,768		G35					
G11	x			6,527	3,193		G36					
G12	x			6,600	3,266	Values above 80% of limit appear bolded	G37					
G13	x			7,068	3,734		G38					
G14	x			9,903	6,569		G39					
G15	x			8,007	4,673		G40					
G16	x			12,187	**8,853**		G41					
G17	x			9,852	6,518		G42					
G18	x			9,604	6,270		G43					
G19	x			9,778	6,444		G44					
G20	x			7,608	4,274	Values above limit appear in red	G45					
G21	x			7,096	3,762		G46					
G22	x			9,237	5,903		G47					
G23	x			9,367	6,033		G48					
G24	x			8,986	5,652		G49					
G25	x			10,128	6,794		G50					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 1515.076 CPM / Average Gross Count is 8185 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

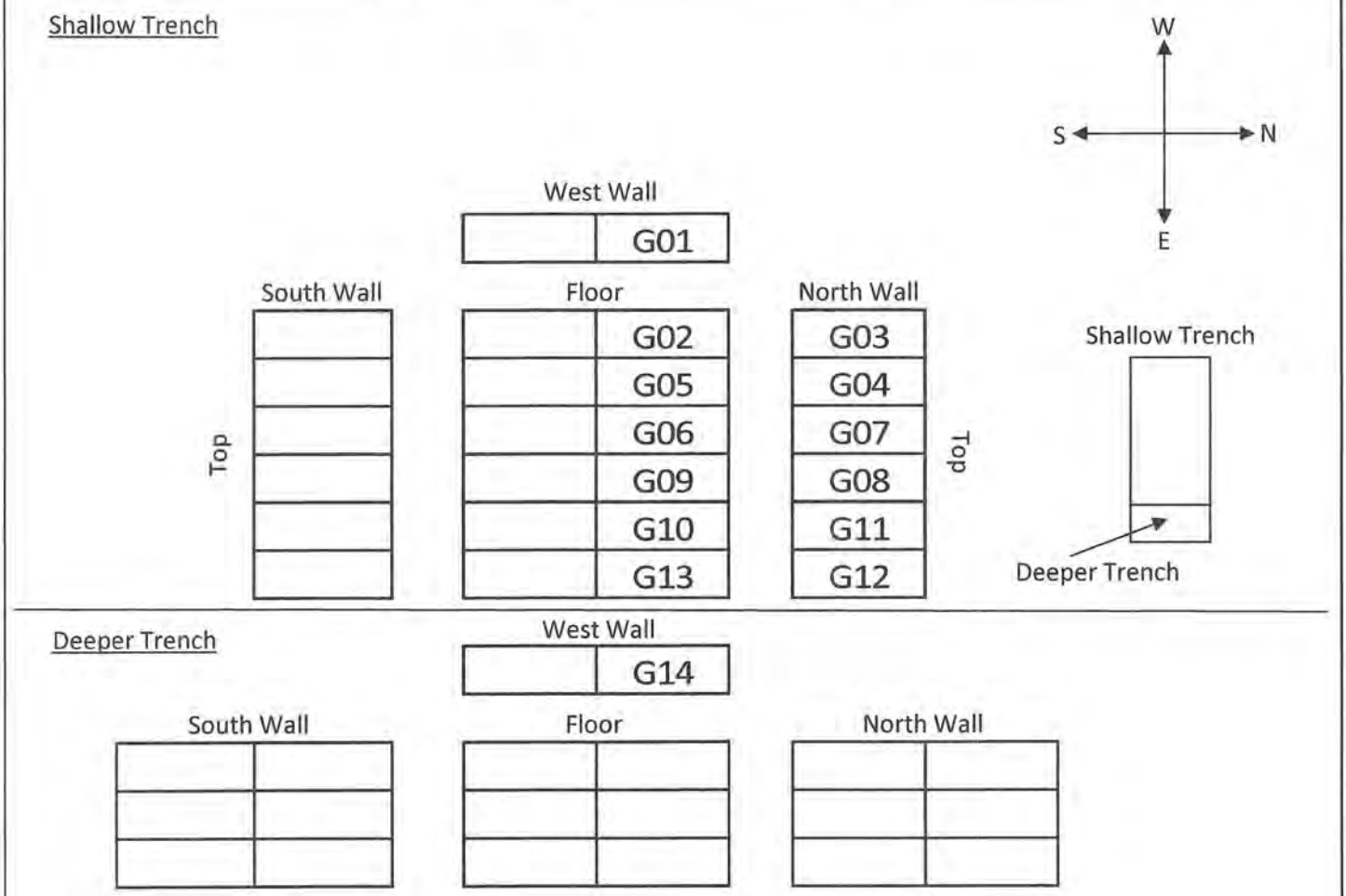
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0152	09/24/19	Contamination	Trench 12-211-28-5H Part 2 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	14



*Data for empty grids are on survey number RS-0151

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

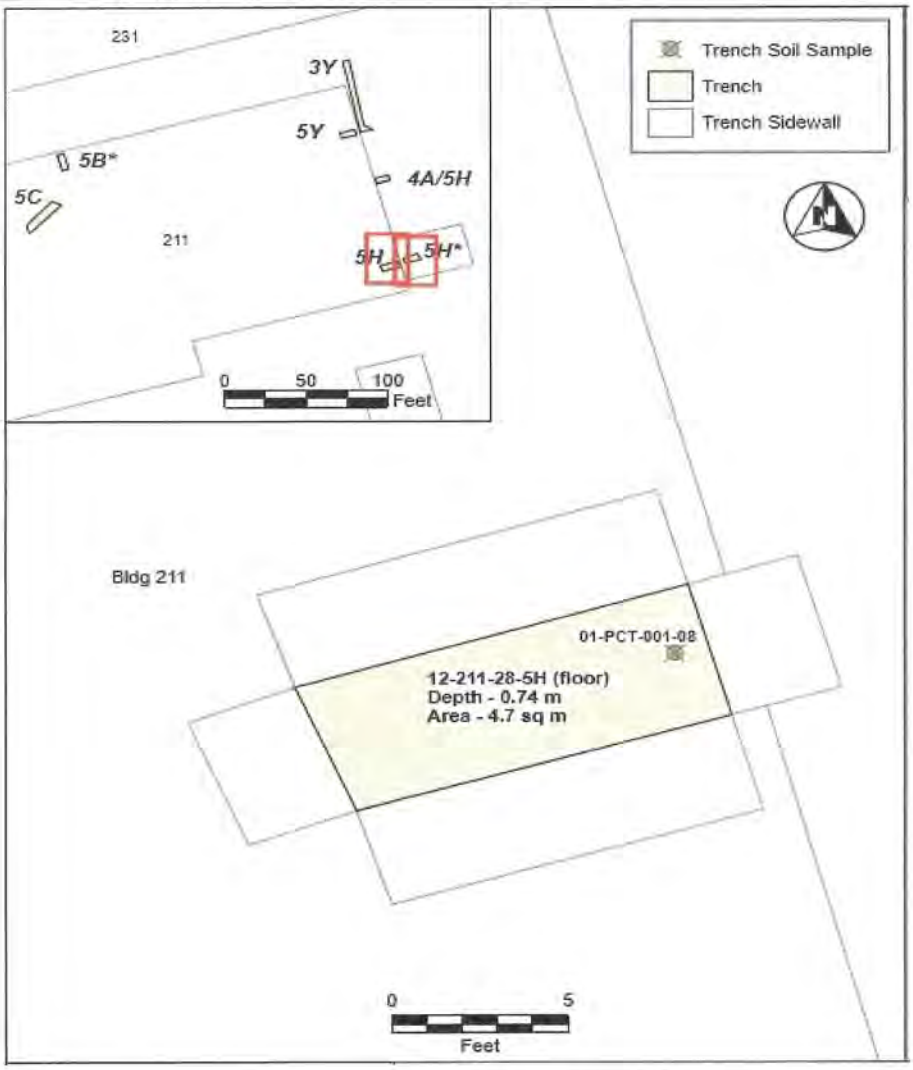
RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0152	Survey Date: 09/24/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5H Part 2 of 2

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	▭	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:

*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0152	09/24/19	Contamination	Trench 12-211-28-5H Part 2 of 2

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,721	10,000	7,203	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			7,839	4,118	Shown on survey map? Yes	G26					
G02	x			10,924	7,203		G27					
G03	x			6,926	3,205		G28					
G04	x			8,172	4,451		G29					
G05	x			8,847	5,126		G30					
G06	x			8,654	4,933		G31					
G07	x			8,114	4,393		G32					
G08	x			8,259	4,538		G33					
G09	x			9,152	5,431		G34					
G10	x			9,189	5,468		G35					
G11	x			9,503	5,782		G36					
G12	x			8,464	4,743	Values above 80% of limit appear bolded	G37					
G13	x			9,984	6,263		G38					
G14	x			9,823	6,102		G39					
G15							G40					
G16							G41					
G17							G42					
G18							G43					
G19							G44					
G20						Values above limit appear in red	G45					
G21							G46					
G22							G47					
G23							G48					
G24							G49					
G25							G50					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Stardard Deviation is 1016.347 CPM / Average Gross Count is 8846 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0155	10/10/19	Contamination	Trench 12-211-28-5H*

Survey Map

Measurement Type	Symbol	Collected	Measurement Type	Symbol	Collected
Total Alpha Beta	□	0	Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0	Gross Gamma	G#	76

North Wall

G01	G03	G05	G07	G09	G11	G13	G14	G15	G16	G17
G02	G04	G06	G08	G10	G12					

West Wall

Top

G18	G19	G20
G21	G22	G23
G24	G25	G26
G27	G28	G29
G30	G31	G32
G33	G34	G35

Bottom Trench

G62	G63	G64	G65	G66
G67	G68	G69	G70	G71
G72	G73	G74	G75	G76

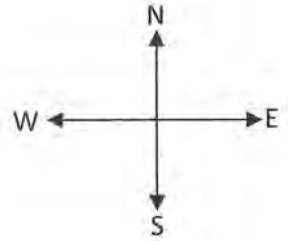
East Wall

G53	G56	G59
G54	G57	G60
G55	G58	G61

Top

South Wall

G36	G41	G42	G47	G48	G52
G37	G40	G43	G46	G49	G51
G38	G39	G44	G45	G50	



Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Dan Bulilan	Signature:	Date: 10/10/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

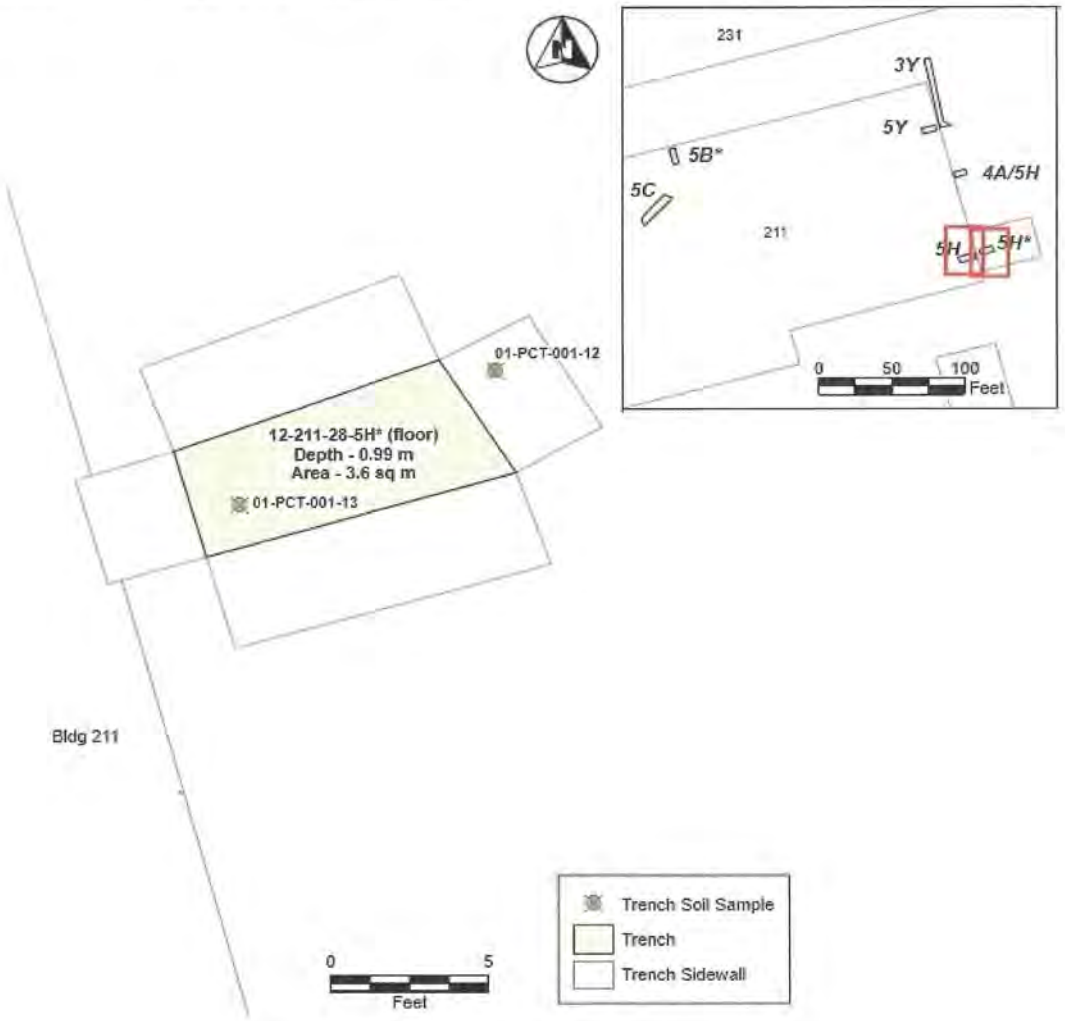
RADIOLOGICAL SURVEY FORM

Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0155	Survey Date: 10/10/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5H*

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	▭	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A



Notes/Comments:
*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Dan Bulilan	Signature:	Date: 10/10/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0155	10/10/19	Contamination	Trench 12-211-28-5H*

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,417	10,000	7,647	No
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			7,565	4,148	Shown on survey map? Yes	G26	x			6,998	3,581
G02	x			10,410	6,993		G27	x			6,509	3,092
G03	x			7,061	3,644		G28	x			6,419	3,002
G04	x			11,064	7,647		G29	x			6,541	3,124
G05	x			7,574	4,157		G30	x			6,841	3,424
G06	x			10,575	7,158		G31	x			7,356	3,939
G07	x			7,957	4,540		G32	x			7,338	3,921
G08	x			9,462	6,045		G33	x			7,413	3,996
G09	x			6,895	3,478		G34	x			7,812	4,395
G10	x			8,981	5,564		G35	x			8,495	5,078
G11	x			6,399	2,982		G36	x			5,832	2,415
G12	x			6,716	3,299	Values above 80% of limit appear bolded	G37	x			5,755	2,338
G13	x			6,512	3,095		G38	x			5,966	2,549
G14	x			6,684	3,267		G39	x			6,250	2,833
G15	x			5,998	2,581		G40	x			7,932	4,515
G16	x			5,905	2,488		G41	x			7,756	4,339
G17	x			5,174	1,757		G42	x			8,660	5,243
G18	x			5,720	2,303		G43	x			7,894	4,477
G19	x			5,760	2,343		G44	x			9,062	5,645
G20	x			5,788	2,371	Values above limit appear in red	G45	x			8,164	4,747
G21	x			6,336	2,919		G46	x			10,064	6,647
G22	x			6,093	2,676		G47	x			8,264	4,847
G23	x			6,925	3,508		G48	x			9,230	5,813
G24	x			6,821	3,404		G49	x			7,958	4,541
G25	x			6,485	3,068		G50	x			9,416	5,999

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 1713.345 CPM / Average Gross Count is 7949 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0155	10/10/19	Contamination	Trench 12-211-28-5H*

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	84718	04/30/20	cpm	3,417	10,000	9,193	No
Detector	44-10	PR150787						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G51	x			7,670	4,253	Shown on survey map? Yes	G76	x			9,770	6,353
G52	x			9,252	5,835		G77					
G53	x			5,406	1,989		G78					
G54	x			7,760	4,343		G79					
G55	x			8,484	5,067		G80					
G56	x			4,986	1,569		G81					
G57	x			7,610	4,193		G82					
G58	x			8,904	5,487		G83					
G59	x			5,224	1,807		G84					
G60	x			7,924	4,507		G85					
G61	x			9,674	6,257		G86					
G62	x			9,683	6,266	Values above 80% of limit appear bolded	G87					
G63	x			8,786	5,369		G88					
G64	x			9,459	6,042		G89					
G65	x			9,682	6,265		G90					
G66	x			8,927	5,510		G91					
G67	x			10,338	6,921		G92					
G68	x			9,722	6,305		G93					
G69	x			9,794	6,377		G94					
G70	x			9,503	6,086	Values above limit appear in red	G95					
G71	x			9,741	6,324		G96					
G72	x			10,747	7,330		G97					
G73	x			12,610	**9,193**		G98					
G74	x			11,631	**8,214**		G99					
G75	x			10,084	6,667		G100					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 1713.345 CPM / Average Gross Count is 7949 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

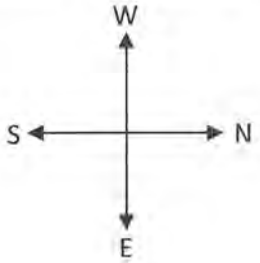
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0156	10/02/19	Contamination	Trench 12-211-28-5Z

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	□	0		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	0		Gross Gamma	G#	110



G01	G02	G03	G04	G05	
G11	G10	G09	G08	G07	G06
G12	G13	G14	G15	G16	G17
G23	G22	G21	G20	G19	G18
G24	G25	G26	G27	G28	G29
G35	G34	G33	G32	G31	G30
G36	G37	G38	G39	G40	G41
G47	G46	G45	G44	G43	G42
G50	G51	G52	G53	G54	G55
G61	G60	G59	G58	G57	G56
G64	G65	G66	G67	G68	G69
G75	G74	G73	G72	G71	G70
G78	G79	G80	G81	G82	G83
G89	G88	G87	G86	G85	G84
G92	G93	G94	G95	G96	G97
G103	G102	G101	G100	G99	G98
G105	G106	G107			

South Wall

G48
G49
G62
G63
G76
G77
G90
G91
G104

G110	G109	G108

East Wall

Notes/Comments:

*The trench was divided into 12"x12" grids, 100% of which were surveyed using a Ludlum 44-10 detector. Upon survey completion, a 1 minute static count were collected at locations where the highest count rates were observed in each grid.

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Dang Vo Tran	Signature:	Date: 10/02/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

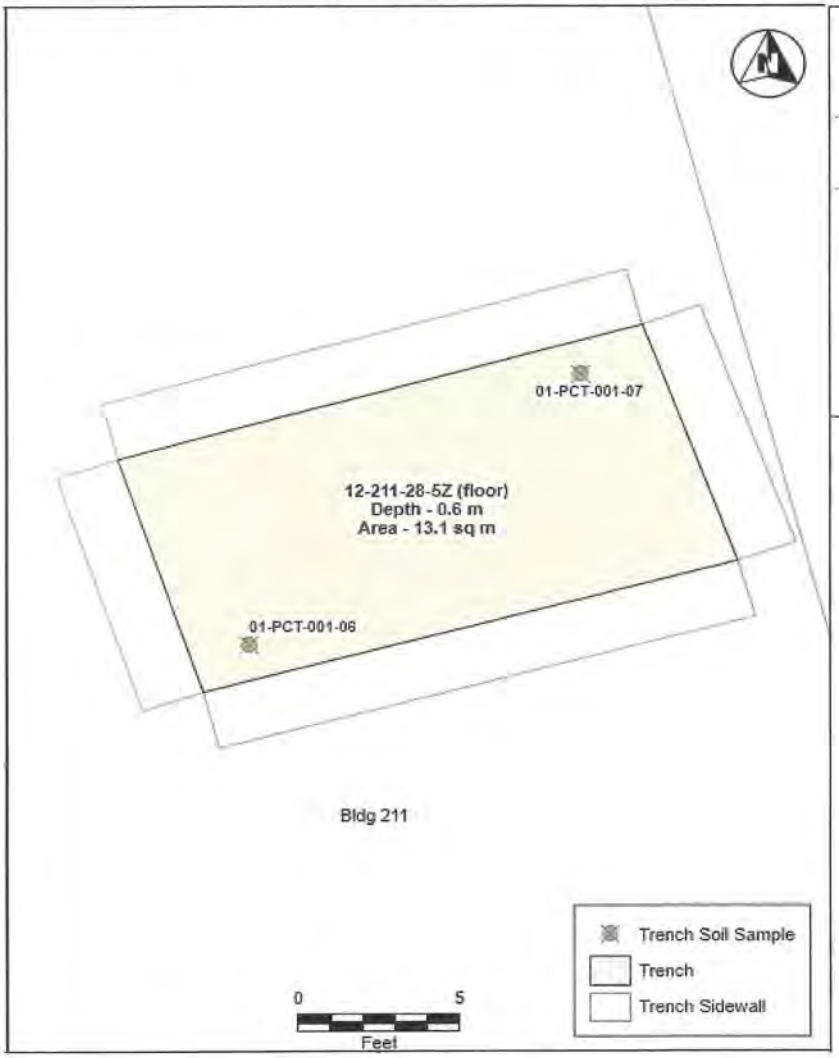
RADIOLOGICAL SURVEY FORM

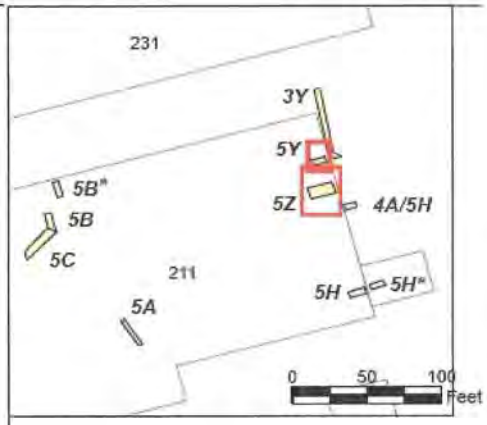
Project Information		
Contract / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information			
Survey Number: RS-0156	Survey Date: 10/02/19	Survey Type: Contamination	Survey Description: Trench 12-211-28-5Z

Survey Map

Measurement Type	Symbol	Collected		Measurement Type	Symbol	Collected
Total Alpha Beta	▭	N/A		Exposure Rate	N/A	N/A
Removable Alpha/Beta	○	N/A		Gross Gamma	G#	N/A





Notes/Comments:
*This map shows the location where soil samples were taken

Technician and reviewer attest survey locations, field readings, & instrument data are correctly transcribed from field notes	Technician Name: Charles Cronister Jr.	Signature:	Date: 09/24/19
	Reviewer Name/Title: Christopher Bryson / RSO	Signature:	Date: 12/17/19

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information		
Contract Number / Task Order Number: N62473-17-D-0005 / 0001	Project Title / Location: Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	Gilbane Project Number: J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0156	10/02/19	Contamination	Trench 12-211-28-5Z

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,292	10,000	3,061	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G01	x			5,186	1,894	Shown on survey map? Yes	G26	x			5,698	2,406
G02	x			5,909	2,617		G27	x			5,325	2,033
G03	x			5,280	1,988		G28	x			6,079	2,787
G04	x			5,935	2,643		G29	x			5,618	2,326
G05	x			6,176	2,884		G30	x			5,551	2,259
G06	x			6,353	3,061		G31	x			5,894	2,602
G07	x			5,968	2,676		G32	x			5,587	2,295
G08	x			5,729	2,437		G33	x			5,719	2,427
G09	x			5,468	2,176		G34	x			5,660	2,368
G10	x			5,453	2,161		G35	x			5,668	2,376
G11	x			5,580	2,288		G36	x			6,164	2,872
G12	x			5,291	1,999	Values above 80% of limit appear bolded	G37	x			5,643	2,351
G13	x			5,903	2,611		G38	x			6,075	2,783
G14	x			5,512	2,220		G39	x			5,633	2,341
G15	x			5,561	2,269		G40	x			5,627	2,335
G16	x			5,636	2,344		G41	x			5,872	2,580
G17	x			6,006	2,714		G42	x			5,522	2,230
G18	x			6,043	2,751		G43	x			5,564	2,272
G19	x			5,398	2,106		G44	x			5,540	2,248
G20	x			5,856	2,564	Values above limit appear in red	G45	x			5,730	2,438
G21	x			5,348	2,056		G46	x			5,698	2,406
G22	x			5,713	2,421		G47	x			6,280	2,988
G23	x			5,599	2,307		G48	x			5,647	2,355
G24	x			5,872	2,580		G49	x			6,144	2,852
G25	x			5,720	2,428		G50	x			6,320	3,028

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 543.7463 CPM / Average Gross Count is 6045 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0156	10/02/19	Contamination	Trench 12-211-28-5Z

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,292	10,000	3,692	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G51	x			5,857	2,565	Shown on survey map? Yes	G76	x			6,550	3,258
G52	x			5,653	2,361		G77	x			6,984	3,692
G53	x			5,866	2,574		G78	x			6,681	3,389
G54	x			5,676	2,384		G79	x			5,949	2,657
G55	x			5,630	2,338		G80	x			5,858	2,566
G56	x			5,265	1,973		G81	x			6,053	2,761
G57	x			5,744	2,452		G82	x			6,721	3,429
G58	x			5,824	2,532		G83	x			6,133	2,841
G59	x			5,718	2,426		G84	x			5,687	2,395
G60	x			5,985	2,693		G85	x			6,193	2,901
G61	x			6,128	2,836	Values above 80% of limit appear bolded	G86	x			6,011	2,719
G62	x			5,764	2,472		G87	x			6,027	2,735
G63	x			6,278	2,986		G88	x			6,283	2,991
G64	x			6,480	3,188		G89	x			6,877	3,585
G65	x			5,695	2,403		G90	x			6,611	3,319
G66	x			5,860	2,568		G91	x			6,689	3,397
G67	x			5,927	2,635		G92	x			6,729	3,437
G68	x			6,237	2,945		G93	x			6,370	3,078
G69	x			5,408	2,116		G94	x			6,658	3,366
G70	x			6,248	2,956	Values above limit appear in red	G95	x			6,311	3,019
G71	x			6,312	3,020		G96	x			6,428	3,136
G72	x			5,877	2,585		G97	x			6,371	3,079
G73	x			5,703	2,411		G98	x			6,390	3,098
G74	x			5,662	2,370		G99	x			6,294	3,002
G75	x			6,387	3,095		G100	x			6,758	3,466

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 543.7463 CPM / Average Gross Count is 6045 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

Gilbane

RADIOLOGICAL SURVEY FORM

Project Information

Contract Number / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	Radiation Remediation Bldg. 211 / 253 HPNS, SF, CA	J310000100

Survey Information

Survey Number:	Survey Date:	Survey Type:	Survey Description:
RS-0156	10/02/19	Contamination	Trench 12-211-28-5Z

Instrument	Model	Serial No.	Cal Due	Units	Bkgrd	Net Limit	Net Max	Exceedance
Meter	2221	146343	02/22/20	cpm	3,292	10,000	5,223	No
Detector	44-10	RN19769						

Static Measurements - Gross Gamma

Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net		Location Number	Orientation: Contact	Orientation: 30 cm	Orientation: 1 m	Gamma Counts (cpm) Gross	Gamma Counts (cpm) Net
G101	x			8,515	5,223	Shown on survey map? Yes	G126					
G102	x			6,600	3,308		G127					
G103	x			6,639	3,347		G128					
G104	x			6,771	3,479		G129					
G105	x			6,619	3,327		G130					
G106	x			6,941	3,649		G131					
G107	x			7,319	4,027		G132					
G108	x			7,399	4,107		G133					
G109	x			7,567	4,275		G134					
G110	x			6,981	3,689		G135					
G111						Values above 80% of limit appear bolded	G136					
G112							G137					
G113							G138					
G114							G139					
G115							G140					
G116							G141					
G117							G142					
G118							G143					
G119							G144					
G120						Values above limit appear in red	G145					
G121							G146					
G122							G147					
G123							G148					
G124							G149					
G125							G150					

Notes/Comments:

*Location #'s with descriptions are shown on page 1.

*Standard Deviation is 543.7463 CPM / Average Gross Count is 6045 CPM

*Net Limit is an arbitrary limit set to highlight grids for possible sampling

*Background is the daily background of the instrument used

ATTACHMENT 3
TU 211-01 Gamma Scan Survey Instrument QC Data
(9 pages)

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ilac-MRA ACCREDITED CERT # 4084.01

Customer ENVIRACHEM INC ORDER NO. 20349939/474872

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 146343

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. RN19769

Cal. Date 22-Feb-19 Cal Due Date 22-Feb-20 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 20 % Alt 704.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☑ Alarm Setting ck. ☑ Batt. ck.

☑ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set Comments V Input Sens. Comments mV Det. Oper. Comments V at Comments mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 2001 V

COMMENTS:

	Peak settings	Gross Counts
High Voltage:	938 V	1250 V
Threshold dial:	642	100 (10mv)
Window dial:	40	N/A
Window Position:	"IN"	"OUT"
Resolution for Cs137:	≈11.48%	N/A

Model 2221 currently set for gross counts
High voltage set with detector connected.

Firmware: 261027

OL checked but not set. Calibrated with coiled cable.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1K	400kcpm	400	400
x1K	100kcpm	100	100
x100	40kcpm	400	400
x100	10kcpm	100	100
x10	4kcpm	400	400
x10	1kcpm	100	100
x1	400cpm	400	400
x1	100cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20% ALL **Range(s) Calibrated Electronically**

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	39977 (0)	39977 (0)	Log Scale	500kcpm	500K cpm	500K cpm
	40kcpm	3999	3999		50kcpm	50	50
	4kcpm	400	400		5kcpm	5	5
	400cpm	40	40		500cpm	500	500
	40cpm	4	4		50cpm	50	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 ISO/IE 17025:2005(E) State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 289158 ☐ Oscilloscope S/N ☑ Multimeter S/N 20870423

Calibrator Jeramy Thompson Title Calibrator Date 22-Feb-19

QC'd By Title Final QC Date 22 Feb 19

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

FORM C22A 10/03/2017

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

www.ludlums.com

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ilac-MRA ACCREDITED CERT # 4084.01

Bench Test Data For Detector

Detector 44-10 Serial No. RN19769

Customer ENVIRACHEM INC ORDER NO. 20349939/474872

Counter 2221 Serial No. 146 343 Counter Input Sensitivity 10 mV

Count Time 6 Seconds Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am241, Size ~0.77 μCi	Isotope ____ Size ____	Isotope ____ Size ____	Isotope ____ Size ____
1100	597	7671			
1150	628	8938			
1200	640	9215			
*1250	646	9302			
1300	656	9397			
1350	741	9197			
1400	850	9413			
1450	1635	10734			

Signature Jeramy Thompson Jeramy Thompson Date 22-Feb-19

RATEMETER DAILY RESPONSE CHECK SHEET

Project Information		
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	HPNS Bldgs 253 & 211 RA / San Francisco, CA	J310000100

Survey Instrument Set-Up Information

Pairing	Meter		Detector		Read-Out	HV	Calibration	Set-Up	Check Source	
ID	Model	S/N	Model	S/N	Units	Setting	Due Date	Date	Isotope	S/N
5	2221	146343	44-10	RN19769	cpm	1250	02/22/20	07/24/19	Cs-137	808132

Daily Response Check Results

	Inst Cal	High	Battery	Audio	Meter	Response Check		QC Results		Tech
Date	Current?	Voltage	Check	Speaker	Reset	Bkgrd	Source	Pass/Fail	Reason	Initials
07/24/19	Yes	1,250	Okay	Okay	Okay	3,007	232,140	Pass	---	DB
07/25/19	Yes	1,250	Okay	Okay	Okay	3,201	233,057	Pass	---	DVT
07/30/19	Yes	1,250	OKAY	Okay	Okay	3,324	232,058	Pass	---	CMC
07/31/19	Yes	1,250	Okay	Okay	Okay	3,291	232,125	Pass	---	DB
08/01/19	Yes	1,250	Okay	Okay	Okay	3,289	232,169	Pass	---	DB
08/05/19	Yes	1,250	Okay	Okay	Okay	3,190	233,494	Pass	---	DVT
08/06/19	Yes	1,250	Okay	Okay	Okay	3,147	232,165	Pass	---	DB
08/07/19	Yes	1,250	Okay	Okay	Okay	3,208	233,195	Pass	---	DB
08/08/19	Yes	1,250	Okay	Okay	Okay	3,049	232,306	Pass	---	DB
08/12/19	Yes	1,250	Okay	Okay	Okay	3,100	235,627	Pass	---	DB
08/15/19	Yes	1,250	Okay	Okay	Okay	3,138	235,727	Pass	---	DB
08/21/19	Yes	1,250	Okay	Okay	Okay	3,009	233,630	Pass	---	DB
08/22/19	Yes	1,250	Okay	Okay	Okay	3,014	233,129	Pass	---	DB
08/26/19	Yes	1,250	Okay	Okay	Okay	3,308	234,083	Pass	---	DB
08/27/19	Yes	1,250	Okay	Okay	Okay	3,309	230,466	Pass	---	DB
08/28/19	Yes	1,250	Okay	Okay	Okay	3,299	232,947	Pass	---	DB
08/29/19	Yes	1,250	Okay	Okay	Okay	3,471	232,273	Pass	---	DB
09/03/19	Yes	1,250	Okay	Okay	Okay	3,073	232,218	Pass	---	DB
09/04/19	Yes	1,250	Okay	Okay	Okay	3,277	232,458	Pass	---	DB
09/05/19	Yes	1,250	Okay	Okay	Okay	3,289	232,556	Pass	---	DB
09/09/19	Yes	1,250	Okay	Okay	Okay	3,279	232,195	Pass	---	DB
09/10/19	Yes	1,250	Okay	Okay	Okay	3,255	232,296	Pass	---	DB
09/11/19	Yes	1,250	Okay	Okay	Okay	3,164	234,560	Pass	---	DB
09/12/19	Yes	1,250	Okay	Okay	Okay	3,349	232,190	Pass	---	DVT
09/16/19	Yes	1,250	Okay	Okay	Okay	3,132	228,049	Pass	---	DB
09/17/19	Yes	1,250	Okay	Okay	Okay	3,256	230,155	Pass	---	DB
09/18/19	Yes	1,250	Okay	Okay	Okay	3,217	233,093	Pass	---	DB
09/19/19	Yes	1,250	Okay	Okay	Okay	3,287	232,580	Pass	---	DB
09/23/19	Yes	1,250	Okay	Okay	Okay	3,034	233,473	Pass	---	DVT
09/24/19	Yes	1,250	Okay	Okay	Okay	3,721	231,433	Pass	---	DVT
09/25/19	Yes	1,250	Okay	Okay	Okay	3,376	223,597	Pass	---	DVT
09/26/19	Yes	1,250	Okay	Okay	Okay	3,477	234,326	Pass	---	DVT
09/30/19	Yes	1,250	Okay	Okay	Okay	3,148	232,686	Pass	---	DB
10/01/19	Yes	1,250	Okay	Okay	Okay	3,273	233,514	Pass	---	DB

SPECTECH

SPECTRUM TECHNIQUES, L.L.C.
106 Union Valley Road
Oak Ridge, TN 37830
Tel: (865) 482-9937 Fax: (865) 483-0473
Email: sales@spectrumtechniques.com
Web: www.spectrumtechniques.com

Certificate of Calibration

Radioactive material, Limited Quantity NOS UN2910,
Exempt Quantity 10CFR30.18, BS 5288/C11111

This source has been calibrated using a HPGe detector whose efficiency was established with the NIST traceable mixed nuclide standard SRS: 80899-854. The stated activity is the weighted average of the measured gamma lines with an estimated uncertainty of 5%. The source is of sealed construction and wipe tested.

Radionuclide: Cs-137

Half-Life: 30.07 years

Decay Constant: 0.02305

Serial Number: 808132

Calibration Date: August 8, 2013 **Activity:** 0.878 **uCi.** 32,486 **Bq.**

Photon Energy (keV)	Intensity (%)	Emission Rate (sec-1)
661.66	**85.1**	27,646

Certified by: *Roger K. Stevens* **Date:** August 8, 2013

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ilac-MRA ACCREDITED
CERT # 4084.01

Customer ENVIRACHEM INC ORDER NO. 20354342/477799

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 84718

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR150787

Cal. Date 30-Apr-19 Cal Due Date 30-Apr-20 Cal. Interval 1 Year Meterface 202-159

Check mark ✓ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 53 % Alt 701.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☑ Alarm Setting ck. ☑ Batt. ck.
☑ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set Comments V Input Sens. Comments mV Det. Oper. Comments V at Comments mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 503 V Ref./Inst. 2000 / 2009 V

COMMENTS:

	Peak settings	Gross Counts
High Voltage:	851 V	1100 V
Threshold dial:	642	100 (10mv)
Window dial:	40	N/A
Window Position:	"IN"	"OUT"
Resolution for Cs137:	≈8.15%	N/A

Model 2221 currently set for gross counts
High voltage set with detector connected.

Firmware: 261022

OL checked but not set. Calibrated with coiled cable.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading, Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
x1K	400kcpm	360	400
x1K	100kcpm	90	100
x100	40kcpm	360	400
x100	10kcpm	90	100
x10	4kcpm	360	400
x10	1kcpm	90	100
x1	400cpm	360	400
x1	100cpm	90	100

ALL **Range(s) Calibrated Electronically**

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
	400kcpm	399.8 (0)	399.8 (0)
	40kcpm	399.8	399.8
	4kcpm	399	399
	400cpm	40	40
	40cpm	4	4

Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
	500kcpm	450K cpm	500K cpm
	50kcpm	45	50
	5kcpm	4.5	5
	500cpm	450	500
	50cpm	45	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013

ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 289158 ☐ Oscilloscope S/N ☑ Multimeter S/N 20870423

Calibrator Jeramy Thompson Title Calibrator Date 30-Apr-19

QC'd By Title Final QC Date 30 Apr 19

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

www.ludlums.com

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR150787

Customer ENVIRACHEM INC ORDER NO. 20354342/477799

Counter 2221 Serial No. 84717 Counter Input Sensitivity 10 mV

Count Time 6 seconds Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am241 Size ≈ 0.77 μCi	Isotope ____ Size	Isotope ____ Size	Isotope ____ Size
1000	463	12351			
1050	471	12950			
*1100	482	12724			
1150	452	12684			
1200	489	12975			
1250	526	12872			
1300	531	12977			
1350	754	13137			
1400	1017	13644			

Signature Jeramy Thompson Jeramy Thompson Date 30 Apr. 19

RATEMETER DAILY RESPONSE CHECK SHEET

Project Information		
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	HPNS Bldgs 253 & 211 RA / San Francisco, CA	J310000100

Survey Instrument Set-Up Information

Pairing	Meter		Detector		Read-Out	HV	Calibration	Set-Up	Check Source	
ID	Model	S/N	Model	S/N	Units	Setting	Due Date	Date	Isotope	S/N
4	2221	84718	44-10	PR150787	cpm	1100	04/30/20	07/08/19	Cs-137	808132

Daily Response Check Results

	Inst Cal	High	Battery	Audio	Meter	Response Check		QC Results		Tech
Date	Current?	Voltage	Check	Speaker	Reset	Bkgrd	Source	Pass/Fail	Reason	Initials
07/08/19	Yes	1,100	Okay	Okay	Okay	3,077	291,129	Pass	---	DB
07/11/19	Yes	1,100	Okay	Okay	Okay	3,256	292,389	Pass	---	DB
07/15/19	Yes	1,100	Okay	Okay	Okay	3,382	292,823	Pass	---	DB
07/16/19	Yes	1,100	Okay	Okay	Okay	3,261	292,448	Pass	---	DB
07/17/19	Yes	1,100	Okay	Okay	Okay	3,283	292,943	Pass	---	DB
07/18/19	Yes	1,100	Okay	Okay	Okay	3,138	294,096	Pass	---	DB
07/22/19	Yes	1,100	Okay	Okay	Okay	3,297	292,736	Pass	---	DB
07/23/19	Yes	1,100	Okay	Okay	Okay	3,245	292,914	Pass	---	DB
07/24/19	Yes	1,100	Okay	Okay	Okay	3,219	291,776	Pass	---	DB
07/25/19	Yes	1,100	Okay	Okay	Okay	3,265	290,868	Pass	---	DB
07/29/19	Yes	1,100	Okay	Okay	Okay	3,179	293,688	Pass	---	DB
07/30/19	Yes	1,100	Okay	Okay	Okay	3,078	293,252	Pass	---	DB
07/31/19	Yes	1,100	Okay	Okay	Okay	3,122	292,976	Pass	---	DB
08/01/19	Yes	1,100	Okay	Okay	Okay	3,201	292,344	Pass	---	DB
08/05/19	Yes	1,100	Okay	Okay	Okay	3,130	292,251	Pass	---	DVT
08/06/19	Yes	1,100	Okay	Okay	Okay	3,196	293,155	Pass	---	DB
08/07/19	Yes	1,100	Okay	Okay	Okay	3,290	294,943	Pass	---	DB
08/08/19	Yes	1,100	Okay	Okay	Okay	3,113	293,115	Pass	---	DB
08/12/19	Yes	1,100	Okay	Okay	Okay	3,314	294,120	Pass	---	DB
08/13/19	Yes	1,100	Okay	Okay	Okay	3,108	292,312	Pass	---	DVT
08/14/19	Yes	1,100	Okay	Okay	Okay	3,488	298,620	Pass	---	DVT
08/15/19	Yes	1,100	Okay	Okay	Okay	3,559	298,716	Pass	---	DB
08/19/19	Yes	1,100	Okay	Okay	Okay	3,357	297,019	Pass	---	CMC
08/20/19	Yes	1,100	Okay	Okay	Okay	3,168	296,467	Pass	---	DVT
08/21/19	Yes	1,100	Okay	Okay	Okay	3,131	301,399	Pass	---	DB
08/22/19	Yes	1,100	Okay	Okay	Okay	3,034	298,181	Pass	---	DB
08/26/19	Yes	1,100	Okay	Okay	Okay	3,056	299,549	Pass	---	DB
08/27/19	Yes	1,100	Okay	Okay	Okay	3,039	297,989	Pass	---	DB
08/28/19	Yes	1,100	Okay	Okay	Okay	3,075	299,083	Pass	---	DB
08/29/19	Yes	1,100	Okay	Okay	Okay	2,913	300,609	Pass	---	DB
09/03/19	Yes	1,100	Okay	Okay	Okay	3,158	298,926	Pass	---	DB
09/04/19	Yes	1,100	Okay	Okay	Okay	3,096	298,542	Pass	---	DB
09/05/19	Yes	1,100	Okay	Okay	Okay	3,114	298,433	Pass	---	DB
09/09/19	Yes	1,100	Okay	Okay	Okay	3,089	299,106	Pass	---	DB

RATEMETER DAILY RESPONSE CHECK SHEET

Project Information		
Contract / Task Order Number:	Project Title / Location:	Gilbane Project Number:
N62473-17-D-0005 / 0001	HPNS Bldgs 253 & 211 RA / San Francisco, CA	J310000100

Survey Instrument Set-Up Information

Pairing	Meter		Detector		Read-Out	HV	Calibration	Set-Up	Check Source	
ID	Model	S/N	Model	S/N	Units	Setting	Due Date	Date	Isotope	S/N
4	2221	84718	44-10	PR150787	cpm	1100	04/30/20	07/08/19	Cs-137	808132

Daily Response Check Results

	Inst Cal	High	Battery	Audio	Meter	Response Check		QC Results		Tech
Date	Current?	Voltage	Check	Speaker	Reset	Bkgrd	Source	Pass/Fail	Reason	Initials
09/10/19	Yes	1,100	Okay	Okay	Okay	3,115	298,765	Pass	---	DB
09/11/19	Yes	1,100	Okay	Okay	Okay	3,430	296,437	Pass	---	DB
09/12/19	Yes	1,100	Okay	Okay	Okay	3,334	300,855	Pass	---	DVT
09/13/19	Yes	1,100	Okay	Okay	Okay	3,568	300,238	Pass	---	DB
09/16/19	Yes	1,100	Okay	Okay	Okay	3,340	297,083	Pass	---	DB
09/17/19	Yes	1,100	Okay	Okay	Okay	3,149	298,402	Pass	---	DB
09/18/19	Yes	1,100	Okay	Okay	Okay	3,132	299,309	Pass	---	DB
09/19/19	Yes	1,100	Okay	Okay	Okay	3,279	297,179	Pass	---	DB
09/23/19	Yes	1,100	Okay	Okay	Okay	3,103	298,587	Pass	---	DVT
09/24/19	Yes	1,100	Okay	Okay	Okay	3,334	296,377	Pass	---	DVT
09/25/19	Yes	1,100	Okay	Okay	Okay	3,358	294,997	Pass	---	DVT
09/26/19	Yes	1,100	Okay	Okay	Okay	3,427	296,959	Pass	---	DVT
09/30/19	Yes	1,100	Okay	Okay	Okay	3,194	299,993	Pass	---	DB
10/01/19	Yes	1,100	Okay	Okay	Okay	3,413	299,676	Pass	---	DB
10/02/19	Yes	1,100	Okay	Okay	Okay	3,385	298,996	Pass	---	DB
10/03/19	Yes	1,100	Okay	Okay	Okay	3,411	299,007	Pass	---	DB
10/07/19	Yes	1,100	Okay	Okay	Okay	3,398	298,632	Pass	---	DB
10/08/19	Yes	1,100	Okay	Okay	Okay	3,524	297,160	Pass	---	DB
10/09/19	Yes	1,100	Okay	Okay	Okay	3,455	330,959	Pass	---	DB
10/10/19	Yes	1,100	Okay	Okay	Okay	3,417	299,605	Pass	---	DB
10/15/19	Yes	1,100	Okay	Okay	Okay	3,226	299,444	Pass	---	DB
10/16/19	Yes	1,100	Okay	Okay	Okay	3,213	301,246	Pass	---	DB
10/17/19	Yes	1,100	Okay	Okay	Okay	3,519	326,406	Pass	---	DB
10/21/19	Yes	1,100	Okay	Okay	Okay	3,348	301,155	Pass	---	DJB
10/22/19	Yes	1,100	Okay	Okay	Okay	3,461	300,091	Pass	---	DJB
10/23/19	Yes	1,100	Okay	Okay	Okay	3,609	293,805	Pass	---	DJB
10/24/19	Yes	1,100	Okay	Okay	Okay	3,416	326,145	Pass	---	DJB
10/28/19	Yes	1,100	Okay	Okay	Okay	3,355	299,254	Pass	---	DJB
10/29/19	Yes	1,100	Okay	Okay	Okay	3,210	302,554	Pass	---	DJB
10/30/19	Yes	1,100	Okay	Okay	Okay	3,383	299,279	Pass	---	DJB
10/31/19	Yes	1,100	Okay	Okay	Okay	3,609	298,298	Pass	---	DJB
11/04/19	Yes	1,100	Okay	Okay	Okay	3,589	296,097	Pass	---	DJB
11/11/19	Yes	1,100	Okay	Okay	Okay	3,540	299,297	Pass	---	DJB

SPECTECH

SPECTRUM TECHNIQUES, L.L.C.
106 Union Valley Road
Oak Ridge, TN 37830
Tel: (865) 482-9937 Fax: (865) 483-0473
Email: sales@spectrumtechniques.com
Web: www.spectrumtechniques.com

Certificate of Calibration

Radioactive material, Limited Quantity NOS UN2910,
Exempt Quantity 10CFR30.18, BS 5288/C11111

This source has been calibrated using a HPGe detector whose efficiency was established with the NIST traceable mixed nuclide standard SRS: 80899-854. The stated activity is the weighted average of the measured gamma lines with an estimated uncertainty of 5%. The source is of sealed construction and wipe tested.

Radionuclide: Cs-137

Half-Life: 30.07 years

Decay Constant: 0.02305

Serial Number: 808132

Calibration Date: August 8, 2013 **Activity:** 0.878 **uCi.** 32,486 **Bq.**

Photon Energy (keV)	Intensity (%)	Emission Rate (sec-1)
661.66	**85.1**	27,646

Certified by: *Roger K. Stevens* **Date:** August 8, 2013

ATTACHMENT 4
TU 211-01 Soil Sample Analytical Results
(92 pages)

Soil Sample Analytical Data Summary
TU 211-01

bolded = MDC VALUE (i.e., results below MDC; MDC value used for statistical calculations)

		Th-232 = 1.69		Cs-137 = 0.113		Ra-226 = 1.37		Sr-90 = 0.331	
Trench	Sample ID	Activity	MDC	Activity	MDC	Activity	MDC	Activity	MDC
12-211-28-5C	01-PCT-001-01	**0.304**	0.304	**0.064**	0.064	**0.171**	0.171		
12-211-28-5C	01-PCT-001-02	0.399	0.239	**0.066**	0.066	0.342	0.146		
12-211-28-5C	01-PCT-001-03	0.44	0.235	**0.055**	0.055	0.604	0.146		
12-211-28-5B*	01-PCT-001-04	**0.228**	0.228	**0.059**	0.059	0.291	0.106		
12-211-28-5B*	01-PCT-001-05	0.473	0.175	**0.056**	0.056	0.303	0.115		
12-211-28-5Z	01-PCT-001-06	0.652	0.171	**0.06**	0.06	0.607	0.126		
12-211-28-5Z	01-PCT-001-07	0.947	0.197	**0.068**	0.068	0.722	0.126		
12-211-28-5H	01-PCT-001-08	0.649	0.15	**0.065**	0.065	0.58	0.13		
12-211-28-4A/5H	01-PCT-001-09	0.4	0.163	**0.049**	0.049	0.386	0.109		
12-211-28-4A/5H	01-PCT-001-10	1.37	0.2	**0.064**	0.064	1.14	0.128		
12-211-28-4A/5H	01-PCT-001-11	1.14	0.188	**0.066**	0.066	1.08	0.122		
12-211-28-5H*	01-PCT-001-12	0.289	0.218	**0.055**	0.055	0.642	0.14		
12-211-28-5H*	01-PCT-001-13	0.591	0.179	**0.057**	0.057	0.473	0.106		
12-211-28-3Y	01-PCT-001-14	0.713	0.181	**0.061**	0.061	0.701	0.103		
12-211-28-3Y	01-PCT-001-15	1.34	0.147	**0.049**	0.049	1.15	0.097	**0.162**	0.162
12-211-28-3Y	01-PCT-001-16	1.37	0.147	**0.055**	0.055	1.2	0.102		
12-211-28-3Y	01-PCT-001-17	0.662	0.233	**0.068**	0.068	0.525	0.162		
12-211-28-3Y	01-PCT-001-18	**0.31**	0.31	**0.051**	0.051	0.518	0.165	**0.11**	0.11
12-211-28-3Y	01-PCT-001-19	0.417	0.256	**0.068**	0.068	0.644	0.121		
12-211-28-3Y	01-PCT-001-20	0.459	0.153	**0.059**	0.059	0.516	0.139		
12-211-28-3Y	01-PCT-001-21	**0.251**	0.251	**0.064**	0.064	0.383	0.147		
12-211-28-3Y	01-PCT-001-22	0.953	0.192	**0.061**	0.061	0.701	0.123		
12-211-28-3Y	01-PCT-001-23	1.25	0.186	**0.068**	0.068	1.14	0.14	**0.153**	0.153
	Sample Count	23		23		23		3	
	Samples > MDC	19		0		22		0	
	Minimum	0.228	0.147	0.049	0.049	0.171	0.097	0.110	0.110
	Maximum	1.370	0.310	0.068	0.068	1.200	0.171	0.162	0.162
	Mean	0.679		0.060		0.644		0.142	
	Median	0.591		0.061		0.604		0.153	

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ARS Aleut Analytical, LLC

Laboratory Analytical Report

ARS1-19-02946

Gilbane Federal
Brett Womack
1655 Grant Street
Suite 1200
Concord, CA 94520
1-925-946-3180
kcarlyon@gilbaneco.com, bwomack@gilbaneco.com

COC Number: **014309, 014310 & 014311**
Sample ID Prefix: **01-PCT-001**
Project Name: **Post Excavation Trench Unit**

Questions regarding this analytical report should be addressed to ARS project manager, Rodney Varnell, who can be reached by phone at 225-381-2991 or email at projectmanagers@amrad.com.

I certify that the test results presented in this report (in either hardcopy or electronic file (EDD)) meet the requirements of the laboratory's certifications and other applicable contract terms and conditions. A full list of the Port Allen, LA laboratory's certifications is provided with this report. Any exceptions to the certification or contract will be noted within the case narratives presented in the report. Any subcontracted sample results will be identified within the case narratives presented in the report. In the event this report is an amendment to a previously released report, the case narrative will clearly identify the original report as well as the reason(s) for reissuance. A statement of uncertainty for each analysis is available upon request. I authorize release and issuance of this report on the date signed below.

Signature	Date	Title
Keith Greene (Digitally signed by Keith Greene DN: cn=Keith Greene, o=Ars International, ou=Lab Manager, email=kgreene@amrad.com, c=US Date: 2019.11.19 15:49:42 -06'00')		Laboratory Management, ARS Aleut Analytical

This report provides analytical results of the requested analysis and does not include any opinions or interpretations. ARS Aleut Analytical, LLC assumes no liability for the use or interpretation of analytical results. Results relate only to items tested. A partial reproduction of this test report is prohibited. Reproduction of this report in full requires the written approval of the laboratory.

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Certifications and Accreditations List

State or Accrediting Body (AB)	Certificate Number
AIHA	209312
Alaska	LA01131
California	2785
ANAB DoD	ADE-1489
ANAB DOE	ADE-1489.01
Louisiana DEQ - NELAC	01949
Louisiana DHH - NELAC	LA022
Nevada	LA011312020-1
New Jersey	LA009
Pennsylvania	68-04294-008
Texas	T104704447-19-14
Utah	LA011312019-9
Washington	C1010

For additional information related to the specific matrices, methods, and analytes recognized by each accrediting body, contact us at QAQC@amrad.com for additional information.

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ARS Aleut Analytical, LLC
Analytical Reports

for

Gilbane Federal

Case Narrative

ARS Aleut Analytical

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PROJECT SAMPLE IDENTIFICATION CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs

Client Sample ID	ARS Aleut Analytical Sample ID
01-PCT-001-01	ARS1-19-02946-001
01-PCT-001-02	ARS1-19-02946-002
01-PCT-001-03	ARS1-19-02946-003
01-PCT-001-04	ARS1-19-02946-004
01-PCT-001-05	ARS1-19-02946-005
01-PCT-001-06	ARS1-19-02946-006
01-PCT-001-07	ARS1-19-02946-007
01-PCT-001-08	ARS1-19-02946-008
01-PCT-001-09	ARS1-19-02946-009
01-PCT-001-10	ARS1-19-02946-010
01-PCT-001-11	ARS1-19-02946-011
01-PCT-001-12	ARS1-19-02946-012
01-PCT-001-13	ARS1-19-02946-013
01-PCT-001-14	ARS1-19-02946-014
01-PCT-001-15	ARS1-19-02946-015
01-PCT-001-16	ARS1-19-02946-016
01-PCT-001-17	ARS1-19-02946-017
01-PCT-001-18	ARS1-19-02946-018
01-PCT-001-19	ARS1-19-02946-019
01-PCT-001-20	ARS1-19-02946-020
01-PCT-001-21	ARS1-19-02946-021
01-PCT-001-22	ARS1-19-02946-022
01-PCT-001-23	ARS1-19-02946-023

Sample	Date Collected	Date Received	Analysis	Prep Date/Time	Analysis Date/Time
001	10/22/19 13:40	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 09:16
002	10/22/19 13:45	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 10:07
003	10/22/19 13:47	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 10:21
004	10/22/19 14:01	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 12:22
005	10/22/19 14:08	10/23/19	GAM-IG-SO	10/24/19 08:03	11/18/19 14:11
006	10/22/19 14:18	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 12:24
007	10/22/19 14:21	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 13:44
008	10/22/19 14:31	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 13:27
009	10/22/19 14:47	10/23/19	GAM-IG-SO	10/24/19 08:03	11/14/19 14:02
010	10/22/19 14:48	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 08:13
011	10/22/19 14:51	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 08:14

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012	10/22/19 15:00	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 09:03
013	10/22/19 15:05	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 09:04
014	10/22/19 15:06	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 09:48
015	10/22/19 15:08	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 10:15
015	10/22/19 15:08	10/23/19	GPC-SR90-SO	11/06/19 08:00	11/08/19 09:32
016	10/22/19 15:10	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 10:47
017	10/22/19 15:11	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 10:16
018	10/22/19 15:13	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 11:07
018	10/22/19 15:13	10/23/19	GPC-SR90-SO	11/06/19 08:00	11/08/19 09:32
019	10/22/19 15:22	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 12:02
020	10/22/19 15:16	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 12:34
021	10/22/19 15:18	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 12:33
022	10/22/19 15:24	10/23/19	GAM-IG-SO	10/24/19 08:03	11/15/19 13:37
023	10/22/19 15:24	10/23/19	GAM-IG-SO	10/24/19 08:03	11/18/19 09:34
023	10/22/19 15:24	10/23/19	GPC-SR90-SO	11/06/19 08:00	11/08/19 09:32

SAMPLE RECEIPT/PREP

The samples arrived in good condition. The samples were screened for radioactive contamination as per procedure **PALA-SR-001-SOP Sample Receiving**. Turnaround time was set at 28 calendar days.

ANALYTICAL METHODS

Ac-228, Am-241, Bi-212, Bi-214, Co-60, Cs-137, Eu-152, Eu-154, K-40, Pa-234, Pb-210, Pb-214, Ra-226, Th-232, Th-234, Tl-208, and U-235 analyses were performed using **ARS-007, "Modified Gamma Emitting Radionuclides in Soil, Air, and Biota Matrices (EPA 901.1 Mod)".**

Sr-TOT analysis was performed using **ARS-032, "Strontium 89, 90 and Total Strontium in Water, Soil and Vegetation Matrices by Eichrom Resin Separation (Eichrom SRW-01 & EPA 905.0)".**

ANALYTICAL RESULTS

ARS1-B19-02227: Sample Duplicate RPD for Sr-TOT is greater than 25; Sample Duplicate RER and DER passed. All LCS/LCSD duplicate criteria were met as well. The Sample Duplicate was a non-detect for Sr-TOT, therefore no qualifier is necessary.

ARS1-B19-02271: Sample Duplicate RER was elevated for Tl-208; Sample Duplicate RPD was elevated for Bi-212, Eu-152, Eu-154, Pa-234, Pb-210, Tl-208and U-235. All Tl-208 data has been qualified with a “*”. Sample Duplicates for all other analytes were non-detect.

ARS1-B19-02272: Sample Duplicate RPD was elevated for Analytes Am-241, Bi-212, Co-60, Cs-137, Eu-152, Eu-154, Pb-210, Th-234 and U-235. All data for Bi-212 has been qualified with a “*”. Sample Duplicates for all other analytes were non-detect.

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LCSD Recoveries

ARS1-19-02227	Strontium Total LCSD recovery is 87.6%
ARS1-19-02271	Am-241 LCSD recovery is 90.2% Co-60 LCSD recovery is 95.8% Cs-137 LCSD recovery is 102.2%
ARS1-19-02272	Am-241 LCSD recovery is 92.2% Co-60 LCSD recovery is 95.0% Cs-137 LCSD recovery is 100.6%

For batch ARS1-B19-02227, sample “01-PCT-001-23” (ARS1-19-02946-023) was used as the Sample Duplicate.

For batch ARS1-B19-02271, sample “01-PCT-001-13” (ARS1-19-02946-013) was used as the Sample Duplicate.

For batch ARS1-B19-02272, sample “01-PCT-001-22” (ARS1-19-02946-022) was used as the Sample Duplicate.

Notes (Case Narrative)

Definitions:

CRDL	Contract Required Detection Limit
CSU	Combined Standard Uncertainty
DLC	Decision Level Concentration (ANSI N42.23) or critical level
DO	Duplicate Original
DUP	Method Duplicate
LCS/LCSD	Laboratory Control Sample/Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MDL	Method Detection Limit
MCL	Maximum Contaminant Level
MDA	Minimum Detectable Activity
MDC	(Minimum Detectable Concentration) minimum concentration of the analyte that ARS can detect utilizing the specific analysis
MBL	Method Blank
MS/MSD	Matrix Spike/Matrix Spike Duplicate
N/A	Not Applicable
NP	Not Provided
NR	Not Referenced

Data Qualifiers:

B	The activity of both the method blank and the target sample are above the MDL.
D	Sample analysis accomplished through dilution.
J	The reported result is an estimated value above the LOD but below the LOQ, or above the MDL but below the PQL.
Q	The LCS and LCSD percent recoveries are out of range.
U	Activity is below the MDC, MDA, MDL, LOD, or LOQ
N	The analyte is a tentatively identified compound using mass spec or any non-customer requested compounds that are tentatively identified.
*****	LCS/LCSD or Sample DUP fails one or more Duplicate criteria.
S	Spike
SC	Subcontracted out to another qualified laboratory
H	Holding time exceeded
E	Exceeds MCL
******	Reporting Limit is higher than MCL; Target cannot be detected

Radiochemistry Comments:

1.0) All MDA/MDC values are calculated on a sample specific basis.

2.0) Data in this report are within the limits of uncertainty specified in the reference method unless otherwise specified.

3.0) Total activity is actually total gamma activity and is determined utilizing the prominent gamma emitters from the naturally occurring radioactive decay chains and other prominent radioactive nuclides. Total activity may be lower than the actual total activity due to the extent of secular equilibrium achieved in the various decay chains at the time of analysis. The total activity is not representative of nuclides that emit solely alpha or beta particles.

4.0) Ra-228 is determined via secular equilibrium with its daughter, Actinium 228 (Gamma Spectroscopy only).

5.0) U-238 is determined via secular equilibrium with its daughter, Thorium 234 (Gamma Spectroscopy only).

6.0) All gamma spectroscopy was performed utilizing high purity germanium detectors (**HPGe**).

7.0) ARS makes every attempt to match sample density to calibrated density; however, in some cases, it is not practical or possible to do so and data results may be affected (Gamma Spectroscopy only).

8.0) Gamma spectroscopy results are calculated values based on the **ORTEC®** GammaVision ENV32 Analysis Engine.

9.0) DoD/DOE and ISO 17025 certifications through ANAB apply only to the following methods in **Non-Potable Water**:
Gross Alpha and Gross Beta (EPA 900.0, EPA 9310); Radium 226 (EPA 903.0, EPA 903.1 Mod, EPA 9315); Radium 228 (EPA 904.0, EPA 9320); ICP/MS (EPA 200.8, EPA 6020B); ICP-OES (EPA 200.7, EPA 6010C, EPA 6010D); Mercury CVAA (EPA 7470A); Strontium-89 (EPA 905.0 Mod, Eichrom SRW01, HASL 300 Sr-01); Strontium-90 (EPA 905.0 Mod, Eichrom SRW01, HASL 300 Sr-02-RC); Tritium (EPA 906.0); Tritium, Carbon-14 (ARS-151-Use of the Pyrolyser); Gamma Emitters (EPA 901.1, SM 7120B, HASL 300 Ga-01-R); Americium-241 (Eichrom ACW03 VBS, HASL 300 Se-03, HASL 300 Am-03); Plutonium 238, Plutonium 239/240, Plutonium-241 (Eichrom ACW03 VBS, HASL 300 Se-03, HASL 300 Pu-10); Thorium-228, Thorium 230, Thorium-232 (Eichrom ACW08, Eichrom ACW10); Uranium-234, Uranium-235, Uranium-238 (Eichrom ACW03 VBS, HASL 300 Se-03); Lead-210 (Eichrom OTW01); Technetium-99 (Eichrom TCW02); GC/MS (EPA 624, EPA 624.1, 8260B, EPA 8270D); GC/ECD (EPA 608, EPA 8082A).

10.0) DoD/DOE and ISO 17025 certifications through ANAB apply only to the following methods in **Solid and Chemical Materials**:
Gross Alpha and Gross Beta (EPA 900.0 Mod, EPA 9310); ICP/MS (EPA 6020B); ICP-OES (EPA 6010C, EPA 6010D); Mercury CVAA (EPA 7471B); Strontium-89 (EPA 905.0 Mod, Eichrom SRW01, HASL 300 Sr-01); Strontium-90 (EPA 905.0 Mod, Eichrom SRW01, HASL 300 Sr-02); Tritium (EPA 906.0 Mod); Tritium, Carbon-14 (ARS-151-Use of the Pyrolyser); Gamma Emitters (EPA 901.1, HASL 300 Ga-01-R); Americium-241 (Eichrom ACW03 VBS, HASL 300 Se-03, HASL 300 Am-01-RC); Plutonium 238, Plutonium 239/240, Plutonium-241 (Eichrom ACW03 VBS, HASL 300 Se-03, HASL 300 Pu-02-RC, HASL 300 Pu-03-RC); Thorium-228, Thorium 230, Thorium-232 (Eichrom ACW08, Eichrom ACW10); Uranium-234, Uranium-235, Uranium-238 (Eichrom ACW03 VBS, HASL 300 Se-03, HASL 300 U-02, HASL 300 U-04); Technetium-99 (Eichrom TCS01 Mod); GC/MS (EPA 8260B, EPA 8270D); GC/ECD (EPA 8082A).

11.0) DoD/DOE and ISO 17025 certifications through ANAB apply only to the following methods in **Air and Emissions**:
Gross Alpha and Gross Beta (EPA 900.0 Mod, EPA 9310); ICP/MS (EPA 6020B); ICP-OES (EPA 6010C, EPA 6010D); Strontium-89 (Eichrom SRW01, HASL 300 Sr-01-RC); Strontium-90 (Eichrom SRW01, HASL 300 Sr-02-RC); Gamma Emitters (EPA 901.1, HASL 300 Ga-01-R); Americium-241 (Eichrom ACW03 VBS, HASL 300 Se-03); Plutonium 238, Plutonium 239/240, Plutonium-241 (Eichrom ACW03 VBS, HASL 300 Se-03); Thorium-228, Thorium 230, Thorium-232 (Eichrom ACW08 Mod, Eichrom ACW10 Mod); Uranium-234, Uranium-235, Uranium-238 (Eichrom ACW03 VBS, HASL 300 Se-03); Technetium-99 (Eichrom TCW02, Eichrom TCS01).

General Comments:

1.0) Soil and Sludge analysis are reported on a wet basis or an as received basis unless otherwise indicated.

2.0) Modified analysis procedures are procedures that are modified to meet the certain specifications. An example may be the use of a water method to analyze a solid matrix due to the lack of an officially recognized procedure for the analysis of the solid matrix. Modified analyses are indicated by the subsequent addition of “m” to the procedure number (i.e. 900.0M).

3.0) All NIOSH method results are reported without blank corrections applied.

2609 North River Road • Port Allen, Louisiana 70767
1 (800) 401-4277 • FAX (225) 381-2996

ARS Aleut Analytical, LLC
Analytical Reports

for

Gilbane Federal

Sample Management Records

014309

Gilbane

Local Address:

Chain-Of-Custody

Project Name and Number: J310000100 Parcel C Bldg 211/253
Project Manager: Brett Womack
Site Location: Hunters Point Shipyard, SF, CA

Laboratory Name: ARS International
Address: 2609 North River Rd
Port Allen, LA
Contact Name: Rodney Varnell
Phone: 225-381-2991

Date: 10/22/19
Page: 3 of 3

Analysis: Gamma, Sr-90

Preservative: —

Container Type: bag

Sample I.D.	Date	Time	Sample Depth (top)	Sample Depth (bottom)	No. of Containers	Sample Matrix	Gamma	Sr-90	Special Instructions/Comments
01-PCT-001-01	10/22/19	1340	0	0.5	1	SO	X		
01-PCT-001-02		1345					X		
01-PCT-001-03		1347					X		
01-PCT-001-04		1401					X		
01-PCT-001-05		1408					X		
01-PCT-001-06		1418					X		
01-PCT-001-07		1421					X		
01-PCT-001-08		1431					X		
01-PCT-001-09		1447					X		
01-PCT-001-10		1448					X		

Sampled By: Kimberly Z
Signature:
Special Instructions: None

Send Results to: (w/fax #) kcarlyon@gilbaneco.com
Kfrank@gilbaneco.com
Turnaround Time: Standard

Sampler: K. Z

Courier/Airbill No.: FedEx 7767 8307 8794

Relinquished By/Affiliation:	Date:	Time:	Received By/Affiliation:	Date:	Time:
FedEx Kimberly Z / Gilbane	10/22/19	1600	FedEx	10/23/19	9:31

014310

Gilbane

Local Address:

Chain-Of-Custody

Project Name and Number: 131000100 Parcel C Bldg 211/253
Project Manager: Brett Warnack
Site Location: Hunters Point Shipyard, SF, CA

Laboratory Name: ARS International
Address: 2609 North Rice Rd, Port Allen, LA
Contact Name: Rodney Vamell
Phone: 225-381-2991

Date: 10/22/19
Page: 2 of 3

Analysis: Cs-137, Sr-90
Preservative: —
Container Type: bag

Sample I.D.	Date	Time	Sample Depth (top)	Sample Depth (bottom)	No. of Containers	Sample Matrix	Cs-137	Sr-90	Special Instructions/Comments
01-PCT-001-11	10/22/19	~~1500~~ 1451	0.0	0.5	1	SO	X		
01-PCT-001-12	10/22/19	~~1505~~ 1500					X		
01-PCT-001-13		~~1506~~ 1505					X		
01-PCT-001-14		~~1508~~ 1506					X		
01-PCT-001-15		1508					X	X	
01-PCT-001-16		1510					X		
01-PCT-001-17		1511					X		
01-PCT-001-18		1513					X	X	
01-PCT-001-19		1522					X		
01-PCT-001-20		1516					X		

Sampled By: K. Tu
Signature:
Special Instructions: None

Sampler: K. Tu

Courier/Airbill No.: FedEx 7767 8307 8794

Relinquished By/Affiliation:	Date:	Time:	Received By/Affiliation:	Date:	Time:
~~FedEx~~ Kimberly Tu / Gilbane	10/22/19	1600	FedEx	10/22/19 10/23/19	1600 9:31

Send Results to: (w/fax #) kcarly@gilbaneco.com ktu@gilbaneco.com
Turnaround Time: Standard

Original – Laboratory Yellow – Field/Office

Graphics/Stationery/chain_custody0614.ai

014311

Gilbane

Local Address:

Chain-Of-Custody

Project Name and Number: 03/00100 Parcel C Bldg 211/238
Laboratory Name: ARS International
Date: 10/22/19
Project Manager: Brett Womack
Address: 2609 North River Rd.
Contact Name: Rodney Varnell
Page: 3 of 3
Site Location: Hunters Point Shipyard, SF, CA
Port Allen, LA
Phone: 225-381-2991

Sample I.D.	Date	Time	Sample Depth (top)	Sample Depth (bottom)	No. of Containers	Sample Matrix	Analysis: Gamma	Analysis: Sr-90	Special Instructions/Comments
							Preservative:		
							Container Type: bag		
01-PCT-00121	10/22/19	1518	0.0	0.5	1	So	X		
01-PCT-001-22	"	1524					X		
01-PCT-001-23	"	1524					X	X	
01-PCT-001-24							X		
01-PCT-001-25							X		
01-PCT-001-26							X		
01-PCT-001-27							X		
01-PCT-001-28							X		
01-PCT-001-29							X		
01-PCT-001-30							X		

Sampled By: Kimberly Ta

Signature:

Special Instructions: None

Send Results to: (w/fax #) kearlyor@gilbaneco.com ktom@gilbaneco.com

Turnaround Time: standard

Sampler: K. Ta

Courier/Airbill No.: FedEx 7767 8307 8794

Relinquished By/Affiliation:	Date:	Time:	Received By/Affiliation:	Date:	Time:
~~FedEx~~ Kimberly Ta/Gilbane	10/22/19	1600	FedEx	10-23-19	1600 9:31

SDG Report - Samples and Containers

SDG Specific Data					
SDG	ARS1-19-02946	TAT Days	28 Calendar Days	Project Type	Environmental
Sample Count	23 Rpt Level 4	Date Received	10/23/2019	COC Number	014309, 014310 & 014311
Client	Gilbane Federal	Discrepancy Resol	N/A	PO Number	
Client Code	1138	Client Deadline	11/20/2019	Job Number	
Profile Number	PN-01056			Job Location	
Comment					

Samples and Containers Checked In Thus Far

FR	Name	Matrix	Start Date	End Date	Disp	Hold	Arch	Storage	Comments
001	01-PCT-001-01	Soil/Solid/Sludge	10/22/2019 13:40	10/22/2019 13:40	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326267	1	HDP Container	Plastic Zip Bag					
002	01-PCT-001-02	Soil/Solid/Sludge	10/22/2019 13:45	10/22/2019 13:45	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326268	1	HDP Container	Plastic Zip Bag					
003	01-PCT-001-03	Soil/Solid/Sludge	10/22/2019 13:47	10/22/2019 13:47	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326269	1	HDP Container	Plastic Zip Bag					
004	01-PCT-001-04	Soil/Solid/Sludge	10/22/2019 14:01	10/22/2019 14:01	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326270	1	HDP Container	Plastic Zip Bag					
005	01-PCT-001-05	Soil/Solid/Sludge	10/22/2019 14:08	10/22/2019 14:08	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326271	1	HDP Container	Plastic Zip Bag					
006	01-PCT-001-06	Soil/Solid/Sludge	10/22/2019 14:18	10/22/2019 14:18	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326272	1	HDP Container	Plastic Zip Bag					

007	01-PCT-001-07	Soil/Solid/Sludge	10/22/2019 14:21	10/22/2019 14:21	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326273	1	HDP Container	Plastic Zip Bag					
008	01-PCT-001-08	Soil/Solid/Sludge	10/22/2019 14:31	10/22/2019 14:31	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326274	1	HDP Container	Plastic Zip Bag					
009	01-PCT-001-09	Soil/Solid/Sludge	10/22/2019 14:47	10/22/2019 14:47	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326275	1	HDP Container	Plastic Zip Bag					
010	01-PCT-001-10	Soil/Solid/Sludge	10/22/2019 14:48	10/22/2019 14:48	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326276	1	HDP Container	Plastic Zip Bag					
011	01-PCT-001-11	Soil/Solid/Sludge	10/22/2019 14:51	10/22/2019 14:51	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326277	1	HDP Container	Plastic Zip Bag					
012	01-PCT-001-12	Soil/Solid/Sludge	10/22/2019 15:00	10/22/2019 15:00	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326278	1	HDP Container	Plastic Zip Bag					
013	01-PCT-001-13	Soil/Solid/Sludge	10/22/2019 15:05	10/22/2019 15:05	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326279	1	HDP Container	Plastic Zip Bag					
014	01-PCT-001-14	Soil/Solid/Sludge	10/22/2019 15:06	10/22/2019 15:06	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326280	1	HDP Container	Plastic Zip Bag					
015	01-PCT-001-15	Soil/Solid/Sludge	10/22/2019 15:08	10/22/2019 15:08	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326281	1	HDP Container	Plastic Zip Bag					

016	01-PCT-001-16	Soil/Solid/Sludge	10/22/2019 15:10	10/22/2019 15:10	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326282	1	HDP Container	Plastic Zip Bag					
017	01-PCT-001-17	Soil/Solid/Sludge	10/22/2019 15:11	10/22/2019 15:11	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326283	1	HDP Container	Plastic Zip Bag					
018	01-PCT-001-18	Soil/Solid/Sludge	10/22/2019 15:13	10/22/2019 15:13	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326284	1	HDP Container	Plastic Zip Bag					
019	01-PCT-001-19	Soil/Solid/Sludge	10/22/2019 15:22	10/22/2019 15:22	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326285	1	HDP Container	Plastic Zip Bag					
020	01-PCT-001-20	Soil/Solid/Sludge	10/22/2019 15:16	10/22/2019 15:16	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326286	1	HDP Container	Plastic Zip Bag					
021	01-PCT-001-21	Soil/Solid/Sludge	10/22/2019 15:18	10/22/2019 15:18	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326287	1	HDP Container	Plastic Zip Bag					
022	01-PCT-001-22	Soil/Solid/Sludge	10/22/2019 15:24	10/22/2019 15:24	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326288	1	HDP Container	Plastic Zip Bag					
023	01-PCT-001-23	Soil/Solid/Sludge	10/22/2019 15:24	10/22/2019 15:24	H	30	10	AH-3	
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**		**Comments**
	326289	1	HDP Container	Plastic Zip Bag					

SDG Report - Analysis Assignments

SDG	ARS1-19-02946	Sample Count	23
Client	Gilbane Federal	Analysis Count	2-26

Sample Count Totals Per Analysis

Analysis Code	Analysis Description	In/Out	Samples Count
GAM-IG-SO	Gamma Spec - 21 Day Ingrowth in (Soil, Sludge, Waste, Sediment,Biota [SO, BI, VG])	I	23
GPC-SR90-SO	Strontium-90 in (Soil, Sludge, Biota, Sediment [SO, BI, VG])	I	3

Analyses Assigned Per Fraction

Fraction	Analysis Code	X = Assigned
001	GAM-IG-SO	X
002	GAM-IG-SO	X
003	GAM-IG-SO	X
004	GAM-IG-SO	X
005	GAM-IG-SO	X
006	GAM-IG-SO	X
007	GAM-IG-SO	X
008	GAM-IG-SO	X
009	GAM-IG-SO	X
010	GAM-IG-SO	X
011	GAM-IG-SO	X
012	GAM-IG-SO	X
013	GAM-IG-SO	X
014	GAM-IG-SO	X
015	GAM-IG-SO	X
015	GPC-SR90-SO	X
016	GAM-IG-SO	X
017	GAM-IG-SO	X
018	GAM-IG-SO	X
018	GPC-SR90-SO	X
019	GAM-IG-SO	X
020	GAM-IG-SO	X
021	GAM-IG-SO	X
022	GAM-IG-SO	X
023	GAM-IG-SO	X
023	GPC-SR90-SO	X

Client Name: Gilbane Federal Profile Name: Gilbane Federal Report Level: 4

Analysis Code	Prep Type	Units	Aliquot	Prep Code	Procedure	Count Time					
GAM-IG-SO	DGAM	pCi	g		ARS-007						
	Analyte			RDL	LCS LL/UL	MS LL/UL	RadY LL/UL	GravY LL/UL	RER	RPD	Surr LL/UL
	Ac-228 (14331-83-0)			0.5 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A
	Am-241 (14596-10-2)				75/125	60/140	30/110	40/110	1	25	N/A
	Bi-212 (14913-49-6)				75/125	60/140	30/110	40/110	1	25	N/A
	Bi-214 (14733-03-0)				75/125	60/140	30/110	40/110	1	25	N/A
	Co-60 (10198-40-0)				75/125	60/140	30/110	40/110	1	25	N/A
	Cs-137 (10045-97-3)			0.07 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A
	Eu-152 (14683-23-9)				75/125	60/140	30/110	40/110	1	25	N/A
	Eu-154 (15585-10-1)				75/125	60/140	30/110	40/110	1	25	N/A
	K-40 (13966-00-2)				75/125	60/140	30/110	40/110	1	25	N/A
	Pb-210 (14255-04-0)				75/125	60/140	30/110	40/110	1	25	N/A
	Pb-214 (15067-28-4)				75/125	60/140	30/110	40/110	1	25	N/A
	Ra-226 (13982-63-3)			0.4 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A
	Th-232 (7440-29-1)				75/125	60/140	30/110	40/110	1	25	N/A
	Th-234 (15065-10-8)				75/125	60/140	30/110	40/110	1	25	N/A
	Tl-208 (14913-50-9)				75/125	60/140	30/110	40/110	1	25	N/A
	U-235 (15117-96-1)				75/125	60/140	30/110	40/110	1	25	N/A
	Pa-234 (15100-28-4)				75/125	60/140	30/110	40/110	1	25	N/A
GPC-SR90-SO	DRAD	pCi	g		ARS-032						
	Analyte			RDL	LCS LL/UL	MS LL/UL	RadY LL/UL	GravY LL/UL	RER	RPD	Surr LL/UL
	Sr-90 (10098-97-2)			0.2 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A

Analysis Code	Fraction	Units	Aliquot	Conductivity	Analyte Count
GAM-IG-SO	001	pCi	g	N/A	17
		Group		Analyte	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	

GAM-IG-SO	001	Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	002	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	

GAM-IG-SO	003	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	004	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	

GAM-IG-SO	004	Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	005	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	006	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	

GAM-IG-SO	006	Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	007	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	008	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	

GAM-IG-SO	008	Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	009	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	010	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	

GAM-IG-SO	010	Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	011	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	

GAM-IG-SO	011	Gilbane Building 211 & 253		U-235	
GAM-IG-SO	012	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	013	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	

GAM-IG-SO	013	Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	014	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	015	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	

GAM-IG-SO	015	Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	016	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	017	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	

GAM-IG-SO	017	Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	018	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	

GAM-IG-SO	019	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	020	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	

GAM-IG-SO	020	Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	021	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	022	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	

GAM-IG-SO	022	Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	023	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GPC-SR90-SO	015	pCi	g	N/A	1
		Group		**Analyte**	
				Sr-90	
GPC-SR90-SO	018	pCi	g	N/A	1
		Group		**Analyte**	
		STD		Sr-90	

GPC-SR90-SO	023	pCi	g	N/A	1
		Group		**Analyte**	
		STD		Sr-90	

ARS Aleut Analytical

PALA Sample Receipt Inspection Form

Client Name: Gilbane

SDG: ARS19-02946

Sample Custodian: Morgan Survey Start Date: 10-23-19 Survey Start Time: 12:25

Thermometer ID: N/A Calibration Due Date: N/A pH Paper Lot#: N/A

Exposure Rate Meter + Probe Unit ID: 242885/PR293744 Calibration Due Date: 9-12-20 Background: 12 µR/hr

Count Rate Meter + Probe Unit ID: 215279/PR357189 Calibration Due Date: 9-12-20 Background: 60 cpm

Delivery Type (circle one): Direct Lock Box Commercial Carrier: Fed-Ex Total # of ESCs: 1

External Shipping Container Tracking:	Exposure Rate (µR/hr) (limit <500 µR/hr)	Max External Swipe Counts (cpm)	Max Internal Swipe Counts (cpm)	ESC Temps (°C)
A: 776783078794	15	50	60	N/A
B:				
C:				
D:				
E:				
F:				

TRAX Matrix ID (circle all that apply): (See Section 4.3 of SOP)

AQ WD WG WO
WS WW SI UR
SO OL BI VG
WP SM AF

Visual Inspection: (Circle response)

External Shipping Container

Good Condition with no Leaks or Tears	Yes	No
Marked Radioactive	Yes	No
UN2910	Yes	No
Security Seals	Yes	No
If yes, intact?	Yes	No N/A

Internal Shipping Container

COC's Present	Yes	No
Well packaged container with no signs of leakage	Yes	No

COC/Sample Inspection (Circle response)

Sample Containers in good condition	Yes	No
No spills or leaks	Yes	No
Marked Radioactive	Yes	No
Durable labels w/indelible ink	Yes	No
COC reliquished/received correctly	Yes	No
Adequate volume/filled correctly	Yes	No
Hold Time sufficient for analysis	Yes	No
For VOC/Radon, Head space?	Yes	No
If yes, <6mm?	Yes	No N/A
# of containers received matches # on COC	Yes	No
Samples received on ice?	Yes	No

Type (circle one): Bagged Ice Loose Ice Blue Ice N/A

Comments:

ARS Aleut Analytical

PALA Sample Survey Form

Client Name: Gilbane

SDG: ARS1-19-02946

Sample Survey Form
PALA-SR-001-FM-02 r 0.1
Effective 08/30/2019

Pipette ID: N/A Tip Lot#: N/A

Disposible pipette lot#: N/A

Sample ID from Client on COC or Sample	ESC Letter	Sample Container Type	Approx. Fill Level (%)	pH As Rec'd (pH <2 is Acceptable)	pH Adjusted	Acid Lot # or Ind container temp (°C)	Vol. of Acid Used (mL)	cpm (Acceptance Limits <100 cpm/cm)
01-PCT-001-01	A	Ziploc	50	N/A	N/A	N/A	N/A	50
-02								
-03								
-04								
-05								
-06								
-07								
-08								
-09								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								
-21								
-22								
-23								

Sample Custodian: Morgan Survey End Date: 10-23-19 Survey/pH End Time: 12:27

pH re-check required? YES or NO

NOTE: Any metals sample acidified at sample receiving must be re-checked after a 24 hour hold.

If YES: pH re-check date/time: _____ / _____ Analyst: _____ pH strip lot #: _____

Were all re-checked samples' pH < 2? YES or NO*

**If no, complete and send to Project Management:*
1. Section A of PALA-SR-001-FM-05 (24 Hour Hold pH Readjustment)
2. SR section of PALA-SR-001-FM-03 (Discrepant Sample Receipt Report).

ORIGIN ID:JCCA (925) 946-3135
KIMBERLY TOM
GILBANE
GILBANE TRAILER
FISHER AVE @ SPEAR AVE BLDG 241
SAN FRANCISCO, CA 94124
UNITED STATES US

SHIP DATE: 22OCT19
ACTWGT: 50.00 LB
CAD: 102700259/INET4160
DIMS: 19x13x14 IN

BILL SENDER

TO **RODNEY VARNELL**
ARS INC.
2609 NORTH RIVER ROAD

PORT ALLEN LA 70767
(225) 381-2991 REF: J310000100
INV:
PO: DEPT:

567J3/2A3C/05A2

FedEx Express

WED - 23 OCT 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7767 8307 8794**

XH OPLA

70767
LA-US **MSY**

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

2609 North River Road • Port Allen, Louisiana 70767
1 (800) 401-4277 • FAX (225) 381-2996

ARS Aleut Analytical, LLC
Analytical Reports

for

Gilbane Federal

Sample Receipt Package

014309

Gilbane

Local Address:

Chain-Of-Custody

Project Name and Number: 1310000100 Parcel C Bldg 211/213
Project Manager: Brett Womack
Site Location: Hunters Point Shipyard, SF, CA

Laboratory Name: ARS International
Address: 2609 North River Rd, Port Allen, LA
Contact Name: Rodney Varnell
Phone: 225-381-2991

Date: 10/22/19
Page: 1 of 3

Analysis: Gamma, Sr-90
Preservative: —
Container Type: bag

Sample I.D.	Date	Time	Sample Depth (top)	Sample Depth (bottom)	No. of Containers	Sample Matrix	Gamma	Sr-90	Special Instructions/Comments
01-PCT-001-01	10/22/19	1340	0	0.5	1	SO	X		
01-PCT-001-02		1345					X		
01-PCT-001-03		1347					X		
01-PCT-001-04		1401					X		
01-PCT-001-05		1408					X		
01-PCT-001-06		1418					X		
01-PCT-001-07		1421					X		
01-PCT-001-08		1431					X		
01-PCT-001-09		1447					X		
01-PCT-001-10		1448					X		

Sampled By: Kimberly T
Signature:
Special Instructions: None

Send Results to: (w/fax #) kcarlyon@gilbanecs.com
Ktom@gilbanecs.com
Turnaround Time: Standard

Sampler: K. T

Relinquished By/Affiliation:	Date:	Time:
~~Fedex~~ Kimberly T / Gilbane	10/22/19	1600

Courier/Airbill No.: FedEx 7767 8307 8794

Received By/Affiliation:	Date:	Time:
FedEx	10/22/19 10/23/19	1600 9:31

Original – Laboratory Yellow – Field/Office

Graphics/Stationery/chain custody0614.ai

014310

Gilbane

Local Address:

Chain-Of-Custody

Project Name and Number: J31000016 Parcel C Bldg 211/253
Project Manager: Brett Warnack
Site Location: Hunters Point Shipyard, SF, CA

Laboratory Name: ARS International
Address: 2609 North River Rd, Port Allen, LA
Contact Name: Rodney Varnell
Phone: 225-381-2991

Date: 10/22/19
Page: 2 of 3

Analysis: Gamma; Sr-90
Preservative: —
Container Type: bag

Sample I.D.	Date	Time	Sample Depth (top)	Sample Depth (bottom)	No. of Containers	Sample Matrix	Gamma	Sr-90	Special Instructions/Comments
01-PCT-001-11	10/22/19	1451 1500	0.0	0.5	1	SO	X		
01-PCT-001-12	10/22/19	1500 1505					X		
01-PCT-001-13		1505 1506					X		
01-PCT-001-14		1506 1508					X		
01-PCT-001-15		1508					X	X	
01-PCT-001-16		1510					X		
01-PCT-001-17		1511					X		
01-PCT-001-18		1513					X	X	
01-PCT-001-19		1522					X		
01-PCT-001-20		1516					X		

Sampled By: K. Tu
Signature:
Special Instructions: None

Send Results to: (w/fax #) kcarlyon@gilbaneco.com ktran@gilbaneco.com
Turnaround Time: Standard

Sampler: K. Tu
Courier/Airbill No.: FedEx 7767 8307 8794

Relinquished By/Affiliation:	Date:	Time:	Received By/Affiliation:	Date:	Time:
~~FedEx~~ Kimberly Tu / Gilbane	10/22/19	1600	FedEx	10/22/19 10/23/19	1600 9:31

Original – Laboratory Yellow – Field/Office

Graphics/Stationery/chain_custody0614.ai

014311

Gilbane

Local Address:

Chain-Of-Custody

Project Name and Number: 231000100 Parcel C Bldg 211/253 Laboratory Name: ARS International Date: 10/22/19

Project Manager: Brett Womack Address: 2609 North River Rd. Contact Name: Rodney Varnell Page: 3 of 3

Site Location: Hunters Point Shipyard, SF, CA Port Allen, LA Phone: 225-381-2991

Sample I.D.	Date	Time	Sample Depth (top)	Sample Depth (bottom)	No. of Containers	Sample Matrix	Analysis: Gamma	Sr-90	Special Instructions/Comments
					Preservative:		1		
					Container Type:		bag		
01-PCT-001-21	10/22/19	1518	0.0	0.5	1	SO	X		
01-PCT-001-22	"	1524					X		
01-PCT-001-23	"	1524					X	X	
~~01-PCT-001-24~~							X		
01-PCT-001-25							X		
01-PCT-001-26							X		
01-PCT-001-27							X		
01-PCT-001-28							X		
01-PCT-001-29							X		
01-PCT-001-30							X		

Sampled By: Kimberly Z

Signature:

Special Instructions: None

Send Results to: (w/fax #) kearlyjor@gilbaneco.com ktom@gilbaneco.com

Turnaround Time: Standard

Sampler: K. Z

Courier/Airbill No.: FedEx 7767 8307 8794

Relinquished By/Affiliation:	Date:	Time:	Received By/Affiliation:	Date:	Time:
~~Fed Ex~~ Kimberly Zo/Gilbane	10/22/19	1600	Fed Ex	10/22/19 10-23-19	1600 9:31

Original – Laboratory Yellow – Field/Office

Graphics/Stationery/chain custody0614.ai

ARS Aleut Analytical, LLC
Port Allen Laboratory

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-19-02946	TAT Days	28	Project Type	Environmental
Sample Count	23 Rpt Level 4	Date Received	10/23/2019	COC Number	014309,014310,014311
Client	Gilbane Federal	Client Deadline	11/20/2019	PO Number	
Client Code	1138	Internal Deadline	11/19/2019	Job Number	
Profile Number	PN-01056	Lab Deadline	11/17/2019	Job Location	
Comment					

Samples and Containers Checked In Thus Far

FR	Name	Matrix	Start Date	End Date	Disp	Hold	Arch	Storage	Comments
001	01-PCT-001-01	Soil/Solid/Sludge	10/22/2019 13:40	10/22/2019 13:40	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326267	1	HDP Container	Plastic Zip Bag					
002	01-PCT-001-02	Soil/Solid/Sludge	10/22/2019 13:45	10/22/2019 13:45	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326268	1	HDP Container	Plastic Zip Bag					
003	01-PCT-001-03	Soil/Solid/Sludge	10/22/2019 13:47	10/22/2019 13:47	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326269	1	HDP Container	Plastic Zip Bag					
004	01-PCT-001-04	Soil/Solid/Sludge	10/22/2019 14:01	10/22/2019 14:01	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326270	1	HDP Container	Plastic Zip Bag					
005	01-PCT-001-05	Soil/Solid/Sludge	10/22/2019 14:08	10/22/2019 14:08	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326271	1	HDP Container	Plastic Zip Bag					
006	01-PCT-001-06	Soil/Solid/Sludge	10/22/2019 14:18	10/22/2019 14:18	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326272	1	HDP Container	Plastic Zip Bag					

007	01-PCT-001-07	Soil/Solid/Sludge	10/22/2019 14:21	10/22/2019 14:21	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326273	1	HDP Container	Plastic Zip Bag					
008	01-PCT-001-08	Soil/Solid/Sludge	10/22/2019 14:31	10/22/2019 14:31	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326274	1	HDP Container	Plastic Zip Bag					
009	01-PCT-001-09	Soil/Solid/Sludge	10/22/2019 14:47	10/22/2019 14:47	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326275	1	HDP Container	Plastic Zip Bag					
010	01-PCT-001-10	Soil/Solid/Sludge	10/22/2019 14:48	10/22/2019 14:48	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326276	1	HDP Container	Plastic Zip Bag					
011	01-PCT-001-11	Soil/Solid/Sludge	10/22/2019 14:51	10/22/2019 14:51	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326277	1	HDP Container	Plastic Zip Bag					
012	01-PCT-001-12	Soil/Solid/Sludge	10/22/2019 15:00	10/22/2019 15:00	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326278	1	HDP Container	Plastic Zip Bag					
013	01-PCT-001-13	Soil/Solid/Sludge	10/22/2019 15:05	10/22/2019 15:05	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326279	1	HDP Container	Plastic Zip Bag					
014	01-PCT-001-14	Soil/Solid/Sludge	10/22/2019 15:06	10/22/2019 15:06	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326280	1	HDP Container	Plastic Zip Bag					
015	01-PCT-001-15	Soil/Solid/Sludge	10/22/2019 15:08	10/22/2019 15:08	H	30	10	AH-3	
	IC_ID	Cnt	Container Type	Container Size	pH Orig	pH Final	Temp (C)		Comments
	326281	1	HDP Container	Plastic Zip Bag					

016	01-PCT-001-16	Soil/Solid/Sludge	10/22/2019 15:10	10/22/2019 15:10	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326282	1	HDP Container	Plastic Zip Bag								
017	01-PCT-001-17	Soil/Solid/Sludge	10/22/2019 15:11	10/22/2019 15:11	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326283	1	HDP Container	Plastic Zip Bag								
018	01-PCT-001-18	Soil/Solid/Sludge	10/22/2019 15:13	10/22/2019 15:13	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326284	1	HDP Container	Plastic Zip Bag								
019	01-PCT-001-19	Soil/Solid/Sludge	10/22/2019 15:22	10/22/2019 15:22	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326285	1	HDP Container	Plastic Zip Bag								
020	01-PCT-001-20	Soil/Solid/Sludge	10/22/2019 15:16	10/22/2019 15:16	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326286	1	HDP Container	Plastic Zip Bag								
021	01-PCT-001-21	Soil/Solid/Sludge	10/22/2019 15:18	10/22/2019 15:18	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326287	1	HDP Container	Plastic Zip Bag								
022	01-PCT-001-22	Soil/Solid/Sludge	10/22/2019 15:24	10/22/2019 15:24	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326288	1	HDP Container	Plastic Zip Bag								
023	01-PCT-001-23	Soil/Solid/Sludge	10/22/2019 15:24	10/22/2019 15:24	H	30	10	AH-3				
	IC_ID	**Cnt**	**Container Type**	**Container Size**	**pH Orig**	**pH Final**	**Temp (C)**					**Comments**
	326289	1	HDP Container	Plastic Zip Bag								

SDG Report - Analysis Assignments

SDG	ARS1-19-02946	Sample Count	23
Client	Gilbane Federal	Analysis Count	2-26

Sample Count Totals Per Analysis

Analysis Code	Analysis Description	In/Out	Samples Count
GAM-IG-SO	Gamma Spec - 21 Day Ingrowth in (Soil, Sludge, Waste, Sediment,Biota [SO, BI, VG])	I	23
GPC-SR90-SO	Strontium-90 in (Soil, Sludge, Biota, Sediment [SO, BI, VG])	I	3

Analyses Assigned Per Fraction

Fraction	Analysis Code	X = Assigned
001	GAM-IG-SO	X
002	GAM-IG-SO	X
003	GAM-IG-SO	X
004	GAM-IG-SO	X
005	GAM-IG-SO	X
006	GAM-IG-SO	X
007	GAM-IG-SO	X
008	GAM-IG-SO	X
009	GAM-IG-SO	X
010	GAM-IG-SO	X
011	GAM-IG-SO	X
012	GAM-IG-SO	X
013	GAM-IG-SO	X
014	GAM-IG-SO	X
015	GAM-IG-SO	X
015	GPC-SR90-SO	X
016	GAM-IG-SO	X
017	GAM-IG-SO	X
018	GAM-IG-SO	X
018	GPC-SR90-SO	X
019	GAM-IG-SO	X
020	GAM-IG-SO	X
021	GAM-IG-SO	X
022	GAM-IG-SO	X
023	GAM-IG-SO	X
023	GPC-SR90-SO	X

DQO Report for SDG

ARS1-19-02946

Client Name: Gilbane Federal

Profile Name: Gilbane Federal

Report Level: 4

Analysis Code	Prep Type	Units	Aliquot	Prep Code	Procedure	Count Time					
GAM-IG-SO	DGAM	pCi	g		ARS-007						
	Analyte			RDL	LCS LL/UL	MS LL/UL	RadY LL/UL	GravY LL/UL	RER	RPD	Surr LL/UL
	Ac-228			0.5 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A
	Am-241				75/125	60/140	30/110	40/110	1	25	N/A
	Bi-212				75/125	60/140	30/110	40/110	1	25	N/A
	Bi-214				75/125	60/140	30/110	40/110	1	25	N/A
	Co-60				75/125	60/140	30/110	40/110	1	25	N/A
	Cs-137			0.07 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A
	Eu-152				75/125	60/140	30/110	40/110	1	25	N/A
	Eu-154				75/125	60/140	30/110	40/110	1	25	N/A
	K-40				75/125	60/140	30/110	40/110	1	25	N/A
	Pb-210				75/125	60/140	30/110	40/110	1	25	N/A
	Pb-214				75/125	60/140	30/110	40/110	1	25	N/A
	Ra-226			0.4 pCi/g	75/125	60/140	30/110	40/110	1	25	N/A
	Th-232				75/125	60/140	30/110	40/110	1	25	N/A
	Th-234				75/125	60/140	30/110	40/110	1	25	N/A
	Tl-208				75/125	60/140	30/110	40/110	1	25	N/A
	U-235				75/125	60/140	30/110	40/110	1	25	N/A
	Pa-234				75/125	60/140	30/110	40/110	1	25	N/A
GPC-SR90-SO	DRAD	pCi	g		ARS-032						
	Analyte			RDL	LCS LL/UL	MS LL/UL	RadY LL/UL	GravY LL/UL	RER	RPD	Surr LL/UL
	Sr-TOT				75/125	60/140	30/110	40/110	1	25	N/A

Analysis Code	Fraction	Units	Aliquot	Conductivity	Analyte Count
GAM-IG-SO	001	pCi	g	N/A	17
		Group		Analyte	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	

User: RVARNELL Last Modified: 10/23/2019 3:09:38 PM

GAM-IG-SO	001	Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	002	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	

GAM-IG-SO	003	pCi	g	N/A	17

Group	Analyte
Gilbane Building 211 & 253	Ac-228
Gilbane Building 211 & 253	Am-241
Gilbane Building 211 & 253	Bi-212
Gilbane Building 211 & 253	Bi-214
Gilbane Building 211 & 253	Co-60
Gilbane Building 211 & 253	Cs-137
Gilbane Building 211 & 253	Eu-152
Gilbane Building 211 & 253	Eu-154
Gilbane Building 211 & 253	K-40
Gilbane Building 211 & 253	Pa-234
Gilbane Building 211 & 253	Pb-210
Gilbane Building 211 & 253	Pb-214
Gilbane Building 211 & 253	Ra-226
Gilbane Building 211 & 253	Th-232
Gilbane Building 211 & 253	Th-234
Gilbane Building 211 & 253	Tl-208
Gilbane Building 211 & 253	U-235

GAM-IG-SO	004	pCi	g	N/A	17

Group	Analyte
Gilbane Building 211 & 253	Ac-228
Gilbane Building 211 & 253	Am-241
Gilbane Building 211 & 253	Bi-212
Gilbane Building 211 & 253	Bi-214
Gilbane Building 211 & 253	Co-60
Gilbane Building 211 & 253	Cs-137
Gilbane Building 211 & 253	Eu-152
Gilbane Building 211 & 253	Eu-154
Gilbane Building 211 & 253	K-40
Gilbane Building 211 & 253	Pa-234
Gilbane Building 211 & 253	Pb-210
Gilbane Building 211 & 253	Pb-214
Gilbane Building 211 & 253	Ra-226

GAM-IG-SO	004	Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	005	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	006	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	

GAM-IG-SO	006	Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	007	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	008	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	

GAM-IG-SO	008	Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	009	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	010	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	

GAM-IG-SO	010	Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	011	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	

GAM-IG-SO	011	Gilbane Building 211 & 253		U-235	
GAM-IG-SO	012	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	013	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	

GAM-IG-SO	013	Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	014	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	015	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	

GAM-IG-SO	015	Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	016	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	017	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	

GAM-IG-SO	017	Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	018	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	

GAM-IG-SO	019	pCi	g	N/A	17

Group	Analyte
Gilbane Building 211 & 253	Ac-228
Gilbane Building 211 & 253	Am-241
Gilbane Building 211 & 253	Bi-212
Gilbane Building 211 & 253	Bi-214
Gilbane Building 211 & 253	Co-60
Gilbane Building 211 & 253	Cs-137
Gilbane Building 211 & 253	Eu-152
Gilbane Building 211 & 253	Eu-154
Gilbane Building 211 & 253	K-40
Gilbane Building 211 & 253	Pa-234
Gilbane Building 211 & 253	Pb-210
Gilbane Building 211 & 253	Pb-214
Gilbane Building 211 & 253	Ra-226
Gilbane Building 211 & 253	Th-232
Gilbane Building 211 & 253	Th-234
Gilbane Building 211 & 253	Tl-208
Gilbane Building 211 & 253	U-235

GAM-IG-SO	020	pCi	g	N/A	17

Group	Analyte
Gilbane Building 211 & 253	Ac-228
Gilbane Building 211 & 253	Am-241
Gilbane Building 211 & 253	Bi-212
Gilbane Building 211 & 253	Bi-214
Gilbane Building 211 & 253	Co-60
Gilbane Building 211 & 253	Cs-137
Gilbane Building 211 & 253	Eu-152
Gilbane Building 211 & 253	Eu-154
Gilbane Building 211 & 253	K-40
Gilbane Building 211 & 253	Pa-234
Gilbane Building 211 & 253	Pb-210
Gilbane Building 211 & 253	Pb-214
Gilbane Building 211 & 253	Ra-226

GAM-IG-SO	020	Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	021	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	022	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	

GAM-IG-SO	022	Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GAM-IG-SO	023	pCi	g	N/A	17
		Group		**Analyte**	
		Gilbane Building 211 & 253		Ac-228	
		Gilbane Building 211 & 253		Am-241	
		Gilbane Building 211 & 253		Bi-212	
		Gilbane Building 211 & 253		Bi-214	
		Gilbane Building 211 & 253		Co-60	
		Gilbane Building 211 & 253		Cs-137	
		Gilbane Building 211 & 253		Eu-152	
		Gilbane Building 211 & 253		Eu-154	
		Gilbane Building 211 & 253		K-40	
		Gilbane Building 211 & 253		Pa-234	
		Gilbane Building 211 & 253		Pb-210	
		Gilbane Building 211 & 253		Pb-214	
		Gilbane Building 211 & 253		Ra-226	
		Gilbane Building 211 & 253		Th-232	
		Gilbane Building 211 & 253		Th-234	
		Gilbane Building 211 & 253		Tl-208	
		Gilbane Building 211 & 253		U-235	
GPC-SR90-SO	015	pCi	g	N/A	1
		Group		**Analyte**	
				Sr-TOT	
GPC-SR90-SO	018	pCi	g	N/A	1
		Group		**Analyte**	
				Sr-TOT	

GPC-SR90-SO	023	pCi	g	N/A	1
		Group		Analyte	
				Sr-TOT	

ARS Aleut Analytical

ARS FILE TRACKING SHEET

SDG: ARS1-19-02946

Task	Date / Time	Initials
Date & Time Samples Received	10/23/2019 09:31	MEC
ICOC Initiated/Storage Location: prePREP/AH3	10/23/2019 13:41	MEC
Technical Checks Performed		
Report Written / EDD Generated _____/_____|_____		
Report / EDD Reviewed for Accuracy and Completeness		
Quality Assurance Checks Performed on Report		
Management Checks Performed on Report		
Preliminary Report Scan		
Report E-mailed/Loaded to FTP Site		
EDD E-mailed/Loaded to FTP Site		
Invoice Completed Invoice #:_____		
Report Reviewed and Imaged		

Turnaround Times	Applies
3 Hour	
24 Hour	
48 Hour	
3 Day	
5 Day	
10 Day	
Standard Oil/Gas Client (5 Day)	
Standard (15 Day)	
21 Day	
Other Turnaround 28 (Work Days / Calendar Days / Requested Due Date)	X

NOTES

ARS Aleut Analytical

PALA Sample Receipt Inspection Form

Client Name: Gilbane

SDG: ARS19-02946

Sample Custodian: Morgan Survey Start Date: 10-23-19 Survey Start Time: 12:25

Thermometer ID: N/A Calibration Due Date: N/A pH Paper Lot#: N/A

Exposure Rate Meter + Probe Unit ID: 242885/PR2937144 Calibration Due Date: 9-12-20 Background: 12 µR/hr

Count Rate Meter + Probe Unit ID: 211579/PR357189 Calibration Due Date: 9-12-20 Background: 60 cpm

Delivery Type (circle one) Direct Lock Box (Commercial Carrier: Fed-Ex) Total # of ESCs: 1

External Shipping Container Tracking:	Exposure Rate (µR/hr) (limit <500 µR/hr)	Max External Swipe Counts (cpm)	Max Internal Swipe Counts (cpm)	ESC Temps (°C)
A: 776783078794	15	50	60	N/A
B:				
C:				
D:				
E:				
F:				

TRAX Matrix ID (circle all that apply): (See Section 4.3 of SOP)

AQ WD WG WO
WS WW SI UR
(SO) OL BI VG
WP SM AF

Visual Inspection: (Circle response)

External Shipping Container

Good Condition with no Leaks or Tears	(Yes)	No	
Marked Radioactive	Yes	(No)	
UN2910	Yes	(No)	
Security Seals	(Yes)	No	
If yes, intact?	(Yes)	No	N/A

Internal Shipping Container

COC's Present	(Yes)	No
Well packaged container with no signs of leakage	(Yes)	No

COC/Sample Inspection (Circle response)

Sample Containers in good condition	(Yes)	No	
No spills or leaks	Yes	(No)	
Marked Radioactive	Yes	(No)	
Durable labels w/indelible ink	(Yes)	No	
COC reliquished/received correctly	(Yes)	No	
Adequate volume/filled correctly	(Yes)	No	
Hold Time sufficient for analysis	(Yes)	No	
For VOC/Radon, Head space?	Yes	(No)	
If yes, <6mm?	Yes	No	(N/A)
# of containers received matches # on COC	(Yes)	No	
Samples received on ice?	Yes	(No)	

Type (circle one): Bagged Ice Loose Ice Blue Ice (N/A)

Comments:

ARS Aleut Analytical

PALA Sample Survey Form

Client Name: Gilbane

SDG: ARS1-19-02946

Sample Survey Form
PALA-SR-001-FM-02 r 0.1
Effective 08/30/2019

Pipette ID: N/A Tip Lot#: N/A

Disposible pipette lot#: N/A

Sample ID from Client on COC or Sample	ESC Letter	Sample Container Type	Approx. Fill Level (%)	pH As Rec'd (pH <2 is Acceptable)	pH Adjusted	Acid Lot # or Ind container temp (°C)	Vol. of Acid Used (mL)	cpm (Acceptance Limits <100 cpm/cm)
01-PCT-001-01	A	Ziploc	50	N/A	N/A	N/A	N/A	50
-02								
-03								
-04								
-05								
-06								
-07								
-08								
-09								
-10								
-11								
-12								
-13								
-14								
-15								
-16								
-17								
-18								
-19								
-20								
-21								
-22								
-23								

Sample Custodian: Morgan Survey End Date: 10-23-19 Survey/pH End Time: 12:27

pH re-check required? YES or NO *NOTE: Any metals sample acidified at sample receiving must be re-checked after a 24 hour hold.*

If YES: pH re-check date/time: _____ / _____ Analyst: _____ pH strip lot #: _____

Were all re-checked samples' pH < 2? YES or NO*

**If no, complete and send to Project Management:*
1. Section A of PALA-SR-001-FM-05 (24 Hour Hold pH Readjustment)
2. SR section of PALA-SR-001-FM-03 (Discrepant Sample Receipt Report).

ENVIRONMENTAL SOLUTIONS | QUALITY CONSCIOUS

Page 1 of 1

ORIGIN ID:JCCA (925) 946-3135
KIMBERLY TOM
GILBANE
GILBANE TRAILER
FISHER AVE @ SPEAR AVE BLDG 241
SAN FRANCISCO, CA 94124
UNITED STATES US

SHIP DATE: 22OCT19
ACTWGT: 50.00 LB
CAD: 102700259/INET4160
DIMS: 19x13x14 IN

BILL SENDER

TO **RODNEY VARNELL**
ARS INC.
2609 NORTH RIVER ROAD

PORT ALLEN LA 70767
(225) 381-2991 REF: J310000100
INV:
PO: DEPT:

567J3/ZA3C/05A2

FedEx Express

J192119819010v

WED - 23 OCT 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7767 8307 8794**

XH OPLA

70767
LA-US **MSY**

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
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ARS Aleut Analytical, LLC
Analytical Reports

for

Gilbane Federal

Analytical Results

ARS Aleut Analytical

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-01
Sample Collection Date: 10/22/19 13:40
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-001
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.218	0.136	0.304	0.152	0.5	U	pCi/g	11/14/19 9:16	EEC	N/A
Am-241	0.028	0.084	0.144	0.072	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Bi-212	0.187	0.305	0.525	0.263	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Bi-214	0.127	0.101	0.171	0.086	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Co-60	0.023	0.060	0.106	0.053	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Cs-137	-0.003	0.035	0.064	0.032	0.07	U	pCi/g	11/14/19 9:16	EEC	N/A
Eu-152	0.073	0.134	0.219	0.110	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Eu-154	0.053	0.053	0.075	0.037	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
K-40	24.846	2.653	0.718	0.359	NP		pCi/g	11/14/19 9:16	EEC	N/A
Pa-234	0.066	0.089	0.167	0.084	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Pb-210	0.264	0.917	1.690	0.845	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Pb-214	0.324	0.110	0.139	0.070	NP		pCi/g	11/14/19 9:16	EEC	N/A
Ra-226	0.127	0.101	0.171	0.086	0.4	U	pCi/g	11/14/19 9:16	EEC	N/A
Th-232	0.218	0.136	0.304	0.152	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Th-234	0.742	0.597	1.450	0.725	NP	U	pCi/g	11/14/19 9:16	EEC	N/A
Tl-208	0.166	0.061	0.067	0.033	NP	*	pCi/g	11/14/19 9:16	EEC	N/A
U-235	0.006	0.250	0.439	0.220	NP	U	pCi/g	11/14/19 9:16	EEC	N/A

ARS Aleut Analytical

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1 (800) 401-4277 • FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-02
Sample Collection Date: 10/22/19 13:45
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-002
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.399	0.196	0.239	0.120	0.5		pCi/g	11/14/19 10:07	EEC	N/A
Am-241	0.000	0.031	0.136	0.068	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Bi-212	-0.041	1.623	0.574	0.287	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Bi-214	0.342	0.110	0.146	0.073	NP		pCi/g	11/14/19 10:07	EEC	N/A
Co-60	-0.003	1.053	0.090	0.045	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Cs-137	-0.016	0.042	0.066	0.033	0.07	U	pCi/g	11/14/19 10:07	EEC	N/A
Eu-152	0.131	0.056	0.192	0.096	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Eu-154	0.037	0.057	0.083	0.042	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
K-40	11.191	1.487	0.668	0.334	NP		pCi/g	11/14/19 10:07	EEC	N/A
Pa-234	0.064	0.089	0.135	0.068	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Pb-210	0.334	0.984	1.830	0.915	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Pb-214	0.462	0.123	0.140	0.070	NP		pCi/g	11/14/19 10:07	EEC	N/A
Ra-226	0.342	0.110	0.146	0.073	0.4		pCi/g	11/14/19 10:07	EEC	N/A
Th-232	0.399	0.196	0.239	0.120	NP		pCi/g	11/14/19 10:07	EEC	N/A
Th-234	0.668	0.618	1.320	0.660	NP	U	pCi/g	11/14/19 10:07	EEC	N/A
Tl-208	0.146	0.054	0.064	0.032	NP	*	pCi/g	11/14/19 10:07	EEC	N/A
U-235	0.212	0.207	0.369	0.185	NP	U	pCi/g	11/14/19 10:07	EEC	N/A

ARS Aleut Analytical

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1 (800) 401-4277 • FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-03
Sample Collection Date: 10/22/19 13:47
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-003
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.440	0.166	0.235	0.118	0.5		pCi/g	11/14/19 10:21	EEC	N/A
Am-241	0.042	0.094	0.158	0.079	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Bi-212	0.315	0.361	0.503	0.252	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Bi-214	0.604	0.140	0.146	0.073	NP		pCi/g	11/14/19 10:21	EEC	N/A
Co-60	-0.021	0.064	0.086	0.043	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Cs-137	0.015	0.032	0.055	0.028	0.07	U	pCi/g	11/14/19 10:21	EEC	N/A
Eu-152	0.089	0.089	0.213	0.107	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Eu-154	0.047	0.055	0.082	0.041	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
K-40	11.734	1.519	0.684	0.342	NP		pCi/g	11/14/19 10:21	EEC	N/A
Pa-234	0.083	0.153	0.158	0.079	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Pb-210	0.677	0.993	1.650	0.825	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Pb-214	0.611	0.153	0.143	0.072	NP		pCi/g	11/14/19 10:21	EEC	N/A
Ra-226	0.604	0.140	0.146	0.073	0.4		pCi/g	11/14/19 10:21	EEC	N/A
Th-232	0.440	0.166	0.235	0.118	NP		pCi/g	11/14/19 10:21	EEC	N/A
Th-234	1.193	0.611	1.500	0.750	NP	U	pCi/g	11/14/19 10:21	EEC	N/A
Tl-208	0.222	0.071	0.073	0.036	NP	*	pCi/g	11/14/19 10:21	EEC	N/A
U-235	0.007	0.035	0.397	0.199	NP	U	pCi/g	11/14/19 10:21	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-04
Sample Collection Date: 10/22/19 14:01
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-004
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.149	0.126	0.228	0.114	0.5	U	pCi/g	11/14/19 12:22	EEC	N/A
Am-241	0.014	0.067	0.115	0.058	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Bi-212	0.054	0.313	0.507	0.254	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Bi-214	0.291	0.095	0.106	0.053	NP		pCi/g	11/14/19 12:22	EEC	N/A
Co-60	-0.009	0.105	0.070	0.035	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Cs-137	-0.002	0.082	0.059	0.029	0.07	U	pCi/g	11/14/19 12:22	EEC	N/A
Eu-152	0.017	0.070	0.184	0.092	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Eu-154	0.042	0.104	0.066	0.033	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
K-40	9.178	1.246	0.572	0.286	NP		pCi/g	11/14/19 12:22	EEC	N/A
Pa-234	0.054	0.147	0.111	0.056	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Pb-210	0.133	0.724	1.450	0.725	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Pb-214	0.378	0.100	0.104	0.052	NP		pCi/g	11/14/19 12:22	EEC	N/A
Ra-226	0.291	0.095	0.106	0.053	0.4		pCi/g	11/14/19 12:22	EEC	N/A
Th-232	0.149	0.126	0.228	0.114	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Th-234	0.725	0.494	1.080	0.540	NP	U	pCi/g	11/14/19 12:22	EEC	N/A
Tl-208	0.100	0.043	0.057	0.029	NP	*	pCi/g	11/14/19 12:22	EEC	N/A
U-235	0.170	0.182	0.295	0.148	NP	U	pCi/g	11/14/19 12:22	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-05
Sample Collection Date: 10/22/19 14:08
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-005
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.473	0.113	0.175	0.088	0.5		pCi/g	11/18/19 14:11	EEC	N/A
Am-241	-0.004	0.176	0.126	0.063	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Bi-212	0.204	0.258	0.435	0.218	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Bi-214	0.303	0.090	0.115	0.058	NP		pCi/g	11/18/19 14:11	EEC	N/A
Co-60	0.001	0.030	0.057	0.028	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Cs-137	-0.012	0.041	0.056	0.028	0.07	U	pCi/g	11/18/19 14:11	EEC	N/A
Eu-152	0.035	0.038	0.203	0.102	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Eu-154	0.033	0.047	0.068	0.034	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
K-40	12.066	1.441	0.487	0.244	NP		pCi/g	11/18/19 14:11	EEC	N/A
Pa-234	0.029	0.052	0.117	0.059	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Pb-210	0.091	0.646	1.190	0.595	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Pb-214	0.357	0.089	0.099	0.049	NP		pCi/g	11/18/19 14:11	EEC	N/A
Ra-226	0.303	0.090	0.115	0.058	0.4		pCi/g	11/18/19 14:11	EEC	N/A
Th-232	0.473	0.113	0.175	0.088	NP		pCi/g	11/18/19 14:11	EEC	N/A
Th-234	0.572	0.484	1.100	0.550	NP	U	pCi/g	11/18/19 14:11	EEC	N/A
Tl-208	0.156	0.048	0.052	0.026	NP	*	pCi/g	11/18/19 14:11	EEC	N/A
U-235	0.037	0.074	0.301	0.151	NP	U	pCi/g	11/18/19 14:11	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-06
Sample Collection Date: 10/22/19 14:18
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-006
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.652	0.162	0.171	0.086	0.5		pCi/g	11/14/19 12:24	EEC	N/A
Am-241	0.037	0.072	0.120	0.060	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Bi-212	0.357	0.300	0.394	0.197	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Bi-214	0.607	0.128	0.126	0.063	NP		pCi/g	11/14/19 12:24	EEC	N/A
Co-60	0.004	0.022	0.060	0.030	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Cs-137	0.004	0.034	0.060	0.030	0.07	U	pCi/g	11/14/19 12:24	EEC	N/A
Eu-152	0.100	0.045	0.171	0.086	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Eu-154	0.017	0.040	0.066	0.033	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
K-40	9.043	1.183	0.673	0.337	NP		pCi/g	11/14/19 12:24	EEC	N/A
Pa-234	0.105	0.115	0.127	0.064	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Pb-210	0.399	0.782	1.340	0.670	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Pb-214	0.660	0.127	0.114	0.057	NP		pCi/g	11/14/19 12:24	EEC	N/A
Ra-226	0.607	0.128	0.126	0.063	0.4		pCi/g	11/14/19 12:24	EEC	N/A
Th-232	0.652	0.162	0.171	0.086	NP		pCi/g	11/14/19 12:24	EEC	N/A
Th-234	0.554	0.471	1.060	0.530	NP	U	pCi/g	11/14/19 12:24	EEC	N/A
Tl-208	0.255	0.055	0.055	0.027	NP	*	pCi/g	11/14/19 12:24	EEC	N/A
U-235	0.059	0.124	0.312	0.156	NP	U	pCi/g	11/14/19 12:24	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-07
Sample Collection Date: 10/22/19 14:21
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-007
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.947	0.231	0.197	0.099	0.5		pCi/g	11/14/19 13:44	EEC	N/A
Am-241	-0.022	0.089	0.151	0.076	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
Bi-212	0.516	0.365	0.557	0.279	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
Bi-214	0.722	0.144	0.126	0.063	NP		pCi/g	11/14/19 13:44	EEC	N/A
Co-60	0.004	0.024	0.080	0.040	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
Cs-137	-7.337E-4	0.382	0.068	0.034	0.07	U	pCi/g	11/14/19 13:44	EEC	N/A
Eu-152	0.044	0.134	0.223	0.112	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
Eu-154	0.051	0.102	0.090	0.045	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
K-40	14.505	1.675	0.691	0.346	NP		pCi/g	11/14/19 13:44	EEC	N/A
Pa-234	0.078	0.089	0.165	0.083	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
Pb-210	-0.062	0.953	1.650	0.825	NP	U	pCi/g	11/14/19 13:44	EEC	N/A
Pb-214	0.600	0.136	0.163	0.082	NP		pCi/g	11/14/19 13:44	EEC	N/A
Ra-226	0.722	0.144	0.126	0.063	0.4		pCi/g	11/14/19 13:44	EEC	N/A
Th-232	0.947	0.231	0.197	0.099	NP		pCi/g	11/14/19 13:44	EEC	N/A
Th-234	1.753	0.766	1.540	0.770	NP		pCi/g	11/14/19 13:44	EEC	N/A
Tl-208	0.355	0.077	0.074	0.037	NP	*	pCi/g	11/14/19 13:44	EEC	N/A
U-235	0.092	0.237	0.389	0.195	NP	U	pCi/g	11/14/19 13:44	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-08
Sample Collection Date: 10/22/19 14:31
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-008
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.649	0.131	0.150	0.075	0.5		pCi/g	11/14/19 13:27	EEC	N/A
Am-241	0.031	0.080	0.136	0.068	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Bi-212	0.300	0.279	0.445	0.223	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Bi-214	0.580	0.126	0.130	0.065	NP		pCi/g	11/14/19 13:27	EEC	N/A
Co-60	-0.007	0.102	0.084	0.042	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Cs-137	0.011	0.037	0.065	0.032	0.07	U	pCi/g	11/14/19 13:27	EEC	N/A
Eu-152	0.095	0.132	0.190	0.095	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Eu-154	0.061	0.096	0.081	0.040	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
K-40	17.218	1.878	0.685	0.343	NP		pCi/g	11/14/19 13:27	EEC	N/A
Pa-234	0.065	0.088	0.140	0.070	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Pb-210	0.239	0.859	1.570	0.785	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Pb-214	0.688	0.127	0.146	0.073	NP		pCi/g	11/14/19 13:27	EEC	N/A
Ra-226	0.580	0.126	0.130	0.065	0.4		pCi/g	11/14/19 13:27	EEC	N/A
Th-232	0.649	0.131	0.150	0.075	NP		pCi/g	11/14/19 13:27	EEC	N/A
Th-234	1.006	0.518	1.300	0.650	NP	U	pCi/g	11/14/19 13:27	EEC	N/A
Tl-208	0.158	0.053	0.069	0.034	NP	*	pCi/g	11/14/19 13:27	EEC	N/A
U-235	-0.047	1.064	0.412	0.206	NP	U	pCi/g	11/14/19 13:27	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-09
Sample Collection Date: 10/22/19 14:47
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-009
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.400	0.112	0.163	0.082	0.5		pCi/g	11/14/19 14:02	EEC	N/A
Am-241	0.006	0.065	0.112	0.056	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
Bi-212	0.550	0.262	0.283	0.142	NP		pCi/g	11/14/19 14:02	EEC	N/A
Bi-214	0.386	0.100	0.109	0.055	NP		pCi/g	11/14/19 14:02	EEC	N/A
Co-60	-0.006	0.231	0.063	0.031	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
Cs-137	-0.002	0.786	0.049	0.024	0.07	U	pCi/g	11/14/19 14:02	EEC	N/A
Eu-152	0.055	0.071	0.171	0.086	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
Eu-154	0.032	0.075	0.055	0.028	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
K-40	4.813	0.841	0.701	0.351	NP		pCi/g	11/14/19 14:02	EEC	N/A
Pa-234	0.056	0.094	0.111	0.056	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
Pb-210	0.024	0.643	1.170	0.585	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
Pb-214	0.463	0.098	0.110	0.055	NP		pCi/g	11/14/19 14:02	EEC	N/A
Ra-226	0.386	0.100	0.109	0.055	0.4		pCi/g	11/14/19 14:02	EEC	N/A
Th-232	0.400	0.112	0.163	0.082	NP		pCi/g	11/14/19 14:02	EEC	N/A
Th-234	0.454	0.340	1.080	0.540	NP	U	pCi/g	11/14/19 14:02	EEC	N/A
Tl-208	0.163	0.041	0.039	0.019	NP	*	pCi/g	11/14/19 14:02	EEC	N/A
U-235	0.087	0.140	0.235	0.118	NP	U	pCi/g	11/14/19 14:02	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-10
Sample Collection Date: 10/22/19 14:48
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-010
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	1.369	0.203	0.200	0.100	0.5		pCi/g	11/15/19 8:13	EEC	N/A
Am-241	0.043	0.084	0.140	0.070	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
Bi-212	0.990	0.438	0.476	0.238	NP		pCi/g	11/15/19 8:13	EEC	N/A
Bi-214	1.143	0.156	0.128	0.064	NP		pCi/g	11/15/19 8:13	EEC	N/A
Co-60	0.011	0.034	0.059	0.030	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
Cs-137	-0.017	0.046	0.064	0.032	0.07	U	pCi/g	11/15/19 8:13	EEC	N/A
Eu-152	0.087	0.100	0.221	0.111	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
Eu-154	0.027	0.035	0.084	0.042	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
K-40	7.065	0.921	0.337	0.169	NP		pCi/g	11/15/19 8:13	EEC	N/A
Pa-234	0.116	0.140	0.129	0.065	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
Pb-210	0.866	0.925	1.430	0.715	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
Pb-214	1.390	0.181	0.111	0.056	NP		pCi/g	11/15/19 8:13	EEC	N/A
Ra-226	1.143	0.156	0.128	0.064	0.4		pCi/g	11/15/19 8:13	EEC	N/A
Th-232	1.369	0.203	0.200	0.100	NP		pCi/g	11/15/19 8:13	EEC	N/A
Th-234	1.296	0.595	1.310	0.655	NP	U	pCi/g	11/15/19 8:13	EEC	N/A
Tl-208	0.421	0.068	0.058	0.029	NP	*	pCi/g	11/15/19 8:13	EEC	N/A
U-235	0.085	0.200	0.350	0.175	NP	U	pCi/g	11/15/19 8:13	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-11
Sample Collection Date: 10/22/19 14:51
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-011
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	1.138	0.160	0.188	0.094	0.5		pCi/g	11/15/19 8:14	EEC	N/A
Am-241	0.065	0.085	0.141	0.071	NP	U	pCi/g	11/15/19 8:14	EEC	N/A
Bi-212	1.214	0.321	0.309	0.155	NP		pCi/g	11/15/19 8:14	EEC	N/A
Bi-214	1.081	0.150	0.122	0.061	NP		pCi/g	11/15/19 8:14	EEC	N/A
Co-60	0.011	0.025	0.057	0.029	NP	U	pCi/g	11/15/19 8:14	EEC	N/A
Cs-137	-0.001	0.225	0.066	0.033	0.07	U	pCi/g	11/15/19 8:14	EEC	N/A
Eu-152	0.036	0.061	0.148	0.074	NP	U	pCi/g	11/15/19 8:14	EEC	N/A
Eu-154	0.050	0.100	0.089	0.044	NP	U	pCi/g	11/15/19 8:14	EEC	N/A
K-40	7.000	0.891	0.400	0.200	NP		pCi/g	11/15/19 8:14	EEC	N/A
Pa-234	-0.007	0.143	0.127	0.064	NP	U	pCi/g	11/15/19 8:14	EEC	N/A
Pb-210	0.912	0.864	1.460	0.730	NP	U	pCi/g	11/15/19 8:14	EEC	N/A
Pb-214	1.025	0.159	0.135	0.068	NP		pCi/g	11/15/19 8:14	EEC	N/A
Ra-226	1.081	0.150	0.122	0.061	0.4		pCi/g	11/15/19 8:14	EEC	N/A
Th-232	1.138	0.160	0.188	0.094	NP		pCi/g	11/15/19 8:14	EEC	N/A
Th-234	1.737	0.620	1.270	0.635	NP		pCi/g	11/15/19 8:14	EEC	N/A
Tl-208	0.366	0.065	0.063	0.031	NP	*	pCi/g	11/15/19 8:14	EEC	N/A
U-235	0.088	0.213	0.360	0.180	NP	U	pCi/g	11/15/19 8:14	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-12
Sample Collection Date: 10/22/19 15:00
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-012
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.289	0.149	0.218	0.109	0.5		pCi/g	11/15/19 9:03	EEC	N/A
Am-241	0.013	0.069	0.119	0.060	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
Bi-212	0.699	0.331	0.343	0.172	NP		pCi/g	11/15/19 9:03	EEC	N/A
Bi-214	0.642	0.143	0.140	0.070	NP		pCi/g	11/15/19 9:03	EEC	N/A
Co-60	0.005	0.041	0.074	0.037	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
Cs-137	-0.002	0.249	0.055	0.027	0.07	U	pCi/g	11/15/19 9:03	EEC	N/A
Eu-152	0.054	0.081	0.195	0.098	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
Eu-154	0.003	0.014	0.080	0.040	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
K-40	8.547	1.290	0.828	0.414	NP		pCi/g	11/15/19 9:03	EEC	N/A
Pa-234	0.066	0.094	0.109	0.055	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
Pb-210	0.277	0.748	1.310	0.655	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
Pb-214	0.695	0.142	0.118	0.059	NP		pCi/g	11/15/19 9:03	EEC	N/A
Ra-226	0.642	0.143	0.140	0.070	0.4		pCi/g	11/15/19 9:03	EEC	N/A
Th-232	0.289	0.149	0.218	0.109	NP		pCi/g	11/15/19 9:03	EEC	N/A
Th-234	0.681	0.517	1.290	0.645	NP	U	pCi/g	11/15/19 9:03	EEC	N/A
Tl-208	0.272	0.061	0.055	0.027	NP	*	pCi/g	11/15/19 9:03	EEC	N/A
U-235	0.069	0.157	0.266	0.133	NP	U	pCi/g	11/15/19 9:03	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-13
Sample Collection Date: 10/22/19 15:05
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-013
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.591	0.174	0.179	0.090	0.5		pCi/g	11/15/19 9:04	EEC	N/A
Am-241	0.023	0.071	0.120	0.060	NP	U	pCi/g	11/15/19 9:04	EEC	N/A
Bi-212	0.480	0.251	0.311	0.156	NP		pCi/g	11/15/19 9:04	EEC	N/A
Bi-214	0.473	0.104	0.106	0.053	NP		pCi/g	11/15/19 9:04	EEC	N/A
Co-60	0.006	0.014	0.041	0.020	NP	U	pCi/g	11/15/19 9:04	EEC	N/A
Cs-137	0.006	0.032	0.057	0.029	0.07	U	pCi/g	11/15/19 9:04	EEC	N/A
Eu-152	0.105	0.086	0.167	0.084	NP	U	pCi/g	11/15/19 9:04	EEC	N/A
Eu-154	0.025	0.068	0.072	0.036	NP	U	pCi/g	11/15/19 9:04	EEC	N/A
K-40	10.336	1.238	0.353	0.177	NP		pCi/g	11/15/19 9:04	EEC	N/A
Pa-234	0.056	0.071	0.095	0.048	NP	U	pCi/g	11/15/19 9:04	EEC	N/A
Pb-210	0.604	0.788	1.270	0.635	NP	U	pCi/g	11/15/19 9:04	EEC	N/A
Pb-214	0.553	0.123	0.118	0.059	NP		pCi/g	11/15/19 9:04	EEC	N/A
Ra-226	0.473	0.104	0.106	0.053	0.4		pCi/g	11/15/19 9:04	EEC	N/A
Th-232	0.591	0.174	0.179	0.090	NP		pCi/g	11/15/19 9:04	EEC	N/A
Th-234	1.065	0.677	1.040	0.520	NP		pCi/g	11/15/19 9:04	EEC	N/A
Tl-208	0.142	0.041	0.052	0.026	NP	*	pCi/g	11/15/19 9:04	EEC	N/A
U-235	0.105	0.172	0.288	0.144	NP	U	pCi/g	11/15/19 9:04	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-14
Sample Collection Date: 10/22/19 15:06
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-014
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.713	0.139	0.181	0.091	0.5		pCi/g	11/15/19 9:48	EEC	N/A
Am-241	0.014	0.068	0.115	0.058	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Bi-212	0.280	0.226	0.386	0.193	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Bi-214	0.701	0.112	0.103	0.052	NP		pCi/g	11/15/19 9:48	EEC	N/A
Co-60	-0.004	4.139	0.043	0.021	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Cs-137	-0.015	0.040	0.061	0.031	0.07	U	pCi/g	11/15/19 9:48	EEC	N/A
Eu-152	0.025	0.048	0.177	0.089	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Eu-154	0.031	0.080	0.076	0.038	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
K-40	11.233	1.180	0.471	0.236	NP		pCi/g	11/15/19 9:48	EEC	N/A
Pa-234	0.097	0.115	0.122	0.061	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Pb-210	0.247	0.717	1.320	0.660	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Pb-214	0.720	0.128	0.117	0.059	NP		pCi/g	11/15/19 9:48	EEC	N/A
Ra-226	0.701	0.112	0.103	0.052	0.4		pCi/g	11/15/19 9:48	EEC	N/A
Th-232	0.713	0.139	0.181	0.091	NP		pCi/g	11/15/19 9:48	EEC	N/A
Th-234	0.946	0.470	1.030	0.515	NP	U	pCi/g	11/15/19 9:48	EEC	N/A
Tl-208	0.257	0.060	0.063	0.032	NP	*	pCi/g	11/15/19 9:48	EEC	N/A
U-235	0.113	0.191	0.302	0.151	NP	U	pCi/g	11/15/19 9:48	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-15
Sample Collection Date: 10/22/19 15:08
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-015
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	1.335	0.176	0.147	0.074	0.5		pCi/g	11/15/19 10:15	EEC	N/A
Am-241	-0.004	0.267	0.109	0.055	NP	U	pCi/g	11/15/19 10:15	EEC	N/A
Bi-212	1.052	0.261	0.266	0.133	NP		pCi/g	11/15/19 10:15	EEC	N/A
Bi-214	1.152	0.128	0.097	0.049	NP		pCi/g	11/15/19 10:15	EEC	N/A
Co-60	-0.005	1.441	0.048	0.024	NP	U	pCi/g	11/15/19 10:15	EEC	N/A
Cs-137	-0.011	0.040	0.049	0.025	0.07	U	pCi/g	11/15/19 10:15	EEC	N/A
Eu-152	0.040	0.064	0.169	0.085	NP	U	pCi/g	11/15/19 10:15	EEC	N/A
Eu-154	0.026	0.038	0.064	0.032	NP	U	pCi/g	11/15/19 10:15	EEC	N/A
K-40	10.781	1.047	0.514	0.257	NP		pCi/g	11/15/19 10:15	EEC	N/A
Pa-234	0.059	0.077	0.109	0.055	NP	U	pCi/g	11/15/19 10:15	EEC	N/A
Pb-210	0.585	0.541	0.887	0.444	NP	U	pCi/g	11/15/19 10:15	EEC	N/A
Pb-214	1.244	0.148	0.095	0.048	NP		pCi/g	11/15/19 10:15	EEC	N/A
Ra-226	1.152	0.128	0.097	0.049	0.4		pCi/g	11/15/19 10:15	EEC	N/A
Th-232	1.335	0.176	0.147	0.074	NP		pCi/g	11/15/19 10:15	EEC	N/A
Th-234	1.376	0.414	0.913	0.457	NP		pCi/g	11/15/19 10:15	EEC	N/A
Tl-208	0.435	0.053	0.041	0.020	NP	*	pCi/g	11/15/19 10:15	EEC	N/A
U-235	0.109	0.133	0.247	0.124	NP	U	pCi/g	11/15/19 10:15	EEC	N/A

Analysis Method: ARS-032/Eichrom SRW-01 & EPA 905.0

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
SR-TOT	-0.100	0.083	0.162	0.076	0.2	U	pCi/g	11/08/19 9:32	GRIDER	78%

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-16
Sample Collection Date: 10/22/19 15:10
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-016
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	1.366	0.194	0.147	0.074	0.5		pCi/g	11/15/19 10:47	EEC	N/A
Am-241	0.041	0.068	0.112	0.056	NP	U	pCi/g	11/15/19 10:47	EEC	N/A
Bi-212	0.902	0.301	0.337	0.169	NP		pCi/g	11/15/19 10:47	EEC	N/A
Bi-214	1.197	0.139	0.102	0.051	NP		pCi/g	11/15/19 10:47	EEC	N/A
Co-60	-0.004	0.029	0.039	0.020	NP	U	pCi/g	11/15/19 10:47	EEC	N/A
Cs-137	-0.004	0.062	0.055	0.027	0.07	U	pCi/g	11/15/19 10:47	EEC	N/A
Eu-152	0.059	0.064	0.185	0.093	NP	U	pCi/g	11/15/19 10:47	EEC	N/A
Eu-154	0.047	0.092	0.067	0.034	NP	U	pCi/g	11/15/19 10:47	EEC	N/A
K-40	10.112	1.011	0.352	0.176	NP		pCi/g	11/15/19 10:47	EEC	N/A
Pa-234	0.055	0.100	0.102	0.051	NP	U	pCi/g	11/15/19 10:47	EEC	N/A
Pb-210	0.828	0.720	1.120	0.560	NP	U	pCi/g	11/15/19 10:47	EEC	N/A
Pb-214	1.287	0.166	0.111	0.056	NP		pCi/g	11/15/19 10:47	EEC	N/A
Ra-226	1.197	0.139	0.102	0.051	0.4		pCi/g	11/15/19 10:47	EEC	N/A
Th-232	1.366	0.194	0.147	0.074	NP		pCi/g	11/15/19 10:47	EEC	N/A
Th-234	1.303	0.506	1.020	0.510	NP		pCi/g	11/15/19 10:47	EEC	N/A
Tl-208	0.451	0.057	0.044	0.022	NP	*	pCi/g	11/15/19 10:47	EEC	N/A
U-235	0.011	0.062	0.302	0.151	NP	U	pCi/g	11/15/19 10:47	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-17
Sample Collection Date: 10/22/19 15:11
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-017
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.662	0.162	0.233	0.117	0.5		pCi/g	11/15/19 10:16	EEC	N/A
Am-241	0.020	0.090	0.153	0.077	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Bi-212	0.428	0.309	0.477	0.239	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Bi-214	0.525	0.141	0.162	0.081	NP		pCi/g	11/15/19 10:16	EEC	N/A
Co-60	-0.004	0.261	0.065	0.033	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Cs-137	-0.007	0.039	0.068	0.034	0.07	U	pCi/g	11/15/19 10:16	EEC	N/A
Eu-152	0.021	0.036	0.218	0.109	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Eu-154	0.019	0.033	0.101	0.051	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
K-40	8.982	1.345	0.785	0.393	NP		pCi/g	11/15/19 10:16	EEC	N/A
Pa-234	0.029	0.108	0.152	0.076	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Pb-210	0.150	0.954	1.700	0.850	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Pb-214	0.631	0.134	0.158	0.079	NP		pCi/g	11/15/19 10:16	EEC	N/A
Ra-226	0.525	0.141	0.162	0.081	0.4		pCi/g	11/15/19 10:16	EEC	N/A
Th-232	0.662	0.162	0.233	0.117	NP		pCi/g	11/15/19 10:16	EEC	N/A
Th-234	0.757	0.573	1.440	0.720	NP	U	pCi/g	11/15/19 10:16	EEC	N/A
Tl-208	0.224	0.058	0.062	0.031	NP	*	pCi/g	11/15/19 10:16	EEC	N/A
U-235	0.226	0.211	0.344	0.172	NP	U	pCi/g	11/15/19 10:16	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-18
Sample Collection Date: 10/22/19 15:13
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-018
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.204	0.173	0.310	0.155	0.5	U	pCi/g	11/15/19 11:07	EEC	N/A
Am-241	0.035	0.095	0.161	0.081	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Bi-212	0.259	0.436	0.654	0.327	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Bi-214	0.518	0.155	0.165	0.083	NP		pCi/g	11/15/19 11:07	EEC	N/A
Co-60	-0.014	0.084	0.106	0.053	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Cs-137	0.006	0.027	0.051	0.026	0.07	U	pCi/g	11/15/19 11:07	EEC	N/A
Eu-152	0.035	0.062	0.253	0.127	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Eu-154	0.050	0.110	0.087	0.044	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
K-40	18.277	2.236	0.782	0.391	NP		pCi/g	11/15/19 11:07	EEC	N/A
Pa-234	0.090	0.137	0.152	0.076	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Pb-210	1.094	1.116	1.840	0.920	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Pb-214	0.521	0.132	0.138	0.069	NP		pCi/g	11/15/19 11:07	EEC	N/A
Ra-226	0.518	0.155	0.165	0.083	0.4		pCi/g	11/15/19 11:07	EEC	N/A
Th-232	0.204	0.173	0.310	0.155	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Th-234	0.872	0.613	1.380	0.690	NP	U	pCi/g	11/15/19 11:07	EEC	N/A
Tl-208	0.137	0.059	0.073	0.036	NP	*	pCi/g	11/15/19 11:07	EEC	N/A
U-235	0.136	0.225	0.382	0.191	NP	U	pCi/g	11/15/19 11:07	EEC	N/A

Analysis Method: ARS-032/Eichrom SRW-01 & EPA 905.0

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
SR-TOT	-0.002	0.061	0.110	0.051	0.2	U	pCi/g	11/08/19 9:32	GRIDER	98%

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-19
Sample Collection Date: 10/22/19 15:22
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-019
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.417	0.184	0.256	0.128	0.5		pCi/g	11/15/19 12:02	EEC	N/A
Am-241	-0.003	0.205	0.160	0.080	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Bi-212	0.168	0.310	0.535	0.268	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Bi-214	0.644	0.141	0.121	0.061	NP		pCi/g	11/15/19 12:02	EEC	N/A
Co-60	-0.008	0.228	0.098	0.049	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Cs-137	-0.009	0.054	0.068	0.034	0.07	U	pCi/g	11/15/19 12:02	EEC	N/A
Eu-152	0.031	0.066	0.273	0.137	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Eu-154	0.004	0.010	0.095	0.047	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
K-40	5.784	1.311	1.160	0.580	NP		pCi/g	11/15/19 12:02	EEC	N/A
Pa-234	0.052	0.068	0.117	0.059	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Pb-210	0.124	0.885	1.610	0.805	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Pb-214	0.491	0.118	0.146	0.073	NP		pCi/g	11/15/19 12:02	EEC	N/A
Ra-226	0.644	0.141	0.121	0.061	0.4		pCi/g	11/15/19 12:02	EEC	N/A
Th-232	0.417	0.184	0.256	0.128	NP		pCi/g	11/15/19 12:02	EEC	N/A
Th-234	1.141	0.608	1.340	0.670	NP	U	pCi/g	11/15/19 12:02	EEC	N/A
Tl-208	0.145	0.049	0.046	0.023	NP	*	pCi/g	11/15/19 12:02	EEC	N/A
U-235	0.173	0.195	0.326	0.163	NP	U	pCi/g	11/15/19 12:02	EEC	N/A

ARS Aleut Analytical

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-20
Sample Collection Date: 10/22/19 15:16
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-020
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.459	0.143	0.153	0.077	0.5		pCi/g	11/15/19 12:34	EEC	N/A
Am-241	0.036	0.065	0.109	0.055	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Bi-212	0.143	0.270	0.492	0.246	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Bi-214	0.516	0.136	0.139	0.070	NP		pCi/g	11/15/19 12:34	EEC	N/A
Co-60	0.016	0.043	0.076	0.038	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Cs-137	-0.001	4.043	0.059	0.029	0.07	U	pCi/g	11/15/19 12:34	EEC	N/A
Eu-152	0.041	0.077	0.230	0.115	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Eu-154	0.016	0.069	0.078	0.039	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
K-40	10.567	1.442	0.370	0.185	NP		pCi/g	11/15/19 12:34	EEC	N/A
Pa-234	0.065	0.069	0.131	0.066	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Pb-210	-0.012	0.966	1.710	0.855	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Pb-214	0.399	0.102	0.121	0.061	NP		pCi/g	11/15/19 12:34	EEC	N/A
Ra-226	0.516	0.136	0.139	0.070	0.4		pCi/g	11/15/19 12:34	EEC	N/A
Th-232	0.459	0.143	0.153	0.077	NP		pCi/g	11/15/19 12:34	EEC	N/A
Th-234	0.617	0.622	1.400	0.700	NP	U	pCi/g	11/15/19 12:34	EEC	N/A
Tl-208	0.100	0.055	0.065	0.033	NP	*	pCi/g	11/15/19 12:34	EEC	N/A
U-235	0.084	0.120	0.319	0.160	NP	U	pCi/g	11/15/19 12:34	EEC	N/A

ARS Aleut Analytical

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-21
Sample Collection Date: 10/22/19 15:18
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-021
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.200	0.148	0.251	0.126	0.5	U	pCi/g	11/15/19 12:33	EEC	N/A
Am-241	-0.008	0.970	0.129	0.065	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Bi-212	0.269	0.345	0.464	0.232	NP	U*	pCi/g	11/15/19 12:33	EEC	N/A
Bi-214	0.383	0.125	0.147	0.074	NP		pCi/g	11/15/19 12:33	EEC	N/A
Co-60	-0.005	0.210	0.133	0.067	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Cs-137	0.021	0.037	0.064	0.032	0.07	U	pCi/g	11/15/19 12:33	EEC	N/A
Eu-152	0.050	0.057	0.278	0.139	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Eu-154	0.056	0.071	0.087	0.043	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
K-40	5.788	1.198	1.070	0.535	NP		pCi/g	11/15/19 12:33	EEC	N/A
Pa-234	0.031	0.051	0.136	0.068	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Pb-210	0.514	1.005	1.750	0.875	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Pb-214	0.479	0.136	0.128	0.064	NP		pCi/g	11/15/19 12:33	EEC	N/A
Ra-226	0.383	0.125	0.147	0.074	0.4		pCi/g	11/15/19 12:33	EEC	N/A
Th-232	0.200	0.148	0.251	0.126	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Th-234	0.586	0.506	1.540	0.770	NP	U	pCi/g	11/15/19 12:33	EEC	N/A
Tl-208	0.126	0.048	0.049	0.025	NP		pCi/g	11/15/19 12:33	EEC	N/A
U-235	0.050	0.135	0.221	0.111	NP	U	pCi/g	11/15/19 12:33	EEC	N/A

ARS Aleut Analytical

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-22
Sample Collection Date: 10/22/19 15:24
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-022
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	0.953	0.197	0.192	0.096	0.5		pCi/g	11/15/19 13:37	EEC	N/A
Am-241	0.031	0.075	0.125	0.063	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
Bi-212	0.799	0.294	0.309	0.155	NP	*	pCi/g	11/15/19 13:37	EEC	N/A
Bi-214	0.701	0.128	0.123	0.062	NP		pCi/g	11/15/19 13:37	EEC	N/A
Co-60	0.025	0.039	0.066	0.033	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
Cs-137	-0.011	0.047	0.061	0.030	0.07	U	pCi/g	11/15/19 13:37	EEC	N/A
Eu-152	0.015	0.044	0.207	0.104	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
Eu-154	0.054	0.070	0.060	0.030	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
K-40	17.637	1.732	0.680	0.340	NP		pCi/g	11/15/19 13:37	EEC	N/A
Pa-234	0.060	0.119	0.131	0.066	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
Pb-210	0.417	0.789	1.270	0.635	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
Pb-214	0.883	0.150	0.124	0.062	NP		pCi/g	11/15/19 13:37	EEC	N/A
Ra-226	0.701	0.128	0.123	0.062	0.4		pCi/g	11/15/19 13:37	EEC	N/A
Th-232	0.953	0.197	0.192	0.096	NP		pCi/g	11/15/19 13:37	EEC	N/A
Th-234	0.822	0.555	1.130	0.565	NP	U	pCi/g	11/15/19 13:37	EEC	N/A
Tl-208	0.356	0.065	0.057	0.029	NP		pCi/g	11/15/19 13:37	EEC	N/A
U-235	0.198	0.191	0.298	0.149	NP	U	pCi/g	11/15/19 13:37	EEC	N/A

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ARS Sample Delivery Group: ARS1-19-02946
Client Sample ID: 01-PCT-001-23
Sample Collection Date: 10/22/19 15:24
Sample Matrix: Soil/Solid/Sludge
Percent Solids: 99.4%

Request or PO Number:
ARS Sample ID: ARS1-19-02946-023
Date Received: 10/23/19
Report Date: 11/19/19

Radiochemistry

Analysis Method: ARS-007/EPA 901.1 Mod

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Ac-228	1.247	0.175	0.186	0.093	0.5		pCi/g	11/18/19 9:34	EEC	N/A
Am-241	0.038	0.082	0.138	0.069	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
Bi-212	1.132	0.407	0.421	0.211	NP	*	pCi/g	11/18/19 9:34	EEC	N/A
Bi-214	1.138	0.165	0.140	0.070	NP		pCi/g	11/18/19 9:34	EEC	N/A
Co-60	-0.002	0.090	0.070	0.035	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
Cs-137	-0.001	0.251	0.068	0.034	0.07	U	pCi/g	11/18/19 9:34	EEC	N/A
Eu-152	0.093	0.077	0.227	0.114	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
Eu-154	0.020	0.058	0.076	0.038	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
K-40	11.026	1.368	0.813	0.407	NP		pCi/g	11/18/19 9:34	EEC	N/A
Pa-234	0.092	0.150	0.154	0.077	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
Pb-210	0.712	0.941	1.590	0.795	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
Pb-214	1.199	0.179	0.133	0.067	NP		pCi/g	11/18/19 9:34	EEC	N/A
Ra-226	1.138	0.165	0.140	0.070	0.4		pCi/g	11/18/19 9:34	EEC	N/A
Th-232	1.247	0.175	0.186	0.093	NP		pCi/g	11/18/19 9:34	EEC	N/A
Th-234	1.061	0.612	1.290	0.645	NP	U	pCi/g	11/18/19 9:34	EEC	N/A
Tl-208	0.423	0.067	0.055	0.027	NP		pCi/g	11/18/19 9:34	EEC	N/A
U-235	0.165	0.216	0.357	0.179	NP	U	pCi/g	11/18/19 9:34	EEC	N/A

Analysis Method: ARS-032/Eichrom SRW-01 & EPA 905.0

Analysis Description	Analysis Results	CSU +/- 2 s	MDC	DLC	CRDL	Qual	Analysis Units	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
SR-TOT	-0.056	0.081	0.153	0.071	0.2	U	pCi/g	11/08/19 9:32	GRIDER	81%

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ARS Aleut Analytical, LLC
Analytical Reports

for

Gilbane Federal

Batch QC

Analytical Batch	ARS1-B19-02227
SDG	ARS1-19-02946
Analysis	Strontium-90 in (Soil, Sludge, Biota,
Analysis Test Method	ARS-032/Eichrom SRW01,EPA
Analysis Code	GPC-SR90-SO
Report Units	pCi/g

QC Results per Analytical Batch

Acceptable QC Performance Ranges

QC Sample Type	Performance Items and Ranges		
Laboratory Control Sample	Recovery (%):	> 75	< 125
Matrix Spike	Recovery (%):	> 60	< 140
Duplicate	Replicate Error Ratio (RER):		< 1
	Duplicate Error Ratio (DER):		< 3
	Relative Percent Difference (RPD %):		≤ 25

Laboratory Control Sample

Analysis Date	11/08/19 09:32	Analysis Technician	GRIDER

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	Expected Value	LCS Rec (%)	MDC
ARS1-B19-02227-01	**LCS**	SR-TOT	20.800	3.157	20.845	99.8	0.372

Duplicate RER/DER/RPD

Analysis Date	11/08/19 09:32	Analysis Technician	GRIDER

Analyte	Results LCS	CSU LCS (2s)	Results LCSD	CSU LCSD (2s)	RER	DER	RPD
SR-TOT	20.800	3.157	18.267	2.796	0.834	1.177	13.0

Duplicate RER/DER/RPD (Dup Sample)

Analysis Date	11/08/19 09:32	Analysis Technician	GRIDER

Analyte	Results DO	CSU DO (2s)	Results DUP	CSU DUP (2s)	RER	DER	RPD
SR-TOT	-0.056	0.081	0.007	0.084	0.757	1.070	257.8

Method Blank

Analysis Date	11/08/19 09:32	Analysis Technician	GRIDER

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	MDC	Qual
ARS1-B19-02227-03	**MBL**	SR-TOT	-0.076	0.205	0.383	U

Analytical Batch	ARS1-B19-02271
SDG	ARS1-19-02946
Analysis	Gamma Spec - 21 Day Ingrowth in (Soil,
Analysis Test Method	ARS-007/EPA 901.1M
Analysis Code	GAM-IG-SO
Report Units	pCi/g

QC Results per Analytical Batch

Acceptable QC Performance Ranges

QC Sample Type	Performance Items and Ranges		
Laboratory Control Sample	Recovery (%):	> 75	< 125
Matrix Spike	Recovery (%):	> 60	< 140
Duplicate	Replicate Error Ratio (RER):		< 1
	Duplicate Error Ratio (DER):		< 3
	Relative Percent Difference (RPD %):		≤ 25

Laboratory Control Sample

Analysis Date: 11/14/19 08:53 | Analysis Technician: EEC

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	Expected Value	LCS Rec (%)	MDC
ARS1-B19-02271-01	**LCS**	AM-241	2.078E+4	1.611E+3	2.275E+4	91.4	578.300
ARS1-B19-02271-01	**LCS**	CO-60	4.145E+4	1.820E+3	4.279E+4	96.9	543.700
ARS1-B19-02271-01	**LCS**	CS-137	3.517E+4	1.619E+3	3.545E+4	99.2	215.500

Duplicate RER/DER/RPD

Analysis Date: 11/14/19 09:04 | Analysis Technician: EEC

Analyte	Results LCS	CSU LCS (2s)	Results LCSD	CSU LCSD (2s)	RER	DER	RPD
AM-241	2.078E+4	1.611E+3	2.051E+4	1.562E+3	0.169	0.239	1.3
CO-60	4.145E+4	1.820E+3	4.104E+4	1.792E+3	0.227	0.321	1.0
CS-137	3.517E+4	1.619E+3	3.623E+4	1.668E+3	0.636	0.899	3.0

Duplicate RER/DER/RPD (Dup Sample)

Analysis Date: 11/15/19 09:05 | Analysis Technician: EEC

Analyte	Results DO	CSU DO (2s)	Results DUP	CSU DUP (2s)	RER	DER	RPD
AC-228	0.591	0.174	0.633	0.129	0.273	0.382	6.9
AM-241	0.023	0.071	0.023	0.075	0.001	0.002	0.4
BI-212	0.480	0.251	0.329	0.301	0.536	0.754	37.3
BI-214	0.473	0.104	0.579	0.126	0.900	1.268	20.2
CO-60	0.006	0.014	0.006	0.024	8.306E-5	1.134E-4	0.0
CS-137	0.006	0.032	0.006	0.027	0.004	0.006	1.9
EU-152	0.105	0.086	0.024	0.075	0.987	1.392	125.3
EU-154	0.025	0.068	0.045	0.056	0.319	0.450	58.0
K-40	10.336	1.238	10.119	1.247	0.171	0.242	2.1
PA-234	0.056	0.071	0.077	0.083	0.270	0.381	32.2
PB-210	0.604	0.788	0.342	0.702	0.344	0.486	55.3
PB-214	0.553	0.123	0.558	0.119	0.034	0.048	0.8
RA-226	0.473	0.104	0.579	0.126	0.900	1.268	20.2
TH-232	0.591	0.174	0.633	0.129	0.273	0.382	6.9
TH-234	1.065	0.677	0.957	0.502	0.180	0.252	10.7
TL-208	0.142	0.041	0.205	0.050	1.364	1.919	36.6
U-235	0.105	0.172	0.051	0.184	0.301	0.425	69.9

Analytical Batch	**ARS1-B19-02271**
SDG	**ARS1-19-02946**
Analysis	**Gamma Spec - 21 Day Ingrowth in (Soil,**
Analysis Test Method	**ARS-007/EPA 901.1M**
Analysis Code	**GAM-IG-SO**
Report Units	**pCi/g**

QC Results per Analytical Batch

Method Blank

		Analysis Date	11/14/19 08:52	Analysis Technician	EEC	
Analysis Batch Sample ID	**QC Type**	**Analyte**	**Results**	**CSU (2s)**	**MDC**	**Qual**
ARS1-B19-02271-03	**MBL**	AC-228	3.498	51.020	104.000	U
ARS1-B19-02271-03	**MBL**	AM-241	2.954	21.245	38.600	U
ARS1-B19-02271-03	**MBL**	BI-212	-3.803	168.560	196.000	U
ARS1-B19-02271-03	**MBL**	BI-214	-2.420	48.279	64.700	U
ARS1-B19-02271-03	**MBL**	CO-60	-1.263	50.505	15.500	U
ARS1-B19-02271-03	**MBL**	CS-137	-0.273	10.917	12.000	U
ARS1-B19-02271-03	**MBL**	EU-152	-5.294	48.614	87.400	U
ARS1-B19-02271-03	**MBL**	EU-154	-6.396	32.913	28.300	U
ARS1-B19-02271-03	**MBL**	K-40	-7.050	187.840	357.000	U
ARS1-B19-02271-03	**MBL**	PA-234	-3.274	84.737	43.500	U
ARS1-B19-02271-03	**MBL**	PB-210	102.470	326.090	643.000	U
ARS1-B19-02271-03	**MBL**	PB-214	-11.460	3.072E+3	56.700	U
ARS1-B19-02271-03	**MBL**	RA-226	-2.420	48.279	64.700	U
ARS1-B19-02271-03	**MBL**	TH-232	3.498	51.020	104.000	U
ARS1-B19-02271-03	**MBL**	TH-234	220.730	130.780	484.000	U
ARS1-B19-02271-03	**MBL**	TL-208	-4.732	56.320	34.100	U
ARS1-B19-02271-03	**MBL**	U-235	24.295	56.776	103.000	U

Analytical Batch	ARS1-B19-02272
SDG	ARS1-19-02946
Analysis	Gamma Spec - 21 Day Ingrowth in (Soil,
Analysis Test Method	ARS-007/EPA 901.1M
Analysis Code	GAM-IG-SO
Report Units	pCi/g

QC Results per Analytical Batch

Acceptable QC Performance Ranges

QC Sample Type	Performance Items and Ranges		
Laboratory Control Sample	Recovery (%):	> 75	< 125
Matrix Spike	Recovery (%):	> 60	< 140
Duplicate	Replicate Error Ratio (RER):		< 1
	Duplicate Error Ratio (DER):		< 3
	Relative Percent Difference (RPD %):		≤ 25

Laboratory Control Sample

Analysis Date: 11/15/19 12:08 | Analysis Technician: EEC

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	Expected Value	LCS Rec (%)	MDC
ARS1-B19-02272-01	**LCS**	AM-241	2.032E+4	1.650E+3	2.275E+4	89.3	687.000
ARS1-B19-02272-01	**LCS**	CO-60	4.131E+4	1.917E+3	4.279E+4	96.5	629.200
ARS1-B19-02272-01	**LCS**	CS-137	3.581E+4	1.693E+3	3.545E+4	101.0	362.200

Duplicate RER/DER/RPD

Analysis Date: 11/15/19 12:19 | Analysis Technician: EEC

Analyte	Results LCS	CSU LCS (2s)	Results LCSD	CSU LCSD (2s)	RER	DER	RPD
AM-241	2.032E+4	1.650E+3	2.097E+4	1.681E+3	0.381	0.539	3.1
CO-60	4.131E+4	1.917E+3	4.065E+4	1.866E+3	0.342	0.484	1.6
CS-137	3.581E+4	1.693E+3	3.565E+4	1.666E+3	0.095	0.134	0.5

Duplicate RER/DER/RPD (Dup Sample)

Analysis Date: 11/15/19 13:23 | Analysis Technician: EEC

Analyte	Results DO	CSU DO (2s)	Results DUP	CSU DUP (2s)	RER	DER	RPD
AC-228	0.953	0.197	0.876	0.197	0.380	0.538	8.4
AM-241	0.031	0.075	-0.009	0.215	0.273	0.347	365.3
BI-212	0.799	0.294	0.566	0.349	0.711	1.002	34.2
BI-214	0.701	0.128	0.824	0.171	0.807	1.130	16.2
CO-60	0.025	0.039	0.001	0.017	0.823	1.081	181.1
CS-137	-0.011	0.047	0.013	0.036	0.554	0.777	2978.6
EU-152	0.015	0.044	0.049	0.077	0.556	0.759	107.2
EU-154	0.054	0.070	0.010	0.037	0.823	1.114	140.2
K-40	17.637	1.732	17.205	1.936	0.231	0.326	2.5
PA-234	0.060	0.119	0.073	0.080	0.131	0.182	19.9
PB-210	0.417	0.789	0.097	1.073	0.337	0.471	124.7
PB-214	0.883	0.150	0.835	0.142	0.321	0.454	5.6
RA-226	0.701	0.128	0.824	0.171	0.807	1.130	16.2
TH-232	0.953	0.197	0.876	0.197	0.380	0.538	8.4
TH-234	0.822	0.555	1.086	0.711	0.409	0.573	27.7
TL-208	0.356	0.065	0.346	0.070	0.142	0.201	2.8
U-235	0.198	0.191	0.054	0.224	0.679	0.958	114.3

Analytical Batch	**ARS1-B19-02272**
SDG	**ARS1-19-02946**
Analysis	**Gamma Spec - 21 Day Ingrowth in (Soil,**
Analysis Test Method	**ARS-007/EPA 901.1M**
Analysis Code	**GAM-IG-SO**
Report Units	**pCi/g**

QC Results per Analytical Batch

Method Blank		**Analysis Date**	11/15/19 13:58	**Analysis Technician**	EEC	
Analysis Batch Sample ID	**QC Type**	**Analyte**	**Results**	**CSU (2s)**	**MDC**	**Qual**
ARS1-B19-02272-03	**MBL**	AC-228	13.166	51.691	101.000	U
ARS1-B19-02272-03	**MBL**	AM-241	2.806	21.107	38.400	U
ARS1-B19-02272-03	**MBL**	BI-212	-22.252	471.400	231.000	U
ARS1-B19-02272-03	**MBL**	BI-214	16.428	36.153	70.200	U
ARS1-B19-02272-03	**MBL**	CO-60	-1.255	50.183	74.600	U
ARS1-B19-02272-03	**MBL**	CS-137	-6.303	20.559	33.900	U
ARS1-B19-02272-03	**MBL**	EU-152	20.538	38.173	77.300	U
ARS1-B19-02272-03	**MBL**	EU-154	13.107	31.684	32.300	U
ARS1-B19-02272-03	**MBL**	K-40	13.658	199.190	413.000	U
ARS1-B19-02272-03	**MBL**	PA-234	27.211	33.531	49.100	U
ARS1-B19-02272-03	**MBL**	PB-210	2.687	302.490	648.000	U
ARS1-B19-02272-03	**MBL**	PB-214	3.711	29.742	57.700	U
ARS1-B19-02272-03	**MBL**	RA-226	16.428	36.153	70.200	U
ARS1-B19-02272-03	**MBL**	TH-232	13.166	51.691	101.000	U
ARS1-B19-02272-03	**MBL**	TH-234	238.200	188.910	453.000	U
ARS1-B19-02272-03	**MBL**	TL-208	0.639	2.190	35.700	U
ARS1-B19-02272-03	**MBL**	U-235	19.489	71.526	111.000	U

Data Validation Report for 19-02946

Facility:	Parcel C Building 211 & 253
Event:	211 & 253 Post-Excavation Trench Units
SDG:	19-02946
Guidance Document:	FINAL SAMPLING AND ANALYSIS PLAN Parcel C Buildings 211 and 253 Radiological Remediation, Hunters Point Naval Shipyard, San Francisco, California (Gilbane Federal, 2019)
Prime Contractor:	Gilbane Federal
Project Manager:	Brett Womack
Contract Laboratory(ies):	ARS ALEUT ANALYTICAL (AAA), PORT ALLEN, LA
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	S4VEM / S2BVEM
Primary Data Reviewer:	Christina Rink-Ashdown, Inorganic Chemist/Project Manager
Second Reviewer:	Allie Jefferson, Chemist
Date Submitted:	January 21, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	E901.1	E905.0
01-PCT-001-01	ARS1-19-02946-001	Solid	Field Sample/N	X	
01-PCT-001-02	ARS1-19-02946-002	Solid	Field Sample/N	X	
01-PCT-001-03	ARS1-19-02946-003	Solid	Field Sample/N	X	
01-PCT-001-04	ARS1-19-02946-004	Solid	Field Sample/N	X	
01-PCT-001-05	ARS1-19-02946-005	Solid	Field Sample/N	X	
01-PCT-001-06	ARS1-19-02946-006	Solid	Field Sample/N	X	
01-PCT-001-07	ARS1-19-02946-007	Solid	Field Sample/N	X	
01-PCT-001-08	ARS1-19-02946-008	Solid	Field Sample/N	X	
01-PCT-001-09	ARS1-19-02946-009	Solid	Field Sample/N	X	
01-PCT-001-10	ARS1-19-02946-010	Solid	Field Sample/N	X	
01-PCT-001-11	ARS1-19-02946-011	Solid	Field Sample/N	X	
01-PCT-001-12	ARS1-19-02946-012	Solid	Field Sample/N	X	
01-PCT-001-13	ARS1-19-02946-013	Solid	Field Sample/N	X	
01-PCT-001-14	ARS1-19-02946-014	Solid	Field Sample/N	X	
01-PCT-001-15	ARS1-19-02946-015	Solid	Field Sample/N	X	X
01-PCT-001-16	ARS1-19-02946-016	Solid	Field Sample/N	X	
01-PCT-001-17	ARS1-19-02946-017	Solid	Field Sample/N	X	
01-PCT-001-18	ARS1-19-02946-018	Solid	Field Sample/N	X	X
01-PCT-001-19	ARS1-19-02946-019	Solid	Field Sample/N	X	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	E901.1	E905.0
01-PCT-001-20	ARS1-19-02946-020	Solid	Field Sample/N	X	
01-PCT-001-21	ARS1-19-02946-021	Solid	Field Sample/N	X	
01-PCT-001-22	ARS1-19-02946-022	Solid	Field Sample/N	X	
01-PCT-001-23	ARS1-19-02946-023	Solid	Field Sample/N	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S4VEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the FINAL SAMPLING AND ANALYSIS PLAN Parcel C Buildings 211 and 253 Radiological Remediation, Hunters Point Naval Shipyard, San Francisco, California (Gilbane Federal, 2019) and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Gilbane Federal; analyses were performed by ARS ALEUT ANALYTICAL (AAA), PORT ALLEN, LA and were reported under sample delivery group (SDG) 19-02946. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 394 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
E901.1	20% of the samples underwent Stage 4 validation. The remainder of the samples underwent Stage 2B validation. The samples that were randomly selected for Stage 4 validation are 01-PCT-001-11, 01-PCT-001-12, 01-PCT-001-13, 01-PCT-001-14, and 01-PCT-001-15.
E905.0	20% of the samples underwent Stage 4 validation. The remainder of the samples underwent Stage 2B validation. The sample that was randomly selected for Stage 4 validation was 01-PCT-001-15.

January 21, 2020

Reviewed by Christina Rink-Ashdown, Inorganic Chemist/Project Manager, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

January 21, 2020

Reviewed by Allie Jefferson, Chemist, Laboratory Data Consultants, Inc.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: E901.1 (Gamma Emitting Radionuclides in Drinking Water)				
Review Questions	Yes	No	NA	Comment
Sampling/Login: COC - Custody Trail?	•			
Sampling/Login: COC - Temperature/Condition?	•			
Sampling/Login: COC - Receipt anomalies?		•		
Sampling/Login: COC - Sample/Methods checked?	•			
Sampling/Login: Case Narratives - Anomalies (DQFs)?		•		
Sampling/Login: Samples - Collection date?	•			
ICAL: Calibration - Verification source when calculated with the new efficiency must be +- 10% of known value?	•			
ICAL: Full Width at the Half Maximum (FWHM) < +- 2 sigma or FWHM <= 3.0 keV at 1332 KeV or reference manufactures specifications?	•			
ICAL: Peak Shape - FWHM difference < 0.5 keV for selected peaks – one low end (ie: 241Am), one middle (ie: 60Co) and one high (ie: 137Cs)	•			
ICAL: Background - Monthly - Long count and Daily - Short count +- 3 sigma of measured population.	•			
ICAL: Background counting time was equal to or longer than sample counting time?	•			
CCV: Daily Verification - Verfication +- 3 sigma?	•			
Analysis: Samples - Extraction date?			•	
Analysis: Samples - Analysis date?	•			
Analysis: Samples - Holding time?	•			
Analysis: Samples - Batching?	•			
Analysis: Samples - Lab qualifiers?	•			
Analysis: Blank - Method blank <MDA?	•			
Analysis: Blank - Equipment blank <MDA?			•	
Analysis: Precision/Accuracy - MS/MSD. Verify by calculation?			•	
Analysis: Precision/Accuracy - LCS/LCSD (75-125%). Verify by calculation?	•			
Analysis: Precision/Accuracy - Laboratory Duplicates (Act. < 5*MDC then RPD < 100%, Act. > 5*MDC then < 20%RPD)?	•			
Analysis: Quantitation - PQLs (Lab RL < Project RL)?	•			
Analysis: Quantitation - Sample Uncertainty (Negative results less than 2X TPU flagged "U", >2X TPU flagged "UJ"?	•			
Analysis: Quantitation - MDA < required detection limit (RDL). Formula 3.5 * CSU <= RDL? If this is not true then: If the result is less than Lc and the result plus 1.65 times its uncertainty is greater than the action level,it shall be qualified as (J/UJ).	•			
Analysis: Quantitation - Dectability - Verify by calculation each analyte's detectability. One sample results at or below the Lc, estimate the Lc by multiplying the CSU by 1.65.	•			
Analysis: Quantitation - Dilution Factor?			•	
Analysis: Quantitation - Verify the raw spectral data and/or peak search and identification reports were included in the results.	•			

Review Questions

Method: E901.1 (Gamma Emitting Radionuclides in Drinking Water)				
Review Questions	Yes	No	NA	Comment
Analysis: Quantitation - Review raw spectral data for potential errors, including but not limited to: misidentification of peaks, nonlinear energy response or skewed spectral peak positions, and unresolved overlapping peak interference.	•			
Analysis: Quantitation - Review the resolution and centroid position of peak associated with radio tracer (alpha spectroscopy).	•			
Analysis: Quantitation - Verify raw data and calculations used in developing the results, MDA, and CSU were included in the results.	•			
Analysis: Quantitation - Review by calculation a subset of the quantitation calculations (10% of target analytes or as otherwise stipulated in the approved SAP).	•			
Analysis: Field Duplicates - RPD in criteria?			•	

Review Questions

Method: E905.0 (Radioactive Strontium in Drinking Water)				
Review Questions	Yes	No	NA	Comment
Sampling/Login: COC - Custody Trail?	•			
Sampling/Login: COC - Temperature/Condition?	•			
Sampling/Login: COC - Receipt anomalies?		•		
Sampling/Login: COC - Sample/Methods checked?	•			
Sampling/Login: Case Narratives - Anomalies (DQFs)?		•		
Sampling/Login: Samples - Collection date?	•			
ICAL: Calibration - Verfication source when calculated with the new efficiency must be +- 25% of known value?	•			
ICAL: Background frequency performed at required interval?	•			
ICAL: Daily (short count) Weekly (long count) Verification - Background Check +- 3 sigma	•			
ICAL: Background updated upon instrument/operational change?	•			
ICAL: Background counting time was equal to or longer than sample counting time?	•			
CCV: Daily Verification - Efficiency Check +- 3 sigma	•			
Analysis: Samples - Extraction date?	•			
Analysis: Samples - Analysis date?	•			
Analysis: Samples - Holding time?	•			
Analysis: Samples - Batching?	•			
Analysis: Samples - Lab qualifiers?	•			
Analysis: Blank - Method blank <MDA?	•			
Analysis: Blank - Equipment blank <MDA?			•	
Analysis: Precision/Accuracy - MS/MSD. Verify by calculation?			•	
Analysis: Precision/Accuracy - LCS/LCSD (75-125%). Verify by calculation?	•			
Analysis: Precision/Accuracy - Tracers/Carriers (25-125%). Verify by calculation?	•			
Analysis: Precision/Accuracy - Laboratory Duplicates (Act. < 5*MDC then RPD < 100%, Act. > 5*MDC then < 20%RPD or RER <= 3)?	•			
Analysis: Quantitation - PQLs (Lab RL < Project RL)?	•			
Analysis: Quantitation - Sample Uncertainty (Negative results less than 2X TPU flagged "U", >2X TPU flagged "UJ"?	•			
Analysis: Quantitation - MDA < required detection limit (RDL). Formula 3.5 * CSU <= RDL? If this is not true then: If the result is less than Lc and the result plus 1.65 times its uncertainty is greater than the action level,it shall be qualified as (J/UJ).	•			
Analysis: Quantitation - Dectability - Verify by calculation each analyte's detectability. One sample results at or below the Lc, estimate the Lc by multiplying the CSU by 1.65.	•			
Analysis: Quantitation - Dilution Factor?			•	
Analysis: Quantitation - Verify the raw spectral data and/or peak search and identification reports were included in the results.	•			

Review Questions

Method: E905.0 (Radioactive Strontium in Drinking Water)				
Review Questions	Yes	No	NA	Comment
Analysis: Quantitation - Review raw spectral data for potential errors, including but not limited to: misidentification of peaks, nonlinear energy response or skewed spectral peak positions, and unresolved overlapping peak interference.	•			
Analysis: Quantitation - Review the resolution and centroid position of peak associated with radio tracer (alpha spectroscopy).	•			
Analysis: Quantitation - Verify raw data and calculations used in developing the results, MDA, and CSU were included in the results.	•			
Analysis: Quantitation - Review by calculation a subset of the quantitation calculations (10% of target analytes or as otherwise stipulated in the approved SAP).	•			
Analysis: Field Duplicates - RPD in criteria?			•	

ATTACHMENT 5
TU 211-01 SSSD Reference Area Data
(27 pages)

SSSD Reference Area Data Summary
TU 211-01

bolded = MDC VALUE (i.e., results below MDC; MDC value used for statistical calculations)

	Cs-137		Ra-226		Th-232		Sr-90	
Sample ID	Activity	MDC	Activity	MDC	Activity	MDC	Activity	MDC
06NPBRA0-001	**0.0238**	0.0238	0.498	0.0308	0.566	0.0785		
06NPBRA0-002	**0.0182**	0.0182	0.454	0.0294	0.611	0.0475		
06NPBRA0-003	**0.0262**	0.0262	0.598	0.0349	0.584	0.054		
06NPBRA0-004	**0.0219**	0.0219	0.331	0.0301	0.519	0.0551		
06NPBRA0-005	**0.0173**	0.0173	0.59	0.0233	0.702	0.0472	**0.194**	0.194
06NPBRA0-006	**0.0221**	0.0221	0.6	0.0356	0.617	0.0586	**0.194**	0.194
06NPBRA0-007	**0.0199**	0.0199	0.507	0.0378	0.6	0.0503		
06NPBRA0-008	**0.0238**	0.0238	0.426	0.0283	0.464	0.0709		
06NPBRA0-009	**0.0194**	0.0194	0.454	0.0315	0.501	0.0744		
06NPBRA0-010	**0.0211**	0.0211	0.554	0.0332	0.555	0.0404		
06NPBRA0-011	**0.0243**	0.0243	0.477	0.0352	0.604	0.0538		
06NPBRA0-012	**0.0195**	0.0195	0.48	0.0291	0.555	0.0552		
06NPBRA0-013	**0.0179**	0.0179	0.421	0.0419	0.515	0.0774		
06NPBRA0-014	**0.0237**	0.0237	0.41	0.0309	0.752	0.063		
06NPBRA0-015	**0.0198**	0.0198	0.559	0.047	0.495	0.0627		
06NPBRA0-016	**0.0243**	0.0243	0.495	0.0454	0.735	0.0644		
06NPBRA0-017	**0.0207**	0.0207	0.431	0.0339	0.416	0.035		
06NPBRA0-018	**0.019**	0.019	0.496	0.0297	0.462	0.0611		
Sample Count	18		18		18		2	
Samples > MDC	0		18		18		0	
Minimum	0.017	0.017	0.331	0.023	0.416	0.035	0.194	0.194
Maximum	0.026	0.026	0.600	0.047	0.752	0.079	0.194	0.194
Mean	0.021		0.488		0.570		0.194	
Median	0.0209		0.4875		0.5605		0.194	
Std Deviation	0.003		0.073		0.093		0.000	

REFERENCE AREA
SAMPLE RESULTS

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Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-001	Received:	04/26/06
Lab ID:	244070-001	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 11:59
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	362 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0642 U	0.163	0.131	0.9
Bismuth-212	0.413	0.424	0.295	
Bismuth-214	0.498	0.0835	0.0308	
Cesium-137	-0.0101 U	0.0301	0.0238	0.07
Cobalt-60	0.0246 U b	0.0547	0.0411	0.03
Europium-152	0.121	0.101	0.0739	0.1
Europium-154	0.0324 U b	0.181	0.239	0.2
Lead-212	0.486	0.0698	0.0345	
Lead-214	0.560	0.0908	0.0393	
Potassium-40	10.7	1.02	0.285	
Protactinium-234	0.0434 U	0.107	0.0810	
Radium-226 (By Bismuth-214)	0.498	0.0835	0.0308	0.2
Thallium-208	0.188	0.0421	0.0170	
Thorium-232 (By Actinium-228)	0.566	0.117	0.0785	0.9
Thorium-234	0.703 U	0.564	1.06	
Uranium-235	0.0748 U	0.0373	0.133	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-002	Received:	04/26/06
Lab ID:	244070-002	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 12:02
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	365 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.0261 U	0.132	0.107	0.9
Bismuth-212	0.680	0.381	0.225	
Bismuth-214	0.454	0.0822	0.0294	
Cesium-137	-0.00495 U	0.0229	0.0182	0.07
Cobalt-60	0 U b	0.0310	0.0436	0.03
Europium-152	0.0348 U	0.0436	0.0690	0.1
Europium-154	0.0209 U	0.117	0.194	0.2
Lead-212	0.470	0.0726	0.0362	
Lead-214	0.564	0.0892	0.0394	
Potassium-40	7.98	0.889	0.287	
Protactinium-234	0.0114 U	0.0230	0.0959	
Radium-226 (By Bismuth-214)	0.454	0.0822	0.0294	0.2
Thallium-208	0.145	0.0342	0.0151	
Thorium-232 (By Actinium-228)	0.611	0.137	0.0475	0.9
Thorium-234	0.572 U	0.660	1.08	
Uranium-235	0.0308 U	0.0229	0.136	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-003	Received:	04/26/06
Lab ID:	244070-003	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 12:59
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	372 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0 U	0.0979	0.119	0.9
Bismuth-212	0.456	0.350	0.243	
Bismuth-214	0.598	0.0991	0.0349	
Cesium-137	-0.00453 U	0.0323	0.0262	0.07
Cobalt-60	-0.0218 U b	0.109	0.0874	0.03
Europium-152	0.0983	0.103	0.0866	0.1
Europium-154	0.0769 U b	0.406	0.325	0.2
Lead-212	0.429	0.0733	0.0390	
Lead-214	0.560	0.103	0.0460	
Potassium-40	12.2	1.09	0.289	
Protactinium-234	-0.00675 U	0.0180	0.0976	
Radium-226 (By Bismuth-214)	0.598	0.0991	0.0349	0.2
Thallium-208	0.172	0.0404	0.0180	
Thorium-232 (By Actinium-228)	0.584	0.114	0.0540	0.9
Thorium-234	0.422 U	0.371	0.993	
Uranium-235	0.0442 U	0.0378	0.128	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-004	Received:	04/26/06
Lab ID:	244070-004	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 13:01
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	352 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.00983 U	0.160	0.131	0.9
Bismuth-212	0.731	0.366	0.170	
Bismuth-214	0.331	0.0710	0.0301	
Cesium-137	0.00396 U	0.0271	0.0219	0.07
Cobalt-60	0 U	0.0557	0.0119	0.03
Europium-152	0.0356 U	0.0969	0.0555	0.1
Europium-154	0.0514 U b	0.311	0.250	0.2
Lead-212	0.425	0.0675	0.0327	
Lead-214	0.453	0.0857	0.0423	
Potassium-40	8.99	0.930	0.265	
Protactinium-234	0.00753 U	0.0688	0.0896	
Radium-226 (By Bismuth-214)	0.331	0.0710	0.0301	0.2
Thallium-208	0.154	0.0364	0.0152	
Thorium-232 (By Actinium-228)	0.519	0.120	0.0551	0.9
Thorium-234	0.408 U	0.271	0.917	
Uranium-235	0.0615 U	0.0369	0.134	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-005	Received:	04/26/06
Lab ID:	244070-005	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 13:50
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	361 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.0483 U	0.125	0.100	0.9
Bismuth-212	0.642	0.504	0.282	
Bismuth-214	0.590	0.0877	0.0233	
Cesium-137	-0.000164 U	0.0211	0.0173	0.07
Cobalt-60	-0.0109 U b	0.0563	0.0448	0.03
Europium-152	0.0616 U	0.0870	0.0829	0.1
Europium-154	0.0723 U b	0.278	0.272	0.2
Lead-212	0.484	0.0719	0.0362	
Lead-214	0.605	0.0933	0.0420	
Potassium-40	12.3	1.07	0.264	
Protactinium-234	-0.0146 U	0.0470	0.0965	
Radium-226 (By Bismuth-214)	0.590	0.0877	0.0233	0.2
Thallium-208	0.217	0.0450	0.0165	
Thorium-232 (By Actinium-228)	0.702	0.134	0.0472	0.9
Thorium-234	0.463 U	0.293	1.11	
Uranium-235	0.0622 U	0.0561	0.136	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-006	Received:	04/26/06
Lab ID:	244070-006	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 13:52
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	350 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0269 U	0.163	0.133	0.9
Bismuth-212	0.262 U	0.445	0.290	
Bismuth-214	0.600	0.0983	0.0356	
Cesium-137	0.000264 U	0.0268	0.0221	0.07
Cobalt-60	0.00675 U b	0.0234	0.0431	0.03
Europium-152	0.0321 U	0.0901	0.0656	0.1
Europium-154	-0.0125 U b	0.0258	0.279	0.2
Lead-212	0.546	0.0720	0.0336	
Lead-214	0.582	0.106	0.0514	
Potassium-40	12.1	1.11	0.308	
Protactinium-234	0.0109 U	0.0203	0.0961	
Radium-226 (By Bismuth-214)	0.600	0.0983	0.0356	0.2
Thallium-208	0.196	0.0481	0.0218	
Thorium-232 (By Actinium-228)	0.617	0.119	0.0586	0.9
Thorium-234	0.576 U	0.762	1.17	
Uranium-235	0.0617 U	0.0363	0.133	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-007	Received:	04/26/06
Lab ID:	244070-007	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 15:07
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	368 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.000767 U	0.137	0.113	0.9
Bismuth-212	0.430	0.349	0.244	
Bismuth-214	0.507	0.0961	0.0378	
Cesium-137	0.0153 U	0.0263	0.0199	0.07
Cobalt-60	0.00713 U b	0.0401	0.0488	0.03
Europium-152	0.0703 U	0.105	0.0716	0.1
Europium-154	0.0286 U b	0.0839	0.244	0.2
Lead-212	0.435	0.0676	0.0335	
Lead-214	0.497	0.0836	0.0387	
Potassium-40	10.6	0.987	0.249	
Protactinium-234	0.00621 U	0.0870	0.0822	
Radium-226 (By Bismuth-214)	0.507	0.0961	0.0378	0.2
Thallium-208	0.160	0.0465	0.0213	
Thorium-232 (By Actinium-228)	0.600	0.120	0.0503	0.9
Thorium-234	0.0240 U	1.29	1.06	
Uranium-235	0.0313 U	0.0291	0.132	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-008	Received:	04/26/06
Lab ID:	244070-008	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/04/13 15:09
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	373 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.0126 U	0.129	0.106	0.9
Bismuth-212	1.00	0.454	0.214	
Bismuth-214	0.426	0.0767	0.0283	
Cesium-137	0.00246 U	0.0292	0.0238	0.07
Cobalt-60	-0.0124 U b	0.0656	0.0525	0.03
Europium-152	0.0259 U	0.0420	0.0603	0.1
Europium-154	0.00690 U b	0.0675	0.257	0.2
Lead-212	0.445	0.0756	0.0404	
Lead-214	0.539	0.0963	0.0451	
Potassium-40	11.5	1.04	0.286	
Protactinium-234	0.0214 U	0.0856	0.0887	
Radium-226 (By Bismuth-214)	0.426	0.0767	0.0283	0.2
Thallium-208	0.152	0.0362	0.0161	
Thorium-232 (By Actinium-228)	0.464	0.117	0.0709	0.9
Thorium-234	0.666 U	0.634	1.01	
Uranium-235	0.0297 U	0.0258	0.148	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-009	Received:	04/26/06
Lab ID:	244070-009	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 08:52
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	362 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.0853 U	0.136	0.107	0.9
Bismuth-212	0.791	0.438	0.241	
Bismuth-214	0.454	0.0825	0.0315	
Cesium-137	-0.00140 U	0.0237	0.0194	0.07
Cobalt-60	-0.0205 U b	0.0665	0.0521	0.03
Europium-152	0.0400 U	0.0682	0.0675	0.1
Europium-154	0.0261 U b	0.0576	0.230	0.2
Lead-212	0.452	0.0789	0.0415	
Lead-214	0.518	0.0848	0.0371	
Potassium-40	12.4	1.07	0.243	
Protactinium-234	0.0269 U	0.0624	0.0851	
Radium-226 (By Bismuth-214)	0.454	0.0825	0.0315	0.2
Thallium-208	0.204	0.0517	0.0224	
Thorium-232 (By Actinium-228)	0.501	0.116	0.0744	0.9
Thorium-234	0.549 U	0.408	0.992	
Uranium-235	0.0452 U	0.0244	0.136	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-010	Received:	04/26/06
Lab ID:	244070-010	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 08:54
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	384 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.00419 U	0.160	0.131	0.9
Bismuth-212	0.840	0.401	0.223	
Bismuth-214	0.554	0.0914	0.0332	
Cesium-137	0.0138 U	0.0272	0.0211	0.07
Cobalt-60	0.0291 U b	0.0535	0.0397	0.03
Europium-152	0.0512 U	0.0894	0.0685	0.1
Europium-154	0.0850 U	0.155	0.176	0.2
Lead-212	0.461	0.0718	0.0380	
Lead-214	0.525	0.0882	0.0409	
Potassium-40	11.3	1.02	0.280	
Protactinium-234	0.0518 U	0.109	0.0857	
Radium-226 (By Bismuth-214)	0.554	0.0914	0.0332	0.2
Thallium-208	0.135	0.0349	0.0164	
Thorium-232 (By Actinium-228)	0.555	0.108	0.0404	0.9
Thorium-234	0.922 U	0.667	1.08	
Uranium-235	0.0768 U	0.0394	0.159	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-011	Received:	04/26/06
Lab ID:	244070-011	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 09:41
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	374 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0472 U	0.156	0.126	0.9
Bismuth-212	0.841	0.480	0.256	
Bismuth-214	0.477	0.0917	0.0352	
Cesium-137	0.0102 U	0.0306	0.0243	0.07
Cobalt-60	0 U b	0.0315	0.0754	0.03
Europium-152	0.0366 U	0.0569	0.0697	0.1
Europium-154	0.0352 U b	0.106	0.205	0.2
Lead-212	0.445	0.0724	0.0376	
Lead-214	0.429	0.0699	0.0412	
Potassium-40	12.2	1.06	0.253	
Protactinium-234	0.00486 U	0.0650	0.0720	
Radium-226 (By Bismuth-214)	0.477	0.0917	0.0352	0.2
Thallium-208	0.193	0.0425	0.0175	
Thorium-232 (By Actinium-228)	0.604	0.116	0.0538	0.9
Thorium-234	0.302 U	0.625	0.995	
Uranium-235	0.0210 U	0.0404	0.133	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-012	Received:	04/26/06
Lab ID:	244070-012	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 09:42
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	350 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.101 U	0.162	0.128	0.9
Bismuth-212	0.436	0.435	0.286	
Bismuth-214	0.480	0.0864	0.0291	
Cesium-137	0.00100 U	0.0238	0.0195	0.07
Cobalt-60	0.0125 U b	0.0191	0.0505	0.03
Europium-152	0.0767	0.0883	0.0699	0.1
Europium-154	0.0164 U b	0.0571	0.241	0.2
Lead-212	0.501	0.0764	0.0380	
Lead-214	0.544	0.0987	0.0449	
Potassium-40	11.1	1.02	0.265	
Protactinium-234	-0.0395 U	0.112	0.0908	
Radium-226 (By Bismuth-214)	0.480	0.0864	0.0291	0.2
Thallium-208	0.205	0.0401	0.0163	
Thorium-232 (By Actinium-228)	0.555	0.108	0.0552	0.9
Thorium-234	1.04 U	1.47	1.16	
Uranium-235	0.0612 U	0.0417	0.138	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-013	Received:	04/26/06
Lab ID:	244070-013	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 10:28
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	348 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	0.0647 U	0.143	0.115	0.9
Bismuth-212	0.451	0.350	0.238	
Bismuth-214	0.421	0.0970	0.0419	
Cesium-137	0.00929 U	0.0232	0.0179	0.07
Cobalt-60	0.00421 U b	0.0445	0.0359	0.03
Europium-152	0.0556 U	0.0832	0.0731	0.1
Europium-154	0.178 U b	0.325	0.247	0.2
Lead-212	0.451	0.0728	0.0365	
Lead-214	0.497	0.0912	0.0448	
Potassium-40	9.14	0.967	0.282	
Protactinium-234	0.0549 U	0.0959	0.0701	
Radium-226 (By Bismuth-214)	0.421	0.0970	0.0419	0.2
Thallium-208	0.168	0.0354	0.0124	
Thorium-232 (By Actinium-228)	0.515	0.115	0.0774	0.9
Thorium-234	0.499 U	0.624	0.976	
Uranium-235	0.113	0.138	0.104	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-014	Received:	04/26/06
Lab ID:	244070-014	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 10:30
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	370 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0471 U	0.159	0.129	0.9
Bismuth-212	0.382	0.472	0.296	
Bismuth-214	0.410	0.0773	0.0309	
Cesium-137	-0.00761 U	0.0297	0.0237	0.07
Cobalt-60	0.00961 U	0.0304	0.0113	0.03
Europium-152	0.0603 U	0.0765	0.0808	0.1
Europium-154	0.0292 U b	0.0592	0.248	0.2
Lead-212	0.462	0.0709	0.0365	
Lead-214	0.482	0.0884	0.0401	
Potassium-40	11.4	1.01	0.261	
Protactinium-234	0.0269 U	0.0939	0.0911	
Radium-226 (By Bismuth-214)	0.410	0.0773	0.0309	0.2
Thallium-208	0.164	0.0405	0.0187	
Thorium-232 (By Actinium-228)	0.752	0.133	0.0630	0.9
Thorium-234	0.462 U	0.498	1.10	
Uranium-235	0.0718 U	0.0390	0.126	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-015	Received:	04/26/06
Lab ID:	244070-015	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 11:16
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	353 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0417 U	0.163	0.133	0.9
Bismuth-212	1.50	0.467	0.174	
Bismuth-214	0.559	0.113	0.0470	
Cesium-137	-0.000512 U	0.0241	0.0198	0.07
Cobalt-60	-0.0151 U b	0.0784	0.0630	0.03
Europium-152	0.00634 U	0.0207	0.0766	0.1
Europium-154	0.0640 U b	0.132	0.245	0.2
Lead-212	0.444	0.0721	0.0377	
Lead-214	0.520	0.0844	0.0350	
Potassium-40	12.4	1.09	0.267	
Protactinium-234	0.0504 U	0.102	0.0834	
Radium-226 (By Bismuth-214)	0.559	0.113	0.0470	0.2
Thallium-208	0.175	0.0479	0.0223	
Thorium-232 (By Actinium-228)	0.495	0.133	0.0627	0.9
Thorium-234	0.336 U	1.27	1.03	
Uranium-235	0.0374 U	0.0336	0.151	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-016	Received:	04/26/06
Lab ID:	244070-016	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 11:18
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	350 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0703 U	0.151	0.120	0.9
Bismuth-212	1.19	0.442	0.184	
Bismuth-214	0.495	0.103	0.0454	
Cesium-137	-0.0119 U	0.0309	0.0243	0.07
Cobalt-60	0.00749 U	0.0320	0.0119	0.03
Europium-152	0.0231 U	0.0465	0.0731	0.1
Europium-154	0.0539 U b	0.0605	0.237	0.2
Lead-212	0.486	0.0743	0.0383	
Lead-214	0.608	0.0987	0.0448	
Potassium-40	12.5	1.13	0.316	
Protactinium-234	0.0293 U	0.0422	0.0968	
Radium-226 (By Bismuth-214)	0.495	0.103	0.0454	0.2
Thallium-208	0.195	0.0427	0.0191	
Thorium-232 (By Actinium-228)	0.735	0.135	0.0644	0.9
Thorium-234	0.567 U	1.44	1.16	
Uranium-235	0.0669 U	0.0336	0.140	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-017	Received:	04/26/06
Lab ID:	244070-017	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 12:03
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	344 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0557 U	0.153	0.123	0.9
Bismuth-212	0.503	0.354	0.229	
Bismuth-214	0.431	0.0891	0.0339	
Cesium-137	-0.00183 U	0.0254	0.0207	0.07
Cobalt-60	0.000819 U b	0.0609	0.0501	0.03
Europium-152	0.0535 U	0.0814	0.0620	0.1
Europium-154	0.0425 U	0.0722	0.158	0.2
Lead-212	0.372	0.0752	0.0403	
Lead-214	0.485	0.0869	0.0404	
Potassium-40	7.43	0.896	0.288	
Protactinium-234	0.0320 U	0.0919	0.0834	
Radium-226 (By Bismuth-214)	0.431	0.0891	0.0339	0.2
Thallium-208	0.153	0.0365	0.0146	
Thorium-232 (By Actinium-228)	0.416	0.111	0.0350	0.9
Thorium-234	0.557 U	0.420	0.952	
Uranium-235	0.0487 U	0.0363	0.121	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-018	Received:	04/26/06
Lab ID:	244070-018	Prepared:	04/26/06 12:00
Matrix:	Soil	Analyzed:	01/07/13 12:05
Units:	pCi/g	Duration (sec):	2,700
Basis:	dry	Sample Amount:	376 g
Diln Fac:	1.00	Uncert. Sigma:	2
Batch#:	196773	Uncert. Units:	pCi/g
Sampled:	04/26/06 12:00		

Analyte	Result	Uncert	MDA	Project MDA
Americium-241	-0.0143 U	0.149	0.122	0.9
Bismuth-212	0.925	0.375	0.162	
Bismuth-214	0.496	0.0855	0.0297	
Cesium-137	-0.00844 U	0.0242	0.0190	0.07
Cobalt-60	0.0186 U b	0.0448	0.0449	0.03
Europium-152	0.0623 U	0.0787	0.0632	0.1
Europium-154	0.0253 U b	0.0584	0.206	0.2
Lead-212	0.510	0.0676	0.0320	
Lead-214	0.509	0.0968	0.0438	
Potassium-40	10.6	0.992	0.287	
Protactinium-234	0.0106 U	0.0747	0.0980	
Radium-226 (By Bismuth-214)	0.496	0.0855	0.0297	0.2
Thallium-208	0.117	0.0342	0.0196	
Thorium-232 (By Actinium-228)	0.462	0.108	0.0611	0.9
Thorium-234	0.839 U	0.630	1.03	
Uranium-235	0.0579 U	0.0280	0.138	0.18

U= Not Detected
b= See narrative
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present

Curtis & Tompkins, Ltd.

Batch QC Report

Gamma Radioactivity in Soil (Ingrowth)

Lab #:	244070	Location:	CT04
Client:	TetraTech	Prep:	GS 186/RA226 Prep
Project#:	40440004.0004	Analysis:	DOE HASL 300 4.5.2.3
Field ID:	06NPBRAO-001	Sampled:	04/26/06 12:00
Type:	IDUP	Received:	04/26/06
MSS Lab ID:	244070-001	Prepared:	04/26/06 00:00
Lab ID:	QC683538	Analyzed:	04/08/13 20:08
Matrix:	Soil	Duration (sec):	2,700
Units:	pCi/g	Sample Amount:	362 g
Basis:	dry	Uncert. Sigma:	2
Diln Fac:	1.00	Uncert. Units:	pCi/g
Batch#:	196773		

Analyte	MSS Result	MSS TPU	Result	TPU	MDA	Project MDA	RPD	Lim	RER	Lim
Americium-241	-0.0642 U	0.163	0.0812 U	0.114	0.0882	0.9	NC	40	NC	1
Bismuth-212	0.413	0.424	0.603	0.402	0.227		37.4	40	0.230	1
Bismuth-214	0.498	0.0865	0.524	0.0927	0.0313		5.20	40	0.148	1
Cesium-137	-0.0101 U	0.0301	0.000464 U	0.0236	0.0194	0.07	NC	40	NC	1
Cobalt-60	0.0246 U	0.0547	-0.00543 U b	0.0612	0.0497	0.03	NC	40	NC	1
Europium-152	0.121	0.102	0.0417 U	0.0749	0.0772	0.1	NC	40	NC	1
Europium-154	0.0324 U	0.181	0.0544 U b	0.148	0.215	0.2	NC	40	NC	1
Lead-212	0.486	0.0805	0.455	0.0794	0.0354		6.44	40	0.189	1
Lead-214	0.560	0.0960	0.601	0.0958	0.0401		7.00	40	0.212	1
Potassium-40	10.7	1.16	11.8	1.22	0.174		10.6	40	0.500	1
Protactinium-234	0.0434 U	0.107	-0.0565 U	0.117	0.0932		NC	40	NC	1
Radium-226 (By Bismuth-214)	0.498	0.0865	0.524	0.0927	0.0313	0.2	5.20	40	0.148	1
Thallium-208	0.188	0.0439	0.168	0.0461	0.0195		11.1	40	0.219	1
Thorium-232 (By Actinium-228)	0.566	0.124	0.650	0.140	0.0445	0.9	13.8	40	0.319	1
Thorium-234	0.703 U	0.568	0.663 U	0.514	1.01		NC	40	NC	1
Uranium-235	0.0748 U	0.0376	0.122 U	0.159	0.132	0.18	NC	40	NC	1

U= Not Detected
b= See narrative
NC= Not Calculated
MDA= estimate of the measured concentration that gives 99% confidence the analyte is present
RER= Relative Error Ratio
RPD= Relative Percent Difference
TPU= Total Propagated Uncertainty

STRONTIUM-90 ANALYSIS REPORT

Count Date:	7/24/2006	Instrument ID:	Protean WPC 9550	Count Time:	30 min
Batch ID:	NWTLAB072406-008	Detector ID:	0615608	Y-90 Efficiency:	47.6%
Performed By:	P Smith	Cal Due Date:	5/24/2007	Sr-90 Efficiency:	39.8%
				Sr-90 Added:	10 mg

Sample ID	Date Time Collected HH:MM:SS	Y-90 Date Time Start HH:MM:SS	Date Time Count HH:MM	Aliquot Mass grams	Initial Mass grams	Final Mass grams	Sr-90 Yield percent	Total CPM	Total Counts	Sr-90 Activity pCi/g	MDC pCi/g	2 Sigma Uncertainty pCi/g
06NPBRAO-006	4/26/06 12:00	7/24/06 1:38	7/24/06 13:22	10	9.2795	9.2890	93.0%	0.433	13	-0.123	0.194	0.171
06NPBRAO-005	4/26/06 14:00	7/24/06 1:38	7/24/06 14:23	10	9.2107	9.2202	93.0%	0.367	11	-0.204	0.194	0.220
Method Spike 1.0	7/22/06 0:00	7/24/06 1:38	7/24/06 12:52	10	9.1080	9.1175	93.0%	1.367	41	1.024	0.194	0.493
Blank	7/22/06 0:00	7/24/06 1:38	7/24/06 12:21	10	9.3800	9.3802		0.533	16			

AlphaVision v5.3

Alpha-Spectroscopy Analysis Report

ORTEC
Oak Ridge, TN 37830
7:11:45AM 5/6/2009

Analyst: ORTEC

Sample

Sample: Pu 06NPBRAO-010 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Weight : 2.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Pu Batch 6
:
Description:

Client Name: Hunters Point Ttec
Client Contact: D. Delong

Tracer

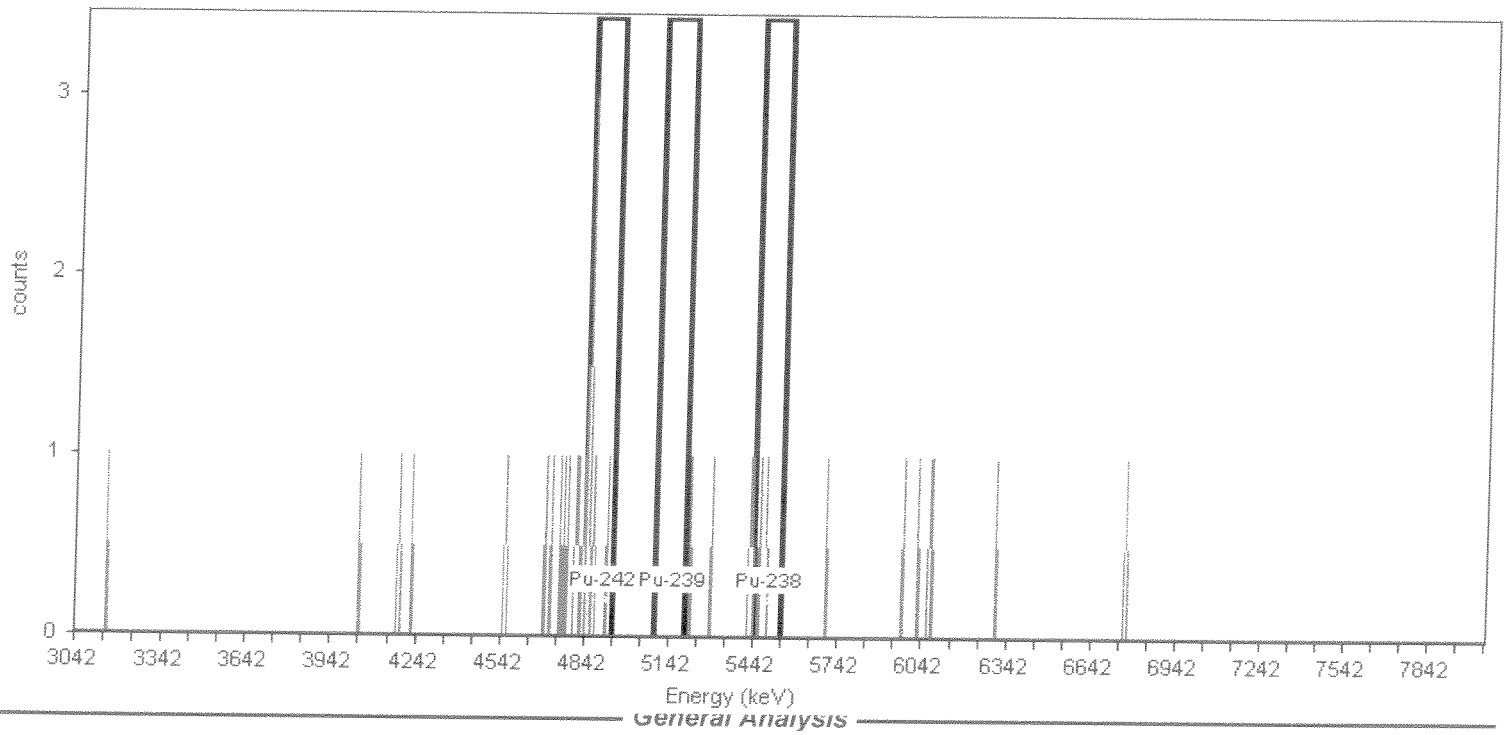
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 85.00%

Acquisition

Detector: Detector 5 SN:
Acquisition Start Date: 5/5/2009 11:10:53AM
Live Time: 1,200.00 min.
Real Time: 1,200.01 min.
Background Date: 12/18/2008 3:11:15PM
Bkgd Info: Sample: Det 5 Bkg; Det: Detector 5; Spectrum #1; Dec-18-2008 15:11

Energy Calibration: Det 5 2009.01.13
Efficiency Calibration:Det 5 2009.01.13
Calibration Date: 1/13/2009 12:44:19PM
Energy Cal: Gain = 4.8953 keV / Ch
Offset = 3.037 17 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 34.19% +/- 0.17% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Batch Plutonium Isotopes
Decay Correction:5/4/2009 10:29:04AM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Batch Plutonium Fraction
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity pCi/g	2.00Sigma TPU pCi/g	Critical Level pCi/g	MDA pCi/g
Pu-242	4901.000	4841.000	4941.000	15.195	100.4	6.00	0.0000	6	3.860E-003	3.413E-003	0.000E+000	1.741E-003
Pu-239	5155.000	5095.000	5195.000	.000	99.9	0.00	0.0000	0	0.000E+000	1.829E-003	0.000E+000	1.749E-003
Pu-238	5499.000	5439.000	5539.000	.000	99.9	2.36	0.0000	2	1.529E-003	2.374E-003	0.000E+000	1.749E-003

AlphaVision v5.3

Alpha-Spectroscopy Analysis Report

ORTEC
Oak Ridge, TN 37830
6:47:29AM 5/7/2009

Analyst: ORTEC

Sample

Sample: Pu 06NPBRAO-018 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Weight : 2.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Pu Batch 6
:
Description:

Client Name: Hunters Point Ttec
Client Contact: D. Delong

Tracer

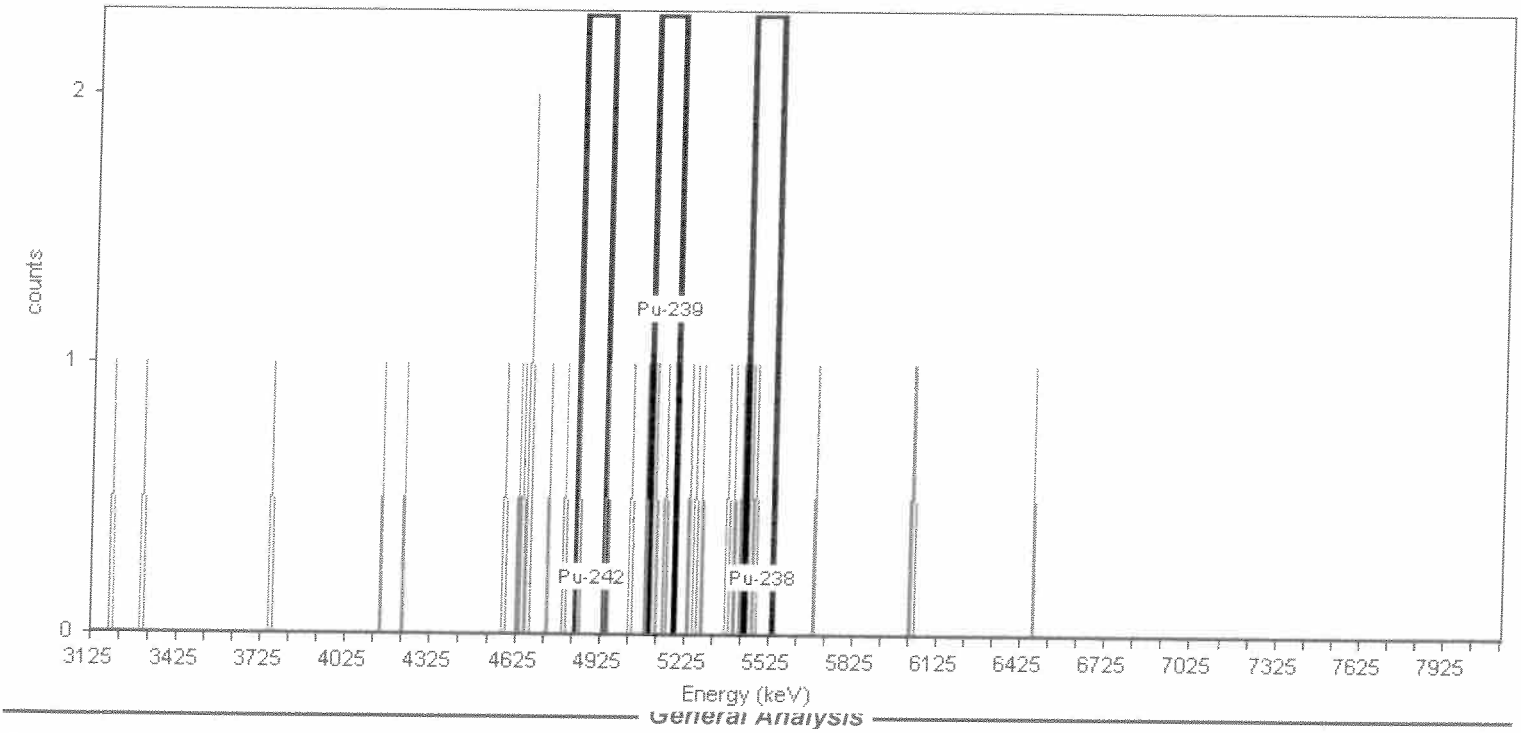
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 85.00%

Acquisition

Detector: Detector 6 SN:
Acquisition Start Date: 5/6/2009 10:47:50AM
Live Time: 1,200.00 min.
Real Time: 1,200.02 min.
Background Date: 12/18/2008 3:11:17PM
Bkgd Info: Sample: Det 6 Bkg; Det: Detector 6; Spectrum #1; Dec-18-2008 15:11

Energy Calibration: Det 6 2009.01.13
Efficiency Calibration:Det 6 2009.01.13
Calibration Date: 1/13/2009 12:59:08PM
Energy Cal: Gain = 4.8987 keV / Ch
Offset = 3,120.65 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 34.06% +/- 0.17% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Batch Plutonium Isotopes
Decay Correction:5/4/2009 10:29:04AM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Batch Plutonium Fraction
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity pCi/g	2.00Sigma TPU pCi/g	Critical Level pCi/g	MDA pCi/g
Pu-242	4901.000	4841.000	4941.000	13.393	100.4	1.00	1.0000	0	0.000E+000	1.827E-003	1.502E-003	4.752E-003
Pu-239	5155.000	5095.000	5195.000	11.424	99.9	3.00	0.0000	3	1.947E-003	2.599E-003	0.000E+000	1.756E-003
Pu-238	5499.000	5439.000	5539.000	26.662	99.9	4.00	0.7446	3	2.113E-003	2.831E-003	1.303E-003	4.362E-003

AlphaVision v5.3

Alpha-Spectroscopy Analysis Report

Analyst: ORTEC

ORTEC
Oak Ridge, TN 37830
1:12:42PM 5/5/2009

Sample

Sample: U 06NPBRAO-010 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Weight : 2.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U Batch 6
:
Description:

Client Name: Hunters Point Ttec
Client Contact: D. Delong

Tracer

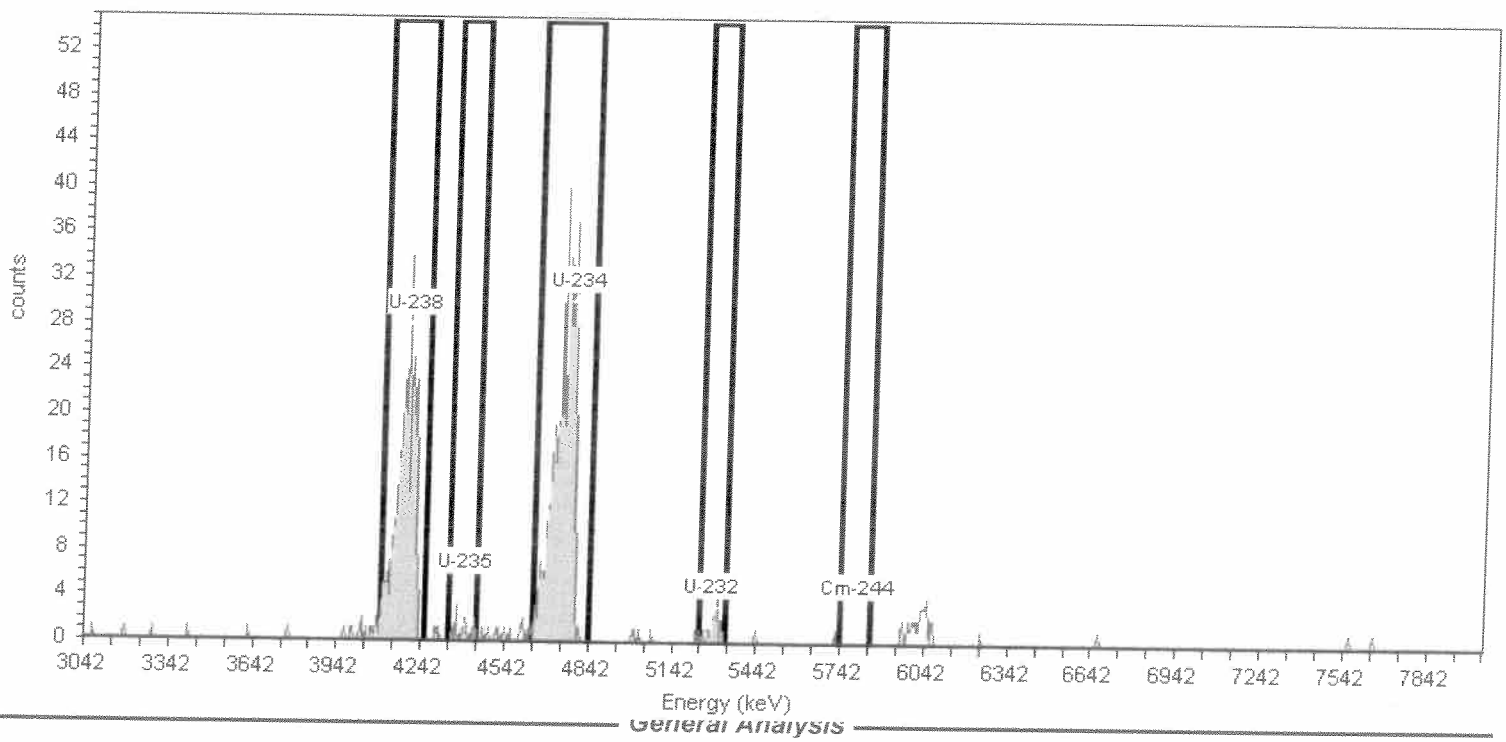
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 75.00%

Acquisition

Detector: Detector 5 SN:
Acquisition Start Date: 5/4/2009 12:15:53PM
Live Time: 1,200.00 min.
Real Time: 1,200.02 min.
Background Date: 12/18/2008 3:11:15PM
Bkgd Info: Sample: Det 5 Bkg; Det: Detector 5; Spectrum #1; Dec-18-2008 15:11

Energy Calibration: Det 5 2009.01.13
Efficiency Calibration:Det 5 2009.01.13
Calibration Date: 1/13/2009 12:44:19PM
Energy Cal: Gain = 4.8953 keV / Ch
Offset = 3,037.17 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 34.19% +/- 0.17% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:None
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Batch Uranium Fraction
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity pCi/g	2.00Sigma TPU pCi/g	Critical Level pCi/g	MDA pCi/g
U-238	4195.997	4089.670	4251.216	71.406	100.0	378.00	1.0000	377	2.759E-001	3.303E-002	1.703E-003	5.386E-003
U-235	4395.996	4336.000	4436.000	68.576	72.0	11.51	0.0000	12	1.170E-002	7.225E-003	0.000E+000	2.751E-003
U-234	4775.997	4642.844	4838.658	74.337	99.8	509.00	0.0000	509	3.733E-001	4.009E-002	0.000E+000	1.985E-003
U-232	5281.686	5235.181	5328.192	21.644	99.8	22.00	0.0000	22	1.614E-002	7.102E-003	0.000E+000	1.985E-003
Cm-244	5804.999	5745.000	5845.000	.000	100.0	0.00	0.0000	0	0.000E+000	2.070E-003	0.000E+000	1.981E-003

AlphaVision v5.3

Alpha-Spectroscopy Analysis Report

ORTEC
Oak Ridge, TN 37830
9:00:56AM 5/7/2009

Analyst: ORTEC

Sample

Sample: U 06NPBRAO-018 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Weight : 2.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U Batch 6
:
Description:

Client Name: Hunters Point Ttec
Client Contact: D. Delong

Tracer

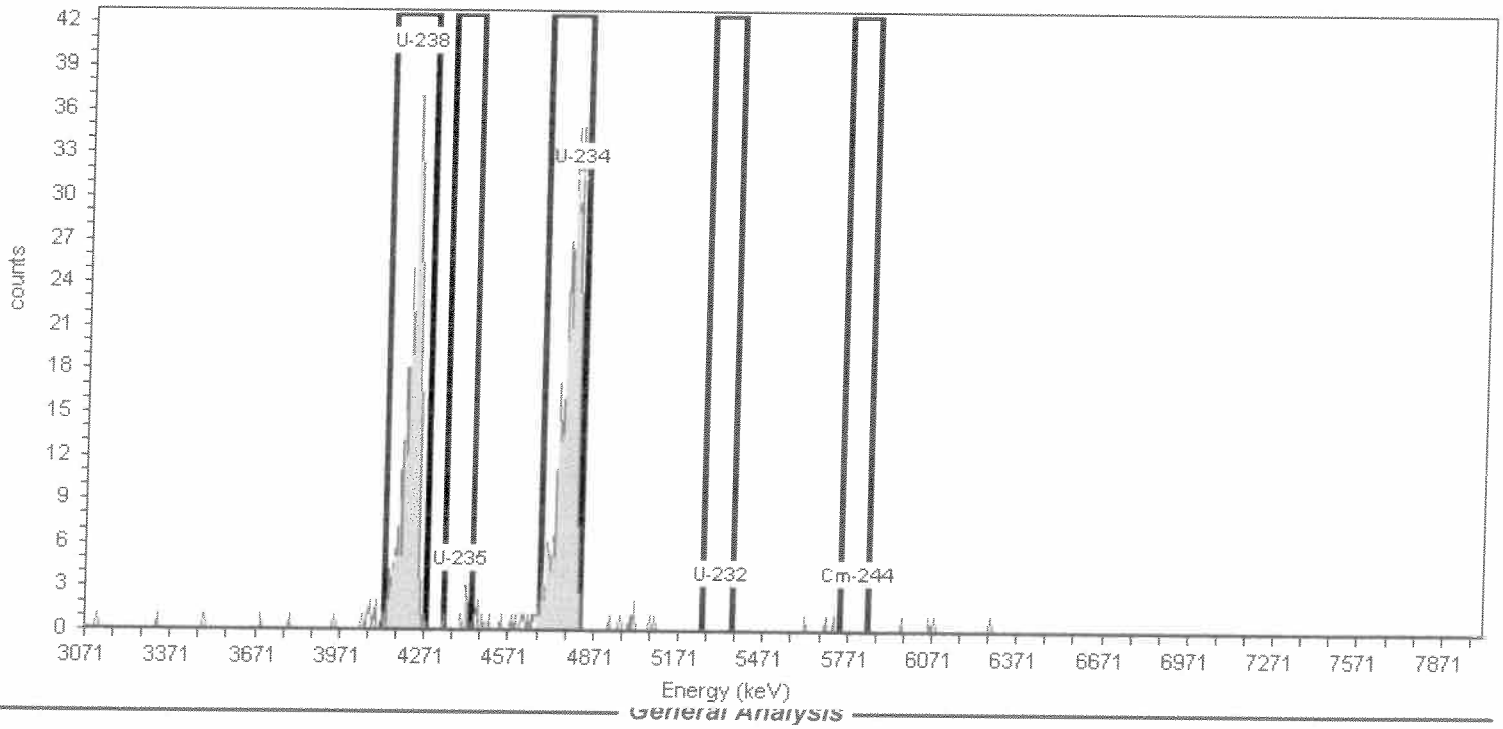
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 75.00%

Acquisition

Detector: Detector 7 SN:
Acquisition Start Date: 5/5/2009 11:20:01AM
Live Time: 1,200.00 min.
Real Time: 1,200.01 min.
Background Date: 12/18/2008 3:11:19PM
Bkgd Info: Sample: Det 7 Bkg; Det: Detector 7; Spectrum #1; Dec-18-2008 15:11

Energy Calibration: Det 7 2009.01.13
Efficiency Calibration:Det 7 2009.01.13
Calibration Date: 1/13/2009 1:09:02PM
Energy Cal: Gain = 4.8366 keV / Ch
Offset = 3,066.86 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 34.14% +/- 0.17% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:None
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Batch Uranium Fraction
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity pCi/g	2.00Sigma TPU pCi/g	Critical Level pCi/g	MDA pCi/g
U-238	4217.981	4126.085	4276.021	45.113	100.0	354.00	0.0000	354	2.595E-001	3.177E-002	0.000E+000	1.984E-003
U-235	4395.998	4336.000	4436.000	14.291	72.0	8.68	1.0000	8	7.814E-003	6.351E-003	2.368E-003	7.492E-003
U-234	4793.540	4677.461	4822.560	45.782	99.8	392.00	5.0000	387	2.843E-001	3.395E-002	3.821E-003	9.629E-003
U-232	5319.998	5260.000	5360.000	000	99.8	0.00	0.0000	0	0.000E+000	2.077E-003	0.000E+000	1.988E-003
Cm-244	5804.996	5745.000	5845.000	000	100.0	0.00	0.0000	0	0.000E+000	2.073E-003	0.000E+000	1.984E-003

ATTACHMENT 6
TU 211-01 RESRAD Dose Results
(21 pages)

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(5)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(6)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(7)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(8)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(9)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(10)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(11)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(12)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(13)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(14)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(15)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(16)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(17)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(19)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(20)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(21)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(22)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(23)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(24)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(2)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(3)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(4)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(2)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(3)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(4)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(2,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(2,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(2,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(2,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.547E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.200E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Cs-137	3.900E-02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pb-210	1.560E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.560E-01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.090E-01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-228	1.090E-01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	1.090E-01	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.623E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.663E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.774E-01	FPLANT
R018	Contamination fraction of meat	-1	-1	0.773E-02	FMEAT
R018	Contamination fraction of milk	-1	-1	0.773E-02	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	154.70 square meters	Cs-137	3.900E-02
Thickness:	2.00 meters	Pb-210	1.560E-01
Cover Depth:	0.00 meters	Ra-226	1.560E-01
		Ra-228	1.090E-01
		Th-228	1.090E-01
		Th-232	1.090E-01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 1.200E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.159E+00	2.153E+00	2.142E+00	2.104E+00	2.021E+00	1.810E+00	1.436E+00	1.158E+00
M(t):	1.799E-01	1.794E-01	1.785E-01	1.753E-01	1.684E-01	1.508E-01	1.196E-01	9.654E-02

Maximum TDOSE(t): 2.159E+00 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.427E-02	0.0298	5.089E-08	0.0000	0.000E+00	0.0000	1.038E-03	0.0005	9.075E-05	0.0000	2.963E-05	0.0000	8.163E-06	0.0000
Pb-210	4.739E-04	0.0002	1.473E-04	0.0001	0.000E+00	0.0000	1.503E-01	0.0696	5.139E-04	0.0002	2.504E-04	0.0001	4.729E-03	0.0022
Ra-226	8.557E-01	0.3964	5.770E-05	0.0000	0.000E+00	0.0000	1.136E-01	0.0526	3.358E-04	0.0002	4.008E-04	0.0002	9.453E-04	0.0004
Ra-228	3.853E-01	0.1785	2.623E-04	0.0001	0.000E+00	0.0000	8.029E-02	0.0372	2.351E-04	0.0001	2.845E-04	0.0001	6.841E-04	0.0003
Th-228	4.567E-01	0.2116	1.307E-03	0.0006	0.000E+00	0.0000	9.958E-04	0.0005	2.047E-06	0.0000	1.460E-07	0.0000	3.131E-04	0.0001
Th-232	2.207E-02	0.0102	7.408E-03	0.0034	0.000E+00	0.0000	8.645E-03	0.0040	1.876E-05	0.0000	1.498E-05	0.0000	1.301E-03	0.0006
Total	1.785E+00	0.8267	9.182E-03	0.0043	0.000E+00	0.0000	3.549E-01	0.1644	1.196E-03	0.0006	9.804E-04	0.0005	7.981E-03	0.0037

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.543E-02	0.0303
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-01	0.0725
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.710E-01	0.4498
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.671E-01	0.2164
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.593E-01	0.2128
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.946E-02	0.0183
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.159E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.280E-02	0.0292	4.972E-08	0.0000	0.000E+00	0.0000	1.014E-03	0.0005	8.867E-05	0.0000	2.895E-05	0.0000	7.977E-06	0.0000
Pb-210	4.587E-04	0.0002	1.426E-04	0.0001	0.000E+00	0.0000	1.455E-01	0.0676	4.974E-04	0.0002	2.423E-04	0.0001	4.577E-03	0.0021
Ra-226	8.533E-01	0.3963	6.204E-05	0.0000	0.000E+00	0.0000	1.179E-01	0.0548	3.514E-04	0.0002	4.076E-04	0.0002	1.087E-03	0.0005
Ra-228	4.709E-01	0.2187	6.042E-04	0.0003	0.000E+00	0.0000	7.137E-02	0.0331	2.089E-04	0.0001	2.516E-04	0.0001	6.942E-04	0.0003
Th-228	3.179E-01	0.1476	9.095E-04	0.0004	0.000E+00	0.0000	6.932E-04	0.0003	1.425E-06	0.0000	1.017E-07	0.0000	2.179E-04	0.0001
Th-232	7.429E-02	0.0345	7.462E-03	0.0035	0.000E+00	0.0000	1.773E-02	0.0082	4.485E-05	0.0000	4.672E-05	0.0000	1.385E-03	0.0006
Total	1.780E+00	0.8265	9.181E-03	0.0043	0.000E+00	0.0000	3.542E-01	0.1645	1.193E-03	0.0006	9.774E-04	0.0005	7.969E-03	0.0037

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.394E-02	0.0297
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-01	0.0703
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.731E-01	0.4520
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.440E-01	0.2527
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.197E-01	0.1485
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.010E-01	0.0469
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.153E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.996E-02	0.0280	4.748E-08	0.0000	0.000E+00	0.0000	9.682E-04	0.0005	8.466E-05	0.0000	2.764E-05	0.0000	7.616E-06	0.0000
Pb-210	4.296E-04	0.0002	1.335E-04	0.0001	0.000E+00	0.0000	1.363E-01	0.0636	4.658E-04	0.0002	2.270E-04	0.0001	4.287E-03	0.0020
Ra-226	8.486E-01	0.3962	7.024E-05	0.0000	0.000E+00	0.0000	1.260E-01	0.0588	3.793E-04	0.0002	4.199E-04	0.0002	1.356E-03	0.0006
Ra-228	5.114E-01	0.2388	8.821E-04	0.0004	0.000E+00	0.0000	5.612E-02	0.0262	1.640E-04	0.0001	1.968E-04	0.0001	6.410E-04	0.0003
Th-228	1.540E-01	0.0719	4.407E-04	0.0002	0.000E+00	0.0000	3.358E-04	0.0002	6.904E-07	0.0000	4.925E-08	0.0000	1.056E-04	0.0000
Th-232	1.953E-01	0.0912	7.650E-03	0.0036	0.000E+00	0.0000	3.303E-02	0.0154	8.959E-05	0.0000	1.005E-04	0.0000	1.547E-03	0.0007
Total	1.770E+00	0.8263	9.176E-03	0.0043	0.000E+00	0.0000	3.527E-01	0.1647	1.184E-03	0.0006	9.719E-04	0.0005	7.943E-03	0.0037

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.104E-02	0.0285
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.418E-01	0.0662
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.768E-01	0.4561
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.694E-01	0.2659
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.549E-01	0.0723
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-01	0.1110
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.142E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.099E-02	0.0242	4.038E-08	0.0000	0.000E+00	0.0000	8.234E-04	0.0004	7.200E-05	0.0000	2.351E-05	0.0000	6.477E-06	0.0000
Pb-210	3.416E-04	0.0002	1.062E-04	0.0001	0.000E+00	0.0000	1.083E-01	0.0515	3.704E-04	0.0002	1.805E-04	0.0001	3.409E-03	0.0016
Ra-226	8.321E-01	0.3955	9.458E-05	0.0000	0.000E+00	0.0000	1.498E-01	0.0712	4.615E-04	0.0002	4.554E-04	0.0002	2.154E-03	0.0010
Ra-228	2.965E-01	0.1409	6.024E-04	0.0003	0.000E+00	0.0000	2.391E-02	0.0114	6.973E-05	0.0000	8.328E-05	0.0000	3.261E-04	0.0002
Th-228	1.219E-02	0.0058	3.488E-05	0.0000	0.000E+00	0.0000	2.659E-05	0.0000	5.465E-08	0.0000	3.899E-09	0.0000	8.359E-06	0.0000
Th-232	5.451E-01	0.2591	8.322E-03	0.0040	0.000E+00	0.0000	6.492E-02	0.0309	1.827E-04	0.0001	2.119E-04	0.0001	1.951E-03	0.0009
Total	1.737E+00	0.8256	9.160E-03	0.0044	0.000E+00	0.0000	3.478E-01	0.1653	1.156E-03	0.0005	9.546E-04	0.0005	7.855E-03	0.0037

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.191E-02	0.0247
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-01	0.0536
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.850E-01	0.4681
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.214E-01	0.1528
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.226E-02	0.0058
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.207E-01	0.2950
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.104E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	3.210E-02	0.0159	2.542E-08	0.0000	0.000E+00	0.0000	5.183E-04	0.0003	4.532E-05	0.0000	1.480E-05	0.0000	4.077E-06	0.0000
Pb-210	1.775E-04	0.0001	5.515E-05	0.0000	0.000E+00	0.0000	5.628E-02	0.0279	1.924E-04	0.0001	9.375E-05	0.0000	1.771E-03	0.0009
Ra-226	7.868E-01	0.3894	1.364E-04	0.0001	0.000E+00	0.0000	1.895E-01	0.0938	6.001E-04	0.0003	5.103E-04	0.0003	3.544E-03	0.0018
Ra-228	2.693E-02	0.0133	5.603E-05	0.0000	0.000E+00	0.0000	2.050E-03	0.0010	5.974E-06	0.0000	7.127E-06	0.0000	2.898E-05	0.0000
Th-228	8.690E-06	0.0000	2.486E-08	0.0000	0.000E+00	0.0000	1.895E-08	0.0000	3.895E-11	0.0000	2.779E-12	0.0000	5.958E-09	0.0000
Th-232	8.214E-01	0.4064	8.891E-03	0.0044	0.000E+00	0.0000	8.638E-02	0.0427	2.452E-04	0.0001	2.866E-04	0.0001	2.250E-03	0.0011
Total	1.667E+00	0.8251	9.139E-03	0.0045	0.000E+00	0.0000	3.347E-01	0.1656	1.089E-03	0.0005	9.126E-04	0.0005	7.598E-03	0.0038

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.268E-02	0.0162
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.857E-02	0.0290
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.811E-01	0.4855
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.908E-02	0.0144
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.740E-06	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.194E-01	0.4550
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.021E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.353E-03	0.0035	5.030E-09	0.0000	0.000E+00	0.0000	1.026E-04	0.0001	8.971E-06	0.0000	2.929E-06	0.0000	8.070E-07	0.0000
Pb-210	1.793E-05	0.0000	5.573E-06	0.0000	0.000E+00	0.0000	5.687E-03	0.0031	1.944E-05	0.0000	9.473E-06	0.0000	1.789E-04	0.0001
Ra-226	6.466E-01	0.3572	1.533E-04	0.0001	0.000E+00	0.0000	1.978E-01	0.1093	6.370E-04	0.0004	4.894E-04	0.0003	4.236E-03	0.0023
Ra-228	4.939E-06	0.0000	1.028E-08	0.0000	0.000E+00	0.0000	3.757E-07	0.0000	1.095E-09	0.0000	1.306E-09	0.0000	5.313E-09	0.0000
Th-228	8.400E-17	0.0000	2.404E-19	0.0000	0.000E+00	0.0000	1.832E-19	0.0000	3.766E-22	0.0000	2.686E-23	0.0000	5.759E-20	0.0000
Th-232	8.476E-01	0.4683	8.944E-03	0.0049	0.000E+00	0.0000	8.838E-02	0.0488	2.511E-04	0.0001	2.935E-04	0.0002	2.278E-03	0.0013
Total	1.501E+00	0.8290	9.103E-03	0.0050	0.000E+00	0.0000	2.920E-01	0.1613	9.165E-04	0.0005	7.954E-04	0.0004	6.695E-03	0.0037

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.468E-03	0.0036
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.918E-03	0.0033
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.499E-01	0.4696
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.333E-06	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.449E-17	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.478E-01	0.5236
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.810E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.208E-05	0.0000	4.916E-11	0.0000	0.000E+00	0.0000	1.002E-06	0.0000	8.766E-08	0.0000	2.862E-08	0.0000	7.886E-09	0.0000
Pb-210	2.566E-08	0.0000	7.976E-09	0.0000	0.000E+00	0.0000	8.140E-06	0.0000	2.783E-08	0.0000	1.356E-08	0.0000	2.561E-07	0.0000
Ra-226	3.689E-01	0.2569	9.074E-05	0.0001	0.000E+00	0.0000	1.162E-01	0.0809	3.749E-04	0.0003	2.848E-04	0.0002	2.522E-03	0.0018
Ra-228	1.040E-16	0.0000	2.163E-19	0.0000	0.000E+00	0.0000	7.908E-18	0.0000	2.305E-20	0.0000	2.749E-20	0.0000	1.118E-19	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	8.472E-01	0.5901	8.939E-03	0.0062	0.000E+00	0.0000	8.833E-02	0.0615	2.509E-04	0.0002	2.934E-04	0.0002	2.277E-03	0.0016
Total	1.216E+00	0.8471	9.030E-03	0.0063	0.000E+00	0.0000	2.045E-01	0.1425	6.259E-04	0.0004	5.782E-04	0.0004	4.800E-03	0.0033

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.321E-05	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.471E-06	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.883E-01	0.3401
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.122E-16	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.472E-01	0.6598
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.436E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.727E-12	0.0000	4.535E-18	0.0000	0.000E+00	0.0000	9.248E-14	0.0000	8.087E-15	0.0000	2.640E-15	0.0000	7.274E-16	0.0000
Pb-210	2.847E-18	0.0000	8.848E-19	0.0000	0.000E+00	0.0000	9.029E-16	0.0000	3.087E-18	0.0000	1.504E-18	0.0000	2.841E-17	0.0000
Ra-226	5.170E-02	0.0446	1.272E-05	0.0000	0.000E+00	0.0000	1.629E-02	0.0141	5.255E-05	0.0000	3.992E-05	0.0000	3.536E-04	0.0003
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	8.455E-01	0.7298	8.922E-03	0.0077	0.000E+00	0.0000	8.816E-02	0.0761	2.504E-04	0.0002	2.928E-04	0.0003	2.273E-03	0.0020
Total	8.972E-01	0.7745	8.935E-03	0.0077	0.000E+00	0.0000	1.044E-01	0.0902	3.030E-04	0.0003	3.327E-04	0.0003	2.626E-03	0.0023

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.831E-12	0.0000
Pb-210	2.847E-15	0.0000	5.967E-18	0.0000	0.000E+00	0.0000	3.395E-17	0.0000	3.772E-19	0.0000	3.096E-19	0.0000	3.828E-15	0.0000
Ra-226	1.426E-01	0.1231	2.552E-04	0.0002	0.000E+00	0.0000	1.704E-03	0.0015	1.991E-05	0.0000	2.296E-05	0.0000	2.131E-01	0.1839
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.454E-01	0.8161
Total	1.426E-01	0.1231	2.552E-04	0.0002	0.000E+00	0.0000	1.704E-03	0.0015	1.991E-05	0.0000	2.296E-05	0.0000	1.158E+00	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137+D	Cs-137+D	1.000E+00	1.678E+00	1.639E+00	1.565E+00	1.331E+00	8.380E-01	1.659E-01	1.621E-03	1.495E-10
Pb-210+D	Pb-210+D	1.000E+00	1.003E+00	9.705E-01	9.090E-01	7.228E-01	3.755E-01	3.794E-02	5.430E-05	2.454E-14
Ra-226+D	Ra-226+D	1.000E+00	6.206E+00	6.188E+00	6.154E+00	6.034E+00	5.705E+00	4.687E+00	2.674E+00	5.649E-01
Ra-226+D	Pb-210+D	1.000E+00	1.846E-02	4.950E-02	1.075E-01	2.803E-01	5.846E-01	7.612E-01	4.566E-01	8.011E-01
Ra-226+D	∑DSR(j)		6.224E+00	6.238E+00	6.261E+00	6.314E+00	6.289E+00	5.448E+00	3.130E+00	1.366E+00
Ra-228+D	Ra-228+D	1.000E+00	3.505E+00	3.099E+00	2.424E+00	1.025E+00	8.773E-02	1.608E-05	3.384E-16	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	7.806E-01	1.892E+00	2.800E+00	1.924E+00	1.791E-01	3.284E-05	6.913E-16	0.000E+00
Ra-228+D	∑DSR(j)		4.285E+00	4.991E+00	5.224E+00	2.949E+00	2.668E-01	4.892E-05	1.030E-15	0.000E+00
Th-228+D	Th-228+D	1.000E+00	4.214E+00	2.933E+00	1.421E+00	1.125E-01	8.018E-05	7.751E-16	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.164E-01	1.162E-01
Th-232	Ra-228+D	1.000E+00	2.127E-01	6.098E-01	1.272E+00	2.644E+00	3.563E+00	3.648E+00	3.646E+00	3.639E+00
Th-232	Th-228+D	1.000E+00	3.275E-02	1.999E-01	7.917E-01	2.934E+00	4.755E+00	4.930E+00	4.927E+00	4.918E+00
Th-232	∑DSR(j)		3.620E-01	9.263E-01	2.181E+00	5.695E+00	8.435E+00	8.695E+00	8.690E+00	8.673E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 1.200E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	7.152E+00	7.320E+00	7.667E+00	9.015E+00	1.432E+01	7.235E+01	7.404E+03	8.026E+10
Pb-210	1.197E+01	1.236E+01	1.320E+01	1.660E+01	3.196E+01	3.163E+02	2.210E+05	*7.634E+13
Ra-226	1.928E+00	1.924E+00	1.917E+00	1.900E+00	1.908E+00	2.203E+00	3.834E+00	8.785E+00
Ra-228	2.800E+00	2.404E+00	2.297E+00	4.069E+00	4.498E+01	2.453E+05	*2.726E+14	*2.726E+14
Th-228	2.848E+00	4.091E+00	8.444E+00	1.067E+02	1.497E+05	*8.195E+14	*8.195E+14	*8.195E+14
Th-232	3.315E+01	1.296E+01	5.503E+00	2.107E+00	1.423E+00	1.380E+00	1.381E+00	1.384E+00

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Cs-137	3.900E-02	0.000E+00	1.678E+00	7.152E+00	1.678E+00	7.152E+00
Pb-210	1.560E-01	0.000E+00	1.003E+00	1.197E+01	1.003E+00	1.197E+01
Ra-226	1.560E-01	17.15 ± 0.03	6.331E+00	1.896E+00	6.224E+00	1.928E+00
Ra-228	1.090E-01	2.368 ± 0.005	5.266E+00	2.279E+00	4.285E+00	2.800E+00
Th-228	1.090E-01	0.000E+00	4.214E+00	2.848E+00	4.214E+00	2.848E+00
Th-232	1.090E-01	89.0 ± 0.2	8.695E+00	1.380E+00	3.620E-01	3.315E+01

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	Cs-137	1.000E+00	6.543E-02	6.394E-02	6.104E-02	5.191E-02	3.268E-02	6.468E-03	6.321E-05	5.831E-12
Pb-210	Pb-210	1.000E+00	1.564E-01	1.514E-01	1.418E-01	1.128E-01	5.857E-02	5.918E-03	8.471E-06	3.828E-15
Pb-210	Ra-226	1.000E+00	2.879E-03	7.722E-03	1.676E-02	4.373E-02	9.120E-02	1.188E-01	7.123E-02	1.250E-01
Pb-210	∑DOSE(j)		1.593E-01	1.591E-01	1.586E-01	1.565E-01	1.498E-01	1.247E-01	7.124E-02	1.250E-01
Ra-226	Ra-226	1.000E+00	9.681E-01	9.654E-01	9.600E-01	9.413E-01	8.899E-01	7.312E-01	4.171E-01	8.813E-02
Ra-228	Ra-228	1.000E+00	3.820E-01	3.378E-01	2.642E-01	1.117E-01	9.562E-03	1.753E-06	3.689E-17	0.000E+00
Ra-228	Th-232	1.000E+00	2.319E-02	6.647E-02	1.387E-01	2.882E-01	3.884E-01	3.977E-01	3.975E-01	3.967E-01
Ra-228	∑DOSE(j)		4.052E-01	4.043E-01	4.029E-01	3.999E-01	3.979E-01	3.977E-01	3.975E-01	3.967E-01
Th-228	Ra-228	1.000E+00	8.509E-02	2.062E-01	3.052E-01	2.097E-01	1.952E-02	3.580E-06	7.535E-17	0.000E+00
Th-228	Th-228	1.000E+00	4.593E-01	3.197E-01	1.549E-01	1.226E-02	8.740E-06	8.449E-17	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	3.569E-03	2.179E-02	8.630E-02	3.198E-01	5.183E-01	5.374E-01	5.371E-01	5.360E-01
Th-228	∑DOSE(j)		5.480E-01	5.477E-01	5.464E-01	5.418E-01	5.379E-01	5.374E-01	5.371E-01	5.360E-01
Th-232	Th-232	1.000E+00	1.270E-02	1.270E-02	1.270E-02	1.270E-02	1.270E-02	1.270E-02	1.269E-02	1.267E-02

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-137	Cs-137	1.000E+00	3.900E-02	3.811E-02	3.638E-02	3.094E-02	1.948E-02	3.855E-03	3.767E-05	3.475E-12
Pb-210	Pb-210	1.000E+00	1.560E-01	1.510E-01	1.414E-01	1.124E-01	5.841E-02	5.902E-03	8.447E-06	9.370E-16
Pb-210	Ra-226	1.000E+00	0.000E+00	4.764E-03	1.380E-02	4.074E-02	8.824E-02	1.162E-01	6.977E-02	9.781E-03
Pb-210	∑S(j):		1.560E-01	1.557E-01	1.552E-01	1.532E-01	1.466E-01	1.221E-01	6.977E-02	9.781E-03
Ra-226	Ra-226	1.000E+00	1.560E-01	1.556E-01	1.547E-01	1.517E-01	1.434E-01	1.178E-01	6.721E-02	9.421E-03
Ra-228	Ra-228	1.000E+00	1.090E-01	9.639E-02	7.538E-02	3.189E-02	2.728E-03	5.001E-07	1.053E-17	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	1.236E-02	3.297E-02	7.562E-02	1.042E-01	1.069E-01	1.068E-01	1.066E-01
Ra-228	∑S(j):		1.090E-01	1.088E-01	1.084E-01	1.075E-01	1.069E-01	1.069E-01	1.068E-01	1.066E-01
Th-228	Ra-228	1.000E+00	0.000E+00	3.106E-02	5.846E-02	4.385E-02	4.126E-03	7.568E-07	1.593E-17	0.000E+00
Th-228	Th-228	1.000E+00	1.090E-01	7.587E-02	3.676E-02	2.910E-03	2.074E-06	2.005E-17	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	2.031E-03	1.352E-02	6.103E-02	1.028E-01	1.069E-01	1.068E-01	1.066E-01
Th-228	∑S(j):		1.090E-01	1.090E-01	1.087E-01	1.078E-01	1.070E-01	1.069E-01	1.068E-01	1.066E-01
Th-232	Th-232	1.000E+00	1.090E-01	1.090E-01	1.090E-01	1.090E-01	1.090E-01	1.090E-01	1.089E-01	1.087E-01

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 3.58 seconds

ATTACHMENT 7
TU 211-01 RESRAD Risk Results
(28 pages)

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Cancer Risk Slope Factors Summary Table
Risk Library: FGR 13 Morbidity

Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Cs-137+D	2.55E-06	5.32E-10	SLPF(1,1)
Sf-1	Pb-210+D	4.21E-09	1.41E-09	SLPF(2,1)
Sf-1	Ra-226+D	8.49E-06	2.29E-08	SLPF(3,1)
Sf-1	Ra-228+D	4.53E-06	0.00E+00	SLPF(4,1)
Sf-1	Th-228+D	7.76E-06	5.59E-09	SLPF(5,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(6,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Cs-137+D	1.12E-10	1.12E-10	SLPF(1,2)
Sf-2	Pb-210+D	3.08E-08	1.58E-08	SLPF(2,2)
Sf-2	Ra-226+D	2.83E-08	2.82E-08	SLPF(3,2)
Sf-2	Ra-228+D	4.37E-08	4.37E-08	SLPF(4,2)
Sf-2	Th-228+D	1.44E-07	1.32E-07	SLPF(5,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(6,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.74E-11	3.74E-11	SLPF(1,3)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(2,3)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(3,3)
Sf-3	Ra-228+D	1.43E-09	1.43E-09	SLPF(4,3)
Sf-3	Th-228+D	4.22E-10	1.48E-10	SLPF(5,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(6,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.04E-11	3.04E-11	SLPF(1,4)
Sf-3	Pb-210+D	2.66E-09	8.81E-10	SLPF(2,4)
Sf-3	Ra-226+D	3.86E-10	3.85E-10	SLPF(3,4)
Sf-3	Ra-228+D	1.04E-09	1.04E-09	SLPF(4,4)
Sf-3	Th-228+D	2.99E-10	1.07E-10	SLPF(5,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(6,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Cs-137+D	3.74E-11	3.74E-11	SLPF(1,5)
Sf-3	Pb-210+D	3.44E-09	1.18E-09	SLPF(2,5)
Sf-3	Ra-226+D	5.15E-10	5.14E-10	SLPF(3,5)
Sf-3	Ra-228+D	1.43E-09	1.43E-09	SLPF(4,5)
Sf-3	Th-228+D	4.22E-10	1.48E-10	SLPF(5,5)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(6,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: FGR 13 Morbidity

Menu	Parameter	Current Value	Base Case*	Parameter Name
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Risk Slope and Environmental Transport Factors for the Ground Pathway

Nuclide (i)	Slope(i)*	ETFG(i,t) At Time in Years (dimensionless) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-228	4.530E-06	4.913E-01	4.913E-01	4.913E-01	4.913E-01	4.913E-01	4.913E-01	4.913E-01	4.913E-01
At-218	3.570E-09	5.140E-01	5.140E-01	5.140E-01	5.140E-01	5.140E-01	5.140E-01	5.140E-01	5.140E-01
Ba-137m	2.690E-06	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01
Bi-210	2.760E-09	4.999E-01	4.999E-01	4.999E-01	4.999E-01	4.999E-01	4.999E-01	4.999E-01	4.999E-01
Bi-212	8.870E-07	4.891E-01	4.891E-01	4.891E-01	4.891E-01	4.891E-01	4.891E-01	4.891E-01	4.891E-01
Bi-214	7.480E-06	4.899E-01	4.899E-01	4.899E-01	4.899E-01	4.899E-01	4.899E-01	4.899E-01	4.899E-01
Cs-137	5.320E-10	5.086E-01	5.086E-01	5.086E-01	5.086E-01	5.086E-01	5.086E-01	5.086E-01	5.086E-01
Pb-210	1.410E-09	5.148E-01	5.148E-01	5.148E-01	5.148E-01	5.148E-01	5.148E-01	5.148E-01	5.148E-01
Pb-212	5.090E-07	5.084E-01	5.084E-01	5.084E-01	5.084E-01	5.084E-01	5.084E-01	5.084E-01	5.084E-01
Pb-214	9.820E-07	4.997E-01	4.997E-01	4.997E-01	4.997E-01	4.997E-01	4.997E-01	4.997E-01	4.997E-01
Po-210	3.950E-11	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01
Po-212	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-214	3.860E-10	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01	4.886E-01
Po-216	7.870E-11	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01
Po-218	4.260E-11	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01	4.895E-01
Ra-224	3.720E-08	5.077E-01	5.077E-01	5.077E-01	5.077E-01	5.077E-01	5.077E-01	5.077E-01	5.077E-01
Ra-226	2.290E-08	5.114E-01	5.114E-01	5.114E-01	5.114E-01	5.114E-01	5.114E-01	5.114E-01	5.114E-01
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Rn-220	1.700E-09	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01
Rn-222	1.740E-09	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01	4.897E-01
Th-228	5.590E-09	5.121E-01	5.121E-01	5.121E-01	5.121E-01	5.121E-01	5.121E-01	5.121E-01	5.121E-01
Th-232	3.420E-10	5.180E-01	5.180E-01	5.180E-01	5.180E-01	5.180E-01	5.180E-01	5.180E-01	5.180E-01
Tl-208	1.760E-05	4.884E-01	4.884E-01	4.884E-01	4.884E-01	4.884E-01	4.884E-01	4.884E-01	4.884E-01
Tl-210	0.000E+00	6.000E-01	6.000E-01	6.000E-01	6.000E-01	6.000E-01	6.000E-01	6.000E-01	6.000E-01

* - Units are 1/yr per (pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.614E-03	2.100E+01	1.836E+00	5.995E-01	1.652E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.360E+01
Pb-210	6.455E-03	2.100E+01	7.178E-02	3.497E-02	6.606E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.176E+01
Ra-226	6.455E-03	8.399E+01	2.448E-01	2.998E-01	6.606E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.519E+01
Ra-228	4.510E-03	5.868E+01	1.710E-01	2.094E-01	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.952E+01
Th-228	4.510E-03	1.468E+00	3.018E-03	2.153E-04	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.933E+00
Th-232	4.510E-03	1.468E+00	3.018E-03	2.153E-04	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.933E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.049E-06	0.0232	3.909E-12	0.0000	1.699E-08	0.0004	1.485E-09	0.0000	4.850E-10	0.0000	1.336E-10	0.0000
Pb-210	9.660E-09	0.0002	5.785E-09	0.0001	2.114E-06	0.0467	7.279E-09	0.0002	3.532E-09	0.0001	6.628E-08	0.0015
Ra-226	1.871E-05	0.4131	5.251E-09	0.0001	1.244E-06	0.0275	3.627E-09	0.0001	4.440E-09	0.0001	9.784E-09	0.0002
Ra-228	7.174E-06	0.1584	5.835E-09	0.0001	2.476E-06	0.0547	7.115E-09	0.0002	8.769E-09	0.0002	1.956E-08	0.0004
Th-228	1.228E-05	0.2712	1.924E-08	0.0004	2.745E-08	0.0006	8.571E-11	0.0000	5.697E-12	0.0000	5.776E-09	0.0001
Th-232	5.793E-10	0.0000	5.859E-09	0.0001	5.858E-09	0.0001	1.204E-11	0.0000	8.591E-13	0.0000	1.842E-09	0.0000
Total	3.922E-05	0.8660	4.198E-08	0.0009	5.884E-06	0.1299	1.960E-08	0.0004	1.723E-08	0.0004	1.034E-07	0.0023

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.068E-06	0.0236
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.206E-06	0.0487
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.997E-05	0.4410
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.691E-06	0.2140
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.233E-05	0.2724
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-08	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.529E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.049E-06	0.0232	3.909E-12	0.0000	0.000E+00	0.0000	1.699E-08	0.0004	1.485E-09	0.0000	4.850E-10	0.0000	1.336E-10	0.0000
Pb-210	6.333E-09	0.0001	3.793E-09	0.0001	0.000E+00	0.0000	1.381E-06	0.0305	4.722E-09	0.0001	2.301E-09	0.0001	4.345E-08	0.0010
Ra-226	1.871E-05	0.4131	7.243E-09	0.0002	0.000E+00	0.0000	1.976E-06	0.0436	6.184E-09	0.0001	5.672E-09	0.0001	3.261E-08	0.0007
Ra-228	5.169E-06	0.1141	6.650E-09	0.0001	0.000E+00	0.0000	6.743E-07	0.0149	1.968E-09	0.0000	2.382E-09	0.0001	6.772E-09	0.0001
Th-228	1.144E-06	0.0253	1.793E-09	0.0000	0.000E+00	0.0000	1.712E-09	0.0000	3.519E-12	0.0000	2.510E-13	0.0000	5.381E-10	0.0000
Th-232	1.314E-05	0.2902	2.250E-08	0.0005	0.000E+00	0.0000	1.834E-06	0.0405	5.241E-09	0.0001	6.393E-09	0.0001	1.987E-08	0.0004
Total	3.922E-05	0.8660	4.198E-08	0.0009	0.000E+00	0.0000	5.884E-06	0.1299	1.960E-08	0.0004	1.723E-08	0.0004	1.034E-07	0.0023

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.068E-06	0.0236
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.442E-06	0.0318
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.074E-05	0.4579
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.861E-06	0.1294
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.148E-06	0.0254
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.503E-05	0.3319
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.529E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.577E-03	2.052E+01	1.794E+00	5.858E-01	1.614E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.306E+01
Pb-210	6.444E-03	2.103E+01	7.244E-02	3.515E-02	6.595E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.180E+01
Ra-226	6.437E-03	8.376E+01	2.442E-01	2.990E-01	6.588E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.496E+01
Ra-228	4.500E-03	5.831E+01	1.676E-01	2.065E-01	4.606E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.915E+01
Th-228	4.509E-03	2.195E+00	6.857E-03	4.557E-04	4.614E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.663E+00
Th-232	4.510E-03	1.468E+00	3.018E-03	2.153E-04	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.933E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.025E-06	0.0227	3.820E-12	0.0000	1.660E-08	0.0004	1.451E-09	0.0000	4.739E-10	0.0000	1.306E-10	0.0000
Pb-210	9.640E-09	0.0002	5.773E-09	0.0001	2.109E-06	0.0467	7.264E-09	0.0002	3.525E-09	0.0001	6.615E-08	0.0015
Ra-226	1.866E-05	0.4128	5.236E-09	0.0001	1.240E-06	0.0274	3.617E-09	0.0001	4.428E-09	0.0001	9.757E-09	0.0002
Ra-228	7.169E-06	0.1586	5.832E-09	0.0001	2.475E-06	0.0548	7.110E-09	0.0002	8.764E-09	0.0002	1.955E-08	0.0004
Th-228	1.227E-05	0.2716	1.923E-08	0.0004	2.745E-08	0.0006	8.578E-11	0.0000	5.701E-12	0.0000	5.773E-09	0.0001
Th-232	5.793E-10	0.0000	5.859E-09	0.0001	5.858E-09	0.0001	1.204E-11	0.0000	8.591E-13	0.0000	1.842E-09	0.0000
Total	3.913E-05	0.8660	4.194E-08	0.0009	5.875E-06	0.1300	1.954E-08	0.0004	1.720E-08	0.0004	1.032E-07	0.0023

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-06	0.0231
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.202E-06	0.0487
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.992E-05	0.4408
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.685E-06	0.2143
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.233E-05	0.2728
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-08	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.519E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.025E-06	0.0227	3.820E-12	0.0000	0.000E+00	0.0000	1.660E-08	0.0004	1.451E-09	0.0000	4.739E-10	0.0000	1.306E-10	0.0000
Pb-210	6.129E-09	0.0001	3.670E-09	0.0001	0.000E+00	0.0000	1.337E-06	0.0296	4.570E-09	0.0001	2.227E-09	0.0000	4.205E-08	0.0009
Ra-226	1.866E-05	0.4129	7.339E-09	0.0002	0.000E+00	0.0000	2.013E-06	0.0445	6.311E-09	0.0001	5.727E-09	0.0001	3.385E-08	0.0007
Ra-228	4.897E-06	0.1084	6.391E-09	0.0001	0.000E+00	0.0000	5.968E-07	0.0132	1.741E-09	0.0000	2.107E-09	0.0000	6.142E-09	0.0001
Th-228	7.965E-07	0.0176	1.248E-09	0.0000	0.000E+00	0.0000	1.191E-09	0.0000	2.449E-12	0.0000	1.747E-13	0.0000	3.746E-10	0.0000
Th-232	1.375E-05	0.3043	2.328E-08	0.0005	0.000E+00	0.0000	1.910E-06	0.0423	5.464E-09	0.0001	6.663E-09	0.0001	2.065E-08	0.0005
Total	3.913E-05	0.8660	4.194E-08	0.0009	0.000E+00	0.0000	5.875E-06	0.1300	1.954E-08	0.0004	1.720E-08	0.0004	1.032E-07	0.0023

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-06	0.0231
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.395E-06	0.0309
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.072E-05	0.4586
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.510E-06	0.1219
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.994E-07	0.0177
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.572E-05	0.3478
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.519E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.506E-03	1.959E+01	1.713E+00	5.593E-01	1.541E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.201E+01
Pb-210	6.422E-03	2.096E+01	7.218E-02	3.503E-02	6.573E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.172E+01
Ra-226	6.401E-03	8.329E+01	2.428E-01	2.973E-01	6.551E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.448E+01
Ra-228	4.483E-03	5.809E+01	1.669E-01	2.057E-01	4.589E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.892E+01
Th-228	4.499E-03	2.189E+00	6.836E-03	4.544E-04	4.605E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.657E+00
Th-232	4.510E-03	1.468E+00	3.018E-03	2.153E-04	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.933E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	9.786E-07	0.0217	3.647E-12	0.0000	1.585E-08	0.0004	1.386E-09	0.0000	4.525E-10	0.0000	1.246E-10	0.0000
Pb-210	9.600E-09	0.0002	5.749E-09	0.0001	2.100E-06	0.0467	7.233E-09	0.0002	3.510E-09	0.0001	6.587E-08	0.0015
Ra-226	1.855E-05	0.4123	5.207E-09	0.0001	1.234E-06	0.0274	3.596E-09	0.0001	4.403E-09	0.0001	9.702E-09	0.0002
Ra-228	7.162E-06	0.1592	5.826E-09	0.0001	2.472E-06	0.0549	7.103E-09	0.0002	8.755E-09	0.0002	1.953E-08	0.0004
Th-228	1.226E-05	0.2725	1.921E-08	0.0004	2.742E-08	0.0006	8.569E-11	0.0000	5.695E-12	0.0000	5.766E-09	0.0001
Th-232	5.793E-10	0.0000	5.859E-09	0.0001	5.858E-09	0.0001	1.204E-11	0.0000	8.591E-13	0.0000	1.842E-09	0.0000
Total	3.896E-05	0.8658	4.185E-08	0.0009	5.856E-06	0.1301	1.942E-08	0.0004	1.713E-08	0.0004	1.028E-07	0.0023

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.965E-07	0.0221
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.192E-06	0.0487
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.981E-05	0.4402
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.676E-06	0.2150
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.231E-05	0.2736
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-08	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.500E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	9.786E-07	0.0217	3.647E-12	0.0000	0.000E+00	0.0000	1.585E-08	0.0004	1.386E-09	0.0000	4.525E-10	0.0000	1.246E-10	0.0000
Pb-210	5.741E-09	0.0001	3.438E-09	0.0001	0.000E+00	0.0000	1.252E-06	0.0278	4.280E-09	0.0001	2.085E-09	0.0000	3.939E-08	0.0009
Ra-226	1.855E-05	0.4123	7.518E-09	0.0002	0.000E+00	0.0000	2.082E-06	0.0463	6.550E-09	0.0001	5.828E-09	0.0001	3.618E-08	0.0008
Ra-228	4.189E-06	0.0931	5.560E-09	0.0001	0.000E+00	0.0000	4.673E-07	0.0104	1.363E-09	0.0000	1.648E-09	0.0000	4.972E-09	0.0001
Th-228	3.859E-07	0.0086	6.047E-10	0.0000	0.000E+00	0.0000	5.773E-10	0.0000	1.187E-12	0.0000	8.466E-14	0.0000	1.815E-10	0.0000
Th-232	1.485E-05	0.3300	2.473E-08	0.0005	0.000E+00	0.0000	2.038E-06	0.0453	5.837E-09	0.0001	7.113E-09	0.0002	2.198E-08	0.0005
Total	3.896E-05	0.8658	4.185E-08	0.0009	0.000E+00	0.0000	5.856E-06	0.1301	1.942E-08	0.0004	1.713E-08	0.0004	1.028E-07	0.0023

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.965E-07	0.0221
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-06	0.0290
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.069E-05	0.4599
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.669E-06	0.1038
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.873E-07	0.0086
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.695E-05	0.3766
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.500E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.280E-03	1.666E+01	1.457E+00	4.757E-01	1.310E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.872E+01
Pb-210	6.338E-03	2.069E+01	7.124E-02	3.457E-02	6.487E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.144E+01
Ra-226	6.276E-03	8.167E+01	2.381E-01	2.915E-01	6.424E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.284E+01
Ra-228	4.449E-03	5.764E+01	1.656E-01	2.041E-01	4.553E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.847E+01
Th-228	4.460E-03	2.170E+00	6.780E-03	4.507E-04	4.565E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.634E+00
Th-232	4.510E-03	1.468E+00	3.018E-03	2.153E-04	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.933E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	8.323E-07	0.0188	3.102E-12	0.0000	1.348E-08	0.0003	1.178E-09	0.0000	3.848E-10	0.0000	1.060E-10	0.0000
Pb-210	9.454E-09	0.0002	5.662E-09	0.0001	2.068E-06	0.0466	7.123E-09	0.0002	3.457E-09	0.0001	6.487E-08	0.0015
Ra-226	1.819E-05	0.4099	5.105E-09	0.0001	1.210E-06	0.0273	3.527E-09	0.0001	4.318E-09	0.0001	9.513E-09	0.0002
Ra-228	7.147E-06	0.1611	5.814E-09	0.0001	2.467E-06	0.0556	7.088E-09	0.0002	8.736E-09	0.0002	1.949E-08	0.0004
Th-228	1.222E-05	0.2755	1.915E-08	0.0004	2.735E-08	0.0006	8.548E-11	0.0000	5.681E-12	0.0000	5.749E-09	0.0001
Th-232	5.793E-10	0.0000	5.858E-09	0.0001	5.858E-09	0.0001	1.204E-11	0.0000	8.590E-13	0.0000	1.842E-09	0.0000
Total	3.840E-05	0.8654	4.160E-08	0.0009	5.792E-06	0.1305	1.901E-08	0.0004	1.690E-08	0.0004	1.016E-07	0.0023

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.474E-07	0.0191
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.159E-06	0.0487
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E-05	0.4377
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.655E-06	0.2176
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.228E-05	0.2767
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-08	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.438E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	8.323E-07	0.0188	3.102E-12	0.0000	0.000E+00	0.0000	1.348E-08	0.0003	1.178E-09	0.0000	3.848E-10	0.0000	1.060E-10	0.0000
Pb-210	4.565E-09	0.0001	2.734E-09	0.0001	0.000E+00	0.0000	9.955E-07	0.0224	3.403E-09	0.0001	1.658E-09	0.0000	3.132E-08	0.0007
Ra-226	1.819E-05	0.4100	8.033E-09	0.0002	0.000E+00	0.0000	2.283E-06	0.0514	7.246E-09	0.0002	6.116E-09	0.0001	4.306E-08	0.0010
Ra-228	1.972E-06	0.0444	2.666E-09	0.0001	0.000E+00	0.0000	1.979E-07	0.0045	5.771E-10	0.0000	6.970E-10	0.0000	2.198E-09	0.0000
Th-228	3.055E-08	0.0007	4.787E-11	0.0000	0.000E+00	0.0000	4.570E-11	0.0000	9.394E-14	0.0000	6.702E-15	0.0000	1.437E-11	0.0000
Th-232	1.737E-05	0.3914	2.811E-08	0.0006	0.000E+00	0.0000	2.302E-06	0.0519	6.608E-09	0.0001	8.046E-09	0.0002	2.487E-08	0.0006
Total	3.840E-05	0.8654	4.160E-08	0.0009	0.000E+00	0.0000	5.792E-06	0.1305	1.901E-08	0.0004	1.690E-08	0.0004	1.016E-07	0.0023

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.474E-07	0.0191
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.039E-06	0.0234
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.054E-05	0.4629
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.177E-06	0.0490
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.066E-08	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.974E-05	0.4448
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.438E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	8.060E-04	1.049E+01	9.170E-01	2.994E-01	8.249E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.179E+01
Pb-210	6.068E-03	1.980E+01	6.819E-02	3.310E-02	6.210E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.053E+01
Ra-226	5.934E-03	7.721E+01	2.251E-01	2.756E-01	6.073E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.832E+01
Ra-228	4.425E-03	5.733E+01	1.647E-01	2.030E-01	4.529E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.816E+01
Th-228	4.426E-03	2.156E+00	6.737E-03	4.477E-04	4.530E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.616E+00
Th-232	4.510E-03	1.468E+00	3.018E-03	2.153E-04	4.616E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.933E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	5.239E-07	0.0122	1.953E-12	0.0000	8.483E-09	0.0002	7.418E-10	0.0000	2.422E-10	0.0000	6.673E-11	0.0000
Pb-210	9.012E-09	0.0002	5.397E-09	0.0001	1.972E-06	0.0460	6.789E-09	0.0002	3.295E-09	0.0001	6.184E-08	0.0014
Ra-226	1.720E-05	0.4012	4.827E-09	0.0001	1.143E-06	0.0267	3.334E-09	0.0001	4.082E-09	0.0001	8.994E-09	0.0002
Ra-228	7.137E-06	0.1665	5.805E-09	0.0001	2.464E-06	0.0575	7.077E-09	0.0002	8.723E-09	0.0002	1.946E-08	0.0005
Th-228	1.220E-05	0.2846	1.911E-08	0.0004	2.730E-08	0.0006	8.533E-11	0.0000	5.671E-12	0.0000	5.737E-09	0.0001
Th-232	5.793E-10	0.0000	5.858E-09	0.0001	5.857E-09	0.0001	1.204E-11	0.0000	8.590E-13	0.0000	1.842E-09	0.0000
Total	3.707E-05	0.8648	4.100E-08	0.0010	5.621E-06	0.1311	1.804E-08	0.0004	1.635E-08	0.0004	9.794E-08	0.0023

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.335E-07	0.0124
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.058E-06	0.0480
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-05	0.4284
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.641E-06	0.2250
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.225E-05	0.2858
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-08	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.286E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	5.239E-07	0.0122	1.953E-12	0.0000	0.000E+00	0.0000	8.483E-09	0.0002	7.418E-10	0.0000	2.422E-10	0.0000	6.673E-11	0.0000
Pb-210	2.371E-09	0.0001	1.420E-09	0.0000	0.000E+00	0.0000	5.171E-07	0.0121	1.768E-09	0.0000	8.614E-10	0.0000	1.627E-08	0.0004
Ra-226	1.720E-05	0.4014	8.803E-09	0.0002	0.000E+00	0.0000	2.598E-06	0.0606	8.355E-09	0.0002	6.516E-09	0.0002	5.456E-08	0.0013
Ra-228	1.727E-07	0.0040	2.343E-10	0.0000	0.000E+00	0.0000	1.694E-08	0.0004	4.939E-11	0.0000	5.965E-11	0.0000	1.899E-10	0.0000
Th-228	2.178E-11	0.0000	3.412E-14	0.0000	0.000E+00	0.0000	3.257E-14	0.0000	6.696E-17	0.0000	4.777E-18	0.0000	1.024E-14	0.0000
Th-232	1.916E-05	0.4471	3.054E-08	0.0007	0.000E+00	0.0000	2.480E-06	0.0579	7.125E-09	0.0002	8.670E-09	0.0002	2.685E-08	0.0006
Total	3.707E-05	0.8648	4.100E-08	0.0010	0.000E+00	0.0000	5.621E-06	0.1311	1.804E-08	0.0004	1.635E-08	0.0004	9.794E-08	0.0023

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.335E-07	0.0124
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.398E-07	0.0126
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.988E-05	0.4638
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.902E-07	0.0044
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.185E-11	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.172E-05	0.5067
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.286E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.595E-04	2.076E+00	1.815E-01	5.926E-02	1.633E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.333E+00
Pb-210	5.052E-03	1.649E+01	5.677E-02	2.755E-02	5.171E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.709E+01
Ra-226	4.875E-03	6.344E+01	1.850E-01	2.264E-01	4.990E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.435E+01
Ra-228	4.422E-03	5.729E+01	1.646E-01	2.029E-01	4.526E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.811E+01
Th-228	4.422E-03	2.154E+00	6.731E-03	4.474E-04	4.526E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.613E+00
Th-232	4.509E-03	1.468E+00	3.017E-03	2.153E-04	4.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.932E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.037E-07	0.0027	3.865E-13	0.0000	1.679E-09	0.0000	1.468E-10	0.0000	4.794E-11	0.0000	1.321E-11	0.0000
Pb-210	7.470E-09	0.0002	4.473E-09	0.0001	1.634E-06	0.0421	5.627E-09	0.0001	2.731E-09	0.0001	5.125E-08	0.0013
Ra-226	1.413E-05	0.3642	3.966E-09	0.0001	9.395E-07	0.0242	2.739E-09	0.0001	3.354E-09	0.0001	7.390E-09	0.0002
Ra-228	7.134E-06	0.1839	5.804E-09	0.0001	2.463E-06	0.0635	7.075E-09	0.0002	8.721E-09	0.0002	1.945E-08	0.0005
Th-228	1.219E-05	0.3143	1.911E-08	0.0005	2.729E-08	0.0007	8.530E-11	0.0000	5.669E-12	0.0000	5.735E-09	0.0001
Th-232	5.792E-10	0.0000	5.857E-09	0.0002	5.856E-09	0.0002	1.204E-11	0.0000	8.588E-13	0.0000	1.841E-09	0.0000
Total	3.357E-05	0.8653	3.921E-08	0.0010	5.071E-06	0.1307	1.569E-08	0.0004	1.486E-08	0.0004	8.569E-08	0.0022

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E-07	0.0027
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.706E-06	0.0440
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.509E-05	0.3889
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.638E-06	0.2484
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.225E-05	0.3157
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-08	0.0004
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.037E-07	0.0027	3.865E-13	0.0000	0.000E+00	0.0000	1.679E-09	0.0000	1.468E-10	0.0000	4.794E-11	0.0000	1.321E-11	0.0000
Pb-210	2.396E-10	0.0000	1.435E-10	0.0000	0.000E+00	0.0000	5.225E-08	0.0013	1.786E-10	0.0000	8.704E-11	0.0000	1.644E-09	0.0000
Ra-226	1.414E-05	0.3644	8.295E-09	0.0002	0.000E+00	0.0000	2.522E-06	0.0650	8.188E-09	0.0002	5.998E-09	0.0002	5.700E-08	0.0015
Ra-228	3.166E-11	0.0000	4.296E-14	0.0000	0.000E+00	0.0000	3.105E-12	0.0000	9.053E-15	0.0000	1.093E-14	0.0000	3.481E-14	0.0000
Th-228	2.105E-22	0.0000	3.298E-25	0.0000	0.000E+00	0.0000	3.148E-25	0.0000	6.416E-28	0.0000	4.018E-29	0.0000	9.899E-26	0.0000
Th-232	1.933E-05	0.4982	3.077E-08	0.0008	0.000E+00	0.0000	2.496E-06	0.0643	7.172E-09	0.0002	8.727E-09	0.0002	2.703E-08	0.0007
Total	3.357E-05	0.8653	3.921E-08	0.0010	0.000E+00	0.0000	5.071E-06	0.1307	1.569E-08	0.0004	1.486E-08	0.0004	8.569E-08	0.0022

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E-07	0.0027
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.455E-08	0.0014
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.674E-05	0.4314
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.486E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.112E-22	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.190E-05	0.5645
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.559E-06	2.028E-02	1.774E-03	5.791E-04	1.595E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.279E-02
Pb-210	2.887E-03	9.422E+00	3.244E-02	1.575E-02	2.955E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.766E+00
Ra-226	2.781E-03	3.619E+01	1.055E-01	1.292E-01	2.846E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.670E+01
Ra-228	4.420E-03	5.726E+01	1.645E-01	2.028E-01	4.523E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.808E+01
Th-228	4.420E-03	2.152E+00	6.728E-03	4.471E-04	4.523E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.612E+00
Th-232	4.507E-03	1.467E+00	3.016E-03	2.151E-04	4.612E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.931E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.013E-09	0.0000	3.777E-15	0.0000	1.641E-11	0.0000	1.435E-12	0.0000	4.685E-13	0.0000	1.291E-13	0.0000
Pb-210	4.266E-09	0.0001	2.555E-09	0.0001	9.334E-07	0.0297	3.214E-09	0.0001	1.560E-09	0.0000	2.927E-08	0.0009
Ra-226	8.060E-06	0.2561	2.262E-09	0.0001	5.359E-07	0.0170	1.563E-09	0.0000	1.913E-09	0.0001	4.215E-09	0.0001
Ra-228	7.130E-06	0.2266	5.800E-09	0.0002	2.461E-06	0.0782	7.071E-09	0.0002	8.716E-09	0.0003	1.944E-08	0.0006
Th-228	1.219E-05	0.3873	1.910E-08	0.0006	2.727E-08	0.0009	8.525E-11	0.0000	5.666E-12	0.0000	5.732E-09	0.0002
Th-232	5.788E-10	0.0000	5.854E-09	0.0002	5.853E-09	0.0002	1.203E-11	0.0000	8.584E-13	0.0000	1.840E-09	0.0001
Total	2.738E-05	0.8702	3.557E-08	0.0011	3.964E-06	0.1260	1.195E-08	0.0004	1.220E-08	0.0004	6.050E-08	0.0019

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.032E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.742E-07	0.0310
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.605E-06	0.2735
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.633E-06	0.3061
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.224E-05	0.3890
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-08	0.0004
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.147E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	1.013E-09	0.0000	3.777E-15	0.0000	0.000E+00	0.0000	1.641E-11	0.0000	1.435E-12	0.0000	4.685E-13	0.0000	1.291E-13	0.0000
Pb-210	3.429E-13	0.0000	2.054E-13	0.0000	0.000E+00	0.0000	7.479E-11	0.0000	2.557E-13	0.0000	1.246E-13	0.0000	2.353E-12	0.0000
Ra-226	8.064E-06	0.2563	4.817E-09	0.0002	0.000E+00	0.0000	1.469E-06	0.0467	4.776E-09	0.0002	3.473E-09	0.0001	3.348E-08	0.0011
Ra-228	6.666E-22	0.0000	9.044E-25	0.0000	0.000E+00	0.0000	6.538E-23	0.0000	1.906E-25	0.0000	2.301E-25	0.0000	7.328E-25	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.932E-05	0.6139	3.075E-08	0.0010	0.000E+00	0.0000	2.495E-06	0.0793	7.168E-09	0.0002	8.722E-09	0.0003	2.701E-08	0.0009
Total	2.738E-05	0.8702	3.557E-08	0.0011	0.000E+00	0.0000	3.964E-06	0.1260	1.195E-08	0.0004	1.220E-08	0.0004	6.050E-08	0.0019

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.032E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.807E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.580E-06	0.3044
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.340E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.189E-05	0.6955
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.147E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Cs-137	1.438E-13	1.871E-09	1.636E-10	5.342E-11	1.472E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.103E-09
Pb-210	4.047E-04	1.321E+00	4.548E-03	2.207E-03	4.142E-02	1.558E+01	3.263E-02	1.858E-01	2.069E-03	1.695E-03	1.717E+01
Ra-226	3.898E-04	5.072E+00	1.479E-02	1.811E-02	3.990E-02	2.216E+01	1.344E-02	2.663E-01	3.673E-03	8.036E-03	2.760E+01
Ra-228	4.411E-03	5.715E+01	1.642E-01	2.024E-01	4.514E-01	1.136E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.797E+01
Th-228	4.411E-03	2.148E+00	6.715E-03	4.463E-04	4.514E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.607E+00
Th-232	4.498E-03	1.464E+00	3.010E-03	2.147E-04	4.603E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.928E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	9.348E-17	0.0000	3.484E-22	0.0000	1.514E-18	0.0000	1.324E-19	0.0000	4.322E-20	0.0000	1.191E-20	0.0000
Pb-210	5.980E-10	0.0000	3.581E-10	0.0000	1.308E-07	0.0053	4.505E-10	0.0000	2.186E-10	0.0000	4.103E-09	0.0002
Ra-226	1.130E-06	0.0457	3.171E-10	0.0000	7.512E-08	0.0030	2.190E-10	0.0000	2.682E-10	0.0000	5.909E-10	0.0000
Ra-228	7.117E-06	0.2879	5.789E-09	0.0002	2.457E-06	0.0994	7.057E-09	0.0003	8.699E-09	0.0004	1.941E-08	0.0008
Th-228	1.216E-05	0.4920	1.906E-08	0.0008	2.722E-08	0.0011	8.508E-11	0.0000	5.655E-12	0.0000	5.720E-09	0.0002
Th-232	5.777E-10	0.0000	5.842E-09	0.0002	5.841E-09	0.0002	1.201E-11	0.0000	8.567E-13	0.0000	1.837E-09	0.0001
Total	2.041E-05	0.8256	3.136E-08	0.0013	2.696E-06	0.1090	7.824E-09	0.0003	9.192E-09	0.0004	3.166E-08	0.0013

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.518E-17	0.0000
Pb-210	1.251E-06	0.0506	3.392E-09	0.0001	1.932E-08	0.0008	2.151E-10	0.0000	1.763E-10	0.0000	1.411E-06	0.0571
Ra-226	2.579E-07	0.0104	2.088E-10	0.0000	4.137E-09	0.0002	5.706E-11	0.0000	1.248E-10	0.0000	1.469E-06	0.0594
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.614E-06	0.3889
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.221E-05	0.4941
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.411E-08	0.0006
Total	1.509E-06	0.0610	3.601E-09	0.0001	2.345E-08	0.0009	2.722E-10	0.0000	3.011E-10	0.0000	2.472E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	9.348E-17	0.0000	3.484E-22	0.0000	0.000E+00	0.0000	1.514E-18	0.0000	1.324E-19	0.0000	4.322E-20	0.0000	1.191E-20	0.0000
Pb-210	3.804E-23	0.0000	2.278E-23	0.0000	0.000E+00	0.0000	8.296E-21	0.0000	2.836E-23	0.0000	1.382E-23	0.0000	2.610E-22	0.0000
Ra-226	1.130E-06	0.0457	6.752E-10	0.0000	0.000E+00	0.0000	2.060E-07	0.0083	6.695E-10	0.0000	4.868E-10	0.0000	4.694E-09	0.0002
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.928E-05	0.7799	3.069E-08	0.0012	0.000E+00	0.0000	2.490E-06	0.1007	7.155E-09	0.0003	8.705E-09	0.0004	2.696E-08	0.0011
Total	2.041E-05	0.8256	3.136E-08	0.0013	0.000E+00	0.0000	2.696E-06	0.1090	7.824E-09	0.0003	9.192E-09	0.0004	3.166E-08	0.0013

Total Excess Cancer Risk CNRS(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.518E-17	0.0000
Pb-210	2.126E-20	0.0000	5.766E-23	0.0000	0.000E+00	0.0000	3.281E-22	0.0000	3.645E-24	0.0000	2.992E-24	0.0000	3.031E-20	0.0000
Ra-226	1.509E-06	0.0610	3.601E-09	0.0001	0.000E+00	0.0000	2.345E-08	0.0009	2.722E-10	0.0000	3.011E-10	0.0000	2.879E-06	0.1165
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.184E-05	0.8835
Total	1.509E-06	0.0610	3.601E-09	0.0001	0.000E+00	0.0000	2.345E-08	0.0009	2.722E-10	0.0000	3.011E-10	0.0000	2.472E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides