

## **RESL CUSTOMER EXPORT CONTROL AGREEMENT**

It is the Radiological and Environmental Sciences Laboratory's (RESL) policy to conduct business in accordance with all applicable U.S. export control laws and regulations. It is also RESL's policy that its Customers comply with U.S. export control laws and regulations. Therefore, Customer agrees to the following:

1. Because products, technical data, and technical assistance (i.e., services) provided to Customer by RESL may be subject to U.S. export control laws and regulations, (i) transactions with certain persons and companies and (ii) the export or reexport of certain types and levels of products, technical data, and services are prohibited or restricted.
2. Customer acknowledges that it is responsible for its own compliance with U.S. export control laws and regulations. Customer further agrees that it assumes the responsibility to obtain all necessary U.S. export licenses or other U.S. governmental authorizations, as well as all liability for the failure to do so.
3. Customer acknowledges that export control requirements may change and that the export or reexport of RESL products, technical data, and services without an export license or other appropriate governmental authorization may result in criminal and/or civil liability.
4. The obligations and requirements described herein shall survive the expiration or termination of any agreement or contract between RESL and Customer.

## GrF47 Participating Laboratories

<b>Lab Code</b>	<b>Lab Name</b>	<b>Matrix Code</b>
ADEM01	Alabama Department of Environmental Management	GrF
AFOH01	USAFSAM/OEA	GrF
ARSL01	ARS Aleut Analytical, LLC	GrF
DEHS01	Department of Environmental Health & Safety	GrF
DINL99	Departamento Ingeniería Energética	GrF
DLEA01	DLE Associates	GrF
ERCL01	Washington State Public Health Laboratories	GrF
ERHD99	National Monitoring Section, Radiation Protection Bureau, Health Canada	GrF
FDHE01	Florida Dept of Health Environmental Laboratory	GrF
FDOH01	Florida Dept. of Health, Mobile Environmental Radiological Lab	GrF
GENE01	GEL Laboratories, LLC	GrF
HECR01	SC Dept. Health and Environmental Control Radiological Laboratory	GrF
HPAL01	Los Alamos National Laboratory	GrF
HSSB99	HG SOLUTION SDN BHD	GrF
IEMA01	Illinois Emergency Management Agency Radiochemistry Laboratory	GrF
ISUP01	ISU - Department of Physics/Health Physics/EAL	GrF
JLNN01	Jefferson Laboratory	GrF
KSCF01	Kennedy Space Center, HP Laboratory	GrF
MART03	Radioactive Material Analysis Laboratory	GrF
MDPH01	MDPH-Radiation Control Program	GrF
NARL02	USEPA - NAREL - MERL	GrF
NESI01	BWXT-Radioisotope & Analytical Chemistry Laboratory	GrF
NRLL99	Environmental Radioactivity - National Centre for Radiation Science	GrF
NSPH01	Nevada State Public Health Laboratory	GrF
ODHL01	Ohio Department of Health Laboratory	GrF
RPSC01	Radiation Protection Service	GrF
SEML01	SRS Environmental Monitoring Laboratory	GrF
SMER01	State of Michigan EGLE Radiological Lab	GrF
SOUT01	Southwest Research Institute	GrF
SRPD01	Sandia National Laboratories, Radiation Protection Sample Diagnostics	GrF
TDHL01	Texas Department of State Health Services Laboratory	GrF
TELE02	ATI Environmental, Inc., Midwest Lab	GrF
TMAO01	EBERLINE Analytical Corporation	GrF
TNUT01	St. Louis USACE FUSRAP Laboratory	GrF
WSHL01	Wisconsin State Laboratory of Hygiene	GrF
WSTP99	Cavendish Nuclear Limited	GrF

## Laboratories Not Reporting

<b>Lab Code</b>	<b>Lab Name</b>	<b>Matrix Code</b>
ARPL01	Analytical Support Operations - Radiochemical Processing Lab	GrF
CMRC01	Carlsbad Environmental Monitoring and Research Center	GrF
IAEA20	IAEA Marine Environment Laboratories, Radiometrics Laboratory	GrF
LOCK03	Advanced Test Reactor (ATR) Complex Radioanalytical Laboratory	GrF
OTLI01	Pace Analytical National Center for Testing & Innovation	GrF
UNEV01	University of Nevada, Reno	GrF

## Study Reference Values

---

MAPEP-22-GrF47

*Radiological Reference Date: 08/01/2022*

<b>Analyte</b>	<b>Ref Value</b>	<b>Ref Unc</b>
Radiological		Units: (Bq/sample)
Gross alpha	0.90	0.03
Gross beta	1.31	0.02

## Sample Statistical Summary

---

MAPEP-22-GrF47

Radiological Reference Date: 08/01/2022

Analyte	T(1)	A(2)	Grand(3) Mean	Std Dev	Ref Value	Ref Unc	Acceptance Range
Radiological							Units: (Bq/sample)
Gross alpha	34	30	0.87	0.33	0.90	0.03	0.27 - 1.53
Gross beta	36	35	1.30	0.17	1.31	0.02	0.66 - 1.97

- Note:**
- (1) T = Total number of laboratories reporting analyte.
  - (2) A = Number of laboratories with 'Acceptable' performance.
  - (3) Mean excludes values derived as total metals and values indicated as "Not Acceptable".

### Gross Alpha Flags:

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

### Gross Beta Flags:

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

### Uncertainty Flags:

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100

## Flag Summary Report

---

MAPEP-22-GrF47

### Radiological

Analyte	A	W	RW	N
Gross alpha	30			4
Gross beta	35			1



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

*Laboratory Results For MAPEP-22-GrF47*

(ADEM01) Alabama Department of Environmental Management  
 1350 Coliseum Blvd.  
 Montgomery, AL 36110

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	NR	0.90				0.27 - 1.53		
Gross beta	1.48296	1.31	A		13.2	0.66 - 1.97	0.035076	A

*Radiological Reference Date: August 1, 2022*

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(AFOH01) USAFSAM/OEA

2510 Fifth Street, Area B

Wright-Patterson AFB, OH 45433-7913

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.15	0.90	A		27.8	0.27 - 1.53	0.14	A
Gross beta	1.340	1.31	A		2.3	0.66 - 1.97	0.070	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100





Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(ARSL01) ARS Aleut Analytical, LLC

2609 North River Road

Port Allen, LA 70767

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.6682	0.90	A		-25.8	0.27 - 1.53	0.0801	A
Gross beta	1.4889	1.31	A		13.7	0.66 - 1.97	0.1776	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (DEHS01) Department of Environmental Health & Safety  
 North Carolina State Univ.  
 Raleigh, NC 27695-8007

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	NR	0.90				0.27 - 1.53		
Gross beta	1.29	1.31	A		-1.5	0.66 - 1.97	.09	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP  $< 2\%$
- ACCEPTABLE..... $2\% \leq RP \leq 15\%$
- ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$
- NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (DINL99) Departamento Ingeniería Energética  
 Escuela de Ingeniería de Bilbao  
 Bilbao, Vizcaya 48013

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.501	0.90	A		-44.3	0.27 - 1.53	0.014	A
Gross beta	1.33	1.31	A		1.5	0.66 - 1.97	0.04	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
  - ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
  - ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
  - NOT ACCEPTABLE.....RP > 30%
- Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(DLEA01) DLE Associates  
 730 Alfred Nobel Drive  
 Hercules, CA 94547

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.81	0.90	N		101.1	0.27 - 1.53	0.10	A
Gross beta	1.58	1.31	A		20.6	0.66 - 1.97	0.09	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (ERCL01) Washington State Public Health Laboratories  
 1610 N.E. 150th Street  
 Shoreline, WA 98155-9701

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.614	0.90	A		-31.8	0.27 - 1.53	0.047	A
Gross beta	1.44	1.31	A		9.9	0.66 - 1.97	0.03	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP  $< 2\%$
- ACCEPTABLE..... $2\% \leq RP \leq 15\%$
- ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$
- NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(ERHD99) National Monitoring Section, Radiation Protection Bureau, Health Canada  
 775 Brookfield Road AL6302D1  
 Ottawa, Ontario K1A 1C1

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.562	0.90	N		73.6	0.27 - 1.53	0.065	A
Gross beta	1.333	1.31	A		1.8	0.66 - 1.97	0.022	N

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(FDHE01) Florida Dept of Health Environmental Laboratory  
 PO Box 680069  
 Orlando, FL 32868-0069

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.026	0.90	A		14.0	0.27 - 1.53	0.388	N
Gross beta	1.213	1.31	A		-7.4	0.66 - 1.97	0.074	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(FDOH01) Florida Dept. of Health, Mobile Environmental Radiological Lab  
 PO Box 680069

Orlando, FL 32868-0069

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.11	0.90	A		23.3	0.27 - 1.53	0.6	N
Gross beta	1.22	1.31	A		-6.9	0.66 - 1.97	0.09	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100





Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(GENE01) GEL Laboratories, LLC

2040 Savage Road

Charleston, SC 29407

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.378	0.90	A		-58.0	0.27 - 1.53	0.0998	W
Gross beta	1.25	1.31	A		-4.6	0.66 - 1.97	0.056	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

*Laboratory Results For MAPEP-22-GrF47*

(HECR01) SC Dept. Health and Environmental Control Radiological Laboratory  
 8231 Parklane Road  
 Columbia, SC 29223

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.496	0.90	A		-44.9	0.27 - 1.53	0.0559	A
Gross beta	1.44	1.31	A		9.9	0.66 - 1.97	0.0696	A

*Radiological Reference Date: August 1, 2022*

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2\sigma$ , the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2\sigma$ , the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (HPAL01) Los Alamos National Laboratory  
 Milan Gadd, MS G761  
 Los Alamos, NM 87545-1663

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.35	0.90	A		50.0	0.27 - 1.53	0.23	W
Gross beta	1.38	1.31	A		5.3	0.66 - 1.97	0.18	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(HSSB99) HG SOLUTION SDN BHD

Lot PT 11300

Dungun, Terengganu 23100

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.911	0.90	A		1.2	0.27 - 1.53	0.02	A
Gross beta	0.532	1.31	N		-59.4	0.66 - 1.97	0.04	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(IEMA01) Illinois Emergency Management Agency Radiochemistry Laboratory  
 1301 Knotts St.  
 Springfield, IL 62703

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.44	0.90	A		60.0	0.27 - 1.53	0.08	A
Gross beta	1.18	1.31	A		-9.9	0.66 - 1.97	0.03	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

*Laboratory Results For MAPEP-22-GrF47*

(ISUP01) ISU - Department of Physics/Health Physics/EAL  
 785 S. 8th Ave, Rm 120  
 Pocatello, ID 83209-8106

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.18	0.90	A		31.1	0.27 - 1.53	0.03	A
Gross beta	0.80	1.31	A		-38.9	0.66 - 1.97	0.11	A

*Radiological Reference Date: August 1, 2022*

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(JLNN01) Jefferson Laboratory  
 111 Hadron Drive  
 Newport News, VA 23606

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	.39	0.90	A		-56.7	0.27 - 1.53	0.0153	A
Gross beta	1.310	1.31	A		0.0	0.66 - 1.97	0.0515	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (KSCF01) Kennedy Space Center, HP Laboratory  
 NEM-022  
 Kennedy Space Center, FL 32899

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.269	0.90	N		-70.1	0.27 - 1.53	0.0139	A
Gross beta	1.35	1.31	A		3.1	0.66 - 1.97	0.0825	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100





Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (MART03) Radioactive Material Analysis Laboratory  
 ORNL  
 Oak Ridge, TN 37830

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.593	0.90	N		77.0	0.27 - 1.53	0.054	A
Gross beta	1.230	1.31	A		-6.1	0.66 - 1.97	0.014	N

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (MDPH01) MDPH-Radiation Control Program  
 MERL-Room 362  
 Jamaica Plain, MA 02130-3597

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.28	0.90	A		42.2	0.27 - 1.53	0.03	A
Gross beta	1.36	1.31	A		3.8	0.66 - 1.97	0.05	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP  $< 2\%$
- ACCEPTABLE..... $2\% \leq RP \leq 15\%$
- ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$
- NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(NARL02) USEPA - NAREL - MERL

540 S Morris Ave

Montgomery, AL 36115

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.460	0.90	A		-48.9	0.27 - 1.53	0.0510	A
Gross beta	1.36	1.31	A		3.8	0.66 - 1.97	0.0750	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (NESI01) BWXT-Radioisotope & Analytical Chemistry Laboratory  
 Lynchburg Technology Center  
 Lynchburg, VA 24504-5447

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.704	0.90	A		-21.8	0.27 - 1.53	0.046	A
Gross beta	1.22	1.31	A		-6.9	0.66 - 1.97	0.33	W

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
  - ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
  - ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
  - NOT ACCEPTABLE.....RP > 30%
- Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(NRL99) Environmental Radioactivity - National Centre for Radiation Science

PO Box 29181

Christchurch, Christchurch 8540

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.801	0.90	A		-11.0	0.27 - 1.53	0.020	A
Gross beta	1.182	1.31	A		-9.8	0.66 - 1.97	0.025	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (NSPH01) Nevada State Public Health Laboratory  
 1664 North Virginia Street, MS 328  
 Reno, NV 89557

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.6332	0.90	A		-29.6	0.27 - 1.53	0.01384	A
Gross beta	1.2090	1.31	A		-7.7	0.66 - 1.97	0.02469	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (ODHL01) Ohio Department of Health Laboratory  
 8995 E Main Street  
 Reynoldsburg, OH 43068

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.888	0.90	A		-1.3	0.27 - 1.53	0.043	A
Gross beta	1.119	1.31	A		-14.6	0.66 - 1.97	0.021	N

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (RPSC01) Radiation Protection Service  
 Ontario Ministry of Labour, Training And Skills Development  
 Toronto, Ontario M9P 3T1

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.07	0.90	A		18.9	0.27 - 1.53	0.12	A
Gross beta	1.19	1.31	A		-9.2	0.66 - 1.97	0.13	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
  - ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
  - ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
  - NOT ACCEPTABLE.....RP > 30%
- Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100





Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (SEML01) SRS Environmental Monitoring Laboratory  
 Bldg 735-B  
 Aiken, SC 29808

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.86	0.90	A		-4.4	0.27 - 1.53	0.060	A
Gross beta	1.41	1.31	A		7.6	0.66 - 1.97	0.044	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP  $< 2\%$
- ACCEPTABLE..... $2\% \leq RP \leq 15\%$
- ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$
- NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (SMER01) State of Michigan EGLE Radiological Lab  
 815 Filley St.  
 Lansing, MI 48906

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.38	0.90	A		-57.8	0.27 - 1.53	0.03	A
Gross beta	1.27	1.31	A		-3.1	0.66 - 1.97	0.04	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

*Laboratory Results For MAPEP-22-GrF47*

(SOUT01) Southwest Research Institute

6220 Culebra Rd.

San Antonio, TX 78238-5166

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.342	0.90	A		-62.0	0.27 - 1.53	0.0328	A
Gross beta	1.22	1.31	A		-6.9	0.66 - 1.97	0.0778	A

*Radiological Reference Date: August 1, 2022*

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(SRPD01) Sandia National Laboratories, Radiation Protection Sample Diagnostics  
 PO Box 5800, MS1103  
 Albuquerque, NM 87185-1103

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.19E+00	0.90	A		32.2	0.27 - 1.53	1.91E-02	N
Gross beta	9.43E-01	1.31	A		-28.0	0.66 - 1.97	2.53E-02	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(TDHL01) Texas Department of State Health Services Laboratory  
 1100 W 49th Street  
 Austin, TX 78756

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.897	0.90	A		-0.3	0.27 - 1.53	0.026	A
Gross beta	1.269	1.31	A		-3.1	0.66 - 1.97	0.023	N

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (TELE02) ATI Environmental, Inc., Midwest Lab  
 700 Landwehr Road  
 Northbrook, IL 60062-

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.39	0.90	A		54.4	0.27 - 1.53	0.10	A
Gross beta	1.69	1.31	A		29.0	0.66 - 1.97	0.04	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (TMAO01) EBERLINE Analytical Corporation  
 601 A SCARBORO RD  
 OAK RIDGE, TN 37830-

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.213	0.90	A		34.8	0.27 - 1.53	0.027	A
Gross beta	1.395	1.31	A		6.5	0.66 - 1.97	0.040	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP < 2%
- ACCEPTABLE.....2%  $\leq$  RP  $\leq$  15%
- ACCEPTABLE WITH WARNING.....15% < RP  $\leq$  30%
- NOT ACCEPTABLE.....RP > 30%

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (TNUT01) St. Louis USACE FUSRAP Laboratory  
 112 James S McDonnell Blvd  
 HAZELWOOD, MO 63042

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.9508	0.90	A		5.6	0.27 - 1.53	0.0399	A
Gross beta	1.3814	1.31	A		5.5	0.66 - 1.97	0.0564	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP  $< 2\%$
- ACCEPTABLE..... $2\% \leq RP \leq 15\%$
- ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$
- NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100





Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47  
 (WSHL01) Wisconsin State Laboratory of Hygiene  
 2601 Agriculture Drive  
 Madison, WI 53718

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.7568	0.90	A		-15.9	0.27 - 1.53	0.0629	A
Gross beta	1.0481	1.31	A		-20.0	0.66 - 1.97	0.0354	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

- NOT ACCEPTABLE.....RP  $< 2\%$
- ACCEPTABLE..... $2\% \leq RP \leq 15\%$
- ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$
- NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100



Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP-22-GrF47

(WSTP99) Cavendish Nuclear Limited

Greson Court

Cumbria, UK CA24 3HZ

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	1.08	0.90	A		20.0	0.27 - 1.53	0.18	W
Gross beta	1.53	1.31	A		16.8	0.66 - 1.97	0.18	A

Radiological Reference Date: August 1, 2022

**Gross Alpha Flags:**

A = Result acceptable, Bias  $\leq \pm 70\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 70\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Gross Beta Flags:**

A = Result acceptable, Bias  $\leq \pm 50\%$  with a statistically positive result at two standard deviations (Result/Uncertainty  $> 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, does not include zero).

N = Result not acceptable, Bias  $> \pm 50\%$  or the reported result is not statistically positive at two standard deviations (Result/Uncertainty  $\leq 2$ , i.e., the range encompassing the result, plus or minus the total uncertainty at two standard deviations, includes zero).

**Uncertainty Flags:**

NOT ACCEPTABLE.....RP  $< 2\%$

ACCEPTABLE..... $2\% \leq RP \leq 15\%$

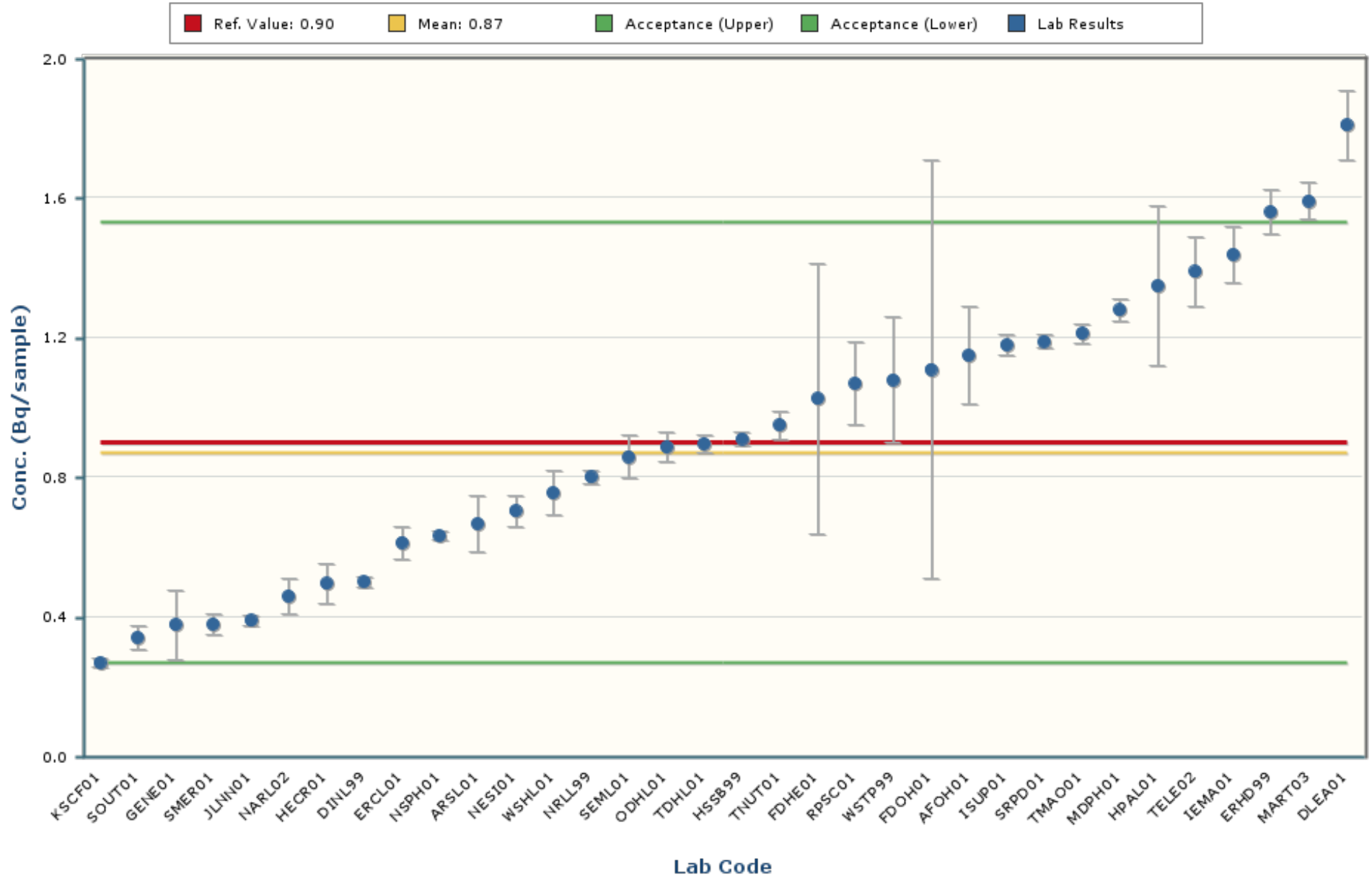
ACCEPTABLE WITH WARNING..... $15\% < RP \leq 30\%$

NOT ACCEPTABLE.....RP  $> 30\%$

Relative Precision (RP) = (Reported Uncertainty / Reported Result) x 100

# Gross alpha

MAPEP-22-GrF47

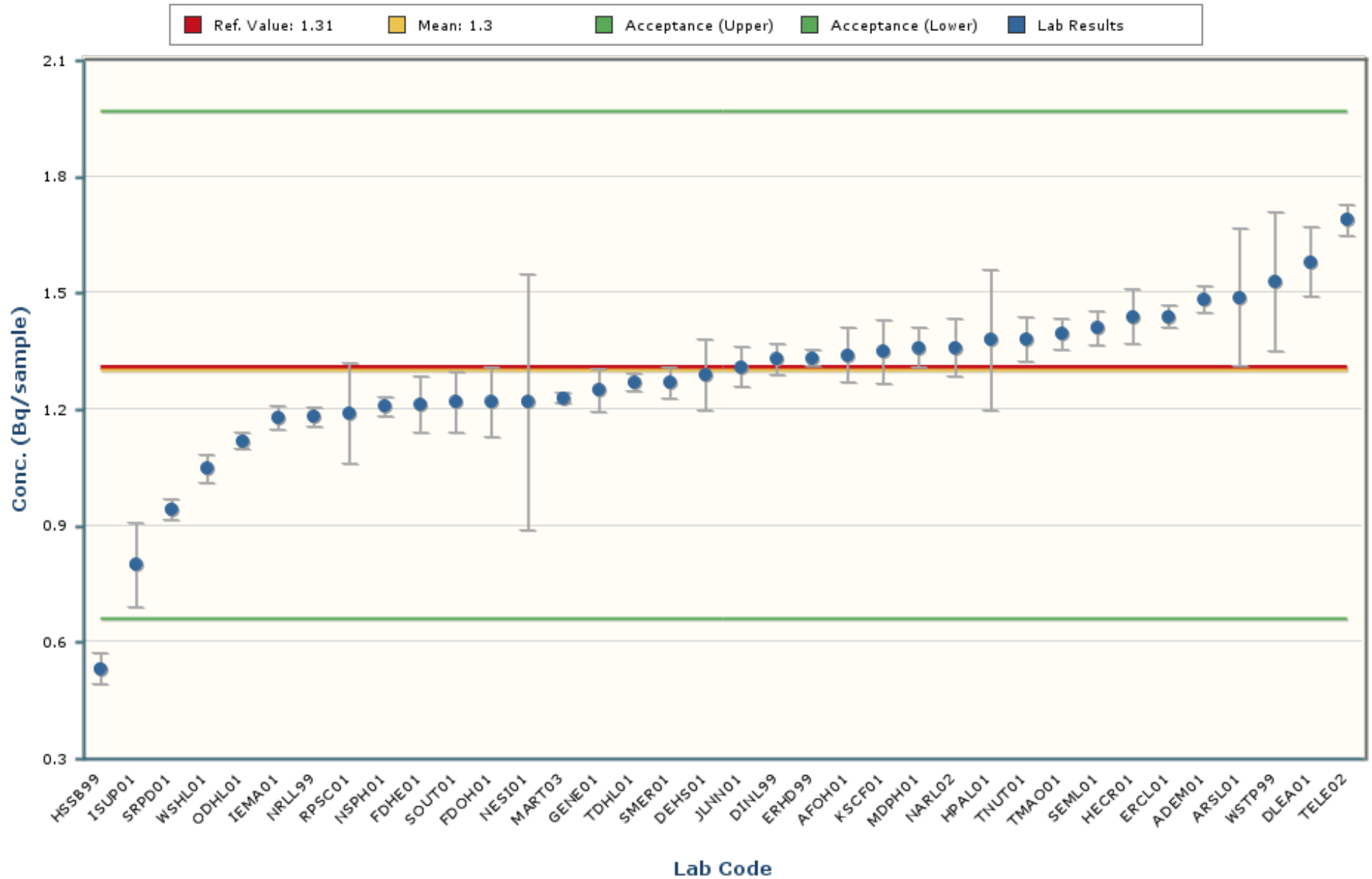


Notes:

The chart shows only data points with values between -0.79 and 2.53 ( $\pm 5$  Standard Deviations).

# Gross beta

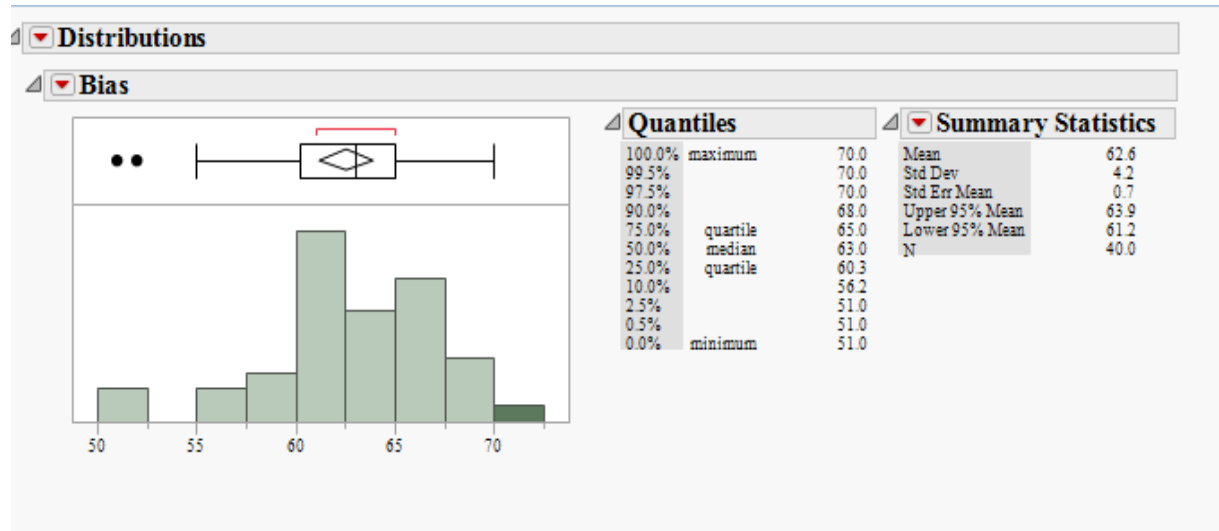
## MAPEP-22-GrF47



### Notes:

The chart shows only data points with values between 0.44 and 2.16 ( $\pm 5$  Standard Deviations).

The intent of the distribution graphs contained within this report is to graphically demonstrate to users how % Bias data within the current MAPEP Series appears when examined by matrix, by analyte, by method of sample preparation or by method of detection. Biases greater than +/- 100% have been screened from the data. The box plot of the bias data points and the mean visually illustrate the breadth of the distribution and where potential outliers in the distribution might lie. The statistics for the distribution plot are provided adjacent to the Bias plot. In some cases, N becomes very small and thus developed statistics may not accurately reflect estimates of the population if N were a significantly larger value.

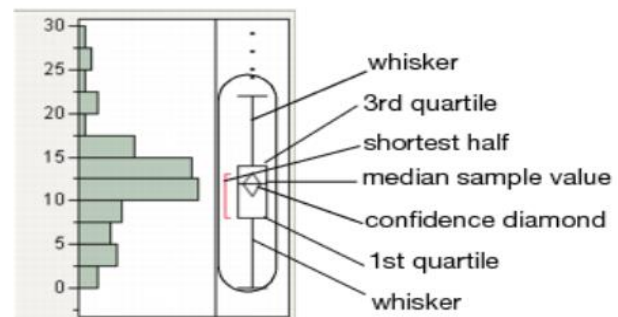


### Outlier Box Plot

The BLACK small vertical line inside the small rectangle at the top of the data distribution graph is the median of the population of the bias shown for that analyte in the matrix. The confidence diamond contains the mean and the upper and lower 95% of the mean. If you drew a line through the middle of the diamond, you would have the mean. The top and bottom points of the diamond represent the upper and lower 95% of the mean. The ends of the box represent the 25th and 75th quantiles, also expressed as 1<sup>st</sup> and 3<sup>rd</sup> quartile. The difference between the 1<sup>st</sup> and 3<sup>rd</sup> quartiles is called the interquartile range. Each box has lines that extend from each end, sometimes called whiskers. The whiskers extend from the ends of the box to the outermost data point that falls within the distances computed as follows:

3rd quartile + 1.5\*(interquartile range)

1st quartile - 1.5\*(interquartile range)

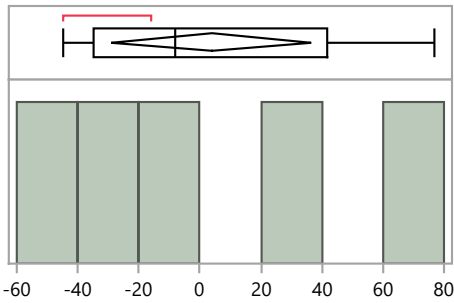


If the data points do not reach the computed ranges, then the whiskers are determined by the upper and lower data point values (not including outliers). The bracket outside of the box identifies the *shortest half*, which is the most dense 50% of the observations (Rousseuw and Leroy 1987).

**GrF Distribution by Detection Method**

**Distributions Analyte\_Detection=Gross alpha Gas Flow Proportional Counter**

**Bias**



**Quantiles**

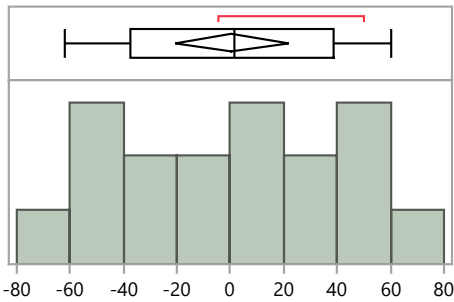
100.0%	maximum	77.0
99.5%		77.0
97.5%		77.0
90.0%		76.7
75.0%	quartile	41.7
50.0%	median	-8.1
25.0%	quartile	-34.9
10.0%		-44.8
2.5%		-44.9
0.5%		-44.9
0.0%	minimum	-44.9

**Summary Statistics**

Mean	3.8
Std Dev	45.7
Std Err Mean	14.5
Upper 95% Mean	36.5
Lower 95% Mean	-28.9
N	10.0

**Distributions Analyte\_Detection=Gross alpha Gross Alpha/Beta - 2 pi gas flow proportional counter**

**Bias**



**Quantiles**

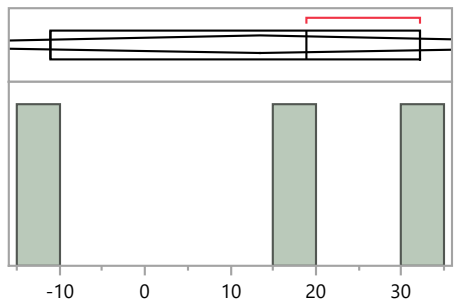
100.0%	maximum	60.0
99.5%		60.0
97.5%		60.0
90.0%		55.5
75.0%	quartile	38.5
50.0%	median	1.2
25.0%	quartile	-37.4
10.0%		-58.8
2.5%		-62.0
0.5%		-62.0
0.0%	minimum	-62.0

**Summary Statistics**

Mean	0.6
Std Dev	41.2
Std Err Mean	10.0
Upper 95% Mean	21.8
Lower 95% Mean	-20.6
N	17.0

**Distributions Analyte\_Detection=Gross alpha Liquid Scintillation Counter**

**Bias**



**Quantiles**

100.0%	maximum	32.2
99.5%		32.2
97.5%		32.2
90.0%		32.2
75.0%	quartile	32.2
50.0%	median	18.9
25.0%	quartile	-11.0
10.0%		-11.0
2.5%		-11.0
0.5%		-11.0
0.0%	minimum	-11.0

**Summary Statistics**

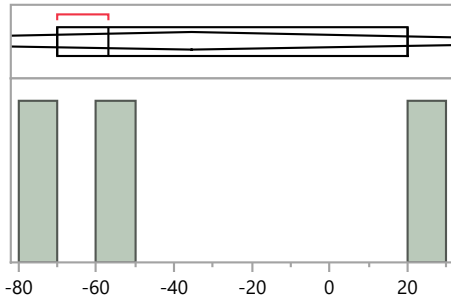
Mean	13.4
Std Dev	22.1
Std Err Mean	12.8
Upper 95% Mean	68.3
Lower 95% Mean	-41.6
N	3.0

GrF47 Distribution by Detection Method

**GrF Distribution by Detection Method**

**Distributions Analyte\_Detection=Gross alpha Other**

**Bias**



**Quantiles**

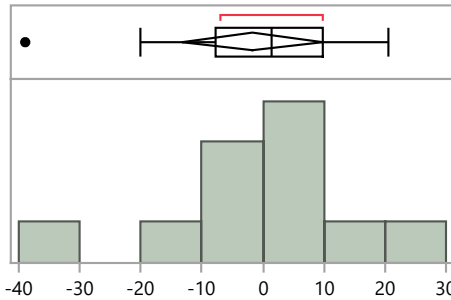
100.0%	maximum	20.0
99.5%		20.0
97.5%		20.0
90.0%		20.0
75.0%	quartile	20.0
50.0%	median	-56.7
25.0%	quartile	-70.1
10.0%		-70.1
2.5%		-70.1
0.5%		-70.1
0.0%	minimum	-70.1

**Summary Statistics**

Mean	-35.6
Std Dev	48.6
Std Err Mean	28.1
Upper 95% Mean	85.2
Lower 95% Mean	-156.4
N	3.0

**Distributions Analyte\_Detection=Gross beta Gas Flow Proportional Counter**

**Bias**



**Quantiles**

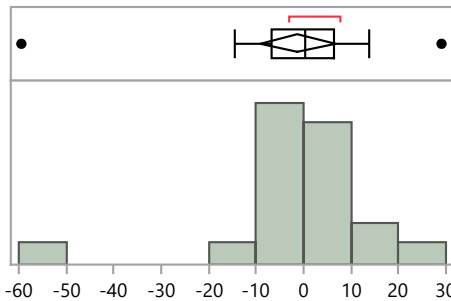
100.0%	maximum	20.6
99.5%		20.6
97.5%		20.6
90.0%		19.8
75.0%	quartile	9.9
50.0%	median	1.5
25.0%	quartile	-7.7
10.0%		-35.1
2.5%		-38.9
0.5%		-38.9
0.0%	minimum	-38.9

**Summary Statistics**

Mean	-1.7
Std Dev	17.1
Std Err Mean	5.2
Upper 95% Mean	9.8
Lower 95% Mean	-13.2
N	11.0

**Distributions Analyte\_Detection=Gross beta Gross Alpha/Beta - 2 pi gas flow proportional counter**

**Bias**



**Quantiles**

100.0%	maximum	29.0
99.5%		29.0
97.5%		29.0
90.0%		13.7
75.0%	quartile	6.3
50.0%	median	0.4
25.0%	quartile	-6.9
10.0%		-14.1
2.5%		-59.4
0.5%		-59.4
0.0%	minimum	-59.4

**Summary Statistics**

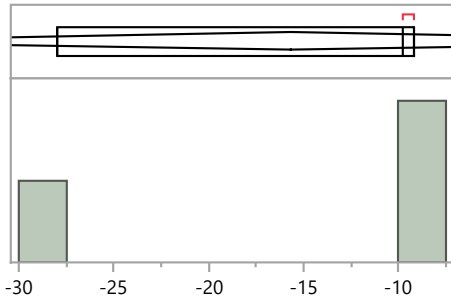
Mean	-1.3
Std Dev	16.8
Std Err Mean	3.8
Upper 95% Mean	6.5
Lower 95% Mean	-9.2
N	20.0

GrF47 Distribution by Detection Method

**GrF Distribution by Detection Method**

**Distributions Analyte\_Detection=Gross beta Liquid Scintillation Counter**

**Bias**



**Quantiles**

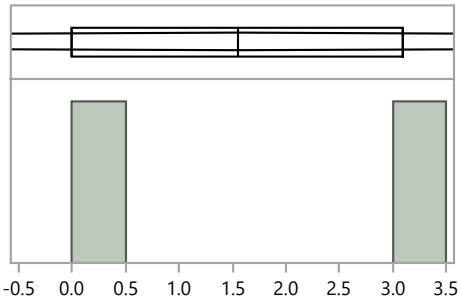
100.0%	maximum	-9.2
99.5%		-9.2
97.5%		-9.2
90.0%		-9.2
75.0%	quartile	-9.2
50.0%	median	-9.8
25.0%	quartile	-28.0
10.0%		-28.0
2.5%		-28.0
0.5%		-28.0
0.0%	minimum	-28.0

**Summary Statistics**

Mean	-15.7
Std Dev	10.7
Std Err Mean	6.2
Upper 95% Mean	10.9
Lower 95% Mean	-42.2
N	3.0

**Distributions Analyte\_Detection=Gross beta Other**

**Bias**



**Quantiles**

100.0%	maximum	3.1
99.5%		3.1
97.5%		3.1
90.0%		3.1
75.0%	quartile	3.1
50.0%	median	1.6
25.0%	quartile	0.0
10.0%		0.0
2.5%		0.0
0.5%		0.0
0.0%	minimum	0.0

**Summary Statistics**

Mean	1.6
Std Dev	2.2
Std Err Mean	1.6
Upper 95% Mean	21.2
Lower 95% Mean	-18.1
N	2.0

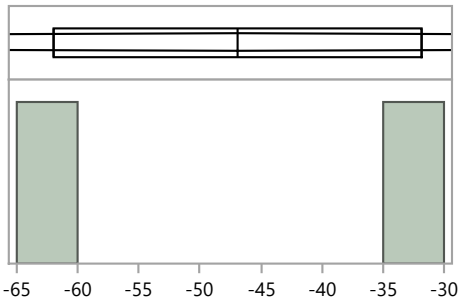


GrF47 Distribution by Preparation Method

**GrF Distribution by Prep Method**

**Distributions Analyte\_Method=Gross alpha Acid dissolution with hydrofluoric acid**

**Bias**



**Quantiles**

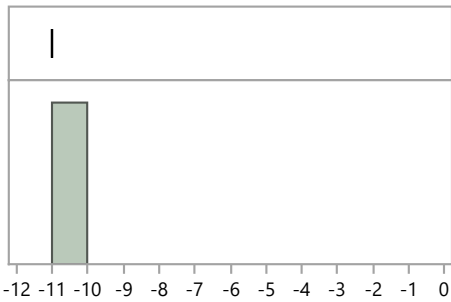
100.0%	maximum	-31.8
99.5%		-31.8
97.5%		-31.8
90.0%		-31.8
75.0%	quartile	-31.8
50.0%	median	-46.9
25.0%	quartile	-62.0
10.0%		-62.0
2.5%		-62.0
0.5%		-62.0
0.0%	minimum	-62.0

**Summary Statistics**

Mean	-46.9
Std Dev	21.4
Std Err Mean	15.1
Upper 95% Mean	145.0
Lower 95% Mean	-238.8
N	2.0

**Distributions Analyte\_Method=Gross alpha Acid leaching without hydrofluoric acid**

**Bias**



**Quantiles**

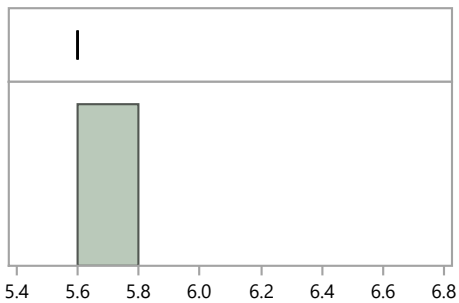
100.0%	maximum	-11.0
99.5%		-11.0
97.5%		-11.0
90.0%		-11.0
75.0%	quartile	-11.0
50.0%	median	-11.0
25.0%	quartile	-11.0
10.0%		-11.0
2.5%		-11.0
0.5%		-11.0
0.0%	minimum	-11.0

**Summary Statistics**

Mean	-11.0
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

**Distributions Analyte\_Method=Gross alpha Coprecipitation, straight**

**Bias**



**Quantiles**

100.0%	maximum	5.6
99.5%		5.6
97.5%		5.6
90.0%		5.6
75.0%	quartile	5.6
50.0%	median	5.6
25.0%	quartile	5.6
10.0%		5.6
2.5%		5.6
0.5%		5.6
0.0%	minimum	5.6

**Summary Statistics**

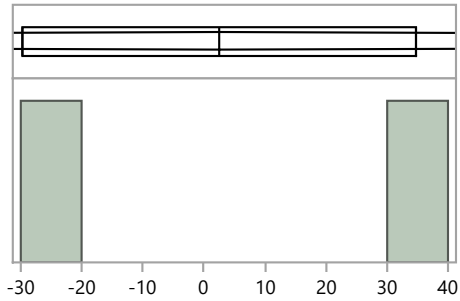
Mean	5.6
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

GrF47 Distribution by Preparation Method

**GrF Distribution by Prep Method**

**Distributions Analyte\_Method=Gross alpha EPA 900, Radioactivity, Gross Alpha/Beta Screening, 600/4-80-032**

**Bias**



**Quantiles**

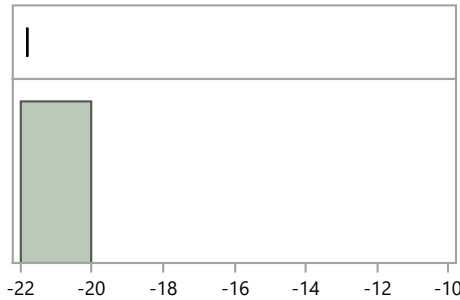
100.0%	maximum	34.8
99.5%		34.8
97.5%		34.8
90.0%		34.8
75.0%	quartile	34.8
50.0%	median	2.6
25.0%	quartile	-29.6
10.0%		-29.6
2.5%		-29.6
0.5%		-29.6
0.0%	minimum	-29.6

**Summary Statistics**

Mean	2.6
Std Dev	45.5
Std Err Mean	32.2
Upper 95% Mean	411.7
Lower 95% Mean	-406.5
N	2.0

**Distributions Analyte\_Method=Gross alpha Evaporation, acidified**

**Bias**



**Quantiles**

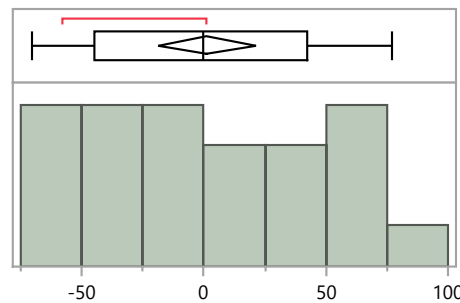
100.0%	maximum	-21.8
99.5%		-21.8
97.5%		-21.8
90.0%		-21.8
75.0%	quartile	-21.8
50.0%	median	-21.8
25.0%	quartile	-21.8
10.0%		-21.8
2.5%		-21.8
0.5%		-21.8
0.0%	minimum	-21.8

**Summary Statistics**

Mean	-21.8
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

**Distributions Analyte\_Method=Gross alpha No preparation - analyzed as received**

**Bias**



**Quantiles**

100.0%	maximum	77.0
99.5%		77.0
97.5%		77.0
90.0%		68.2
75.0%	quartile	42.2
50.0%	median	-0.3
25.0%	quartile	-44.9
10.0%		-57.9
2.5%		-70.1
0.5%		-70.1
0.0%	minimum	-70.1

**Summary Statistics**

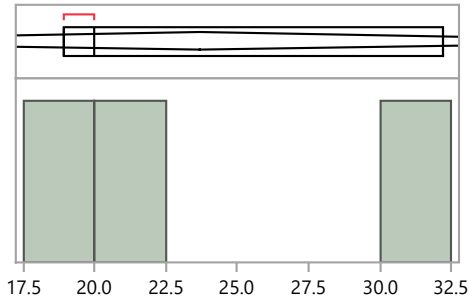
Mean	1.1
Std Dev	46.1
Std Err Mean	9.6
Upper 95% Mean	21.1
Lower 95% Mean	-18.8
N	23.0

GrF47 Distribution by Preparation Method

**GrF Distribution by Prep Method**

**Distributions Analyte\_Method=Gross alpha Other**

**Bias**



**Quantiles**

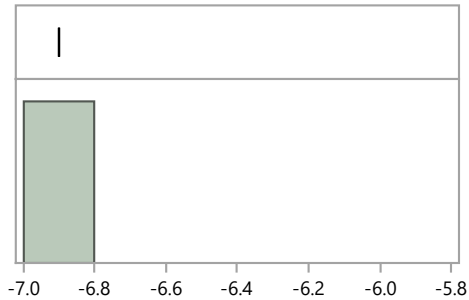
100.0%	maximum	32.2
99.5%		32.2
97.5%		32.2
90.0%		32.2
75.0%	quartile	32.2
50.0%	median	20.0
25.0%	quartile	18.9
10.0%		18.9
2.5%		18.9
0.5%		18.9
0.0%	minimum	18.9

**Summary Statistics**

Mean	23.7
Std Dev	7.4
Std Err Mean	4.3
Upper 95% Mean	42.0
Lower 95% Mean	5.4
N	3.0

**Distributions Analyte\_Method=Gross beta Acid dissolution with hydrofluoric acid**

**Bias**



**Quantiles**

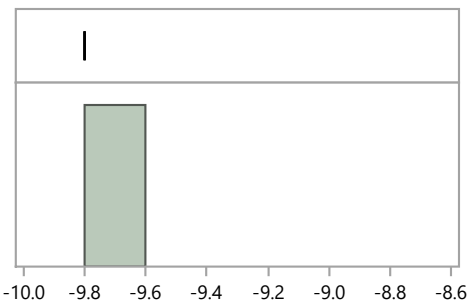
100.0%	maximum	-6.9
99.5%		-6.9
97.5%		-6.9
90.0%		-6.9
75.0%	quartile	-6.9
50.0%	median	-6.9
25.0%	quartile	-6.9
10.0%		-6.9
2.5%		-6.9
0.5%		-6.9
0.0%	minimum	-6.9

**Summary Statistics**

Mean	-6.9
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

**Distributions Analyte\_Method=Gross beta Acid leaching without hydrofluoric acid**

**Bias**



**Quantiles**

100.0%	maximum	-9.8
99.5%		-9.8
97.5%		-9.8
90.0%		-9.8
75.0%	quartile	-9.8
50.0%	median	-9.8
25.0%	quartile	-9.8
10.0%		-9.8
2.5%		-9.8
0.5%		-9.8
0.0%	minimum	-9.8

**Summary Statistics**

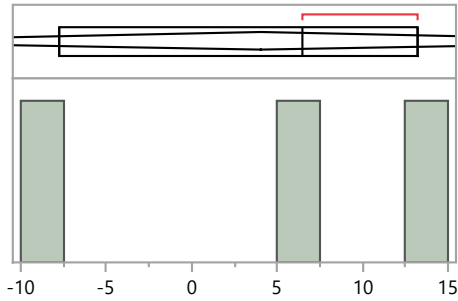
Mean	-9.8
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

GrF47 Distribution by Preparation Method

**GrF Distribution by Prep Method**

**Distributions Analyte\_Method=Gross beta EPA 900, Radioactivity, Gross Alpha/Beta Screening, 600/4-80-032**

**Bias**



**Quantiles**

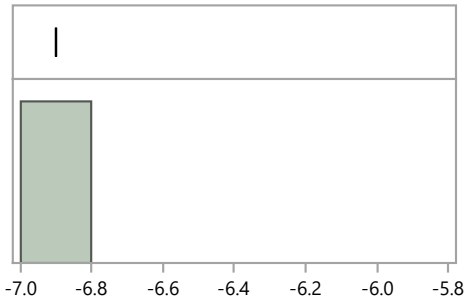
100.0%	maximum	13.2
99.5%		13.2
97.5%		13.2
90.0%		13.2
75.0%	quartile	13.2
50.0%	median	6.5
25.0%	quartile	-7.7
10.0%		-7.7
2.5%		-7.7
0.5%		-7.7
0.0%	minimum	-7.7

**Summary Statistics**

Mean	4.0
Std Dev	10.7
Std Err Mean	6.2
Upper 95% Mean	30.5
Lower 95% Mean	-22.5
N	3.0

**Distributions Analyte\_Method=Gross beta Evaporation, acidified**

**Bias**



**Quantiles**

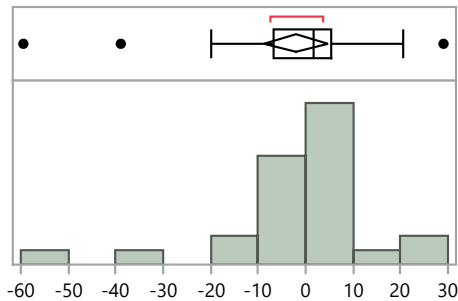
100.0%	maximum	-6.9
99.5%		-6.9
97.5%		-6.9
90.0%		-6.9
75.0%	quartile	-6.9
50.0%	median	-6.9
25.0%	quartile	-6.9
10.0%		-6.9
2.5%		-6.9
0.5%		-6.9
0.0%	minimum	-6.9

**Summary Statistics**

Mean	-6.9
Std Dev	.
Std Err Mean	.
Upper 95% Mean	.
Lower 95% Mean	.
N	1.0

**Distributions Analyte\_Method=Gross beta No preparation - analyzed as received**

**Bias**



**Quantiles**

100.0%	maximum	29.0
99.5%		29.0
97.5%		29.0
90.0%		15.1
75.0%	quartile	5.5
50.0%	median	1.5
25.0%	quartile	-6.9
10.0%		-23.8
2.5%		-59.4
0.5%		-59.4
0.0%	minimum	-59.4

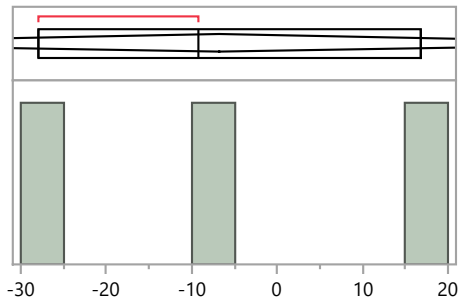
**Summary Statistics**

Mean	-2.1
Std Dev	17.1
Std Err Mean	3.3
Upper 95% Mean	4.6
Lower 95% Mean	-8.9
N	27.0

**GrF Distribution by Prep Method**

Distributions Analyte\_Method=Gross beta Other

**Bias**



Quantiles		
100.0%	maximum	16.8
99.5%		16.8
97.5%		16.8
90.0%		16.8
75.0%	quartile	16.8
50.0%	median	-9.2
25.0%	quartile	-28.0
10.0%		-28.0
2.5%		-28.0
0.5%		-28.0
0.0%	minimum	-28.0

Summary Statistics	
Mean	-6.8
Std Dev	22.5
Std Err Mean	13.0
Upper 95% Mean	49.1
Lower 95% Mean	-62.7
N	3.0