

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.1 Project: MJWC00115
Sample ID: 385077001 Client ID: MJWC001
Matrix: Soil
Collect Date: 21-OCT-15 13:10
Receive Date: 05-NOV-15
Collector: Client
Moisture: 23.1%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids												
ASTM D 2216 % Moisture "As Received"												
Moisture		23.1				percent		CXC1	11/10/15	1347	1521843	1
Rad Gamma Spec Analysis												
Gammaspec, Gamma, Solid "Dry Weight Corrected"												
Actinium-227	U	-0.156	+/-0.336	0.603		pCi/g		RXF2	12/03/15	0838	1522384	2
Antimony-125	U	0.0105	+/-0.129	0.235		pCi/g						
Cesium-137		1.23	+/-0.144	0.0838	0.100	pCi/g						
Cobalt-60	U	-6.76E-05	+/-0.0362	0.0732		pCi/g						
Europium-154	U	0.0303	+/-0.155	0.304		pCi/g						
Protactinium-231	U	0.634	+/-0.821	1.00		pCi/g						
Radium-226		1.04	+/-0.188	0.147		pCi/g						
Radium-228		1.09	+/-0.445	0.353		pCi/g						
Tin-126	U	0.129	+/-0.133	0.150		pCi/g						
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, solid "Dry Weight Corrected"												
Alpha		18.4	+/-2.52	2.56	4.00	pCi/g		KXB2	12/01/15	1954	1525765	3
Beta		27.7	+/-1.76	1.72	10.0	pCi/g						

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE HASL 300, 4.5.2.3/Ga-01-R	
3	EPA 900.0/SW846.9310/SM 7110B Modified	

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
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Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Report Date: December 17, 2015

Client Sample ID: 3.1.1.E.1
Sample ID: 385077001
Matrix: Soil
Collect Date: 21-OCT-15
Receive Date: 05-NOV-15
Collector: Client
Moisture: 23.1%

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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Gravimetric Solids

ASTM D 2216 % Moisture "As Received"

Moisture		23.1						percent	CXC1	11/10/15	1347	1521843	1
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Rad Gamma Spec Analysis

GammaSpec, Gamma, Solid "Dry Weight Corrected"

Actinium-227	U	-0.156	+/-0.336	0.603	0.284	+/-0.344		pCi/g	RXF2	12/03/15	0838	1522384	2
Antimony-125	U	0.0105	+/-0.129	0.235	0.109	+/-0.129		pCi/g					
Bismuth-212	UI	0.00	+/-0.865	1.40	0.643	+/-1.01		pCi/g					
Bismuth-214		1.04	+/-0.188	0.147	0.0665	+/-0.207		pCi/g					
Cesium-137		1.23	+/-0.144	0.0838	0.0379	+/-0.176	0.100	pCi/g					
Cobalt-60	U	-6.76E-05	+/-0.0362	0.0732	0.0304	+/-0.0362		pCi/g					
Europium-154	U	0.0303	+/-0.155	0.304	0.135	+/-0.156		pCi/g					
Lead-212		1.40	+/-0.146	0.126	0.0594	+/-0.186		pCi/g					
Lead-214		1.34	+/-0.213	0.401	0.195	+/-0.241		pCi/g					
Potassium-40		14.7	+/-1.64	0.880	0.378	+/-2.09		pCi/g					
Protactinium-231	UI	0.00	+/-0.821	1.00	0.467	+/-0.833		pCi/g					
Radium-226		1.04	+/-0.188	0.147	0.0665	+/-0.207		pCi/g					
Radium-228		1.09	+/-0.445	0.353	0.160	+/-0.474		pCi/g					
Thallium-208		0.394	+/-0.0939	0.0724	0.0326	+/-0.0997		pCi/g					
Tin-126	UI	0.00	+/-0.133	0.150	0.0713	+/-0.135		pCi/g					

Rad Gas Flow Proportional Counting

GFPC, Gross A.B. solid "Dry Weight Corrected"

Alpha		18.4	+/-2.52	2.56	1.19	+/-4.35	4.00	pCi/g	KXB2	12/01/15	1954	1525765	3
Beta		27.7	+/-1.76	1.72	0.830	+/-4.28	10.0	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE HASL 300, 4 5.2 3/Ga-01-R
3	EPA 900.0/SW846 9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
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Contact: Ms. Laurie Losey
Project: Soil Radioisotopes
Client Sample ID: 3.1.1.E.1
Sample ID: 385077001

Report Date: December 17, 2015

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.	
Surrogate/Tracer	Recovery	Test											Batch ID	Recovery%	Acceptable Limits

Notes:

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

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
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Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.2 Project: MJWC00115
Sample ID: 385077002 Client ID: MJWC001
Matrix: Soil
Collect Date: 21-OCT-15 13:25
Receive Date: 05-NOV-15
Collector: Client
Moisture: 23.3%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids												
ASTM D 2216 % Moisture "As Received"												
Moisture		23.3				percent		CXC1	11/10/15	1347	1521843	1
Rad Gamma Spec Analysis												
Gammascpec, Gamma, Solid "Dry Weight Corrected"												
Actinium-227	U	0.0383	+/-0.392	0.707		pCi/g		RXF2	12/03/15	1107	1522384	2
Antimony-125	U	-0.00441	+/-0.158	0.291		pCi/g						
Cesium-137		1.94	+/-0.184	0.0985	0.100	pCi/g						
Cobalt-60	U	-0.00321	+/-0.0508	0.0977		pCi/g						
Europium-154	U	0.0969	+/-0.174	0.339		pCi/g						
Protactinium-231	UI	0.00	+/-1.10	1.28		pCi/g						
Radium-226		1.02	+/-0.241	0.229		pCi/g						
Radium-228		1.18	+/-0.327	0.288		pCi/g						
Tin-126	U	-0.00367	+/-0.221	0.260		pCi/g						
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, solid "Dry Weight Corrected"												
Alpha		13.2	+/-2.26	2.59	4.00	pCi/g		KXB2	12/01/15	1954	1525765	3
Beta		25.7	+/-1.68	1.68	10.0	pCi/g						

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep Gl.-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE HASL 300, 4.5.2.3/Ga-01-R	
3	EPA 900.0/SW846 9310/SM 7110B Modified	

Notes:

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

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Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.2
 Sample ID: 385077002
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 23.3%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		23.3						percent		CXC1	11/10/15	1347	1521843	1
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.0383	+/-0.392	0.707	0.333	+/-0.393		pCi/g		RXF2	12/03/15	1107	1522384	2
Antimony-125	U	-0.00441	+/-0.158	0.291	0.136	+/-0.158		pCi/g						
Bismuth-212	UI	0.00	+/-0.869	1.67	0.774	+/-1.12		pCi/g						
Bismuth-214		1.02	+/-0.241	0.229	0.107	+/-0.256		pCi/g						
Cesium-137		1.94	+/-0.184	0.0985	0.0447	+/-0.246	0.100	pCi/g						
Cobalt-60	U	-0.00321	+/-0.0508	0.0977	0.0416	+/-0.0508		pCi/g						
Europium-154	U	0.0969	+/-0.174	0.339	0.150	+/-0.179		pCi/g						
Lead-212		1.44	+/-0.173	0.153	0.0722	+/-0.213		pCi/g						
Lead-214		1.33	+/-0.230	0.436	0.211	+/-0.257		pCi/g						
Potassium-40		17.0	+/-1.85	0.829	0.341	+/-2.35		pCi/g						
Protactinium-231	U	0.00	+/-1.10	1.28	0.596	+/-1.16		pCi/g						
Radium-226		1.02	+/-0.241	0.229	0.107	+/-0.256		pCi/g						
Radium-228		1.18	+/-0.327	0.288	0.124	+/-0.370		pCi/g						
Thallium-208		0.327	+/-0.0934	0.108	0.050	+/-0.0975		pCi/g						
Tin-126	U	-0.00367	+/-0.221	0.260	0.125	+/-0.221		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A-B, solid "Dry Weight Corrected"</i>														
Alpha		13.2	+/-2.26	2.59	1.21	+/-3.43	4.00	pCi/g		KXB2	12/01/15	1954	1525765	3
Beta		25.7	+/-1.68	1.68	0.811	+/-3.96	10.0	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE HASL 300, 4.5.2.3:Ga-01-R
3	EPA 900.0/SW846 9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.2
Sample ID: 385077002

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.	
Surrogate/Tracer Recovery	Test												Batch ID	Recovery%	Acceptable Limits

Notes:

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

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Report Date: January 20, 2016

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Project: MJWC00115
 Client ID: MJWC001

Client Sample ID: 3.1.1.E.3
 Sample ID: 388092016
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 23-DEC-15
 Collector: Client
 Moisture: 21.6%

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gamma spec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	-0.115	+/-0.378	0.645	0.303	+/-0.382		pCi/g		MJH1	01/18/16	0722	1534020	1
Antimony-125	U	0.0664	+/-0.138	0.266	0.124	+/-0.142		pCi/g						
Bismuth-212	UI	0.00	+/-0.995	1.46	0.672	+/-1.10		pCi/g						
Bismuth-214		0.754	+/-0.200	0.191	0.0879	+/-0.211		pCi/g						
Cesium-137		2.18	+/-0.173	0.0805	0.0359	+/-0.263	0.100	pCi/g						
Cobalt-60	U	-0.0565	+/-0.0527	0.0595	0.0228	+/-0.0587		pCi/g						
Europium-154	U	-0.236	+/-0.158	0.235	0.0986	+/-0.192		pCi/g						
Lead-212		1.15	+/-0.189	0.165	0.0782	+/-0.215		pCi/g						
Lead-214		1.09	+/-0.265	0.181	0.084	+/-0.281		pCi/g						
Potassium-40		14.5	+/-1.75	0.834	0.349	+/-2.14		pCi/g						
Protactinium-231	U	0.0605	+/-0.657	1.24	0.581	+/-0.658		pCi/g						
Radium-226		0.754	+/-0.200	0.191	0.0879	+/-0.211		pCi/g						
Radium-228		1.12	+/-0.346	0.285	0.124	+/-0.380		pCi/g						
Thallium-208		0.409	+/-0.0963	0.0824	0.0373	+/-0.103		pCi/g						
Tin-126	UI	0.00	+/-0.150	0.239	0.115	+/-0.200		pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	LYT1	12/24/15	0703	1533924

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Report Date: January 20, 2016

Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.3
Sample ID: 388092016

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.	
Surrogate/Tracer Recovery	Test												Batch ID	Recovery%	Acceptable Limits

Notes:

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

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Report Date: January 20, 2016

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.3
 Sample ID: 388092006
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 23-DEC-15
 Collector: Client
 Moisture: 21.6%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		21.6						percent		LYT1	12/24/15	0703	1533555	1
Rad Alpha Spec Analysis														
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>														
Plutonium-238	U	0.000662	+/-0.049	0.109	0.0297	+/-0.0491	1.00	pCi/g		MXS2	01/12/16	1021	1534070	2
Plutonium-239/240	U	-0.0112	+/-0.0508	0.128	0.0392	+/-0.0508	1.00	pCi/g						
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>														
Uranium-232	U	-0.0254	+/-0.0409	0.130	0.0387	+/-0.041	1.00	pCi/g		MXS2	01/12/16	1015	1534063	3
Uranium-233/234		0.906	+/-0.238	0.132	0.0431	+/-0.282	1.00	pCi/g						
Uranium-235/236		0.0732	+/-0.081	0.107	0.0306	+/-0.0819	1.00	pCi/g						
Uranium-238		0.779	+/-0.217	0.0928	0.0236	+/-0.254	1.00	pCi/g						
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>														
Neptunium-237		0.126	+/-0.248	0.343	0.0642	+/-0.248	1.00	pCi/g		MXS2	01/12/16	1032	1534069	4
<i>Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"</i>														
Thorium-228		0.728	+/-0.509	0.507	0.142	+/-0.533	1.00	pCi/g		MXS2	01/12/16	1031	1534062	5
Thorium-229	U	-0.0165	+/-0.142	0.329	0.0616	+/-0.143	1.00	pCi/g						
Thorium-230		1.20	+/-0.587	0.379	0.0869	+/-0.638	1.00	pCi/g						
Thorium-232		1.01	+/-0.537	0.327	0.0612	+/-0.577	1.00	pCi/g						
<i>Am241, Cm Solid "Dry Weight Corrected"</i>														
Americium-241		0.0335	+/-0.0532	0.0736	0.0169	+/-0.0534	1.00	pCi/g		MXS2	01/12/16	1103	1534067	6
Curium-242		0.0187	+/-0.0525	0.056	0.00	+/-0.0526	1.00	pCi/g						
Curium-243/244	U	0.0169	+/-0.0465	0.0807	0.0205	+/-0.0466	1.00	pCi/g						
Curium-245/246		0.0304	+/-0.0521	0.0456	0.00	+/-0.0523	1.00	pCi/g						
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>														
Plutonium-241	U	-10.2	+/-7.00	12.6	6.15	+/-7.00	15.0	pCi/g		MXS2	01/14/16	1658	1534073	7
Rad Gamma Spec Analysis														
<i>Gamma 1129, Solid "Dry Weight Corrected"</i>														
Iodine-129	U	0.0709	+/-0.139	0.522	0.165	+/-0.143	1.00	pCi/g		MJH1	01/15/16	0848	1535059	8
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.00701	+/-0.251	0.463	0.223	+/-0.251		pCi/g		MJH1	12/29/15	1156	1533562	9
Antimony-125	U	-0.0128	+/-0.102	0.184	0.0876	+/-0.102		pCi/g						
Bismuth-212		1.32	+/-0.844	0.726	0.335	+/-0.854		pCi/g						
Bismuth-214		0.838	+/-0.139	0.124	0.0582	+/-0.156		pCi/g						
Cesium-137		2.12	+/-0.137	0.0659	0.0309	+/-0.221	0.100	pCi/g						
Cobalt-60	U	0.0125	+/-0.0307	0.061	0.0274	+/-0.0312		pCi/g						
Europium-154	U	0.0934	+/-0.139	0.219	0.101	+/-0.145		pCi/g						
Lead-212		1.21	+/-0.113	0.104	0.0501	+/-0.148		pCi/g						
Lead-214		1.05	+/-0.168	0.126	0.0598	+/-0.188		pCi/g						

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Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228
 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes
 Client Sample ID: 3.1.1.E.3
 Sample ID: 388092006

Report Date: January 20, 2016

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		14.1	+/-1.19	0.438	0.188	+/-1.72		pCi/g						
Protactinium-231	U1	0.00	+/-0.806	0.802	0.383	+/-0.816		pCi/g						
Radium-226		0.838	+/-0.139	0.124	0.0582	+/-0.156		pCi/g						
Radium-228		1.07	+/-0.264	0.215	0.0987	+/-0.298		pCi/g						
Thallium-208		0.429	+/-0.0742	0.0595	0.0279	+/-0.0826		pCi/g						
Tin-126	U	0.00	+/-0.155	0.147	0.0712	+/-0.159		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		16.3	+/-2.11	1.97	0.906	+/-3.79	4.00	pCi/g		JXB7	01/11/16	1900	1534760	10
Beta		23.2	+/-1.54	1.57	0.760	+/-3.53	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	-0.219	+/-0.842	1.66	0.733	+/-0.842	2.00	pCi/g		KSD1	01/07/16	1129	1534788	11
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist. Solid "Dry Weight Corrected"</i>														
Tritium	U	-1.11	+/-2.39	4.23	2.04	+/-2.39	6.00	pCi/g		TXJ1	01/10/16	1952	1534918	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	-0.823	+/-0.792	1.38	0.677	+/-0.792	2.00	pCi/g		TXJ1	01/16/16	1059	1534935	13
<i>Liquid Scint Tc99, Solid "Dry Weight Corrected"</i>														
Technetium-99	U	-0.644	+/-1.56	2.77	1.33	+/-1.56	5.00	pCi/g		MYM	01/19/16	0626	1534638	14

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	LYT1	12/24/15	0703	1533555

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	ASTM C 1476-00 Modified
5	DOE EML HASL-300, Th-01-RC Modified
6	DOE EML HASL-300, Am-05-RC Modified
7	DOE EML HASL-300, Pu-11-RC Modified
8	DOE EML HASL-300, I-01 Modified
9	DOE HASL 300, 4.5.2.3:Ga-01-R
10	EPA 900.0/SW846 9310/SM 7110B Modified
11	EPA 905.0 Modified/DOE RP501 Rev 1 Modified
12	EPA 906.0 Modified
13	EPA EERF C-01 Modified

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes
Client Sample ID: 3.1.1.E.3
Sample ID: 388092006

Report Date: January 20, 2016

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
14	DOE EML HASL-300, Te-02-RC Modified													

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"	1534070	72.1	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1534063	72.9	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1534063	81.9	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"	1534069	95.8	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"	1534062	92.2	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"	1534067	87.4	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"	1534073	72.1	(15%-125%)
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"	1534788	76	(25%-125%)
Technetium-99m Tracer	Liquid Scint Te99, Solid "Dry Weight Corrected"	1534638	97.8	(15%-125%)

Notes:

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

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.4	Project: MJWC00115
Sample ID: 385077003	Client ID: MJWC001
Matrix: Soil	
Collect Date: 21-OCT-15 13:45	
Receive Date: 05-NOV-15	
Collector: Client	
Moisture: 21.8%	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids												
ASTM D 2216 % Moisture "As Received"												
Moisture		21.8				percent		CXC1	11/10/15	1347	1521843	1
Rad Gamma Spec Analysis												
Gammascpec, Gamma, Solid "Dry Weight Corrected"												
Actinium-227	U	0.356	+/-0.453	0.675		pCi/g		RXT2	12/03/15	1107	1522384	2
Antimony-125	U	0.0916	+/-0.116	0.236		pCi/g						
Cesium-137		0.315	+/-0.0979	0.0869	0.100	pCi/g						
Cobalt-60	U	0.0439	+/-0.0449	0.103		pCi/g						
Europium-154	U	-0.0144	+/-0.166	0.321		pCi/g						
Protactinium-231	U	0.526	+/-0.985	1.09		pCi/g						
Radium-226		1.11	+/-0.194	0.147		pCi/g						
Radium-228		1.22	+/-0.370	0.374		pCi/g						
Tin-126	UI	0.00	+/-0.177	0.213		pCi/g						
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, solid "Dry Weight Corrected"												
Alpha		47.8	+/-3.52	2.23	4.00	pCi/g		KXB2	12/01/15	1954	1525765	3
Beta		32.0	+/-2.01	2.14	10.0	pCi/g						

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE HASL 300.4 5.2.3/Ga-01-R	
3	EPA 900.0/SW846 9310/SM 7110B Modified	

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228

Report Date: December 17, 2015

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.4
 Sample ID: 385077003
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 21.8%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		21.8						percent		CXC1	11/10/15	1347	1521843	1
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	UI	0.00	+/-0.453	0.675	0.316	+/-0.484		pCi/g		RXF2	12/03/15	1107	1522384	2
Antimony-125	U	0.0916	+/-0.116	0.236	0.108	+/-0.124		pCi/g						
Bismuth-212	UI	0.00	+/-0.808	1.59	0.728	+/-1.14		pCi/g						
Bismuth-214		1.11	+/-0.194	0.147	0.0648	+/-0.215		pCi/g						
Cesium-137		0.315	+/-0.0979	0.0869	0.0386	+/-0.101	0.100	pCi/g						
Cobalt-60	UI	0.00	+/-0.0449	0.103	0.0438	+/-0.0492		pCi/g						
Europium-154	U	-0.0144	+/-0.166	0.321	0.140	+/-0.166		pCi/g						
Lead-212		1.16	+/-0.149	0.134	0.0628	+/-0.180		pCi/g						
Lead-214		1.07	+/-0.219	0.398	0.192	+/-0.237		pCi/g						
Potassium-40		12.8	+/-1.63	0.979	0.413	+/-1.96		pCi/g						
Protactinium-231	UI	0.00	+/-0.985	1.09	0.505	+/-0.993		pCi/g						
Radium-226		1.11	+/-0.194	0.147	0.0648	+/-0.215		pCi/g						
Radium-228		1.22	+/-0.370	0.374	0.166	+/-0.403		pCi/g						
Thallium-208		0.373	+/-0.103	0.0747	0.033	+/-0.108		pCi/g						
Tin-126	UI	0.00	+/-0.177	0.213	0.101	+/-0.178		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		47.8	+/-3.52	2.23	1.03	+/-10.0	4.00	pCi/g		KXB2	12/01/15	1954	1525765	3
Beta		32.0	+/-2.01	2.14	1.04	+/-4.99	10.0	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE HASL 300, 4.5.2.3/Ga-01-R
3	EPA 900.0/SW846.9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes
Client Sample ID: 3.1.1.E.4
Sample ID: 385077003

Report Date: December 17, 2015

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.	
Surrogate/Tracer	Recovery	Test											Batch ID	Recovery%	Acceptable Limits

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Report Date: January 19, 2016

Client Sample ID: 3.1.1.E.4
Sample ID: 389094001
Matrix: Soil
Collect Date: 21-OCT-15
Receive Date: 05-NOV-15
Collector: Client
Moisture: 21.8%

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Le	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow Proportional Counting														
<i>GFP. Gross A-B, solid "Dry Weight Corrected"</i>														
Alpha		14.5	+/-3.59	3.92	1.73	+/-4.55	4.00	pCi/g		JXB7	01/13/16	1613	1536863	1
Beta		21.6	+/-2.76	2.85	1.34	+/-4.16	10.0	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1536780

The following Analytical Methods were performed

Method	Description
1	EPA 900.0/SW846 9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Notes:

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

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228
 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.I.I.E.5	Project: MJWC00115
Sample ID: 385077004	Client ID: MJWC001
Matrix: Soil	
Collect Date: 21-OCT-15 13:15	
Receive Date: 05-NOV-15	
Collector: Client	
Moisture: 22.9%	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time Batch	Method
Gravimetric Solids											
ASTM D 2216 % Moisture "As Received"											
Moisture		22.9				percent		CXCI	11/10/15	1347 1521843	1
Rad Alpha Spec Analysis											
ASP Plutonium Isotopic, Solid "Dry Weight Corrected"											
Plutonium-238	U	-0.0167	+/-0.0386	0.114	1.00	pCi/g		HAKB	11/23/15	1501 1522577	2
Plutonium-239/240	U	-0.00278	+/-0.0643	0.145	1.00	pCi/g					
ASP Uranium Isotopic, Solid "Dry Weight Corrected"											
Uranium-232	U	-0.02	+/-0.0486	0.106	1.00	pCi/g		HAKB	11/25/15	1325 1522580	3
Uranium-233/234		0.995	+/-0.246	0.0854	1.00	pCi/g					
Uranium-235/236	U	0.0427	+/-0.0615	0.0741	1.00	pCi/g					
Uranium-238		0.849	+/-0.231	0.125	1.00	pCi/g					
Alphaspec Np237, Solid "Dry Weight Corrected"											
Neptunium-237	U	-0.108	+/-0.245	0.668	1.00	pCi/g		HAKB	11/23/15	1707 1522576	4
Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"											
Thorium-228		1.60	+/-0.545	0.350	1.00	pCi/g		HAKB	11/24/15	1014 1522579	5
Thorium-229	U	-0.0396	+/-0.134	0.348	1.00	pCi/g					
Thorium-230		1.03	+/-0.432	0.283	1.00	pCi/g					
Thorium-232		1.28	+/-0.468	0.128	1.00	pCi/g					
Am241, Cm Solid "Dry Weight Corrected"											
Americium-241	U	0.0129	+/-0.0442	0.0819	1.00	pCi/g		HAKB	11/24/15	1042 1522571	6
Curium-242	U	-0.0034	+/-0.0293	0.068	1.00	pCi/g					
Curium-243/244	U	-0.00246	+/-0.0369	0.0862	1.00	pCi/g					
Curium-245/246	U	0.0392	+/-0.0565	0.0682	1.00	pCi/g					
Liquid Scint Pu241, Solid "Dry Weight Corrected"											
Plutonium-241	U	-2.57	+/-5.58	9.76	15.0	pCi/g		HAKB	11/25/15	1233 1522578	7
Rad Gamma Spec Analysis											
Gamma I129, Solid "Dry Weight Corrected"											
Iodine-129	U	-0.00286	+/-0.364	0.643	1.00	pCi/g		MJH1	12/02/15	1556 1522374	8
Gammaspect, Gamma, Solid "Dry Weight Corrected"											
Actinium-227	U	0.285	+/-0.412	0.785		pCi/g		RXF2	12/03/15	1108 1522384	9
Antimony-125	U	-0.131	+/-0.185	0.276		pCi/g					
Cesium-137		1.25	+/-0.142	0.111	0.100	pCi/g					
Cobalt-60	U	0.0377	+/-0.0576	0.125		pCi/g					
Europium-154	U	0.190	+/-0.174	0.382		pCi/g					
Protactinium-231	U	0.635	+/-0.833	1.49		pCi/g					

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.5 Project: MJWC00115
Sample ID: 385077004 Client ID: MJWC001

Rad Gamma Spec Analysis

Gammasec, Gamma, Solid "Dry Weight Corrected"

Radium-226	0.858	+/-0.232	0.207	pCi/g	
Radium-228	1.19	+/-0.351	0.390	pCi/g	
Tin-126	U	0.0421	+/-0.158	0.242	pCi/g

Rad Gas Flow Proportional Counting

GFPC, Gross A/B, solid "Dry Weight Corrected"

Alpha	16.7	+/-2.60	2.98	4.00	pCi/g	KXB2	12/01/15	1954	1525765	10
Beta	28.1	+/-1.76	1.50	10.0	pCi/g					

GFPC, Sr90, solid "Dry Weight Corrected"

Strontium-90	U	-0.0135	+/-0.998	1.91	2.00	pCi/g	KSD1	12/03/15	1629	1525755	11
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Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Solid "Dry Weight Corrected"

Tritium	U	0.912	+/-1.87	3.34	6.00	pCi/g	TXJ1	12/02/15	1546	1522724	12
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Liquid Scint C14, Solid "Dry Weight Corrected"

Carbon-14	U	-0.754	+/-0.860	1.50	2.00	pCi/g	TXJ1	12/03/15	2206	1522716	13
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Liquid Scint Tc99, Solid "Dry Weight Corrected"

Technetium-99	U	1.26	+/-1.56	2.62	5.00	pCi/g	MYM1	11/29/15	1137	1522715	14
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.5

Project: MJWC00115

Sample ID: 385077004

Client ID: MJWC001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, Pu-11-RC Modified	
3	DOE EML HASL-300, U-02-RC Modified	
4	ASTM C 1476-00 Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, Am-05-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE EML HASL-300, I-01 Modified	
9	DOE HASL 300, 4 5 2 3/Ga-01-R	
10	EPA 900.0/SW846 9310/SM 7110B Modified	
11	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
12	EPA 906.0 Modified	
13	EPA EERF C-01 Modified	
14	DOE EML HASL-300, Tc-02-RC Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"			86.6	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			81.9	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			74.7	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"			92.3	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"			103	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"			93.9	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			86.6	(15%-125%)
Sr90 Carrier	GFPC, Sr90, solid "Dry Weight Corrected"			63.2	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"			94.2	(15%-125%)

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228

Report Date: December 17, 2015

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.5
 Sample ID: 385077004
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 22.9%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		22.9						percent		CXC1	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis														
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>														
Plutonium-238	U	-0.0167	+/-0.0386	0.114	0.0312	+/-0.0387	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	-0.00278	+/-0.0643	0.145	0.0467	+/-0.0643	1.00	pCi/g						
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>														
Uranium-232	U	-0.02	+/-0.0486	0.106	0.0433	+/-0.0486	1.00	pci/g		HAKB	11/25/15	1325	1522580	3
Uranium-233/234		0.995	+/-0.246	0.0854	0.0196	+/-0.303	1.00	pci/g						
Uranium-235/236		0.0427	+/-0.0615	0.0741	0.0139	+/-0.062	1.00	pci/g						
Uranium-238		0.849	+/-0.231	0.125	0.0391	+/-0.276	1.00	pci/g						
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>														
Neptunium-237	U	-0.108	+/-0.245	0.668	0.218	+/-0.245	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
<i>Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"</i>														
Thorium-228		1.60	+/-0.545	0.350	0.109	+/-0.589	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229	U	-0.0396	+/-0.134	0.348	0.109	+/-0.134	1.00	pCi/g						
Thorium-230		1.03	+/-0.432	0.283	0.0771	+/-0.454	1.00	pCi/g						
Thorium-232		1.28	+/-0.468	0.128	0.00	+/-0.499	1.00	pCi/g						
<i>Am241, Cm Solid "Dry Weight Corrected"</i>														
Americium-241	U	0.0129	+/-0.0442	0.0819	0.0223	+/-0.0442	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242	U	-0.0034	+/-0.0293	0.068	0.0127	+/-0.0294	1.00	pCi/g						
Curium-243/244	U	-0.00246	+/-0.0369	0.0862	0.0247	+/-0.0369	1.00	pCi/g						
Curium-245/246		0.0392	+/-0.0565	0.0682	0.0128	+/-0.0567	1.00	pCi/g						
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>														
Plutonium-241	U	-2.57	+/-5.58	9.76	4.75	+/-5.58	15.0	pCi/g		HAKB	11/25/15	1233	1522578	7
Rad Gamma Spec Analysis														
<i>Gamma 1129, Solid "Dry Weight Corrected"</i>														
Iodine-129	U	-0.00286	+/-0.364	0.643	0.298	+/-0.364	1.00	pCi/g		MJH1	12/02/15	1556	1522374	8
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.285	+/-0.412	0.785	0.370	+/-0.434		pCi/g		RXF2	12/03/15	1108	1522384	9
Antimony-125	U	-0.131	+/-0.185	0.276	0.127	+/-0.195		pCi/g						
Bismuth-212		1.52	+/-1.03	1.30	0.582	+/-1.05		pCi/g						
Bismuth-214		0.858	+/-0.232	0.207	0.0949	+/-0.245		pCi/g						
Cesium-137		1.25	+/-0.142	0.111	0.0505	+/-0.181	0.100	pCi/g						
Cobalt-60	U	0.0377	+/-0.0576	0.125	0.0547	+/-0.0601		pCi/g						
Europium-154	UI	0.00	+/-0.174	0.382	0.170	+/-0.194		pCi/g						
Lead-212		1.36	+/-0.187	0.161	0.0757	+/-0.224		pCi/g						
Lead-214		1.15	+/-0.274	0.222	0.104	+/-0.292		pCi/g						

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228
 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes
 Client Sample ID: 3.1.1.E.5
 Sample ID: 385077004

Report Date: December 17, 2015

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		15.9	+/-2.04	0.894	0.369	+/-2.45		pCi/g						
Protactinium-231	U	0.635	+/-0.833	1.49	0.701	+/-0.893		pCi/g						
Radium-226		0.858	+/-0.232	0.207	0.0949	+/-0.245		pCi/g						
Radium-228		1.19	+/-0.351	0.390	0.174	+/-0.395		pCi/g						
Thallium-208		0.477	+/-0.110	0.104	0.0476	+/-0.118		pCi/g						
Tin-126	U	0.0421	+/-0.158	0.242	0.116	+/-0.159		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		16.7	+/-2.60	2.98	1.40	+/-4.18	4.00	pCi/g		KXB2	12/01/15	1954	1525765	10
Beta		28.1	+/-1.76	1.50	0.717	+/-4.52	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	-0.0135	+/-0.998	1.91	0.839	+/-0.998	2.00	pCi/g		KSD1	12/03/15	1629	1525755	11
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Solid "Dry Weight Corrected"</i>														
Tritium	U	0.912	+/-1.87	3.34	1.45	+/-1.87	6.00	pCi/g		TXJ1	12/02/15	1546	1522724	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	-0.754	+/-0.860	1.50	0.734	+/-0.860	2.00	pCi/g		TXJ1	12/03/15	2206	1522716	13
<i>Liquid Scint Tc99, Solid "Dry Weight Corrected"</i>														
Technetium-99	U	1.26	+/-1.56	2.62	1.26	+/-1.56	5.00	pCi/g		MYM	11/29/15	1137	1522715	14

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	ASTM C 1476-00 Modified
5	DOE EML HASL-300, Th-01-RC Modified
6	DOE EML HASL-300, Am-05-RC Modified
7	DOE EML HASL-300, Pu-11-RC Modified
8	DOE EML HASL-300, I-01 Modified
9	DOE HASL 300, 4.5.2.3/Ga-01-R
10	EPA 900.0/SW846 9310/SM 7110B Modified
11	EPA 905.0 Modified/DOE RP501 Rev 1 Modified
12	EPA 906.0 Modified
13	EPA EERF C-01 Modified

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Contact: Ms. Laurie Losey
Project: Soil Radioisotopes
Client Sample ID: 3.1.1.E.5
Sample ID: 385077004

Report Date: December 17, 2015

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
14	DOE EML HASL-300, 1c-02-RC Modified													
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"							1522577	86.6	(15%-125%)				
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"							1522580	81.9	(15%-125%)				
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"							1522580	74.7	(15%-125%)				
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"							1522576	92.3	(15%-125%)				
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"							1522579	103	(15%-125%)				
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"							1522571	93.9	(15%-125%)				
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"							1522578	86.6	(15%-125%)				
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"							1525755	63.2	(25%-125%)				
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"							1522715	94.2	(15%-125%)				

Notes:

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

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.6	Project: MJWC00115
Sample ID: 385077005	Client ID: MJWC001
Matrix: Soil	
Collect Date: 21-OCT-15 13:30	
Receive Date: 05-NOV-15	
Collector: Client	
Moisture: 23.4%	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids												
ASTM D 2216 % Moisture "As Received"												
Moisture		23.4				percent		CXC1	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis												
ASP Plutonium Isotopic, Solid "Dry Weight Corrected"												
Plutonium-238	U	0.0278	+/-0.0639	0.101	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	-0.0117	+/-0.0688	0.164	1.00	pCi/g						
ASP Uranium Isotopic, Solid "Dry Weight Corrected"												
Uranium-232	U	0.0288	+/-0.0774	0.140	1.00	pCi/g		HAKB	11/24/15	0851	1522580	3
Uranium-233/234		1.16	+/-0.300	0.119	1.00	pCi/g						
Uranium-235/236	U	0.0345	+/-0.0679	0.0941	1.00	pCi/g						
Uranium-238		0.958	+/-0.271	0.0587	1.00	pCi/g						
Alphaspec Np237, Solid "Dry Weight Corrected"												
Neptunium-237	U	0.0729	+/-0.249	0.462	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"												
Thorium-228	U	0.773	+/-0.805	1.11	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229	U	-0.062	+/-0.274	0.716	1.00	pCi/g						
Thorium-230		1.81	+/-1.02	0.850	1.00	pCi/g						
Thorium-232		0.998	+/-0.761	0.617	1.00	pCi/g						
Am241, Cm Solid "Dry Weight Corrected"												
Americium-241	U	0.0182	+/-0.0418	0.0663	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242	U	0.00	+/-0.0276	0.041	1.00	pCi/g						
Curium-243/244	U	-0.00521	+/-0.036	0.0876	1.00	pCi/g						
Curium-245/246	X	0.137	+/-0.0893	0.0411	1.00	pCi/g						
Liquid Scint Pu241, Solid "Dry Weight Corrected"												
Plutonium-241	U	-2.06	+/-6.25	10.9	15.0	pCi/g		HAKB	11/25/15	1335	1522578	7
Rad Gamma Spec Analysis												
Gamma I129, Solid "Dry Weight Corrected"												
Iodine-129	U	0.162	+/-0.310	0.601	1.00	pCi/g		MJH1	12/02/15	1556	1522374	8
Gammasec, Gamma, Solid "Dry Weight Corrected"												
Actinium-227	U	0.219	+/-0.330	0.576		pCi/g		RXF2	12/03/15	1108	1522384	9
Antimony-125	U	0.0237	+/-0.135	0.255		pCi/g						
Cesium-137		1.86	+/-0.164	0.0911	0.100	pCi/g						
Cobalt-60	U	-0.026	+/-0.0457	0.0821		pCi/g						
Europium-154	U	0.0489	+/-0.132	0.278		pCi/g						
Protactinium-231	UI	0.00	+/-1.01	1.08		pCi/g						

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Lauric Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.I.E.6
Sample ID: 385077005

Project: MJWC00115
Client ID: MJWC001

Rad Gamma Spec Analysis

Gammascpec, Gamma, Solid "Dry Weight Corrected"

Radium-226	0.840	+/-0.203	0.170	pCi/g	
Radium-228	1.19	+/-0.438	0.285	pCi/g	
Th-126	U	0.151	+/-0.127	0.176	pCi/g

Rad Gas Flow Proportional Counting

GFPC, Gross A/B, solid "Dry Weight Corrected"

Alpha	23.6	+/-2.63	2.10	4.00	pCi/g	KXB2	12/01/15	1954	1525765	10
Beta	29.4	+/-1.83	1.66	10.0	pCi/g					

GFPC, Sr90, solid "Dry Weight Corrected"

Strontium-90	U	-0.576	+/-0.594	1.37	2.00	pCi/g	KSD1	12/02/15	1710	1525755	11
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Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Solid "Dry Weight Corrected"

Tritium	U	0.979	+/-1.86	3.29	6.00	pCi/g	TXJ1	12/02/15	1634	1522724	12
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Liquid Scint C14, Solid "Dry Weight Corrected"

Carbon-14	U	-0.975	+/-0.836	1.47	2.00	pCi/g	TXJ1	12/03/15	2318	1522716	13
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Liquid Scint Tc99, Solid "Dry Weight Corrected"

Technetium-99	U	1.11	+/-1.76	2.99	5.00	pCi/g	MYM1	11/29/15	1203	1522715	14
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.6 Project: MJWC00115
Sample ID: 385077005 Client ID: MJWC001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, Pu-11-RC Modified	
3	DOE EML HASL-300, U-02-RC Modified	
4	ASTM C 1476-00 Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, Am-05-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE EML HASL-300, I-01 Modified	
9	DOE HASL 300, 4.5.2.3/Ga-01-R	
10	EPA 900.0/SW846 9310/SM 7110B Modified	
11	EPA 905.0 Modified/DOE RP501 Rev 1 Modified	
12	EPA 906.0 Modified	
13	EPA EERF C-01 Modified	
14	DOE EML HASL-300, Tc-02-RC Modified	

Surrogate/tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"			78.8	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			77.3	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			75.4	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"			96.9	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"			40.1	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"			89.2	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			78.8	(15%-125%)
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"			87.8	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"			94.1	(15%-125%)

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
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Report Date: December 17, 2015

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.6
 Sample ID: 385077005
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 23.4%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		23.4						percent		CXCI	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis														
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>														
Plutonium-238		0.0278	+/-0.0639	0.101	0.0232	+/-0.064	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	-0.0117	+/-0.0688	0.164	0.0544	+/-0.0689	1.00	pCi/g						
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>														
Uranium-232	U	0.0288	+/-0.0774	0.140	0.0587	+/-0.0776	1.00	pci/g		HAKB	11/24/15	0851	1522580	3
Uranium-233/234		1.16	+/-0.300	0.119	0.0304	+/-0.370	1.00	pci/g						
Uranium-235/236		0.0345	+/-0.0679	0.0941	0.0176	+/-0.0682	1.00	pci/g						
Uranium-238		0.958	+/-0.271	0.0587	0.00	+/-0.325	1.00	pci/g						
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>														
Neptunium-237	U	0.0729	+/-0.249	0.462	0.126	+/-0.249	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
<i>Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"</i>														
Thorium-228		0.773	+/-0.805	1.11	0.357	+/-0.824	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229	U	-0.062	+/-0.274	0.716	0.164	+/-0.276	1.00	pCi/g						
Thorium-230		1.81	+/-1.02	0.850	0.231	+/-1.09	1.00	pCi/g						
Thorium-232		0.998	+/-0.761	0.617	0.115	+/-0.791	1.00	pCi/g						
<i>Am241, Cm Solid "Dry Weight Corrected"</i>														
Americium-241		0.0182	+/-0.0418	0.0663	0.0152	+/-0.0419	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242		0.00	+/-0.0276	0.041	0.00	+/-0.0276	1.00	pCi/g						
Curium-243/244	U	-0.00521	+/-0.036	0.0876	0.026	+/-0.036	1.00	pCi/g						
Curium-245/246	X	0.137	+/-0.0893	0.0411	0.00	+/-0.0908	1.00	pCi/g						
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>														
Plutonium-241	U	-2.06	+/-6.25	10.9	5.30	+/-6.25	15.0	pCi/g		HAKB	11/25/15	1335	1522578	7
Rad Gamma Spec Analysis														
<i>Gamma I129, Solid "Dry Weight Corrected"</i>														
Iodine-129	U	0.162	+/-0.310	0.601	0.274	+/-0.319	1.00	pCi/g		MJH1	12/02/15	1556	1522374	8
<i>Gommaspec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.219	+/-0.330	0.576	0.269	+/-0.346		pCi/g		RXF2	12/03/15	1108	1522384	9
Antimony-125	U	0.0237	+/-0.135	0.255	0.118	+/-0.136		pCi/g						
Bismuth-212	UI	0.00	+/-0.909	1.49	0.686	+/-1.18		pCi/g						
Bismuth-214		0.840	+/-0.203	0.170	0.0776	+/-0.215		pCi/g						
Cesium-137		1.86	+/-0.164	0.0911	0.0413	+/-0.225	0.100	pCi/g						
Cobalt-60	U	-0.026	+/-0.0457	0.0821	0.0343	+/-0.0472		pCi/g						
Europium-154	U	0.0489	+/-0.132	0.278	0.121	+/-0.134		pCi/g						
Lead-212		1.34	+/-0.152	0.125	0.0585	+/-0.192		pCi/g						
Lead-214		1.23	+/-0.229	0.395	0.191	+/-0.252		pCi/g						

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Certificate of Analysis

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 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes
 Client Sample ID: 3.1.1.E.6
 Sample ID: 385077005

Report Date: December 17, 2015

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		17.1	+/-1.88	0.922	0.394	+/-2.38		pCi/g						
Protactinium-231	U1	0.00	+/-1.01	1.08	0.500	+/-1.06		pCi/g						
Radium-226		0.840	+/-0.203	0.170	0.0776	+/-0.215		pCi/g						
Radium-228		1.19	+/-0.438	0.285	0.125	+/-0.472		pCi/g						
Thallium-208		0.430	+/-0.0867	0.0704	0.0314	+/-0.0939		pCi/g						
Tin-126	U1	0.00	+/-0.127	0.176	0.0837	+/-0.129		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		23.6	+/-2.63	2.10	0.963	+/-5.81	4.00	pCi/g		KXB2	12/01/15	1954	1525765	10
Beta		29.4	+/-1.83	1.66	0.798	+/-4.56	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	-0.576	+/-0.594	1.37	0.591	+/-0.594	2.00	pCi/g		KSD1	12/02/15	1710	1525755	11
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist. Solid "Dry Weight Corrected"</i>														
Tritium	U	0.979	+/-1.86	3.29	1.44	+/-1.86	6.00	pCi/g		TXJ1	12/02/15	1634	1522724	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	-0.975	+/-0.836	1.47	0.719	+/-0.836	2.00	pCi/g		TXJ1	12/03/15	2318	1522716	13
<i>Liquid Scint Tc99, Solid "Dry Weight Corrected"</i>														
Technetium-99	U	1.11	+/-1.76	2.99	1.44	+/-1.76	5.00	pCi/g		MYM	11/29/15	1203	1522715	14

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	ASTM C 1476-00 Modified
5	DOE EML HASL-300, Th-01-RC Modified
6	DOE EML HASL-300, Am-05-RC Modified
7	DOE EML HASL-300, Pu-11-RC Modified
8	DOE EML HASL-300, I-01 Modified
9	DOE HASL 300, 4 5 2 3/Ga-01-R
10	EPA 900.0/SW846 9310/SM 7110B Modified
11	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
12	EPA 906.0 Modified
13	EPA EERF C-01 Modified

GEL LABORATORIES LLC

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Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes
Client Sample ID: 3.1.1.E.6
Sample ID: 385077005

Report Date: December 17, 2015

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
14	DOE EML HASL-300, Tc-02-RC Modified													

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"	1522577	78.8	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1522580	77.3	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1522580	75.4	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"	1522576	96.9	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"	1522579	40.1	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"	1522571	89.2	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"	1522578	78.8	(15%-125%)
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"	1525755	87.8	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"	1522715	94.1	(15%-125%)

Notes:

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

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228
 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.7 Project: MJWC00115
 Sample ID: 385077006 Client ID: MJWC001
 Matrix: Soil
 Collect Date: 21-OCT-15 13:40
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 22.1%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids												
ASTM D 2216 % Moisture "As Received"												
Moisture		22.1				percent		CXCI	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis												
ASP Plutonium Isotopic, Solid "Dry Weight Corrected"												
Plutonium-238	U	0.0414	+/-0.0732	0.111	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	-0.0421	+/-0.0719	0.192	1.00	pCi/g						
ASP Uranium Isotopic, Solid "Dry Weight Corrected"												
Uranium-232	U	0.0336	+/-0.105	0.196	1.00	pCi/g		HAKB	11/24/15	0851	1522580	3
Uranium-233/234		0.747	+/-0.251	0.117	1.00	pCi/g						
Uranium-235/236		0.159	+/-0.125	0.117	1.00	pCi/g						
Uranium-238		0.815	+/-0.261	0.101	1.00	pCi/g						
Alphaspec Np237, Solid "Dry Weight Corrected"												
Neptunium-237	U	0.00278	+/-0.206	0.458	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"												
Thorium-228		1.38	+/-0.542	0.376	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229	U	0.0995	+/-0.198	0.321	1.00	pCi/g						
Thorium-230		0.841	+/-0.418	0.297	1.00	pCi/g						
Thorium-232		1.15	+/-0.477	0.233	1.00	pCi/g						
Am241, Cm Solid "Dry Weight Corrected"												
Americium-241	U	0.0101	+/-0.0454	0.0888	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242	U	0.00	+/-0.0291	0.0434	1.00	pCi/g						
Curium-243/244	U	0.0125	+/-0.0352	0.0376	1.00	pCi/g						
Curium-245/246	X	0.101	+/-0.0806	0.0435	1.00	pCi/g						
Liquid Scint Pu241, Solid "Dry Weight Corrected"												
Plutonium-241	U	-4.56	+/-5.95	10.5	15.0	pCi/g		HAKB	11/25/15	1436	1522578	7
Rad Gamma Spec Analysis												
Gamma 1129, Solid "Dry Weight Corrected"												
Iodine-129	U	-0.103	+/-0.254	0.447	1.00	pCi/g		MJH1	12/02/15	1557	1522374	8
Gammaspect, Gamma, Solid "Dry Weight Corrected"												
Actinium-227	U	0.193	+/-0.347	0.648		pCi/g		RXF2	12/03/15	1109	1522384	9
Antimony-125	U	0.0443	+/-0.139	0.263		pCi/g						
Cesium-137		2.58	+/-0.202	0.089	0.100	pCi/g						
Cobalt-60	U	0.0335	+/-0.0582	0.109		pCi/g						
Europium-154	U	-0.128	+/-0.189	0.326		pCi/g						
Protactinium-231	U	0.870	+/-0.724	0.967		pCi/g						

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.I.I.E.7

Sample ID: 385077006

Project: MJWC00115

Client ID: MJWC001

Rad Gamma Spec Analysis

Gammascpec, Gamma, Solid "Dry Weight Corrected"

Radium-226		0.912	+/-0.169	0.177	pCi/g
Radium-228		1.27	+/-0.432	0.281	pCi/g
Th-126	UI	0.00	+/-0.093	0.122	pCi/g

Rad Gas Flow Proportional Counting

GFPC, Gross A/B, solid "Dry Weight Corrected"

Alpha		10.4	+/-2.05	2.41	4.00	pCi/g	KXB2	12/01/15	1954	1525765	10
Beta		25.0	+/-2.07	2.59	10.0	pCi/g					

GFPC, Sr90, solid "Dry Weight Corrected"

Strontium-90	U	-0.368	+/-0.522	1.12	2.00	pCi/g	KSD1	12/03/15	1125	1525755	11
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Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Solid "Dry Weight Corrected"

Tritium	U	1.56	+/-1.90	3.21	6.00	pCi/g	TXJ1	12/02/15	1721	1522724	12
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Liquid Scint C14, Solid "Dry Weight Corrected"

Carbon-14	U	0.399	+/-0.897	1.52	2.00	pCi/g	TXJ1	12/04/15	0142	1522716	13
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Liquid Scint Tc99, Solid "Dry Weight Corrected"

Technetium-99	U	2.21	+/-1.64	2.70	5.00	pCi/g	MYM1	11/29/15	1230	1522715	14
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.I.I.E.7

Project: MJWC00115

Sample ID: 385077006

Client ID: MJWC001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, Pu-11-RC Modified	
3	DOE EML HASL-300, U-02-RC Modified	
4	ASTM C 1476-00 Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, Am-05-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE EML HASL-300.1-01 Modified	
9	DOE HASL 300, 4.5.2.3/Ga-01-R	
10	EPA 900.0/SW846.9310/SM 7110B Modified	
11	EPA 905.0 Modified/DOE RPS01 Rev 1 Modified	
12	EPA 906.0 Modified	
13	EPA EERF C-01 Modified	
14	DOE EML HASL-300, Te-02-RC Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"			80.9	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			76.3	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			79.7	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"			94.8	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228.230.232 Solid "Dry Weight Corrected"			106	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"			84.1	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			80.9	(15%-125%)
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"			91	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"			95.7	(15%-125%)

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
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Report Date: December 17, 2015

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.7
 Sample ID: 385077006
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 22.1%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		22.1						percent		CXC1	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis														
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>														
Plutonium-238		0.0414	+/-0.0732	0.111	0.0282	+/-0.0734	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	-0.0421	+/-0.0719	0.192	0.069	+/-0.072	1.00	pCi/g						
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>														
Uranium-232	U	0.0336	+/-0.105	0.196	0.0767	+/-0.105	1.00	pci/g		HAKB	11/24/15	0851	1522580	3
Uranium-233/234		0.747	+/-0.251	0.117	0.0267	+/-0.292	1.00	pci/g						
Uranium-235/236		0.159	+/-0.125	0.117	0.0268	+/-0.129	1.00	pci/g						
Uranium-238		0.815	+/-0.261	0.101	0.0189	+/-0.307	1.00	pci/g						
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>														
Neptunium-237	U	0.00278	+/-0.206	0.458	0.125	+/-0.206	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
<i>Alphaspec Th229 - 228,230,232 Solid "Dry Weight Corrected"</i>														
Thorium-228		1.38	+/-0.542	0.376	0.113	+/-0.577	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229		0.0995	+/-0.198	0.321	0.0876	+/-0.198	1.00	pCi/g						
Thorium-230		0.841	+/-0.418	0.297	0.0756	+/-0.435	1.00	pCi/g						
Thorium-232		1.15	+/-0.477	0.233	0.0435	+/-0.504	1.00	pCi/g						
<i>Am241, Cm Solid "Dry Weight Corrected"</i>														
Americium-241	U	0.0101	+/-0.0454	0.0888	0.0254	+/-0.0454	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242		0.00	+/-0.0291	0.0434	0.00	+/-0.0292	1.00	pCi/g						
Curium-243/244		0.0125	+/-0.0352	0.0376	0.00	+/-0.0352	1.00	pCi/g						
Curium-245/246	X	0.101	+/-0.0806	0.0435	0.00	+/-0.0816	1.00	pCi/g						
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>														
Plutonium-241	U	-4.56	+/-5.95	10.5	5.11	+/-5.95	15.0	pCi/g		HAKB	11/25/15	1436	1522578	7
Rad Gamma Spec Analysis														
<i>Gamma I129, Solid "Dry Weight Corrected"</i>														
Iodine-129	U	-0.103	+/-0.254	0.447	0.190	+/-0.258	1.00	pCi/g		MJH1	12/02/15	1557	1522374	8
<i>Gamma spec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.193	+/-0.347	0.648	0.308	+/-0.359		pCi/g		RXF2	12/03/15	1109	1522384	9
Antimony-125	U	0.0443	+/-0.139	0.263	0.124	+/-0.141		pCi/g						
Bismuth-212		2.00	+/-0.947	0.941	0.416	+/-0.967		pCi/g						
Bismuth-214		0.912	+/-0.169	0.177	0.0815	+/-0.186		pCi/g						
Cesium-137		2.58	+/-0.202	0.089	0.0405	+/-0.296	0.100	pCi/g						
Cobalt-60	U	0.0335	+/-0.0582	0.109	0.0479	+/-0.0602		pCi/g						
Europium-154	U	-0.128	+/-0.189	0.326	0.146	+/-0.198		pCi/g						
Lead-212		1.28	+/-0.141	0.123	0.0583	+/-0.211		pCi/g						
Lead-214		1.26	+/-0.178	0.192	0.0904	+/-0.209		pCi/g						

GEL LABORATORIES LLC

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
 Suite 112
 Buffalo, New York 14228
 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes
 Client Sample ID: 3.1.1.E.7
 Sample ID: 385077006

Report Date: December 17, 2015

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		15.5	+/-1.65	0.845	0.359	+/-2.23		pCi/g						
Protactinium-231	UI	0.00	+/-0.724	0.967	0.451	+/-0.751		pCi/g						
Radium-226		0.912	+/-0.169	0.177	0.0815	+/-0.186		pCi/g						
Radium-228		1.27	+/-0.432	0.281	0.123	+/-0.463		pCi/g						
Thallium-208		0.347	+/-0.111	0.0915	0.0422	+/-0.114		pCi/g						
Tin-126	UI	0.00	+/-0.093	0.122	0.0585	+/-0.096		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		10.4	+/-2.05	2.41	1.12	+/-3.00	4.00	pCi/g		KXB2	12/01/15	1954	1525765	10
Beta		25.0	+/-2.07	2.59	1.26	+/-4.12	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	-0.368	+/-0.522	1.12	0.490	+/-0.522	2.00	pCi/g		KSD1	12/03/15	1125	1525755	11
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Solid "Dry Weight Corrected"</i>														
Tritium		1.56	+/-1.90	3.21	1.40	+/-1.90	6.00	pCi/g		TXJ1	12/02/15	1721	1522724	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	0.399	+/-0.897	1.52	0.746	+/-0.898	2.00	pCi/g		TXJ1	12/04/15	0142	1522716	13
<i>Liquid Scint Tc99, Solid "Dry Weight Corrected"</i>														
Technetium-99		2.21	+/-1.64	2.70	1.30	+/-1.66	5.00	pCi/g		MYM	11/29/15	1230	1522715	14

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	ASTM C 1476-00 Modified
5	DOE EML HASL-300, Th-01-RC Modified
6	DOE EML HASL-300, Am-05-RC Modified
7	DOE EML HASL-300, Pu-11-RC Modified
8	DOE EML HASL-300, I-01 Modified
9	DOE HASL 300, 4.5 2.3/Ga-01-R
10	EPA 900.0/SW846 9310/SM 7110B Modified
11	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
12	EPA 906.0 Modified
13	EPA EERF C-01 Modified

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Certificate of Analysis

Company : MJW Corporation
Address : 15 Hazelwood Drive
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Report Date: December 17, 2015

Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.7
Sample ID: 385077006

Project: MJWC00115
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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14 DOE EML HASL-300, Tc-02-RC Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"	1522577	80.9	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1522580	76.3	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1522580	79.7	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"	1522576	94.8	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"	1522579	106	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"	1522571	84.1	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"	1522578	80.9	(15%-125%)
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"	1525755	91	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"	1522715	95.7	(15%-125%)

Notes:

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

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.8 Project: MJWC00115
Sample ID: 385077007 Client ID: MJWC001
Matrix: Soil
Collect Date: 21-OCT-15 13:50
Receive Date: 05-NOV-15
Collector: Client
Moisture: 21.5%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids												
ASTM D 2216 % Moisture "As Received"												
Moisture		21.5				percent		CXC1	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis												
ASP Plutonium Isotopic, Solid "Dry Weight Corrected"												
Plutonium-238	U	0.010	+/-0.0556	0.107	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	0.00154	+/-0.0707	0.155	1.00	pCi/g						
ASP Uranium Isotopic, Solid "Dry Weight Corrected"												
Uranium-232	U	0.0148	+/-0.0869	0.173	1.00	pCi/g		HAKB	11/24/15	0857	1522580	3
Uranium-233/234		1.12	+/-0.316	0.176	1.00	pCi/g						
Uranium-235/236		0.148	+/-0.122	0.105	1.00	pCi/g						
Uranium-238		0.951	+/-0.288	0.121	1.00	pCi/g						
Alphaspec Np237, Solid "Dry Weight Corrected"												
Neptunium-237	U	0.131	+/-0.257	0.356	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"												
Thorium-228		0.973	+/-0.445	0.381	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229	U	0.0786	+/-0.178	0.306	1.00	pCi/g						
Thorium-230		0.960	+/-0.421	0.287	1.00	pCi/g						
Thorium-232		1.09	+/-0.444	0.286	1.00	pCi/g						
Am241, Cm Solid "Dry Weight Corrected"												
Americium-241	U	0.00914	+/-0.059	0.121	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242	U	0.00	+/-0.0375	0.0559	1.00	pCi/g						
Curium-243/244	U	-0.0232	+/-0.0375	0.119	1.00	pCi/g						
Curium-245/246	U	0.0702	+/-0.0828	0.0895	1.00	pCi/g						
Liquid Scint Pu241, Solid "Dry Weight Corrected"												
Plutonium-241	U	-4.42	+/-6.41	11.3	15.0	pCi/g		HAKB	11/25/15	1537	1522578	7
Rad Gamma Spec Analysis												
Gamma I129, Solid "Dry Weight Corrected"												
Iodine-129	U	-0.243	+/-0.361	0.607	1.00	pCi/g		MJH1	12/02/15	1558	1522374	8
Gamma spec, Gamma, Solid "Dry Weight Corrected"												
Actinium-227	U	0.394	+/-0.272	0.567		pCi/g		RXF2	12/03/15	1109	1522384	9
Antimony-125	U	0.00737	+/-0.102	0.193		pCi/g						
Cesium-137		0.315	+/-0.083	0.081	0.100	pCi/g						
Cobalt-60	U	0.0063	+/-0.0346	0.0738		pCi/g						
Europium-154	U	0.119	+/-0.132	0.292		pCi/g						
Protactinium-231	U1	0.00	+/-0.788	1.00		pCi/g						

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Certificate of Analysis

Report Date: December 7, 2015

Company : MJW Corporation
Address : 15 Hazelwood Drive
Suite 112
Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.8

Project: MJWC00115

Sample ID: 385077007

Client ID: MJWC001

Rad Gamma Spec Analysis

Gammascpec, Gamma, Solid "Dry Weight Corrected"

Radium-226	0.952	+/-0.176	0.142	pCi/g	
Radium-228	0.991	+/-0.327	0.293	pCi/g	
Tin-126	U	0.00	+/-0.143	0.167	pCi/g

Rad Gas Flow Proportional Counting

GFPC, Gross A/B, solid "Dry Weight Corrected"

Alpha	10.7	+/-1.91	2.15	4.00	pCi/g	KXB2	12/01/15	1954	1525765	10
Beta	19.0	+/-1.50	1.50	10.0	pCi/g					

GFPC, Sr90, solid "Dry Weight Corrected"

Strontium-90	U	0.259	+/-0.510	0.913	2.00	pCi/g	KSD1	12/03/15	1156	1525755	11
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Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Solid "Dry Weight Corrected"

Tritium	U	1.54	+/-1.91	3.24	6.00	pCi/g	TXJ1	12/02/15	1809	1522724	12
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Liquid Scint C14, Solid "Dry Weight Corrected"

Carbon-14	U	-0.847	+/-0.846	1.48	2.00	pCi/g	TXJ1	12/04/15	0255	1522716	13
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Liquid Scint Tc99, Solid "Dry Weight Corrected"

Technetium-99	U	0.991	+/-1.62	2.75	5.00	pCi/g	MYM1	11/29/15	1257	1522715	14
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The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

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Buffalo, New York 14228
Contact: Ms. Laurie Losey
Project: Soil Radioisotopes

Client Sample ID: 3.1.I.E.8

Project: MJWC00115

Sample ID: 385077007

Client ID: MJWC001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, Pu-11-RC Modified	
3	DOE EML HASL-300, U-02-RC Modified	
4	ASTM C 1476-00 Modified	
5	DOE EML HASL-300, Th-01-RC Modified	
6	DOE EML HASL-300, Am-05-RC Modified	
7	DOE EML HASL-300, Pu-11-RC Modified	
8	DOE EML HASL-300, I-01 Modified	
9	DOE HASL 300, 4.5.2.3/Ga-01-R	
10	EPA 900.0/SW846 9310/SM 7110B Modified	
11	EPA 905.0 Modified/DOE RP501 Rev 1 Modified	
12	EPA 906.0 Modified	
13	EPA FERF C-01 Modified	
14	DOE EML HASL-300, Tc-02-RC Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"			75.9	(15%-125%)
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			74	(15%-125%)
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"			68.4	(15%-125%)
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"			94.9	(15%-125%)
Actinium-227 Tracer	Alphaspec Th229 + 228.230.232 Solid "Dry Weight Corrected"			105	(15%-125%)
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"			75	(15%-125%)
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"			75.9	(15%-125%)
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"			92.1	(25%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"			93.6	(15%-125%)

Notes:

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

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Certificate of Analysis

Company : MJW Corporation
 Address : 15 Hazelwood Drive
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Report Date: December 17, 2015

Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes

Client Sample ID: 3.1.1.E.8
 Sample ID: 385077007
 Matrix: Soil
 Collect Date: 21-OCT-15
 Receive Date: 05-NOV-15
 Collector: Client
 Moisture: 21.5%

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Gravimetric Solids														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		21.5						percent		CXC1	11/10/15	1347	1521843	1
Rad Alpha Spec Analysis														
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>														
Plutonium-238	U	0.010	+/-0.0556	0.107	0.0244	+/-0.0557	1.00	pCi/g		HAKB	11/23/15	1501	1522577	2
Plutonium-239/240	U	0.00154	+/-0.0707	0.155	0.0488	+/-0.0707	1.00	pCi/g						
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>														
Uranium-232	U	0.0148	+/-0.0869	0.173	0.0634	+/-0.0869	1.00	pci/g		HAKB	11/24/15	0857	1522580	3
Uranium-233/234		1.12	+/-0.316	0.176	0.0554	+/-0.387	1.00	pci/g						
Uranium-235/236		0.148	+/-0.122	0.105	0.0197	+/-0.126	1.00	pci/g						
Uranium-238		0.951	+/-0.288	0.121	0.0277	+/-0.345	1.00	pci/g						
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>														
Neptunium-237		0.131	+/-0.257	0.356	0.0665	+/-0.257	1.00	pCi/g		HAKB	11/23/15	1707	1522576	4
<i>Alphaspec Th229 - 228,230,232 Solid "Dry Weight Corrected"</i>														
Thorium-228		0.973	+/-0.445	0.381	0.123	+/-0.467	1.00	pCi/g		HAKB	11/24/15	1014	1522579	5
Thorium-229	U	0.0786	+/-0.178	0.306	0.0876	+/-0.179	1.00	pCi/g						
Thorium-230		0.960	+/-0.421	0.287	0.0781	+/-0.442	1.00	pCi/g						
Thorium-232		1.09	+/-0.444	0.286	0.0779	+/-0.471	1.00	pCi/g						
<i>Am241, Cm Solid "Dry Weight Corrected"</i>														
Americium-241	U	0.00914	+/-0.059	0.121	0.0359	+/-0.0591	1.00	pCi/g		HAKB	11/24/15	1042	1522571	6
Curium-242		0.00	+/-0.0375	0.0559	0.00	+/-0.0376	1.00	pCi/g						
Curium-243/244	U	-0.0232	+/-0.0375	0.119	0.0355	+/-0.0375	1.00	pCi/g						
Curium-245/246		0.0702	+/-0.0828	0.0895	0.0168	+/-0.0833	1.00	pCi/g						
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>														
Plutonium-241	U	-4.42	+/-6.41	11.3	5.50	+/-6.41	15.0	pCi/g		HAKB	11/25/15	1537	1522578	7
Rad Gamma Spec Analysis														
<i>Gamma I129, Solid "Dry Weight Corrected"</i>														
Iodine-129	U	-0.243	+/-0.361	0.607	0.242	+/-0.378	1.00	pCi/g		MJH1	12/02/15	1558	1522374	8
<i>Gamma spec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	UI	0.00	+/-0.272	0.567	0.266	+/-0.330		pCi/g		RXF2	12/03/15	1109	1522384	9
Antimony-125	U	0.00737	+/-0.102	0.193	0.0885	+/-0.102		pCi/g						
Bismuth-212	U	0.533	+/-0.711	1.28	0.589	+/-0.752		pCi/g						
Bismuth-214		0.952	+/-0.176	0.142	0.0641	+/-0.194		pCi/g						
Cesium-137		0.315	+/-0.083	0.081	0.0366	+/-0.0871	0.100	pCi/g						
Cobalt-60	U	0.0063	+/-0.0346	0.0738	0.0309	+/-0.0347		pCi/g						
Europium-154	U	0.119	+/-0.132	0.292	0.129	+/-0.143		pCi/g						
Lead-212		1.12	+/-0.158	0.174	0.0832	+/-0.185		pCi/g						
Lead-214		1.41	+/-0.232	0.389	0.189	+/-0.261		pCi/g						

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 Contact: Ms. Laurie Losey
 Project: Soil Radioisotopes
 Client Sample ID: 3.1.1.E.8
 Sample ID: 385077007

Report Date: December 17, 2015

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		13.6	+/-1.60	0.656	0.268	+/-1.99		pCi/g						
Protactinium-231	U1	0.00	+/-0.788	1.00	0.466	+/-0.863		pCi/g						
Radium-226		0.952	+/-0.176	0.142	0.0641	+/-0.194		pCi/g						
Radium-228		0.991	+/-0.327	0.293	0.130	+/-0.358		pCi/g						
Thallium-208		0.374	+/-0.0813	0.0703	0.0317	+/-0.0873		pCi/g						
Tin-126	U1	0.00	+/-0.143	0.167	0.0794	+/-0.146		pCi/g						
Rad Gas Flow Proportional Counting														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		10.7	+/-1.91	2.15	0.995	+/-2.87	4.00	pCi/g		KXB2	12/01/15	1954	1525765	10
Beta		19.0	+/-1.50	1.50	0.720	+/-3.07	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	0.259	+/-0.510	0.913	0.390	+/-0.512	2.00	pCi/g		KSD1	12/03/15	1156	1525755	11
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Solid "Dry Weight Corrected"</i>														
Tritium		1.54	+/-1.91	3.24	1.41	+/-1.91	6.00	pCi/g		TXJ1	12/02/15	1809	1522724	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	-0.847	+/-0.846	1.48	0.725	+/-0.846	2.00	pCi/g		TXJ1	12/04/15	0255	1522716	13
<i>Liquid Scint Te99, Solid "Dry Weight Corrected"</i>														
Technetium-99	U	0.991	+/-1.62	2.75	1.33	+/-1.62	5.00	pCi/g		MYM	11/29/15	1257	1522715	14

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	11/10/15	1347	1521843

The following Analytical Methods were performed

Method	Description
1	ASTM D 2216 (Modified)
2	DOE EML HASL-300, Pu-11-RC Modified
3	DOE EML HASL-300, U-02-RC Modified
4	ASTM C 1476-00 Modified
5	DOE EML HASL-300, Th-01-RC Modified
6	DOE EML HASL-300, Am-05-RC Modified
7	DOE EML HASL-300, Pu-11-RC Modified
8	DOE EML HASL-300, I-01 Modified
9	DOE HASL 300, 4.5.2.3/Ga-01-R
10	EPA 900.0/SW846.9310/SM 7110B Modified
11	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
12	EPA 906.0 Modified
13	EPA EERF C-01 Modified

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 Project: Soil Radioisotopes
 Client Sample ID: 3.1.1.E.8
 Sample ID: 385077007

Report Date: December 17, 2015

Project: MJWC00115
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
14	DOE EML HASL-300, Te-02-RC Modified													

Surrogate/Tracer	Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Plutonium-242 Tracer		ASP Plutonium Isotopic, Solid "Dry Weight Corrected"	1522577	75.9	(15%-125%)
Uranium-232 Tracer		ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1522580	74	(15%-125%)
Uranium-235/236 Tracer		ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1522580	68.4	(15%-125%)
Americium-243 Tracer		Alphaspec Np237, Solid "Dry Weight Corrected"	1522576	94.9	(15%-125%)
Actinium-227 Tracer		Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"	1522579	105	(15%-125%)
Americium-243 Tracer		Am241, Cm Solid "Dry Weight Corrected"	1522571	75	(15%-125%)
Plutonium-242 Tracer		Liquid Scint Pu241, Solid "Dry Weight Corrected"	1522578	75.9	(15%-125%)
Strontium Carrier		GFPC, Sr90, solid "Dry Weight Corrected"	1525755	92.1	(25%-125%)
Technetium-99m Tracer		Liquid Scint Te99, Solid "Dry Weight Corrected"	1522715	93.6	(15%-125%)

Notes:

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