

# 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

Report Date: January 15, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.1.1  
 Sample ID: 387763009  
 Matrix: Soil  
 Collect Date: 08-DEC-15  
 Receive Date: 17-DEC-15  
 Collector: Client  
 Moisture: 23.7%

Project: MJWC00115  
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Gravimetric Solids</b>														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		23.7						percent		LYT1	12/18/15	0843	1532296	1
<b>Rad Gamma Spec Analysis</b>														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.0447	+/-0.293	0.543	0.256	+/-0.293		pCi/g		RXF2	01/12/16	1100	1532303	2
Antimony-125	U	0.0206	+/-0.114	0.209	0.0971	+/-0.115		pCi/g						
Bismuth-212	LI	0.00	+/-0.930	1.38	0.641	+/-1.05		pCi/g						
Bismuth-214		1.05	+/-0.167	0.137	0.0621	+/-0.189		pCi/g						
Cesium-137		1.73	+/-0.141	0.0654	0.0292	+/-0.202	0.100	pCi/g						
Cobalt-60	U	0.0173	+/-0.0368	0.0792	0.0341	+/-0.0377		pCi/g						
Europium-154	U	0.0605	+/-0.139	0.282	0.126	+/-0.142		pCi/g						
Lead-212		1.21	+/-0.136	0.112	0.0525	+/-0.179		pCi/g						
Lead-214		1.15	+/-0.234	0.171	0.0802	+/-0.255		pCi/g						
Potassium-40		15.8	+/-1.58	0.643	0.267	+/-2.11		pCi/g						
Protactinium-231	U	0.557	+/-0.640	1.23	0.580	+/-0.699		pCi/g						
Radium-226		1.05	+/-0.167	0.137	0.0621	+/-0.189		pCi/g						
Radium-228		1.27	+/-0.256	0.198	0.084	+/-0.317		pCi/g						
Thallium-208		0.406	+/-0.0764	0.0752	0.0344	+/-0.0837		pCi/g						
Tm-126	U	0.0371	+/-0.124	0.145	0.0694	+/-0.125		pCi/g						
<b>Rad Gas Flow Proportional Counting</b>														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		12.4	+/-3.53	3.89	1.68	+/-4.25	4.00	pCi/g		JXB7	01/11/16	1015	1534686	3
Beta		25.4	+/-3.16	3.32	1.56	+/-4.77	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	LYT1	12/18/15	0843	1532296

**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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Report Date: January 15, 2016

Contact: Ms. Laurie Losey  
Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.1.1  
Sample ID: 387763009

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 Technical Services  
 Address : 15 Hazelwood Drive  
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 Buffalo, New York 14228

Report Date: March 9, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Client Sample ID: 4.2.A.R.1.2  
 Sample ID: 392057002  
 Matrix: Soil  
 Collect Date: 08-DEC-15  
 Receive Date: 25-FEB-16  
 Collector: Client  
 Moisture: 18.8%

Project: MJWC00115  
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Gamma Spec Analysis</b>														
<i>Gamma with Ingrowth "Dry Weight Corrected"</i>														
Actinium-227	U	-0.163	+/-0.305	0.547	0.257	+/-0.315		pCi/g		MXR1	03/07/16	1043	1547922	1
Antimony-125	U	-0.0214	+/-0.140	0.249	0.117	+/-0.141		pCi/g						
Bismuth-212	UI	0.00	+/-0.630	1.31	0.608	+/-0.733		pCi/g						
Bismuth-214		0.903	+/-0.190	0.155	0.0714	+/-0.204		pCi/g						
Cesium-137		1.96	+/-0.167	0.0905	0.0417	+/-0.230	0.100	pCi/g						
Cobalt-60	U	0.0166	+/-0.0538	0.0944	0.0418	+/-0.0544		pCi/g						
Europium-154	U	0.0677	+/-0.137	0.274	0.122	+/-0.140		pCi/g						
Lead-212		1.06	+/-0.141	0.120	0.0565	+/-0.164		pCi/g						
Lead-214		1.27	+/-0.195	0.359	0.174	+/-0.219		pCi/g						
Potassium-40		14.9	+/-1.64	0.730	0.312	+/-2.13		pCi/g						
Protactinium-231	U	0.400	+/-0.687	1.22	0.578	+/-0.716		pCi/g						
Radium-226		0.903	+/-0.190	0.155	0.0714	+/-0.204		pCi/g						
Radium-228		1.13	+/-0.305	0.277	0.123	+/-0.342		pCi/g						
Thallium-208		0.330	+/-0.0868	0.0772	0.0354	+/-0.091		pCi/g						
Tin-126	U	0.0795	+/-0.153	0.197	0.0946	+/-0.154		pCi/g						

### Rad Gas Flow Proportional Counting

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

Alpha		18.6	+/-4.26	3.89	1.65	+/-5.59	4.00	pCi/g		BNF1	03/05/16	1448	1549866	2
Beta		25.0	+/-2.91	2.44	1.12	+/-4.51	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	02/26/16	1436	1547873

### The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4 5 2 3/Ga-01-R
2	EPA 900.0/SW846 9310/SM 7110B Modified

### Surrogate/Tracer Recovery Test

Batch ID Recovery% Acceptable Limits

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Report Date: March 9, 2016

Contact: Ms. Laurie Losey  
Project: Soil Radioisotopes

Client Sample ID: 4.2.A.R.1.2  
Sample ID: 392057002

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 15, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Project: MJWC00115  
 Client ID: MJWC001

Client Sample ID: 4.2A.R.2.1  
 Sample ID: 387763010  
 Matrix: Soil  
 Collect Date: 08-DEC-15  
 Receive Date: 17-DEC-15  
 Collector: Client  
 Moisture: 30.1%

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Gravimetric Solids</b>														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		30.1						percent		LYT1	12/18/15	0843	1532296	1
<b>Rad Gamma Spec Analysis</b>														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	-0.115	+/-0.228	0.404	0.192	+/-0.234		pCi/g		RXF2	01/12/16	1101	1532303	2
Antimony-125	U	-0.0245	+/-0.0916	0.168	0.0783	+/-0.0923		pCi/g						
Bismuth-212	U	0.327	+/-0.743	1.20	0.561	+/-0.758		pCi/g						
Bismuth-214		0.909	+/-0.158	0.123	0.0562	+/-0.175		pCi/g						
Cesium-137		0.787	+/-0.112	0.0801	0.0371	+/-0.129	0.100	pCi/g						
Cobalt-60	U	-0.0174	+/-0.0548	0.0827	0.0364	+/-0.0554		pCi/g						
Europium-154	U	0.0969	+/-0.128	0.286	0.130	+/-0.136		pCi/g						
Lead-212		1.09	+/-0.0977	0.0886	0.0422	+/-0.155		pCi/g						
Lead-214		1.16	+/-0.184	0.301	0.147	+/-0.210		pCi/g						
Potassium-40		16.2	+/-1.59	0.687	0.293	+/-2.16		pCi/g						
Protactinium-231	UI	0.00	+/-0.499	0.875	0.416	+/-0.587		pCi/g						
Radium-226		0.909	+/-0.158	0.123	0.0562	+/-0.175		pCi/g						
Radium-228		1.03	+/-0.316	0.297	0.135	+/-0.342		pCi/g						
Thallium-208		0.351	+/-0.0825	0.0631	0.0289	+/-0.0877		pCi/g						
Tin-126	UI	0.00	+/-0.0631	0.0727	0.035	+/-0.0658		pCi/g						
<b>Rad Gas Flow Proportional Counting</b>														
<i>GFPC, Gross A-B, solid "Dry Weight Corrected"</i>														
Alpha		16.2	+/-3.45	2.32	0.903	+/-4.66	4.00	pCi/g		JXB7	01/11/16	1021	1534686	3
Beta		27.4	+/-3.12	3.05	1.43	+/-4.93	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	LYT1	12/18/15	0843	1532296

**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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Report Date: January 15, 2016

Contact: Ms. Laurie Losey  
Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.2.I  
Sample ID: 387763010

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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Company : MJW Technical Services  
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 Suite 112  
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Report Date: March 9, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Client Sample ID: 4.2.A.R.2.2  
 Sample ID: 392057003  
 Matrix: Soil  
 Collect Date: 08-DEC-15  
 Receive Date: 25-FEB-16  
 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.
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**Rad Gamma Spec Analysis**

*Gamma with Ingrowth "Dry Weight Corrected"*

Actinium-227	U	0.0811	+/-0.339	0.579	0.274	+/-0.341		pCi/g		MXR1	03/07/16	1043	1547922	1
Antimony-125	U	-0.0542	+/-0.141	0.252	0.119	+/-0.143		pCi/g						
Bismuth-212	UI	0.00	+/-0.540	1.19	0.552	+/-0.621		pCi/g						
Bismuth-214		0.799	+/-0.196	0.137	0.0625	+/-0.208		pCi/g						
Cesium-137		3.85	+/-0.208	0.0705	0.0319	+/-0.390	0.100	pCi/g						
Cobalt-60	U	0.0183	+/-0.042	0.0906	0.0402	+/-0.0429		pCi/g						
Europium-154	U	-0.042	+/-0.136	0.238	0.105	+/-0.138		pCi/g						
Lead-212		1.08	+/-0.128	0.135	0.0644	+/-0.165		pCi/g						
Lead-214		1.01	+/-0.212	0.340	0.165	+/-0.230		pCi/g						
Potassium-40		16.2	+/-1.51	0.578	0.239	+/-2.06		pCi/g						
Protactinium-231	U	0.435	+/-0.605	1.19	0.562	+/-0.644		pCi/g						
Radium-226		0.799	+/-0.196	0.137	0.0625	+/-0.208		pCi/g						
Radium-228		1.23	+/-0.296	0.262	0.117	+/-0.350		pCi/g						
Thallium-208		0.302	+/-0.0821	0.073	0.0335	+/-0.0862		pCi/g						
Tin-126	UI	0.00	+/-0.121	0.146	0.0699	+/-0.122		pCi/g						

**Rad Gas Flow Proportional Counting**

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

Alpha		18.6	+/-4.66	3.83	1.54	+/-5.91	4.00	pCi/g		BXF1	03/05/16	1448	1549866	2
Beta		26.8	+/-3.45	2.88	1.30	+/-5.10	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	02/26/16	1436	1547873

**The following Analytical Methods were performed**

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R
2	EPA 900 0/SW846 9310/SM 7110B Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
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Report Date: March 9, 2016

Contact: Ms. Laurie Losey  
Project: Soil Radioisotopes

Client Sample ID: 4.2.A.R.2.2  
Sample ID: 392057003

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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 Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Report Date: January 15, 2016

Client Sample ID: 4.2A.R.3.1  
 Sample ID: 387763011  
 Matrix: Soil  
 Collect Date: 02-DEC-15  
 Receive Date: 17-DEC-15  
 Collector: Client  
 Moisture: 28.1%

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		28.1						percent		LYT1	12/18/15	0843	1532296	1
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**Rad Gamma Spec Analysis**

*Gammascpec, Gamma, Solid "Dry Weight Corrected"*

Actinium-227	U	0.121	+/-0.202	0.370	0.179	+/-0.210		pCi/g		RXF2	01/12/16	1101	1532303	2
Antimony-125	U	-0.0393	+/-0.0779	0.136	0.0654	+/-0.0799		pCi/g						
Bismuth-212		1.28	+/-0.649	0.636	0.301	+/-0.660		pCi/g						
Bismuth-214		0.927	+/-0.139	0.0942	0.0449	+/-0.161		pCi/g						
Cesium-137		0.912	+/-0.0795	0.049	0.0232	+/-0.112	0.100	pCi/g						
Cobalt-60	U	-0.0217	+/-0.0262	0.0446	0.0204	+/-0.028		pCi/g						
Europium-154	U	-0.0128	+/-0.0861	0.152	0.0705	+/-0.0863		pCi/g						
Lead-212		1.15	+/-0.0934	0.0815	0.0394	+/-0.130		pCi/g						
Lead-214		1.16	+/-0.135	0.107	0.0515	+/-0.162		pCi/g						
Potassium-40		17.1	+/-0.998	0.470	0.216	+/-1.76		pCi/g						
Protactinium-231	UI	0.00	+/-0.589	0.663	0.319	+/-0.620		pCi/g						
Radium-226		0.927	+/-0.139	0.0942	0.0449	+/-0.161		pCi/g						
Radium-228		1.21	+/-0.217	0.171	0.080	+/-0.252		pCi/g						
Thallium-208		0.358	+/-0.0544	0.0457	0.0217	+/-0.0624		pCi/g						
Tin-126	UI	0.00	+/-0.108	0.110	0.0533	+/-0.111		pCi/g						

**Rad Gas Flow Proportional Counting**

*GFPC, Gross A-B, solid "Dry Weight Corrected"*

Alpha		14.4	+/-3.49	3.30	1.40	+/-4.48	4.00	pCi/g		JXB7	01/11/16	1026	1534686	3
Beta		28.5	+/-3.10	3.15	1.49	+/-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	LYT1	12/18/15	0843	1532296

**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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Report Date: January 15, 2016

Contact: Ms. Laurie Losey  
Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.3.1  
Sample ID: 387763011

Project: MJWC00115  
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lo	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 15, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.4.1  
 Sample ID: 387763012  
 Matrix: Soil  
 Collect Date: 02-DEC-15  
 Receive Date: 17-DEC-15  
 Collector: Client  
 Moisture: 26.3%

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		26.3						percent		LYT1	12/18/15	0843	1532296	1
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### Rad Gamma Spec Analysis

*Gammaspec, Gamma, Solid "Dry Weight Corrected"*

Actinium-227	U	-0.0367	+/-0.211	0.360	0.172	+/-0.212		pCi/g		RXF2	01/12/16	1102	1532303	2
Antimony-125	U	-0.0436	+/-0.0755	0.134	0.0631	+/-0.0781		pCi/g						
Bismuth-212		1.56	+/-0.563	0.684	0.318	+/-0.583		pCi/g						
Bismuth-214		0.817	+/-0.108	0.102	0.0477	+/-0.127		pCi/g						
Cesium-137		0.577	+/-0.0719	0.0603	0.0284	+/-0.0853	0.100	pCi/g						
Cobalt-60	U	-0.00784	+/-0.0301	0.0542	0.0244	+/-0.0303		pCi/g						
Europium-154	U	0.0294	+/-0.100	0.188	0.0868	+/-0.101		pCi/g						
Lead-212		0.985	+/-0.107	0.0969	0.0468	+/-0.138		pCi/g						
Lead-214		1.06	+/-0.125	0.105	0.0501	+/-0.152		pCi/g						
Potassium-40		14.3	+/-1.16	0.444	0.195	+/-1.71		pCi/g						
Protactinium-231	UI	0.00	+/-0.648	0.626	0.297	+/-0.695		pCi/g						
Radium-226		0.817	+/-0.108	0.102	0.0477	+/-0.127		pCi/g						
Radium-228		1.32	+/-0.204	0.198	0.0914	+/-0.275		pCi/g						
Thallium-208		0.379	+/-0.0573	0.0488	0.0228	+/-0.0652		pCi/g						
Tin-126	UI	0.00	+/-0.0763	0.0889	0.043	+/-0.078		pCi/g						

### Rad Gas Flow Proportional Counting

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

Alpha		13.4	+/-3.79	3.91	1.65	+/-4.57	4.00	pCi/g		JXB7	01/11/16	1016	1534686	3
Beta		14.1	+/-2.27	1.98	0.886	+/-3.05	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	LYT1	12/18/15	0843	1532296

### 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

Report Date: January 15, 2016

Contact: Ms. Laurie Losey  
Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.4.1  
Sample ID: 387763012

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 15, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Project: MJWC00115  
 Client ID: MJWC001

Client Sample ID: 4.2A.R.4.5  
 Sample ID: 387763013  
 Matrix: Soil  
 Collect Date: 02-DEC-15  
 Receive Date: 17-DEC-15  
 Collector: Client  
 Moisture: 26.7%

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Gravimetric Solids</b>														
<i>ASTM D 2216 % Moisture "As Received"</i>														
Moisture		26.7						percent		LYT1	12/18/15	0843	1532296	1
<b>Rad Alpha Spec Analysis</b>														
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>														
Plutonium-238		0.036	+/-0.0518	0.0625	0.0117	+/-0.052	1.00	pCi/g		HAKB	01/07/16	1349	1532467	2
Plutonium-239/240	U	-0.0156	+/-0.0296	0.0914	0.0261	+/-0.0297	1.00	pCi/g						
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>														
Uranium-232	U	0.0193	+/-0.0659	0.122	0.0333	+/-0.066	1.00	pCi/g		HAKB	01/07/16	1205	1532463	3
Uranium-233/234		0.766	+/-0.252	0.0999	0.0187	+/-0.289	1.00	pCi/g						
Uranium-235/236		0.0418	+/-0.0716	0.0627	0.00	+/-0.072	1.00	pCi/g						
Uranium-238		0.677	+/-0.239	0.115	0.0264	+/-0.270	1.00	pCi/g						
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>														
Neptunium-237	U	-0.108	+/-0.136	0.453	0.143	+/-0.136	1.00	pCi/g		HAKB	01/07/16	1409	1532466	4
<i>Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"</i>														
Thorium-228		1.48	+/-0.761	0.549	0.138	+/-0.808	1.00	pCi/g		HAKB	01/07/16	1207	1532462	5
Thorium-229	U	0.0459	+/-0.255	0.489	0.112	+/-0.255	1.00	pCi/g						
Thorium-230		0.511	+/-0.499	0.617	0.177	+/-0.507	1.00	pCi/g						
Thorium-232		1.38	+/-0.712	0.421	0.0788	+/-0.754	1.00	pCi/g						
<i>Am241, Cm Solid "Dry Weight Corrected"</i>														
Americium-241	U	-0.012	+/-0.0362	0.102	0.0259	+/-0.0362	1.00	pCi/g		HAKB	01/08/16	0855	1532464	6
Curium-242		0.00	+/-0.0387	0.0577	0.00	+/-0.0388	1.00	pCi/g						
Curium-243/244	U	-0.0079	+/-0.0349	0.0911	0.0209	+/-0.035	1.00	pCi/g						
Curium-245/246	U	0.0145	+/-0.0543	0.0913	0.0171	+/-0.0543	1.00	pCi/g						
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>														
Plutonium-241	U	-0.964	+/-6.02	10.4	5.08	+/-6.02	15.0	pCi/g		HAKB	01/13/16	2153	1532468	7
<b>Rad Gamma Spec Analysis</b>														
<i>Gamma I129, Solid "Dry Weight Corrected"</i>														
Iodine-129	U	0.053	+/-0.431	1.14	0.384	+/-0.432	1.00	pCi/g		MJH1	01/12/16	0807	1533088	8
<i>Gammasespec, Gamma, Solid "Dry Weight Corrected"</i>														
Actinium-227	U	0.0647	+/-0.209	0.380	0.182	+/-0.211		pCi/g		RXF2	01/12/16	1102	1532303	9
Antimony-125	U	-0.0144	+/-0.0829	0.150	0.0712	+/-0.0831		pCi/g						
Bismuth-212	UI	0.00	+/-0.581	1.07	0.509	+/-0.942		pCi/g						
Bismuth-214		0.945	+/-0.130	0.114	0.0537	+/-0.153		pCi/g						
Cesium-137		0.568	+/-0.0875	0.064	0.0301	+/-0.0997	0.100	pCi/g						
Cobalt-60	U	0.0165	+/-0.0372	0.0701	0.032	+/-0.038		pCi/g						
Europium-154	U	-0.0534	+/-0.110	0.194	0.0885	+/-0.113		pCi/g						
Lead-212		1.16	+/-0.0899	0.0818	0.0393	+/-0.168		pCi/g						
Lead-214		1.15	+/-0.147	0.249	0.122	+/-0.177		pCi/g						

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 Buffalo, New York 14228  
 Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes  
 Client Sample ID: 4.2A.R.4.5  
 Sample ID: 387763013

Report Date: January 15, 2016

Project: MJWC00115  
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Gamma Spec Analysis</b>														
<i>Gammascpec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		14.1	+/-1.23	0.467	0.202	+/-1.84		pCi/g						
Protactinium-231	UI	0.00	+/-0.433	0.688	0.328	+/-0.477		pCi/g						
Radium-226		0.945	+/-0.130	0.114	0.0537	+/-0.153		pCi/g						
Radium-228		1.18	+/-0.242	0.192	0.0876	+/-0.287		pCi/g						
Thallium-208		0.317	+/-0.0683	0.0563	0.0264	+/-0.0735		pCi/g						
Tin-126	UI	0.00	+/-0.0659	0.070	0.0339	+/-0.0697		pCi/g						
<b>Rad Gas Flow Proportional Counting</b>														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		17.6	+/-4.02	3.72	1.58	+/-5.23	4.00	pCi/g		JXB7	01/11/16	1020	1534686	10
Beta		24.2	+/-2.64	2.85	1.36	+/-4.18	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	-0.427	+/-0.831	1.72	0.754	+/-0.831	2.00	pCi/g		KSD1	01/06/16	1538	1534449	11
<b>Rad Liquid Scintillation Analysis</b>														
<i>LSC, Tritium Dist, Solid "Dry Weight Corrected"</i>														
Tritium	U	1.82	+/-2.69	4.57	2.20	+/-2.69	6.00	pCi/g		TXJ1	01/06/16	2022	1533793	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	-0.493	+/-0.864	1.51	0.736	+/-0.864	2.00	pCi/g		TXJ1	01/13/16	1956	1533786	13
<i>Liquid Scint Te99, Solid "Dry Weight Corrected"</i>														
Technetium-99	U	0.369	+/-1.27	2.19	1.05	+/-1.27	5.00	pCi/g		MYM	01/11/16	0248	1534429	14

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	LTY1	12/18/15	0843	1532296

**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: 4.2A.R.4.5  
Sample ID: 387763013

Report Date: January 15, 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, Tc-02-RC Modified													
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				
Plutonium-242 Tracer	ASP Plutonium Isotopic, Solid "Dry Weight Corrected"							1532467	81.9	(15%-125%)				
Uranium-232 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"							1532463	68.9	(15%-125%)				
Uranium-235/236 Tracer	ASP Uranium Isotopic, Solid "Dry Weight Corrected"							1532463	75.5	(15%-125%)				
Americium-243 Tracer	Alphaspec Np237, Solid "Dry Weight Corrected"							1532466	83.8	(15%-125%)				
Actinium-227 Tracer	Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"							1532462	75.7	(15%-125%)				
Americium-243 Tracer	Am241, Cm Solid "Dry Weight Corrected"							1532464	89	(15%-125%)				
Plutonium-242 Tracer	Liquid Scint Pu241, Solid "Dry Weight Corrected"							1532468	81.9	(15%-125%)				
Strontium Carrier	GFPC, Sr90, solid "Dry Weight Corrected"							1534449	74.9	(25%-125%)				
Technetium-99m Tracer	Liquid Scint Tc99, Solid "Dry Weight Corrected"							1534429	93.4	(15%-125%)				

### 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  
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 Buffalo, New York 14228

Report Date: January 15, 2016

Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes

Client Sample ID: 4.2A.R.4.6  
 Sample ID: 387763014  
 Matrix: Soil  
 Collect Date: 02-DEC-15  
 Receive Date: 17-DEC-15  
 Collector: Client  
 Moisture: 21.9%

Project: MJWC00115  
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date Time	Batch	Mtd.
<b>Gravimetric Solids</b>													
<i>ASTM D 2216 % Moisture "As Received"</i>													
Moisture		21.9						percent		LYT1	12/18/15 0843	1532296	1
<b>Rad Alpha Spec Analysis</b>													
<i>ASP Plutonium Isotopic, Solid "Dry Weight Corrected"</i>													
Plutonium-238	U	-0.0047	+/-0.0406	0.094	0.0176	+/-0.0407	1.00	pCi/g		HAKB	01/07/16 1705	1532467	2
Plutonium-239/240	U	-0.00392	+/-0.0588	0.137	0.0393	+/-0.0589	1.00	pCi/g					
<i>ASP Uranium Isotopic, Solid "Dry Weight Corrected"</i>													
Uranium-232	U	-0.015	+/-0.0507	0.132	0.0414	+/-0.0508	1.00	pCi/g		HAKB	01/07/16 1205	1532463	3
Uranium-233/234		0.947	+/-0.274	0.0604	0.00	+/-0.322	1.00	pCi/g					
Uranium-235/236		0.0865	+/-0.0988	0.123	0.0314	+/-0.100	1.00	pCi/g					
Uranium-238		0.902	+/-0.268	0.0966	0.0181	+/-0.313	1.00	pCi/g					
<i>Alphaspec Np237, Solid "Dry Weight Corrected"</i>													
Neptunium-237	U	0.0921	+/-0.209	0.359	0.103	+/-0.209	1.00	pCi/g		HAKB	01/07/16 1409	1532466	4
<i>Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"</i>													
Thorium-228		1.35	+/-0.695	0.503	0.127	+/-0.737	1.00	pCi/g		HAKB	01/07/16 1207	1532462	5
Thorium-229		0.203	+/-0.323	0.446	0.102	+/-0.325	1.00	pCi/g					
Thorium-230		1.03	+/-0.592	0.386	0.0722	+/-0.620	1.00	pCi/g					
Thorium-232		1.02	+/-0.591	0.384	0.072	+/-0.618	1.00	pCi/g					
<i>Am241, Cm Solid "Dry Weight Corrected"</i>													
Americium-241		0.0599	+/-0.118	0.163	0.0305	+/-0.118	1.00	pCi/g		HAKB	01/08/16 0855	1532464	6
Curium-242		0.00	+/-0.0793	0.118	0.00	+/-0.0796	1.00	pCi/g					
Curium-243/244	U	0.0175	+/-0.0972	0.186	0.0427	+/-0.0975	1.00	pCi/g					
Curium-245/246		0.00	+/-0.0785	0.117	0.00	+/-0.0789	1.00	pCi/g					
<i>Liquid Scint Pu241, Solid "Dry Weight Corrected"</i>													
Plutonium-241	U	-1.19	+/-6.71	11.6	5.66	+/-6.71	15.0	pCi/g		HAKB	01/13/16 2240	1532468	7
<b>Rad Gamma Spec Analysis</b>													
<i>Gamma I129, Solid "Dry Weight Corrected"</i>													
Iodine-129	U	0.108	+/-0.420	0.911	0.373	+/-0.423	1.00	pCi/g		MJH1	01/12/16 0825	1533088	8
<i>Gamma spec, Gamma, Solid "Dry Weight Corrected"</i>													
Actinium-227	U	0.126	+/-0.190	0.363	0.175	+/-0.200		pCi/g		RXF2	01/12/16 1102	1532303	9
Antimony-125	U	-0.0287	+/-0.0766	0.134	0.0639	+/-0.0777		pCi/g					
Bismuth-212	UI	0.00	+/-0.590	0.832	0.396	+/-0.884		pCi/g					
Bismuth-214		0.850	+/-0.117	0.086	0.0404	+/-0.136		pCi/g					
Cesium-137		1.84	+/-0.098	0.0509	0.024	+/-0.176	0.100	pCi/g					
Cobalt-60	U	-0.0177	+/-0.0257	0.044	0.0198	+/-0.0269		pCi/g					
Europium-154	U	0.0194	+/-0.0821	0.155	0.0714	+/-0.0825		pCi/g					
Lead-212		1.14	+/-0.0909	0.077	0.0371	+/-0.140		pCi/g					
Lead-214		0.959	+/-0.127	0.211	0.104	+/-0.150		pCi/g					



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 Contact: Ms. Laurie Losey  
 Project: Soil Radioisotopes  
 Client Sample ID: 4.2A.R.4.6  
 Sample ID: 387763014

Report Date: January 15, 2016

Project: MJWC00115  
 Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	Lc	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Gamma Spec Analysis</b>														
<i>Gamma spec, Gamma, Solid "Dry Weight Corrected"</i>														
Potassium-40		13.2	+/-1.02	0.427	0.191	+/-1.54		pCi/g						
Protactinium-231	UI	0.00	+/-0.449	0.532	0.253	+/-0.475		pCi/g						
Radium-226		0.850	+/-0.117	0.086	0.0404	+/-0.136		pCi/g						
Radium-228		0.868	+/-0.186	0.160	0.0738	+/-0.223		pCi/g						
Thallium-208		0.303	+/-0.0476	0.0462	0.0218	+/-0.0537		pCi/g						
Tin-126	UI	0.00	+/-0.0714	0.089	0.0433	+/-0.0728		pCi/g						
<b>Rad Gas Flow Proportional Counting</b>														
<i>GFPC, Gross A/B, solid "Dry Weight Corrected"</i>														
Alpha		12.3	+/-3.84	3.85	1.57	+/-4.51	4.00	pCi/g		JXB7	01/11/16	1015	1534686	10
Beta		12.6	+/-2.59	2.66	1.19	+/-3.17	10.0	pCi/g						
<i>GFPC, Sr90, solid "Dry Weight Corrected"</i>														
Strontium-90	U	0.515	+/-1.05	1.82	0.840	+/-1.05	2.00	pCi/g		KSD1	01/07/16	1122	1534449	11
<b>Rad Liquid Scintillation Analysis</b>														
<i>LSC, Tritium Dist, Solid "Dry Weight Corrected"</i>														
Tritium	U	1.64	+/-2.34	3.97	1.90	+/-2.34	6.00	pCi/g		TXJ1	01/08/16	1614	1533793	12
<i>Liquid Scint C14, Solid "Dry Weight Corrected"</i>														
Carbon-14	U	-0.459	+/-0.813	1.42	0.692	+/-0.813	2.00	pCi/g		TXJ1	01/13/16	2057	1533786	13
<i>Liquid Scint Tc99, Solid "Dry Weight Corrected"</i>														
Technetium-99	U	0.598	+/-1.37	2.36	1.13	+/-1.38	5.00	pCi/g		MYM	01/11/16	0305	1534429	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	12/18/15	0843	1532296

**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: 4.2A.R.4.6  
Sample ID: 387763014

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"	1532467	75	(15%-125%)
Uranium-232 Tracer		ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1532463	69.4	(15%-125%)
Uranium-235/236 Tracer		ASP Uranium Isotopic, Solid "Dry Weight Corrected"	1532463	87.4	(15%-125%)
Americium-243 Tracer		Alphaspec Np237, Solid "Dry Weight Corrected"	1532466	88.9	(15%-125%)
Actinium-227 Tracer		Alphaspec Th229 + 228,230,232 Solid "Dry Weight Corrected"	1532462	73.5	(15%-125%)
Americium-243 Tracer		Am241, Cm Solid "Dry Weight Corrected"	1532464	43.8	(15%-125%)
Plutonium-242 Tracer		Liquid Scint Pu241, Solid "Dry Weight Corrected"	1532468	75	(15%-125%)
Strontium Carrier		GFPC, Sr90, solid "Dry Weight Corrected"	1534449	78.2	(25%-125%)
Technetium-99m Tracer		Liquid Scint Tc99, Solid "Dry Weight Corrected"	1534429	92.4	(15%-125%)

### Notes:

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