

NM WRRI Student Water Research Grant Progress Report Form

Progress Report due Feb 1, 2017
Draft Final Report due June 1, 2017
Final Report due June 30, 2017

- 1. Student Researcher:** Moticha Yellowman
Faculty Advisor: Dr. Antonio Lara
Project Sponsor: Dennis McQuillan

- 2. Project Title:** San Jose Mining District Groundwater Investigation

- 3. Description of research problem and research objectives.**

Uranium in excess of the drinking-water standard of 30 µg/L has been detected in approximately 50% of the wells tested in the Española Basin east of the Rio Grande, extending from northern Santa Fe into Española, New Mexico. Concentrations range from less than 1 µg/L to a maximum of 1820 µg/L. Isotopic signatures are consistent with natural uranium, not depleted or enriched by anthropogenic processes. At least 27 wells serving 19 public water systems, and 209 private domestic wells, produce water with excessive uranium. Many wells also contain high concentrations of arsenic. Potential sources for uranium in the groundwater include

- 1) uranium mineralization in the Tesuque Formation (San Jose mining district)
- 2) rhyolitic volcanic ash beds and sandstones with volcanic detritus interbedded with the Tesuque Formation
- 3) granites, pegmatites, veins and replacement minerals in crystalline rocks in the Sangre de Cristo Mountains east of the Española Basin.

Some area residents have installed ion exchange and reverse osmosis treatment units to decrease contaminants levels from their well water. The Pojoaque Basin Regional Water System is scheduled to be constructed, and residents in the service area will have the option to either connect or remain on their private domestic wells

- 4. Description of methodology, employed.**

Methods that were used out in the field were to knock on doors, requesting permission to sample wells along HW-285 between Pojoaque and Arroyo Seco. When permission was granted by the home owners, a conductivity reading was tested on their water wells. After conductivity reading was stable, duplicate samples from the domestic water wells were collected for general water chemistry and trace metals. For statistical quality assurance, a blind duplicate was implemented for one well. Another method was to locate the home sites on an aerial photo, while documenting the longitude, latitude and the elevation of the water wells. An interview on the homeowner was taken note of; homeowners gave their information about the domestic well with their information to give possible results back to them.

- 5. Description of results; including findings, conclusions, and recommendations for further research.**

The analyses were completed by the New Mexico Bureau of Geology. With the following findings:

- Out of 12 samples, 10 exceeded the Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) for arsenic. EPA MCL standard for arsenic is 0.01 mg/L.
- Out of 12 samples, 4 exceeded the New Mexico Water Consumption standard for fluoride. New Mexico Water Commission standard for fluoride is 1.6 mg/L.
- Out of 12 samples, only 2 exceeded the EPA MCL standard for uranium. EPA MCL standard for uranium is 0.03 mg/L.

Below are all 13 samples that were taken from domestic wells in the San Jose Mining District.

Sample 2

Analytical Report		New Mexico Bureau of Geology and Mineral Resources	
Sample data report		801 Camino Plaza Socorro, NM 87801 (505) 826-6176	
Customer: NMEQ	Order Number: 170607	Receiver Date: 6/20/2017 9:00:00 AM	Project: 6/20/2017 9:00:00 AM
Contact: Dennis McCullen	Phone:	Matrix: Water	
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Specific Conductance	Method: EPA 153.1
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Specific Conductance	579 uS/cm	1	6/17/2017
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: pH	Method: EPA 153.1
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
pH	6.8	uS/cm	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Cadmium by ICP-MS	Method: EPA 200.7
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Cadmium	1.48	mg/L	1
Iron	30	mg/L	1
Magnesium	0.37	mg/L	1
Potassium	1.99	mg/L	1
Sulfate	1.96	mg/L	6
Zinc	0.19	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Arsenic by ICP-MS	Method: EPA 200.8
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Arsenic	0.014	mg/L	1
Barium	140	mg/L	1
Calcium	0.803	mg/L	1
Chloride	0.016	mg/L	1
Copper	0.001	mg/L	1
Lead	0.001	mg/L	1
Mercury	0.001	mg/L	1
Manganese	0.001	mg/L	1
Nickel	0.001	mg/L	1
Selenium	0.001	mg/L	1

Customer: NMEQ		Order Number: 170607	
Contact: Dennis McCullen		Receiver Date: 6/20/2017 9:00:00 AM	
Phone:		Project: 6/20/2017 9:00:00 AM	
Matrix: Water		Method: Water	
Barium 111	0.895	mg/L	1
Calcium 111	0.895	mg/L	1
Chloride 111	0.895	mg/L	1
Copper 111	0.895	mg/L	1
Iron 111	0.895	mg/L	1
Magnesium 111	0.895	mg/L	1
Manganese 111	0.895	mg/L	1
Nickel 111	0.895	mg/L	1
Potassium 111	0.895	mg/L	1
Selenium 111	0.895	mg/L	1
Silver 111	0.895	mg/L	1
Sulfate 111	0.895	mg/L	1
Thallium 111	0.895	mg/L	1
Vanadium 111	0.895	mg/L	1
Zinc 111	0.895	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Arsenic by IC	Method: EPA 200.8
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Arsenic	0.19	mg/L	1
Chloride	28.3	mg/L	1
Fluoride	0.14	mg/L	1
Nitrate	0.01	mg NO3-N	1
Nitrite	0.01	mg NO2-N	1
Ortho Phosphate	0.01	mg P	1
Sulfate	0.01	mg S	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Ammonia	Method: EPA 351.1
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Ammonia as NH3	101	mg/L	1

Customer: NMEQ		Order Number: 170607	
Contact: Dennis McCullen		Receiver Date: 6/20/2017 9:00:00 AM	
Phone:		Project: 6/20/2017 9:00:00 AM	
Matrix: Water		Method: Water	
Barium 111	0.895	mg/L	1
Calcium 111	0.895	mg/L	1
Chloride 111	0.895	mg/L	1
Copper 111	0.895	mg/L	1
Iron 111	0.895	mg/L	1
Magnesium 111	0.895	mg/L	1
Manganese 111	0.895	mg/L	1
Nickel 111	0.895	mg/L	1
Potassium 111	0.895	mg/L	1
Selenium 111	0.895	mg/L	1
Silver 111	0.895	mg/L	1
Sulfate 111	0.895	mg/L	1
Thallium 111	0.895	mg/L	1
Vanadium 111	0.895	mg/L	1
Zinc 111	0.895	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Checking correctness	Method: SM 1530c
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Ammonia	0.41	mg/L	1
Calcium	0.34	mg/L	1
Fluoride	0.07	%	1
Iron	0.17	mg/L	1
Total	0.01	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Hardness by calculation	Method: SM 1343B
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Hardness	109	mg CaCO3/L	1

Sample 7

Customer: NMEQ		Order Number: 170607	
Contact: Dennis McCullen		Receiver Date: 6/20/2017 9:00:00 AM	
Phone:		Project: 6/20/2017 9:00:00 AM	
Matrix: Water		Method: Water	
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Specific Conductance	Method: EPA 153.1
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Specific Conductance	581 uS/cm	1	6/17/2017
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: pH	Method: EPA 153.1
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
pH	6.4	uS/cm	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Cadmium by ICP-MS	Method: EPA 200.7
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Cadmium	0.13	mg/L	1
Iron	10	mg/L	1
Magnesium	0.45	mg/L	1
Potassium	1.93	mg/L	1
Sulfate	1.96	mg/L	6
Zinc	0.18	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Arsenic by ICP-MS	Method: EPA 200.8
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Arsenic	0.017	mg/L	1
Barium	140	mg/L	1
Calcium	0.807	mg/L	1
Chloride	0.016	mg/L	1
Copper	0.001	mg/L	1
Lead	0.001	mg/L	1
Mercury	0.001	mg/L	1
Manganese	0.001	mg/L	1
Nickel	0.001	mg/L	1
Selenium	0.001	mg/L	1

Customer: NMEQ		Order Number: 170607	
Contact: Dennis McCullen		Receiver Date: 6/20/2017 9:00:00 AM	
Phone:		Project: 6/20/2017 9:00:00 AM	
Matrix: Water		Method: Water	
Barium 111	0.895	mg/L	1
Calcium 111	0.895	mg/L	1
Chloride 111	0.895	mg/L	1
Copper 111	0.895	mg/L	1
Iron 111	0.895	mg/L	1
Magnesium 111	0.895	mg/L	1
Manganese 111	0.895	mg/L	1
Nickel 111	0.895	mg/L	1
Potassium 111	0.895	mg/L	1
Selenium 111	0.895	mg/L	1
Silver 111	0.895	mg/L	1
Sulfate 111	0.895	mg/L	1
Thallium 111	0.895	mg/L	1
Vanadium 111	0.895	mg/L	1
Zinc 111	0.895	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Arsenic by IC	Method: EPA 200.8
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Arsenic	0.18	mg/L	1
Chloride	28.8	mg/L	1
Fluoride	0.14	mg/L	1
Nitrate	0.01	mg NO3-N	1
Nitrite	0.01	mg NO2-N	1
Ortho Phosphate	0.01	mg P	1
Sulfate	0.01	mg S	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Ammonia	Method: EPA 351.1
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Ammonia as NH3	118	mg/L	1

Customer: NMEQ		Order Number: 170607	
Contact: Dennis McCullen		Receiver Date: 6/20/2017 9:00:00 AM	
Phone:		Project: 6/20/2017 9:00:00 AM	
Matrix: Water		Method: Water	
Barium 111	0.895	mg/L	1
Calcium 111	0.895	mg/L	1
Chloride 111	0.895	mg/L	1
Copper 111	0.895	mg/L	1
Iron 111	0.895	mg/L	1
Magnesium 111	0.895	mg/L	1
Manganese 111	0.895	mg/L	1
Nickel 111	0.895	mg/L	1
Potassium 111	0.895	mg/L	1
Selenium 111	0.895	mg/L	1
Silver 111	0.895	mg/L	1
Sulfate 111	0.895	mg/L	1
Thallium 111	0.895	mg/L	1
Vanadium 111	0.895	mg/L	1
Zinc 111	0.895	mg/L	1
Lab Sample ID: 170607-01	Customer sample ID: 2	Test: Checking correctness	Method: SM 1530c
Parameter: Results Units Dilution Reporting Unit	Analysis Date		
Ammonia	0.48	mg/L	1

Sample 9

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	Specific Conductance	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Specific Conductance	808	uS/cm	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	pH	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
pH	8.2	pH Units	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	Cations by CPOES	EPA 200.7	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Calcium	0.18	mg/L	1	6/9/2017
Iron	0.10	mg/L	1	6/9/2017
Magnesium	1.96	mg/L	1	6/9/2017
Potassium	4.35	mg/L	1	6/9/2017
Sodium	755	mg/L	5	6/9/2017
Selenium	0.106	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	Trace Metals by ICPMS	EPA 200.8	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Aluminum	ND	mg/L	1	6/9/2017
Antimony	ND	mg/L	1	6/9/2017
Arsenic	0.0076	mg/L	1	6/9/2017
Barium	0.007	mg/L	1	6/9/2017
Beryllium	ND	mg/L	1	6/9/2017
Bismuth	ND	mg/L	1	6/9/2017
Cadmium	ND	mg/L	1	6/9/2017
Chromium	ND	mg/L	1	6/9/2017
Cobalt	ND	mg/L	1	6/9/2017
Copper	0.0019	mg/L	1	6/9/2017
Lead	ND	mg/L	1	6/9/2017
Lithium	0.106	mg/L	5	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
The data is presented as reported but multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Manganese	0.017	mg/L	1	6/9/2017
Mercury	0.046	mg/L	1	6/9/2017
Nickel	0.049	mg/L	1	6/9/2017
Silver	0.048	mg/L	1	6/9/2017
Silica	0.07	mg/L	5	6/9/2017
Silver	ND	mg/L	1	6/9/2017
Strontium	0.094	mg/L	1	6/9/2017
Thallium	ND	mg/L	1	6/9/2017
Thoron	ND	mg/L	1	6/9/2017
Tin	ND	mg/L	1	6/9/2017
Tungsten	0.041	mg/L	1	6/9/2017
Vanadium	0.066	mg/L	1	6/9/2017
Zinc	0.066	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	Anions by IC	EPA 200.8	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Bromide	0.46	mg/L	1	6/9/2017
Chloride	65.7	mg/L	1	6/9/2017
Fluoride	0.41	mg/L	1	6/9/2017
Iodide	0.17	mg/L	1	6/9/2017
Nitrate	0.28	mg/NO3-L	1	6/9/2017
Ortho Phosphate	ND	mg/L	1	6/9/2017
Sulfate	126	mg/L	2	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	Alkalinity	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Alkalinity as CaCO3	119	mg/L	1	6/9/2017
Barium	ND	mg/L	1	6/9/2017
Calcium	ND	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-03	Huffman 9	Checking completeness	SM 1030	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Check	100	%	1	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
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Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Acetic acid	7.91	mg/L	1	6/9/2017
Calcium	7.76	mg/L	1	6/9/2017
Percent difference	-1.12	%	1	6/9/2017
NO2	15.4	mg/L	1	6/9/2017
TSS	5.0	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 9	Heavy Metals by calculation	SM 2200B	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Heavy Metals	58.5	mg CaCO3/L	1	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
The data is presented as reported but multiplied by the dilution factor and should be the value used for reporting purposes.

Sample 4

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Specific Conductance	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Specific Conductance	485	uS/cm	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	pH	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
pH	8.3	pH Units	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Cations by CPOES	EPA 200.7	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Calcium	0.27	mg/L	1	6/9/2017
Iron	ND	mg/L	1	6/9/2017
Magnesium	0.24	mg/L	1	6/9/2017
Potassium	0.26	mg/L	1	6/9/2017
Sodium	0.14	mg/L	1	6/9/2017
Selenium	0.106	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Trace Metals by ICPMS	EPA 200.8	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Aluminum	0.0017	mg/L	1	6/9/2017
Antimony	ND	mg/L	1	6/9/2017
Arsenic	0.0045	mg/L	1	6/9/2017
Barium	0.004	mg/L	1	6/9/2017
Beryllium	ND	mg/L	1	6/9/2017
Bismuth	ND	mg/L	1	6/9/2017
Cadmium	ND	mg/L	1	6/9/2017
Chromium	ND	mg/L	1	6/9/2017
Cobalt	ND	mg/L	1	6/9/2017
Copper	0.0003	mg/L	1	6/9/2017
Lead	0.0003	mg/L	1	6/9/2017
Lithium	0.071	mg/L	1	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
The data is presented as reported but multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Manganese	ND	mg/L	1	6/9/2017
Mercury	0.015	mg/L	1	6/9/2017
Nickel	ND	mg/L	1	6/9/2017
Silver	0.007	mg/L	1	6/9/2017
Silica	0.07	mg/L	5	6/9/2017
Silver	ND	mg/L	1	6/9/2017
Strontium	0.171	mg/L	1	6/9/2017
Thallium	ND	mg/L	1	6/9/2017
Thoron	ND	mg/L	1	6/9/2017
Tin	ND	mg/L	1	6/9/2017
Tungsten	0.040	mg/L	1	6/9/2017
Vanadium	0.044	mg/L	1	6/9/2017
Zinc	0.019	mg/L	1	6/9/2017
Zinc	0.019	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Anions by IC	EPA 200.8	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Bromide	0.16	mg/L	1	6/9/2017
Chloride	16.2	mg/L	1	6/9/2017
Fluoride	0.24	mg/L	1	6/9/2017
Iodide	ND	mg/L	1	6/9/2017
Nitrate	ND	mg/NO3-L	1	6/9/2017
Ortho Phosphate	ND	mg/L	1	6/9/2017
Sulfate	61.1	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Alkalinity	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Alkalinity as CaCO3	146	mg/L	1	6/9/2017
Barium	ND	mg/L	1	6/9/2017
Calcium	ND	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Checking completeness	SM 1030	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Check	100	%	1	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
The data is presented as reported but multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Acetic acid	4.97	mg/L	1	6/9/2017
Calcium	4.50	mg/L	1	6/9/2017
Percent difference	-2.62	%	1	6/9/2017
NO2	54.4	mg/L	1	6/9/2017
TSS	120	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-04	Huffman 4	Heavy Metals by calculation	SM 2200B	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Heavy Metals	0.17	mg CaCO3/L	1	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
The data is presented as reported but multiplied by the dilution factor and should be the value used for reporting purposes.

Sample 6

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-05	Huffman 5	Specific Conductance	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Specific Conductance	572	uS/cm	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-05	Huffman 5	pH	EPA 151.1	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
pH	7.8	pH Units	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-05	Huffman 5	Cations by CPOES	EPA 200.7	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Calcium	2.17	mg/L	1	6/9/2017
Iron	0.26	mg/L	1	6/9/2017
Magnesium	2.82	mg/L	1	6/9/2017
Potassium	0.16	mg/L	1	6/9/2017
Sodium	0.17	mg/L	1	6/9/2017
Selenium	0.007	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-05	Huffman 5	Trace Metals by ICPMS	EPA 200.8	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Aluminum	0.0017	mg/L	1	6/9/2017
Antimony	ND	mg/L	1	6/9/2017
Arsenic	0.006	mg/L	1	6/9/2017
Barium	0.006	mg/L	1	6/9/2017
Beryllium	ND	mg/L	1	6/9/2017
Bismuth	ND	mg/L	1	6/9/2017
Cadmium	ND	mg/L	1	6/9/2017
Chromium	ND	mg/L	1	6/9/2017
Cobalt	ND	mg/L	1	6/9/2017
Copper	0.0004	mg/L	1	6/9/2017
Lead	ND	mg/L	1	6/9/2017
Lithium	0.082	mg/L	1	6/9/2017

ND - Not detected at the reporting limit. Thursday, June 29, 2017 Page 1 of 20
The data is presented as reported but multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NHEC		Order Number: 17067		
Contact: Dennis McCallan		Receive Date: 6/9/2017 9:00:00 AM		
Phone:		Project: Matrix Water		
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Manganese	0.023	mg/L	1	6/9/2017
Mercury	0.001	mg/L	1	6/9/2017
Nickel	ND	mg/L	1	6/9/2017
Silver	0.007	mg/L	1	6/9/2017
Silica	0.07	mg/L	5	6/9/2017
Silver	ND	mg/L	1	6/9/2017
Strontium	0.176	mg/L	1	6/9/2017
Thallium	ND	mg/L	1	6/9/2017
Thoron	ND	mg/L	1	6/9/2017
Tin	ND	mg/L	1	6/9/2017
Tungsten	0.005	mg/L	1	6/9/2017
Vanadium	0.016	mg/L	1	6/9/2017
Zinc	0.014	mg/L	1	6/9/2017
Lab Sample ID:	Customer Sample ID:	Test:	Method:	
17067-05	Huffman 5	Anions by IC	EPA 200.8	
Parameter:	Result:	Units:	Dilution: Reporting Limit: Analysis Date:	
Bromide	ND	mg/L	1	6/9/2017
Chloride	0.85	mg/L		

Sample 11

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Mayes 11	Specific Conductance	EPA 153.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Specific Conductance	492 uS/cm	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-09	Mayes 11	pH	EPA 153.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
pH	6.8 pH Units	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-06	Mayes 11	Cations by ICP/MS	EPA 200.7
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Calcium	1.88 mg/L	1	6/1/2017
Iron	ND mg/L	1	6/1/2017
Magnesium	0.866 mg/L	1	6/1/2017
Potassium	0.871 mg/L	1	6/1/2017
Sodium	171 mg/L	6	0.05
Strontium	0.007 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-06	Mayes 11	Trace Metals by ICP/MS	EPA 200.8
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Arsenic	0.003 mg/L	1	6/1/2017
Barium	ND mg/L	1	6/1/2017
Bismuth	0.019 mg/L	1	6/1/2017
Cadmium	0.002 mg/L	1	6/1/2017
Chromium	ND mg/L	1	6/1/2017
Copper	ND mg/L	1	6/1/2017
Lead	ND mg/L	1	6/1/2017
Lithium	0.075 mg/L	1	6/1/2017

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-06	Mayes 11	Anions by IC	EPA 200.8
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Bromide	0.17 mg/L	1	6/1/2017
Chloride	14.8 mg/L	1	6/1/2017
Fluoride	1.48 mg/L	1	6/1/2017
Nitrate	0.11 mg/NO3-L	1	6/1/2017
Nitrite	ND mg/NO2-L	1	6/1/2017
Ortho Phosphate	ND mg/L	1	6/1/2017
Sulfate	0.6 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-06	Mayes 11	Alkalinity	EPA 245.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Alkalinity as CaCO3	188 mg/L	1	6/1/2017
Bicarbonate (HCO3)	173 mg/L	1	6/1/2017
Carbonate (CO3)	14 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-05	Mayes 11	Checking conductivity	SM 10386
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Conductivity	492 uS/cm	1	6/1/2017

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-01	Mayes 11	Hardness by calculation	SM 2240B
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Hardness	178 mg CaCO3/L	1	

Sample 3

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Specific Conductance	EPA 153.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Specific Conductance	492 uS/cm	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	pH	EPA 153.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
pH	6.8 pH Units	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Cations by ICP/MS	EPA 200.7
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Calcium	0.52 mg/L	1	6/1/2017
Iron	ND mg/L	1	6/1/2017
Magnesium	0.866 mg/L	1	6/1/2017
Potassium	0.871 mg/L	1	6/1/2017
Sodium	171 mg/L	6	0.05
Strontium	0.007 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Trace Metals by ICP/MS	EPA 200.8
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Arsenic	0.003 mg/L	1	6/1/2017
Barium	ND mg/L	1	6/1/2017
Bismuth	0.019 mg/L	1	6/1/2017
Cadmium	0.002 mg/L	1	6/1/2017
Chromium	ND mg/L	1	6/1/2017
Copper	ND mg/L	1	6/1/2017
Lead	ND mg/L	1	6/1/2017
Lithium	0.075 mg/L	1	6/1/2017

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Anions by IC	EPA 200.8
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Bromide	0.17 mg/L	1	6/1/2017
Chloride	14.8 mg/L	1	6/1/2017
Fluoride	1.48 mg/L	1	6/1/2017
Nitrate	0.11 mg/NO3-L	1	6/1/2017
Nitrite	ND mg/NO2-L	1	6/1/2017
Ortho Phosphate	ND mg/L	1	6/1/2017
Sulfate	0.6 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Alkalinity	EPA 245.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Alkalinity as CaCO3	188 mg/L	1	6/1/2017
Bicarbonate (HCO3)	173 mg/L	1	6/1/2017
Carbonate (CO3)	14 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Checking conductivity	SM 10386
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Conductivity	492 uS/cm	1	6/1/2017

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-07	Monticla Resistance 3	Hardness by calculation	SM 2240B
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Hardness	178 mg CaCO3/L	1	

Sample 5

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Specific Conductance	EPA 153.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Specific Conductance	429 uS/cm	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	pH	EPA 153.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
pH	6.8 pH Units	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Cations by ICP/MS	EPA 200.7
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Calcium	7.81 mg/L	1	6/1/2017
Iron	ND mg/L	1	6/1/2017
Magnesium	0.866 mg/L	1	6/1/2017
Potassium	0.871 mg/L	1	6/1/2017
Sodium	81.3 mg/L	1	0.05
Strontium	0.102 mg/L	1	0.005
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Trace Metals by ICP/MS	EPA 200.8
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Arsenic	0.003 mg/L	1	6/1/2017
Barium	ND mg/L	1	6/1/2017
Bismuth	0.019 mg/L	1	6/1/2017
Cadmium	0.002 mg/L	1	6/1/2017
Chromium	ND mg/L	1	6/1/2017
Copper	ND mg/L	1	6/1/2017
Lead	ND mg/L	1	6/1/2017
Lithium	0.075 mg/L	1	6/1/2017

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Anions by IC	EPA 200.8
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Bromide	0.17 mg/L	1	6/1/2017
Chloride	14.8 mg/L	1	6/1/2017
Fluoride	1.48 mg/L	1	6/1/2017
Nitrate	0.11 mg/NO3-L	1	6/1/2017
Nitrite	ND mg/NO2-L	1	6/1/2017
Ortho Phosphate	ND mg/L	1	6/1/2017
Sulfate	0.6 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Alkalinity	EPA 245.1
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Alkalinity as CaCO3	148 mg/L	1	6/1/2017
Bicarbonate (HCO3)	131 mg/L	1	6/1/2017
Carbonate (CO3)	14 mg/L	1	6/1/2017
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Checking conductivity	SM 10386
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Conductivity	429 uS/cm	1	6/1/2017

Customer: NHEI	Order Number: 17007		
Contact: Dennis McCallum	Receive Date: 6/6/2017 9:00:00 AM		
Phone:	Project: Water		
Method: Water			
Laboratory sample ID: Customer sample ID: Test: Method:			
17007-08	Pinak 5	Hardness by calculation	SM 2240B
Parameter: Result Units Dilution Reporting limit Analytic Date:			
Hardness	218 mg CaCO3/L	1	

Sample 10

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Specific Conductance	EPA 163.1
Parameter:	Result	Units	Dilution
Specific Conductance	677	uS/cm	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	pH	EPA 163.1
Parameter:	Result	Units	Dilution
pH	6.4	pH Units	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Cations by IC/PCS	EPA 200.7
Parameter:	Result	Units	Dilution
Calcium	14.3	mg/L	1
Iron	0.08	mg/L	1
Magnesium	0.07	mg/L	1
Potassium	2.77	mg/L	1
Sodium	192	mg/L	5
Strontium	0.346	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Trace Metals by ICP/MS	EPA 200.8
Parameter:	Result	Units	Dilution
Antimony	0.001	mg/L	1
Asbestos 1/1	ND	mg/L	1
Asbestos 2/1	ND	mg/L	1
Barium	0.007	mg/L	1
Beryllium	ND	mg/L	1
Bismuth	0.001	mg/L	1
Cadmium	0.001	mg/L	1
Chromium	ND	mg/L	1
Cobalt	ND	mg/L	1
Copper	0.003	mg/L	1
Lead	ND	mg/L	1
Lithium	0.119	mg/L	5

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 10 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Anions by IC	EPA 200.9
Parameter:	Result	Units	Dilution
Fluoride	0.24	mg/L	1
Nitrate	ND	mg/L	1
Sulfate	0.881	mg/L	1
Silica 107	ND	mg/L	1
Silica 107	ND	mg/L	1
Titanium	ND	mg/L	1
Tin	ND	mg/L	1
Tungsten	0.001	mg/L	1
Vanadium	ND	mg/L	1
Zinc	0.007	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Ammonia by IC	EPA 200.9
Parameter:	Result	Units	Dilution
Ammonia	0.24	mg/L	1
Chloride	36.4	mg/L	1
Fluoride	0.06	mg/L	1
Nitrate	ND	mg/NO3-L	1
Nitrite	ND	mg/NO2-L	1
Ortho Phosphate	ND	mg/L	1
Sulfate	292	mg/L	5
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Amalgam	EPA 210.1
Parameter:	Result	Units	Dilution
Amalgam as Cd/Co	ND	mg/L	1
Amalgam as Cu/Zn	116	mg/L	1
Amalgam as Pb	ND	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Chewing Gum Resins	SM 1036
Parameter:	Result	Units	Dilution
Phenol	ND	mg/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 11 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Hardness by calculation	SM 2140B
Parameter:	Result	Units	Dilution
Hardness	36.8	mg CaCO3/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-09	Runoff 10	Hardness by calculation	SM 2140B
Parameter:	Result	Units	Dilution
Hardness	36.8	mg CaCO3/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 12 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Sample 13

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Specific Conductance	EPA 163.1
Parameter:	Result	Units	Dilution
Specific Conductance	438	uS/cm	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	pH	EPA 163.1
Parameter:	Result	Units	Dilution
pH	6.2	pH Units	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Cations by IC/PCS	EPA 200.7
Parameter:	Result	Units	Dilution
Calcium	13.8	mg/L	1
Iron	ND	mg/L	1
Magnesium	0.08	mg/L	1
Potassium	1.84	mg/L	1
Sodium	83.4	mg/L	1
Strontium	0.146	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Trace Metals by ICP/MS	EPA 200.8
Parameter:	Result	Units	Dilution
Antimony	0.007	mg/L	1
Asbestos 1/1	ND	mg/L	1
Asbestos 2/1	ND	mg/L	1
Barium	0.017	mg/L	1
Beryllium	ND	mg/L	1
Bismuth	0.001	mg/L	1
Cadmium	0.001	mg/L	1
Chromium	ND	mg/L	1
Cobalt	ND	mg/L	1
Copper	0.003	mg/L	1
Lead	ND	mg/L	1
Lithium	0.071	mg/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 10 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Anions by IC	EPA 200.9
Parameter:	Result	Units	Dilution
Fluoride	0.17	mg/L	1
Nitrate	ND	mg/L	1
Sulfate	0.98	mg/L	1
Silica 107	ND	mg/L	1
Silica 107	ND	mg/L	1
Titanium	ND	mg/L	1
Tin	ND	mg/L	1
Tungsten	0.001	mg/L	1
Vanadium	ND	mg/L	1
Zinc	0.005	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Amalgam	EPA 210.1
Parameter:	Result	Units	Dilution
Amalgam as Cd/Co	121	mg/L	1
Amalgam as Cu/Zn	148	mg/L	1
Amalgam as Pb	ND	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Chewing Gum Resins	SM 1036
Parameter:	Result	Units	Dilution
Phenol	ND	mg/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 11 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Hardness by calculation	SM 2140B
Parameter:	Result	Units	Dilution
Hardness	27.0	mg CaCO3/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-10	Runoff 13	Hardness by calculation	SM 2140B
Parameter:	Result	Units	Dilution
Hardness	27.0	mg CaCO3/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 12 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Sample 1

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Specific Conductance	EPA 163.1
Parameter:	Result	Units	Dilution
Specific Conductance	586	uS/cm	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	pH	EPA 163.1
Parameter:	Result	Units	Dilution
pH	6.6	pH Units	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Cations by IC/PCS	EPA 200.7
Parameter:	Result	Units	Dilution
Calcium	6.07	mg/L	1
Iron	ND	mg/L	1
Magnesium	0.069	mg/L	1
Potassium	1.47	mg/L	1
Sodium	118	mg/L	5
Strontium	0.173	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Trace Metals by ICP/MS	EPA 200.8
Parameter:	Result	Units	Dilution
Antimony	0.001	mg/L	1
Asbestos 1/1	ND	mg/L	1
Asbestos 2/1	ND	mg/L	1
Barium	0.017	mg/L	1
Beryllium	ND	mg/L	1
Bismuth	0.001	mg/L	1
Cadmium	0.001	mg/L	1
Chromium	ND	mg/L	1
Cobalt	ND	mg/L	1
Copper	0.003	mg/L	1
Lead	ND	mg/L	1
Lithium	0.096	mg/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 10 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Anions by IC	EPA 200.9
Parameter:	Result	Units	Dilution
Fluoride	0.23	mg/L	1
Nitrate	ND	mg/L	1
Sulfate	0.861	mg/L	1
Silica 107	ND	mg/L	1
Silica 107	ND	mg/L	1
Titanium	ND	mg/L	1
Tin	ND	mg/L	1
Tungsten	0.001	mg/L	1
Vanadium	ND	mg/L	1
Zinc	0.004	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Amalgam	EPA 210.1
Parameter:	Result	Units	Dilution
Amalgam as Cd/Co	139	mg/L	1
Amalgam as Cu/Zn	141	mg/L	1
Amalgam as Pb	ND	mg/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Chewing Gum Resins	SM 1036
Parameter:	Result	Units	Dilution
Phenol	ND	mg/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 11 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Customer: NRED		Order Number: 110007	
Contact: Dennis McCullen		Receive Date: 6/9/2017 9:00:00 AM	Project: Water
Phone:		Matrix:	Water
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Hardness by calculation	SM 2140B
Parameter:	Result	Units	Dilution
Hardness	27.0	mg CaCO3/L	1
Laboratory sample ID: Customer sample ID: Test: Method:			
110007-11	Shoat Resilience 1	Hardness by calculation	SM 2140B
Parameter:	Result	Units	Dilution
Hardness	27.0	mg CaCO3/L	1

ND = not detected at the reporting level. Thursday, June 26, 2017 Page 12 of 20
The value in parentheses in reporting level multiplied by the dilution factor and should be the value used for reporting purposes.

Sample 8

Customer: NMED		Order Number: 17007	
Contact: Dennis McCullen		Revised Date: 05/20/17 9:00:00 AM	
Phone:		Project:	
Matrix: Water		Method:	
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Specific Conductance	EPA 12.1
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Specific Conductance	182	uS/cm	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	pH	EPA 12.1
Parameter	Result	Units	Detection Reporting Limit Analytic Date
pH	8.7	ph Units	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Cations by IC/DES	EPA 200.7
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Calcium	0.76	mg/L	1 0.00 05/20/17
Iron	ND	mg/L	1 0.01 05/20/17
Magnesium	0.366	mg/L	1 0.00 05/20/17
Potassium	2.79	mg/L	1 0.00 05/20/17
Sulfate	106	mg/L	0 0.00 (B/L) 05/20/17
Selenium	0.128	mg/L	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Trace Metals by ICP/MS	EPA 821.0
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Aluminum	0.016	mg/L	1 0.000 05/20/17
Arsenic (V)	ND	mg/L	1 0.000 05/20/17
Arsenic	0.079	mg/L	1 0.000 05/20/17
Barium	0.074	mg/L	1 0.001 05/20/17
Boron	ND	mg/L	1 0.000 05/20/17
Bromine	0.136	mg/L	0 0.00 (B/L) 05/20/17
Cadmium	ND	mg/L	1 0.000 05/20/17
Chromium	ND	mg/L	1 0.000 05/20/17
Cobalt	ND	mg/L	1 0.000 05/20/17
Copper	0.006	mg/L	1 0.000 05/20/17
Lead	ND	mg/L	1 0.000 05/20/17
Lithium	0.002	mg/L	1 0.001 05/20/17

Customer: NMED		Order Number: 17007	
Contact: Dennis McCullen		Revised Date: 05/20/17 9:00:00 AM	
Phone:		Project:	
Matrix: Water		Method:	
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Mercury	0.001	mg/L	1 0.001 05/20/17
Nickel	0.001	mg/L	1 0.001 05/20/17
Niobium	ND	mg/L	1 0.000 05/20/17
Vanadium	0.001	mg/L	1 0.001 05/20/17
Silver	15.7	mg/L	0 0.01 (B/L) 05/20/17
Strontium	ND	mg/L	1 0.001 05/20/17
Tantalum	0.128	mg/L	1 0.001 05/20/17
Thallium	ND	mg/L	1 0.000 05/20/17
Tin	ND	mg/L	1 0.000 05/20/17
Tungsten	0.001	mg/L	1 0.001 05/20/17
Zinc	ND	mg/L	1 0.000 05/20/17
Zinc	ND	mg/L	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Anions by IC	EPA 300.0
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Bromide	0.26	mg/L	1 0.1 05/20/17
Chloride	36.1	mg/L	1 1 05/20/17
Fluoride	1.42	mg/L	1 0.1 05/20/17
Nitrate	ND	mg/NO3-N	1 0.1 05/20/17
Nitrite	ND	mg/NO2-N	1 0.1 05/20/17
Ortho Phosphate	ND	mg/PO4-P	1 0.1 05/20/17
Sulfate	65.8	mg/L	1 1 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Amalgam	EPA 310.1
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Mercury (Total)	1.02	mg/L	1 0 05/20/17
Mercury (PbCl2)	1.07	mg/L	1 0 05/20/17
Mercury (ZnCl2)	0	mg/L	1 0 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Checking correctness	SM 1000
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Check	0.00	mg/L	1 0.00 05/20/17

Customer: NMED		Order Number: 17007	
Contact: Dennis McCullen		Revised Date: 05/20/17 9:00:00 AM	
Phone:		Project:	
Matrix: Water		Method:	
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Arsenic (V)	0.17	mg/L	1 0.000 05/20/17
Arsenic (III)	0.10	mg/L	1 0.000 05/20/17
Percent Difference	-1.0	%	1 0.00 05/20/17
SDI	16.8	mg/L	1 0.00 05/20/17
TDS calc	361	mg/L	1 0.00 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-12	Vgl 8	Hardness by calculation	SM 2100
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Hardness	11.7	mg CaCO3/L	1 0.000 05/20/17

Sample 12

Customer: NMED		Order Number: 17007	
Contact: Dennis McCullen		Revised Date: 05/20/17 9:00:00 AM	
Phone:		Project:	
Matrix: Water		Method:	
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Specific Conductance	EPA 12.1
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Specific Conductance	180	uS/cm	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	pH	EPA 12.1
Parameter	Result	Units	Detection Reporting Limit Analytic Date
pH	8.0	ph Units	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Cations by IC/DES	EPA 200.7
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Calcium	7.71	mg/L	1 0.00 05/20/17
Iron	ND	mg/L	1 0.01 05/20/17
Magnesium	0.367	mg/L	1 0.00 05/20/17
Potassium	3.88	mg/L	1 0.00 05/20/17
Sulfate	170	mg/L	0 0.00 (B/L) 05/20/17
Selenium	0.121	mg/L	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Trace Metals by ICP/MS	EPA 200.8
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Aluminum	0.016	mg/L	1 0.000 05/20/17
Arsenic (V)	ND	mg/L	1 0.000 05/20/17
Arsenic	0.020	mg/L	1 0.000 05/20/17
Barium	0.014	mg/L	1 0.001 05/20/17
Boron	ND	mg/L	1 0.000 05/20/17
Bromine	0.088	mg/L	1 0.000 05/20/17
Cadmium	ND	mg/L	1 0.000 05/20/17
Chromium	ND	mg/L	1 0.000 05/20/17
Cobalt	ND	mg/L	1 0.000 05/20/17
Copper	0.006	mg/L	1 0.000 05/20/17
Lead	ND	mg/L	1 0.000 05/20/17
Lithium	0.112	mg/L	1 0.001 05/20/17

Customer: NMED		Order Number: 17007	
Contact: Dennis McCullen		Revised Date: 05/20/17 9:00:00 AM	
Phone:		Project:	
Matrix: Water		Method:	
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Mercury	0.001	mg/L	1 0.001 05/20/17
Nickel	0.001	mg/L	1 0.001 05/20/17
Niobium	ND	mg/L	1 0.000 05/20/17
Vanadium	0.001	mg/L	1 0.001 05/20/17
Silver	15.0	mg/L	0 0.01 (B/L) 05/20/17
Strontium	ND	mg/L	1 0.001 05/20/17
Tantalum	0.128	mg/L	1 0.001 05/20/17
Thallium	ND	mg/L	1 0.000 05/20/17
Tin	ND	mg/L	1 0.000 05/20/17
Tungsten	0.001	mg/L	1 0.001 05/20/17
Zinc	ND	mg/L	1 0.000 05/20/17
Zinc	ND	mg/L	1 0.000 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Anions by IC	EPA 300.0
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Bromide	0.15	mg/L	1 0.1 05/20/17
Chloride	36.0	mg/L	1 1 05/20/17
Fluoride	1.40	mg/L	1 0.1 05/20/17
Nitrate	ND	mg/NO3-N	1 0.1 05/20/17
Nitrite	ND	mg/NO2-N	1 0.1 05/20/17
Ortho Phosphate	ND	mg/PO4-P	1 0.1 05/20/17
Sulfate	160	mg/L	1 0.01 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Amalgam	EPA 310.1
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Mercury (Total)	1.07	mg/L	1 0 05/20/17
Mercury (PbCl2)	1.03	mg/L	1 0 05/20/17
Mercury (ZnCl2)	0	mg/L	1 0 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Checking correctness	SM 1000
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Check	0.00	mg/L	1 0.00 05/20/17

Customer: NMED		Order Number: 17007	
Contact: Dennis McCullen		Revised Date: 05/20/17 9:00:00 AM	
Phone:		Project:	
Matrix: Water		Method:	
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Arsenic (V)	0.76	mg/L	1 0.000 05/20/17
Arsenic (III)	0.00	mg/L	1 0.000 05/20/17
Percent Difference	-0.0	%	1 0.00 05/20/17
SDI	16.8	mg/L	1 0.00 05/20/17
TDS calc	361	mg/L	1 0.00 05/20/17
Lab Sample ID:	Customer Sample ID:	Test:	Method:
17007-13	Vgl 12	Hardness by calculation	SM 2100
Parameter	Result	Units	Detection Reporting Limit Analytic Date
Hardness	11.6	mg CaCO3/L	1 0.000 05/20/17

Letters will be sent out to the well owners about the high levels of arsenic, fluoride and or uranium. In conclusion, majority of the owners had elevated levels of arsenic and fluoride. The blind duplicate was persistent with the original data from the well they were collected from.

6. Provide a paragraph on who will benefit from your research results. Include any water agency that could your results.

The community members living in the Pojoaque and Arroyo Seco will benefit from the results. If a community member has elevated amounts of uranium in their water well, they should implement a reverse osmosis system to their well or even another filter system. From the results, it will give an understanding to other community members that other domestic water wells might have potential uranium in their water system. New Mexico Environment Department (NMED) may benefit from the project as well. NMED will have a better understanding of the wells in the area, which can lead to piping in a water system for the community to have clean drinking water.

7. Describe how you have spent your grant fund.

There will be no money left over.

Salary \$2,620.80

Description: the salary has been distributed out evenly from
May 16, 2017 to June 30, 2017

Fringe Benefits \$28.83

Description: undergraduate student fringe benefits is 1.1%

Travel \$832.16

Description: claiming per diem for the 4-day round trip from NMSU to Sant Fe, New
Mexico

NM Bureau of Geology Water testing \$2,275.00

Description: New Mexico Bureau of Geology (NMBG) will do the analyses for 13
samples. NMBG will conducting the general water chemistry and the trace
metals.

8. List presentations you have made related to the project.

There has been no presentation on this project.

9. List publications or reports, if any, that you are preparing. Remember to acknowledge the NM WRRI funding in any presentation or report that you prepare.

There have been no publications on this project, there might be soon when the
analyses are done at New Mexico Tech in Socorro, New Mexico. The publications and
report will help assist the people in Arroyo Seco about their domestic water wells.

10. List any other students or faculty members who have assisted you with your project.

Kristine Pintado from New Mexico Environment Department

11. Provide special recognition awards or notable achievements as a result of the research including any publicity such as newspaper articles, or similar.

There is no special recognition awards or notable achievement for this project,
maybe soon.

12. Provide information on degree completion and future career plans. Funding for student grants comes from the New Mexico Legislature and legislators are interested in whether recipients of these grants go on to complete academic degrees and work in a water-related field in New Mexico or elsewhere.

After my expected graduation date in May 2019, I plan on applying for graduate
school. My plans for graduate school will either be at New Mexico State University or an
out of state university. I will continue in the chemistry field, which will help with the
decision in my career in becoming a teacher or working in industry.