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April 21, 2011

U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

TDD No: T02-09-10-08-0005
Project No: 002693.2103.01RA

Attention: Harry Allen, USEPA On-Scene Coordinator
Andrew Bain, USEPA

Subject: **NECR Water Well Sampling**
Church Rock Chapter
Navajo Nation

INTRODUCTION

In October 2010 the U.S. Environmental Protection Agency (USEPA) tasked the Ecology and Environment Inc. Superfund Technical Assessment and Response Team (START) with technical assistance relating to residential water well sampling in the vicinity of the former Northeast Church Rock Mine located in the Church Rock Chapter of the Navajo Nation. (Figure 1, Attachment A).

The purpose of this sampling event was to generate additional data to measure the impact of the former Northeast Church Rock Mine uranium mine on wells within the adjacent areas.

SAMPLING ACTIVITIES

Well sampling was conducted on October 19, 2010. A total of five wells were sampled. Four of the wells were residential wells and one (Mill Well) well was part of the former United Nuclear Corporation (UNC) facility in the area. Table 1 (Appendix B) gives the GPS coordinates and chapter locations of the wells. Every effort was made to collect water samples in a manner consistent with resident collection and use (i.e. taps, pumps or bucket collect).

A Time Critical Quality Assurance and Sampling (QASP) Plan (Appendix D) was developed prior to sampling and followed with the following exceptions:

- Well NR#1 is locked and therefore inaccessible for sampling.
- The Mine Well is no longer in use and was not sampled as the casing has been filled with concrete.

Water quality parameters were measured in the field using a Horiba, Ltd. multi-parameter water quality meter. The meter was calibrated daily using a buffer solution. Samples were collected and analyzed for metals, radionuclides and anions by GEL Laboratories Inc. (Charleston, SC). Samples were collected and analyzed for oxygen and hydrogen isotopic ratio by Isotech Laboratories, Inc (Champaign, Il). The QASP (Appendix D) contains all methods and volumes used in sample analysis. Table 2 (Appendix B) lists the full analyte list with associated reporting limits and action levels.

WELL DESCRIPTIONS

Well 15T-303
Well 15T-303 is a windmill powered well that feeds into an approximately 40,000 gallon uncovered metal tank. The well is currently in use and there is a trough and locked tap in the vicinity of the tank that are used to water livestock. Samples were collected from the top of the tank using a bucket.

14T-586
14T-586 is a diesel engine powered well that feeds into an approximately 10,000 gallon covered metal tank. The well is currently in use and there is a trough and tap in the vicinity of the tank that are used to water livestock. Samples were collected from the tap in manner consistent with residential use.

16K-336
Well 16K-336 is a windmill powered well that feeds into an approximately 10,000 gallon covered metal tank. The well is currently in use and there is a trough and tap in the vicinity of the tank that are used to water livestock. Samples were collected from the tap in manner consistent with residential use.

Mill Well
The Mill Well is located on the former UNC facility property. The well is electric powered well, housed in a wooden pump house, north of the former UNC offices and equipment yard. There is no storage tank affiliated with the well and the well is not currently in use. Samples were collected from a tap inside the pump house with pump turned on.

Mine Well
The mine well is located within the boundary of the former Northeast Church Rock Mine. The well is currently not in use and has been non-operational for at least 15 years. The well opening is currently plugged with concrete.

NR#1
The NR#1 well is located just outside the boundary of the former Northeast Church Rock Mine. The well is currently locked and was inaccessible for sampling.

16K-340
Well 16K-340 is a windmill powered well that feeds into an approximately 40,000 gallon covered metal tank. The well is currently in use and there is a trough and tap in the vicinity of the tank that are used to water livestock. Samples were collected from the tap in manner consistent with residential use.

RESULTS

Table 3 (Appendix B) gives a well specific summary of all applicable data. All laboratory data was validated by a START chemist using the *Region 9 Draft Superfund Data Evaluation/Validation Guidance.* Data validation indicated the laboratory data was acceptable with qualification as definitive data. A separate data validation report was generated under this project and is included in the project file.

This letter summarizes all activities conducted on the Tuba City Removal project. If you have any questions regarding START's activities associated with this project, please do not hesitate to contact me.

Respectfully,

Craig Tiballi
START Member

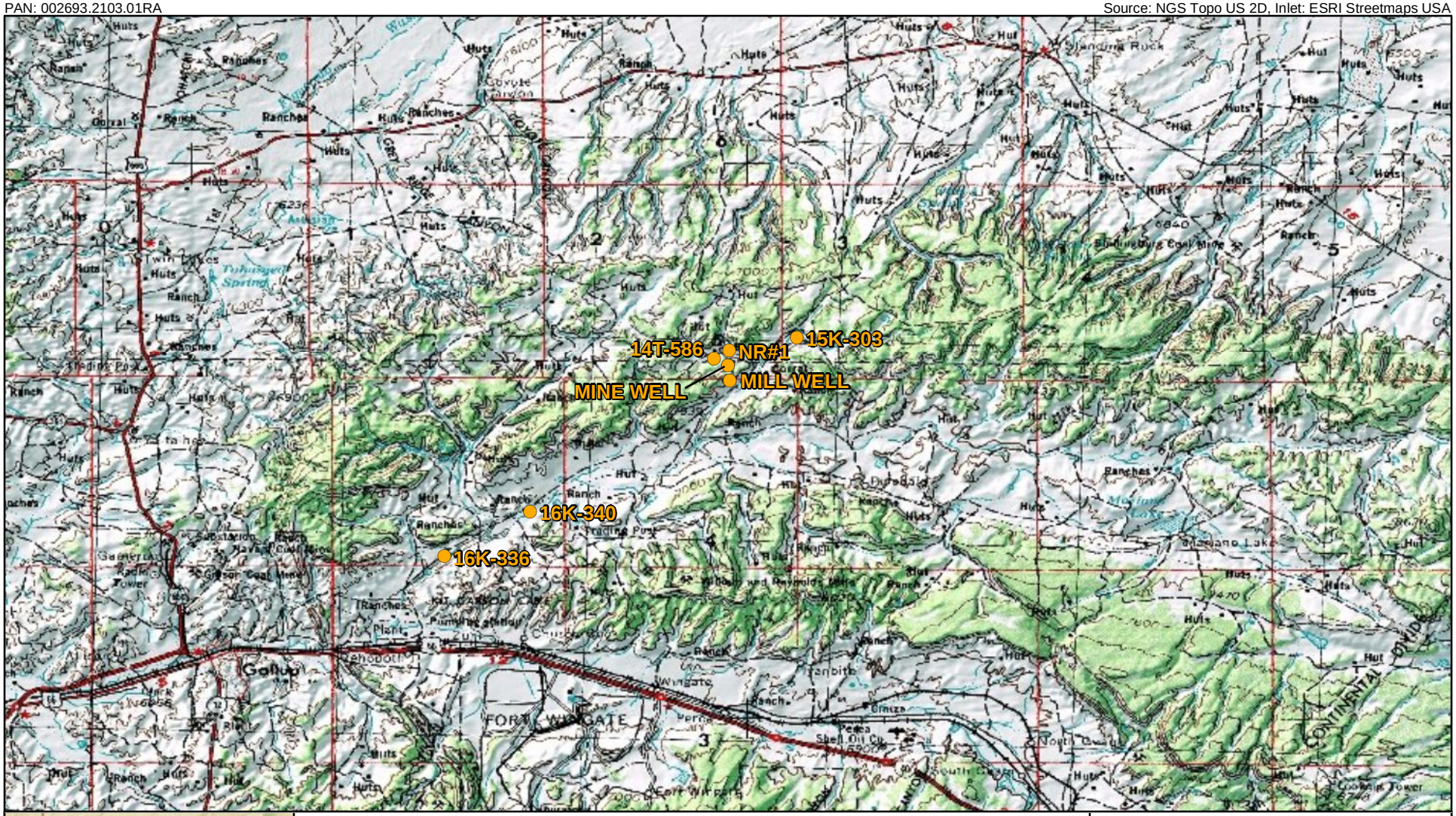
Attachments: A – Homesite Location Map
B – Tables
C – Photographic Documentation
D – QASP
E – Laboratory Analytical Results

cc: file

ATTACHMENT A:
Well Location Map

TDD: 09-10-08-0004
PAN: 002693.2103.01RA

Source: NGS Topo US 2D, Inlet: ESRI Streetmaps USA



LEGEND

- Unregulated well

N

0 2.25 4.5 9 Miles

Figure 1
NECR
Water Well Sampling

Navajo Nation

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ATTACHMENT B:
Tables

Table 1: Well Locations

TDD:09-10-08-0005 PAN:002693.2103.01RA

	Well ID	Chapter	Latitude	Longitude	Sampled
NECR Wells	14T-586	Coyote Canyon	35.661716656	-108.515296099	Yes
	16K-340	Church Rock	35.592875014	-108.598006052	Yes
	16K-336	Church Rock	35.572619910	-108.636751134	Yes
	15T-303	Nahodishgish	35.671296289	-108.478137564	Yes
	NECR Mine Well	Pinedale	35.658635376	-108.508977438	No
	UNC Mill Well	Pinedale	35.652017885	-108.508322659	Yes
	NR#1	Coyote Canyon	35.665519801	-108.508418190	No

Table 1: NECR Water Well Sampling Data

TDD:09-10-08-0005 PAN:002693.2104.01RA

	14T-586			14T-586100 (duplicate)			15T-303		
		Result	Units		Result	Units		Result	Units
Water Quality	pH	7.1		pH	7.1		pH	6.8	
	Conductivity	0.26	S/m	Conductivity	0.26	S/m	Conductivity	0.35	S/m
	Turbidity	10.1	NTU	Turbidity	10.1	NTU	Turbidity	10.1	NTU
	Dissolved Oxygen	6.30	mg/L	Dissolved Oxygen	6.30	mg/L	Dissolved Oxygen	7.99	mg/L
	Temperature	7.6	°C	Temperature	7.6	°C	Temperature	12.1	°C
	Salinity	0.1	%	Salinity	0.1	%	Salinity	0.2	%
	Total Dissolved Solids	1.7	g/L	Total Dissolved Solids	1.7	g/L	Total Dissolved Solids	2.2	g/L
	Oxidation Reduction Potential	100	mV	Oxidation Reduction Potential	100	mV	Oxidation Reduction Potential	129	mV
Metals	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	Aluminum	220	ug/L	Aluminum	82	ug/L	Aluminum	<68	ug/L
	Antimony	<3.0	ug/L	Antimony	7.34	ug/L	Antimony	6.83	ug/L
	Arsenic	<5.0	ug/L	Arsenic	<5.0	ug/L	Arsenic	7.54	ug/L
	Barium	13.1	ug/L	Barium	13.4	ug/L	Barium	8.24	ug/L
	Beryllium	<1.0	ug/L	Beryllium	<1.0	ug/L	Beryllium	<1.0	ug/L
	Bromide	<0.20	ug/L	Bromide	<0.20	ug/L	Bromide	<0.2	ug/L
	Cadmium	<1.0	ug/L	Cadmium	<1.0	ug/L	Cadmium	1.17	ug/L
	Calcium	270000	ug/L	Calcium	281000	ug/L	Calcium	373000	ug/L
	Chromium	13.9	ug/L	Chromium	<1.0	ug/L	Chromium	1.16	ug/L
	Cobalt	1.13	ug/L	Cobalt	<1.0	ug/L	Cobalt	<1.0	ug/L
	Copper	<3.0	ug/L	Copper	<3.0	ug/L	Copper	<3.0	ug/L
	Iron	482	ug/L	Iron	468	ug/L	Iron	685	ug/L
	Lead	<3.3	ug/L	Lead	<3.3	ug/L	Lead	<3.3	ug/L
	Magnesium	119000	ug/L	Magnesium	122000	ug/L	Magnesium	144000	ug/L
	Manganese	320	ug/L	Manganese	319	ug/L	Manganese	162	ug/L
	Mercury	<0.066	ug/L	Mercury	<0.066	ug/L	Mercury	<0.066	ug/L
	Nickel	71.3	ug/L	Nickel	1.51	ug/L	Nickel	<1.5	ug/L
	Potassium	7430	ug/L	Potassium	7690	ug/L	Potassium	5650	ug/L
	Selenium	7.7	ug/L	Selenium	37.7	ug/L	Selenium	43.8	ug/L
	Silver	<1.0	ug/L	Silver	<1.0	ug/L	Silver	<1.0	ug/L
	Sodium	135000	ug/L	Sodium	140000	ug/L	Sodium	188000	ug/L
	Thallium	<5.0	ug/L	Thallium	<5.0	ug/L	Thallium	8.9	ug/L
	Vanadium	<1.0	ug/L	Vanadium	<1.0	ug/L	Vanadium	<1.0	ug/L
	Zinc	338	ug/L	Zinc	355	ug/L	Zinc	839	ug/L
Radionuclide's	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	ALPHA	<5.0	pCi/L	ALPHA	5.80	pCi/L	ALPHA	<5.0	pCi/L
	BETA	6.58	pCi/L	BETA	6.02	pCi/L	BETA	<5.0	pCi/L
	Pct Uranium-235	0.00	percent	Pct Uranium-235	0.00	percent	Pct Uranium-235	0.00	percent
	Radium-226	0.880	pCi/L	Radium-226	0.540	pCi/L	Radium-226	1.18	pCi/L
	Radium-228	3.41	pCi/L	Radium-228	3.71	pCi/L	Radium-228	3.34	pCi/L
	Thorium-228	<1.0	pCi/L	Thorium-228	<1.0	pCi/L	Thorium-228	<1.0	pCi/L
	Thorium-230	<1.0	pCi/L	Thorium-230	<1.0	pCi/L	Thorium-230	<1.0	pCi/L
	Thorium-232	<1.0	pCi/L	Thorium-232	<1.0	pCi/L	Thorium-232	<1.0	pCi/L
	Uranium-233/234	1.16	pCi/L	Uranium-233/234	1.73	pCi/L	Uranium-233/234	<1.0	pCi/L
	Uranium-235/236	<1.0	pCi/L	Uranium-235/236	<1.0	pCi/L	Uranium-235/236	<1.0	pCi/L
	Uranium-238	1.20	pCi/L	Uranium-238	<1.0	pCi/L	Uranium-238	<1.0	pCi/L

Table 1: NECR Water Well Sampling Data

TDD:09-10-08-0005 PAN:002693.2104.01RA

	14T-586			14T-586100 (duplicate)			15T-303		
Anions	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	Chloride	14.0	mg/L	Chloride	14.1	mg/L	Chloride	10.5	mg/L
	Nitrate	0.267	mg/L	Nitrate	0.266	mg/L	Nitrate	<0.10	mg/L
	Nitrite	<0.10	mg/L	Nitrite	<0.10	mg/L	Nitrite	<0.10	mg/L
	Ortho-phosphate	<0.20	mg/L	Ortho-phosphate	<0.20	mg/L	Ortho-phosphate	<2.0	mg/L
	Sulfate	1380	mg/L	Sulfate	1310	mg/L	Sulfate	2000	mg/L
	Fluoride	1.19	mg/L	Fluoride	1.24	mg/L	Fluoride	1.52	mg/L
	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	$\delta D\ H_2O$	-80.8	%	$\delta D\ H_2O$	-81.2	%	$\delta D\ H_2O$	-73.1	%
	$\delta^{18}O\ H_2O$	-10.44	%	$\delta^{18}O\ H_2O$	-10.53	%	$\delta^{18}O\ H_2O$	-8.56	%

Table 1: NECR Water Well Sampling Data

TDD:09-10-08-0005 PAN:002693.2104.01RA

	16K-336			16K-340			MILLWELL		
		Result	Units		Result	Units		Result	Units
Water Quality	pH	7.4		pH	7.6		pH	7.4	
	Conductivity	0.15	S/m	Conductivity	0.19	S/m	Conductivity	0.36	S/m
	Turbidity	29.9	NTU	Turbidity	5.5	NTU	Turbidity	14.7	NTU
	Dissolved Oxygen	3.05	mg/L	Dissolved Oxygen	5.26	mg/L	Dissolved Oxygen	6.39	mg/L
	Temperature	15.5	°C	Temperature	16.8	°C	Temperature	15.2	°C
	Salinity	0.1	%	Salinity	0.1	%	Salinity	0.2	%
	Total Dissolved Solids	1	g/L	Total Dissolved Solids	1.2	g/L	Total Dissolved Solids	2.3	g/L
	Oxidation Reduction Potential	86	mV	Oxidation Reduction Potential	76	mV	Oxidation Reduction Potential	-127	mV
Metals	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	Aluminum	229	ug/L	Aluminum	126	ug/L	Aluminum	<68	ug/L
	Antimony	<3.0	ug/L	Antimony	<3.0	ug/L	Antimony	<3.0	ug/L
	Arsenic	11	ug/L	Arsenic	8.53	ug/L	Arsenic	<5.0	ug/L
	Barium	450	ug/L	Barium	140	ug/L	Barium	1.64	ug/L
	Beryllium	<1.0	ug/L	Beryllium	<1.0	ug/L	Beryllium	<1.0	ug/L
	Bromide	0.234	ug/L	Bromide	0.295	ug/L	Bromide	0.361	ug/L
	Cadmium	<1.0	ug/L	Cadmium	<1.0	ug/L	Cadmium	<1.0	ug/L
	Calcium	76800	ug/L	Calcium	99800	ug/L	Calcium	2420	ug/L
	Chromium	<1.0	ug/L	Chromium	1.03	ug/L	Chromium	1.43	ug/L
	Cobalt	<1.0	ug/L	Cobalt	<1.0	ug/L	Cobalt	<1.0	ug/L
	Copper	29.7	ug/L	Copper	<3.0	ug/L	Copper	20.4	ug/L
	Iron	2720	ug/L	Iron	181	ug/L	Iron	9870	ug/L
	Lead	3.58	ug/L	Lead	<3.3	ug/L	Lead	3.74	ug/L
	Magnesium	20600	ug/L	Magnesium	43500	ug/L	Magnesium	470	ug/L
	Manganese	95.9	ug/L	Manganese	122	ug/L	Manganese	51	ug/L
	Mercury	<0.066	ug/L	Mercury	<0.066	ug/L	Mercury	<0.066	ug/L
	Nickel	<1.5	ug/L	Nickel	<1.5	ug/L	Nickel	2.38	ug/L
	Potassium	2540	ug/L	Potassium	3940	ug/L	Potassium	3200	ug/L
	Selenium	10.2	ug/L	Selenium	<5.0	ug/L	Selenium	26.7	ug/L
	Silver	<1.0	ug/L	Silver	<1.0	ug/L	Silver	<1.0	ug/L
	Sodium	202000	ug/L	Sodium	233000	ug/L	Sodium	694000	ug/L
	Thallium	<5.0	ug/L	Thallium	<5.0	ug/L	Thallium	6.45	ug/L
	Vanadium	<1.0	ug/L	Vanadium	<1.0	ug/L	Vanadium	<1.0	ug/L
	Zinc	153	ug/L	Zinc	148	ug/L	Zinc	659	ug/L
Radionuclide's	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	ALPHA	<5.0	pCi/L	ALPHA	5.46	pCi/L	ALPHA	9.79	pCi/L
	BETA	4.99	pCi/L	BETA	<5.0	pCi/L	BETA	<5.0	pCi/L
	Pct Uranium-235	0.00	percent	Pct Uranium-235	0.00	percent	Pct Uranium-235	0.00	percent
	Radium-226	1.20	pCi/L	Radium-226	0.464	pCi/L	Radium-226	0.639	pCi/L
	Radium-228	4.58	pCi/L	Radium-228	<1.0	pCi/L	Radium-228	<1.0	pCi/L
	Thorium-228	<1.0	pCi/L	Thorium-228	<1.0	pCi/L	Thorium-228	<1.0	pCi/L
	Thorium-230	<1.0	pCi/L	Thorium-230	<1.0	pCi/L	Thorium-230	<1.0	pCi/L
	Thorium-232	<1.0	pCi/L	Thorium-232	<1.0	pCi/L	Thorium-232	<1.0	pCi/L
	Uranium-233/234	<1.0	pCi/L	Uranium-233/234	0.297	pCi/L	Uranium-233/234	2.61	pCi/L
	Uranium-235/236	<1.0	pCi/L	Uranium-235/236	<1.0	pCi/L	Uranium-235/236	<1.0	pCi/L
	Uranium-238	<1.0	pCi/L	Uranium-238	1.40	pCi/L	Uranium-238	2.82	pCi/L

Table 1: NECR Water Well Sampling Data

TDD:09-10-08-0005 PAN:002693.2104.01RA

	16K-336			16K-340			MILLWELL		
Anions	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	Chloride	18.8	mg/L	Chloride	22.1	mg/L	Chloride	154	mg/L
	Nitrate	2.89	mg/L	Nitrate	5.97	mg/L	Nitrate	<0.10	mg/L
	Nitrite	<0.10	mg/L	Nitrite	<0.10	mg/L	Nitrite	<0.10	mg/L
	Ortho-phosphate	0.291	mg/L	Ortho-phosphate	0.163	mg/L	Ortho-phosphate	2.00	mg/L
	Sulfate	118	mg/L	Sulfate	368	mg/L	Sulfate	1460	mg/L
	Fluoride	0.861	mg/L	Fluoride	0.483	mg/L	Fluoride	1.73	mg/L
	Analyte	Result	Units	Analyte	Result	Units	Analyte	Result	Units
	$\delta D\ H_2O$	-91.4	%	$\delta D\ H_2O$	-82.6	%	$\delta D\ H_2O$	-107.3	%
	$\delta^{18}O\ H_2O$	-12.04	%	$\delta^{18}O\ H_2O$	-11.01	%	$\delta^{18}O\ H_2O$	-14.14	%

ATTACHMENT C:
Photographic Documentation

PHOTOGRAPHIC LOG

NECR Water Well Sampling

Navajo Nation Reservation

002693.2103.01RA T02-09-10-08-0005

Date: 10/19/10

Description:

Well 15T-303

Date: 10/19/10

Description:

Well 15T-303

PHOTOGRAPHIC LOG

NECR Water Well Sampling

Navajo Nation Reservation

002693.2103.01RA T02-09-10-08-0005

Date: 10/19/10

Description:

Well 14T-586

Date: 10/19/10

Description:

Well 14T-586

PHOTOGRAPHIC LOG

NECR Water Well Sampling

Navajo Nation Reservation

002693.2103.01RA T02-09-10-08-0005

Date: 10/19/10

Description:

Mill Well

Date: 10/19/10

Description:

Mill Well

PHOTOGRAPHIC LOG

NECR Water Well Sampling

Navajo Nation Reservation

002693.2103.01RA T02-09-10-08-0005

Date: 10/19/10

Description:
Mine Well

Date: 10/19/10

Description:

Well NR#1

PHOTOGRAPHIC LOG

NECR Water Well Sampling

Navajo Nation Reservation

002693.2103.01RA T02-09-10-08-0005

Date: 10/19/10

Description:

16K-340

Date: 10/19/10

Description:

16K-340

PHOTOGRAPHIC LOG

NECR Water Well Sampling

Navajo Nation Reservation

002693.2103.01RA T02-09-10-08-0005

Date: 10/19/10

Description:

16K-336

Date: 10/19/10

Description:

16K-336

ATTACHMENT D:
Time Critical Quality Assurance and Sampling Plan

EPA Emergency Response Section (ERS) and Superfund Technical Assessment and Response Team (START)

Time-Critical Quality Assurance Sampling Plan For Radiation Assessment of Unregulated Drinking Water Sources

Response Location: Navajo Nation Water Well Sampling / NECR Water Well Sampling,
TDD#: T02-09-10-08-0004 / T02-09-10-08-0005

Date: October 8, 2010

Prepared by: Mike Folan _____ Date:

Reviewed by: Howard Edwards, Ecology and Environment, Inc. Date:

Andrew Bain, U.S. EPA Date:

Cynthia Wetmore, U.S. EPA Date:

Linda Reeves, U.S. EPA Date:

_____,NNEPA Date:

Approved by: Harry L. Allen, U.S. EPA _____ Date:

This sampling plan was prepared and delivered to the EPA Task Monitor:

☒ **Prior to Sampling** ☐ **Post Sampling (within one month of sampling)**

This emergency sampling plan is intended to be used in conjunction with the EPA's Region 9 Emergency Response Section's Generic Data Quality Objectives (DQOs) for Time-Critical Evaluations. This sampling plan has been designed to assist field responders in their preparation for collecting, analyzing, shipping, storing and handling samples collected during a time-critical response. The use of this generic sampling plan will involve forethought and planning that should help direct the sampling and analytical work. It is meant to be used in the case of emergency responses or time-critical responses when sampling teams may not have the opportunity to write a more thorough sampling plan. Sampling teams should always reference standard quality procedures, standard operations procedures, standard methods for sampling and analytical guidance.

The development of this generic plan will improve the documentation, communication, planning, and overall quality associated with the sampling and analysis by:

1) encouraging field teams to consider their goals and objectives before the generation of environmental data,
2) documenting predetermined information in a standardize format,
3) increasing the communication between sampling personnel and decision makers, and
4) detailing expectations and objective before samples are collected.

1.0 Introduction and Background. ***Describe the site and specify the geographic boundaries for the site and any specific areas of concern****. What is the problem, what precipitated the response, which agencies and other entities (e.g., contractors) are on site, who has taken the lead for the response and for environmental clean-up actions?*

Many households on the Navajo Reservation obtain their water from wells that were drilled or dug without previously obtaining permits and that do not conform to ordinary practices for well completion. The wells are often used for a combination of residential, domestic or agricultural purposes. Some households use surface water sources, rather than groundwater, that are also of poor quality. Nearly all of these water sources are used or consumed without treatment. USEPA Region 9 and the Navajo Nation EPA need to obtain good information about contaminants, in particular radioactive contaminants, in these water sources, using the National Primary Drinking Water Regulations (NPDWR) Maximum Contaminant Levels (MCLs) For Drinking Water that are listed in 40CFR141 Subpart G, and most notably in 40CFR141.66, as benchmarks for water quality.

The USEPA has agreed to conduct well sampling as a one-time event. Sampling will be performed under two separate projects: (1) Navajo Nation Well Sampling and (2) Northeast Church Rock Water Well Sampling. Where a determination is made that a significant imminent threat exists, the data will be evaluated to identify sources that exceed federal primary and secondary maximum contaminant levels to determine next steps. The information will be given to those responsible for the operation of the water sources and residents using the sources on a case-by-case basis, as deemed appropriate by the Navajo Nation EPA. The USEPA will be responsible for the analysis of metals, radioactive parameters and additional water parameters.

One area of focus in the October 2010 sampling event will be approximately 10 wells within the Eastern Agency that were sampled in 2008 but require confirmation samples for data validation. This will be referred to as the Navajo Nation Well Sampling project.

The Centers of Disease Control (CDC) and USEPA sampled a total of 199 water sources during 2006/2007 and 2008 respectively, from non-municipal water sources within the Navajo Nation. A significant portion of the water sources were found to contain metals and/or radioactive parameter analytes which exceeded site-specific action levels determined by the USEPA including 22 water sources which exceeded primary drinking water standards for radionuclide's.

The other area of focus in the October 2010 sampling event will be approximately 7 wells in the vicinity of the Northeast Church Rock Mine near Gallup, NM. This project will look at the impact of Northeast Church Rock Mine on residential wells in that specific area. This project will be referred to as the Northeast Church Rock Water Well Sampling project.

The START and a commercial laboratory will assist with this investigation. The USEPA's States, Tribes, and Site Assessment Section is the lead USEPA section for the assessment. After the assessment data is collected, the EPA's Emergency Response Section will evaluate the data to determine whether there is an imminent and substantial threat to human health which could prompt further actions by the EPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority.

Ref: United States Army Corps of Engineers, IAG No. DW96955370-01-0, Data Quality Assurance Summary, Section 2, Field Operation Summary, Revision 3, December 2000

2.0 Objectives. *Brief statement on the general project objective. What is the overall goal or objective? Specific objectives are summarized in Table D in Section 3.5.*

The primary objective of this assessment is to verify previous analytical data and determine whether unregulated drinking water sources are contaminated above MCLs for the analytes investigated.

2.1 Data Use Objectives. (How will the data be used?)

Radiation Monitoring Data
Data from direct-reading instruments will be used:

1) ☐ To be compared with established background radiation data.
2) ☐ To compare with site-specific action levels or risk-based action levels to determine if acute or chronic health threats exist.
3) ☐ To assist with determining the area of impact due to a release.
4) ☐ To assist with determining whether radioactive materials have contaminated specific areas or movable objects.
5) ☐ To assist in the identification of the potential source of radiation.
6) ☐ Other objectives:

Data from Collected Sample
Analytical data for soil, water, air or other media samples, if generated, will be used:

7) ☒ To be compared with site-specific action levels or risk-based action levels (e.g., EPA MCLs) to assist in determination if health threats exist.
8) ☒ Other objectives: Provide Navajo agencies and public with information regarding quality of unregulated water sources that residents, against the advice of Navajo Nation EPA, use for potable water.

2.2 Objectives. (What are you proposing to do?)

Radiation Measurement
1) ☐ Measurement to establish the presence or absence of radiation above site-specific action levels or risk-based action levels in the area of concern. (Initial assessment and post removal confirmation).
- ☐ Airborne
  - ☐ Static
    - ☐ Activity
    - ☐ Dose Rate
    - ☐ Dose
  - ☐ Scanning
    - ☐ Activity
    - ☐ Dose Rate
- ☐ Surface
  - ☐ Static
    - ☐ Activity
    - ☐ Dose Rate
    - ☐ Dose
  - ☐ Scanning
    - ☐ Activity
    - ☐ Dose Rate

2) ☐ Measurement to determine the location of contamination within the area of concern.
- ☐ Airborne (area)
- ☐ Surface

3) ☐ Activity screening to establish control points (exclusion, decontamination and support zones).
- ☐ Airborne
  - ☐ Static
  - ☐ Scanning
- ☐ Surface
  - ☐ Static
  - ☐ Scanning

4) ☐ Activity screening to determine type of radiation.
- ☐ Airborne
  - ☐ Static
  - ☐ Scanning
- ☐ Surface
  - ☐ Static
  - ☐ Scanning

5) ☐ Other:

Sample Screening

6) ☐ Activity screening of samples for evaluation prior to definitive analysis.

7) ☐ Other:

Sampling

8) ☐ Surface soil sampling to estimate the lateral extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

9) ☐ Subsurface soil sampling to estimate the vertical extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

10) ☐ Air sampling to estimate airborne extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

11) ☐ Wipe sampling to estimate removable extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site

☐ Off-site

12) ☐ Groundwater sampling to estimate extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

13) ☐ Surface water sampling to estimate extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

14) ☐ In-situ surface sampling to estimate extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

15) ☐ In-situ airborne sampling to estimate extent of contamination
- ☐ Over specific source area(s) or areas of concern
- ☐ Over the entire site
- ☐ Off-site

16) ☐ Other:

2.3 Matrices

☐ Airborne (area) Monitoring
☐ In-situ measurement
- □ Surface soil
- □ Subsurface soil
- □ Other (specify): floor, wall, and ceiling surface dose rate, area dose rate, and floor activity

☐ Surface soil
☐ Sub-surface soil
Depth(s):
☐ Wipe (removable contamination)
☐ Radon-222
☐ Particulates in air
☒ Water
- ⊠ Surface water
- ⊠ Groundwater
- ⊠ Tanks or other containers
- □ Wastewater

☐ Containerized waste
- □ Solid
- □ Liquid

☐ Other:

2.4 Data Type

In general, data type and data needs should be decided prior to data generation. The data can be generally divided into three categories: definitive methodology data (referred to as definitive data for brevity and generally generated using standardize methods), non-definitive methodology data (also referred to as screening data) and screening data with at least 10% definitive data confirmation (referred to as collaborative data). The generation of definitive data is preferable, however in emergency and time critical situations where definitive data is not available, non-definitive data should be generated. Note that the data type is not an indicator of precision, accuracy or documentation of completeness or quality! Reported data should be verified (by a party other than the laboratory) as meeting specific quality control and data category requirements by following a verification or validation procedure. Refer to the START or ERS Quality Assurance Plans for specific quality parameters and requirements.

Check appropriate box(es):

For radiation monitoring data generated during the assessment and removal,

☐ Time-Critical Screening Quality Data will be generated The data by itself may not be verifiable. The data will be reported for evaluation to make a decisions.

For sampling data generated during the assessment and removal,

1 ☐ **Time-Critical Screening Quality Data** will be generated. The data by itself may not be verifiable. **Due to the time critical situation, the data must be reported and may be used to make decisions.**

2a ☐ **Time-Critical Collaborative Data** will be generated (screening data with at least 10 percent definitive data). Data using non-definitive analytical methodologies will be generated. **Due to the time critical situation, the data must be reported and may be used to make decisions prior to generation of definitive data.** The screening data by itself may not be verifiable. Screening data will be evaluated and reported with definitive data at a later time.

2b ☐ **Collaborative Data Sets** will be generated (screening data with 10 percent definitive data). Data using non-definitive analytical methodologies will be generated. **Data will not be reported until it is evaluated against definitive data.**

3a ☐ Time-Critical Definitive Data Sets will be generated without validation. The sampling and analysis must be done on an emergency basis. **Due to the time critical situation, the preliminarily data must be reported and used for comparison without validation. Analytical data packages will be required**. **However, since the data was not used or intended for decision making, validation of the data package will not be performed.** (Document generic DQO deviation in Section 4.4)

3b ☐ **Time-Critical Definitive Data Sets** will be generated with validation. The sampling must be done on an emergency basis. **Due to the time critical situation, preliminary data must be reported and may be used to make decisions without validation. The generated analytical documentation packages will be reviewed and validated. Qualified data will be reported after validation.**

3c ☒ **Definitive Data Sets** will be generated with third-party validation. **Full documentation will be required. Analytical data packages will be reviewed and validated prior to reporting.**

2.5 Contaminants of Concern

The radiation parameters of concern, proposed analytical method or Field Operating Procedure (FOP), proposed action levels and available reporting limit are summarized in Table A-1. Metals of concern are summarized in Table A-2. If other analytes of concern exist, they should be addressed in a separate QASP.

Table A-1 Radiation of Concern			
Radiation Type (check all that apply)	**Proposed Monitoring Method**	**Proposed Action Level**	**Available Reporting Limit**
☐ Alpha Particles			
☐ Beta Particles			
☐ Gamma Rays			
☐ Neutrons			
☐ Radionuclide Identification	Gamma Spectroscopy	Qualitative	Qualitative
Radionuclides of Concern			
Radionuclide (list all of concern)	**Proposed Analytical Method**	**Proposed Action Level**	**Available Reporting Limit**
☒ Gross alpha	EPA Method 900 or equivalent	15 pCi/L(1)	1.0 pCi/L
☒ Gross beta and photon radioactivity	EPA Method 900 or equivalent	1.0 pCi/L(2)	1.0 pCi/L
☒ Radium-226	EPA Method 903.1 or equivalent	5 pCi/L(3)	1.0 pCi/L
☒ Radium-228	EPA Method 904.0 or equivalent	5 pCi/L(3)	1.0 pCi/L
☒ Isotopic Uranium (233/234, 235/236, 238)	HASL 300 U-01-RC mod	1.0 pCi/L(4)	1.0 pCi/L

☒ Isotopic Thorium (228, 230, 232)	HASL 300 Th-01-RC mod	1.0 pCi/L	1.0 pCi/L
Other Data Collection Activity (non-radiological) *(circle all that apply)*	GPS Visual Interviews Magnetometer Other Geophysical Modeling File Search Water quality parameters [5] (pH, temperature, conductivity, DO, salinity, TDS, Turbidity, ORP) Photograph of water source		

Add additional pages if necessary.

Key:

(1) Includes radium-226 but excludes uranium and radon.

(2) The MCLG is listed at zero. In this specific case 1.0 pCi/L is the lowest available reporting limit. The MCL is stated as 4 mrem/yr for man-made radionuclides; the annual dose equivalent to the total body or any internal organ is 4 mrem/yr.

(3) Action level of 5 pCi/L is for combined radium-226 and radium-228.

(4) Method will measure specific Uranium isotope activity rates. Total Uranium MCL is 30 ug/L.

(5) Water quality parameters will be measured real time with an appropriate water quality instrument that reads all listed parameters.

Table A-2
Metals of Concern

Metal (check all that apply)	Proposed Monitoring Method	Proposed Action Level	Available Reporting Limit
☒ Target Analyte List Metals	EPA 6010 B	See Table J	See Table J
Other Data Collection Activity (non-radiological) *(circle all that apply)*	GPS Visual Interviews Magnetometer Other Geophysical Modeling Photography File Search		

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3.0 Approach and Sampling Methodologies

3.1 Sampling Approach

Monitoring approach that is to be used with monitoring instruments (select approach):

1) ☐ Due to the lack of site information the approach will be determined in the field based on professional judgment of START.

2) ☐ Due to the lack of site information the approach will be determined in the field based on professional judgment of USEPA.

3) ☐ Due to the lack of site information the approach will be determined in the field based on professional judgment of local regulator.

4) ☐ Judgmental (Biased)

5) ☐ Random

6) ☐ Systematic- Non Search

7) ☐ Transects

8) ☐ Search-Grid (Systematic planning using tools like Visual Sample Plan or DQO-PRO)

If a search-grid, specify grid type (circle one): Not Applicable Square Triangle Rectangle

Size of contamination hot-spot to be detected:

Shape of hot-spot (circle one): Circle Elliptical Elongated-Elliptical

Required Grid Spacing:

Acceptable probability of missing hot-spot (circle one): 5 % 10 % 20% 40%

9 ☐ MARSSIM Final Status Survey (Documented in an attached document)

Sampling approach that is to be used to select samples (select approach):

1 ☐ High biased with radiation sampling instruments

2 ☐ Low biased with radiation sampling instruments

3 ☐ Random

4 ☐ Systematic-- Non Search

5 ☐ Transects

6 ☐ Search-Grid

7 ☒ Judgmental (Biased): Wells will be sampled for the NECR well project based on the vicinity to the NECR mine. Wells will be sampled for the Navajo Nation well project based data gaps from the previous investigations. Wells for both projects have been selected due to their use as community drinking water sources.

If a search-grid, specify grid type (circle one): Not applicable Square Triangle Rectangle

Indicate the size of contamination hot-spot to be detected:

Indicate the shape of hot-spot (circle one): Circle Elliptical Elongated-Elliptica

Indicate the required Grid Spacing:

Indicate the acceptable probability of missing hot-spot (circle one):

5 % 10 % 20% 40%

7 ☐ MARSSIM Final Status Survey (Documented in an attached document)

3.2 Field Analysis Equipment

Field analysis equipment requirements are summarized in Table B-1 .

Table B-1
Field Analytical Equipment

Monitoring Equipment Specify the radiation monitoring instrument to be used. Select the appropriate boxes.	**Meter range**	**Probe**	**Amount**	**Resource/Contractor**
☐ Ludlum Model 19 Micro R Meter, (Gamma)	0-5000 µR/hour	Integrated with Meter		
☐ Ludlum Model 3-97 (Gamma)	0-3000 µR/hour	Integrated with Meter		
☐ Ludlum Model 44-38 Beta and Gamma	0-3000 µR/hour 0-200 µR/hour	Integrated with Meter. ☐ External gamma/beta energy compensating Geiger-Mueller		
☐ Ludlum Model 2241-2 Ratemeter	0.0 cpm- 999 kcpm or 0.1-999 µR/hour	☐ Pancake Probe Ludlum Model 44-9 ☐ Alpha Scintillatior Ludlum Model 43-90 ☐ Beta Scintillatior Ludlum Model 44-116 ☐ Gamma Ludlum Model 44-10 ☐ Gamma Ludlum Model 44-20		
☐ Ludlum Model 2221 Ratemeter/Scaler		☐ Alpha Scintillatior Ludlum Model 43-90 ☐ Beta Scintillatior Ludlum Model 44-116 ☐ Gamma Ludlum Model 44-10		
☐ Ludlum Model 192 Micro R Meter (Gamma)	0-5000 µR/hour	Integrated with Meter		
☐ Bicron Surveyor M Ratemeter	0 cpm- 1,000 kcpm	☐ Pancake Probe PGM ☐ Scintillatior G1		
☐ BNC SAM 935 Gamma Spectrometer	0.01-99 µR/hour	Spectrometer Integrated with Meter		
☐ Eberline RO20 Ion Chamber (Beta and Gamma)	0-50 R/hour	Integrated with Meter		
☐ Bicron Model 2221 Portable Scaler Ratemeter	50-5000k cpm	☐ Gamma Ludlum Model 44-10 ☐ Alpha Scintillator Ludlum Model 43-90 ☐ Beta Ludlum Model 44-116		
☐ SAIC Exploranium GR-130 mini-SPEC (gamma spectrometer	0- 65,535 cps 1 µR/hour-5mR/hour	Spectrometer Integrated with Meter		

☐ Canberra AN/UDR-14 Mini-Radiac Monitor (gamma dosimeter)		Integrated with dosimeter		
☐ Ludlum Model 15 (gamma, beta, neutrons)		☐ Neutrons Ludlum Model 42-9BF ☐ Gamma/beta Ludlum Model 44-7		
☐ Ludlum Model 3030 (alpha/beta counter)				
☐ Ludlum Model 78 Stretch Scope (gamma)				
☐ Ludlum Model 239-1F Floor Monitor (alpha and beta)				
☐ Other:				
☐ Other:				
☐ Other:				

Non Radiation Detection Analytical Equipment

Monitoring Equipment Specify the Non-radiation monitoring instrument to be used. Select the appropriate boxes.	**Make**	**Model**	**Amount**	**Resource/Contractor**
☐ X-Ray Fluorescence (XRF) Device [for metals]	Innov-X			
☐ X-Ray Fluorescence (XRF) Device [for metals]	☐ Metals			
☒ Other: Water quality meter	YSI	To be determined		U.S. EPA
☒ Other: Water level meter	Solinst	To be determined		U.S. EPA
☐ Other:				
☐ Other:				

Check Standard for Analytical Instruments

STANDARD	**Type**	**Model**	**Amount**	**Resource/Contractor**
☐ Metals	NIST	SRM 2709 SRM 2710 SRM 2711 Silicon Dioxide Blank		
☐ Metals	EPA QATS			

☐ Alpha radioisotope Check Source				
☐ Beta radioisotope Check Source				
☐ Gamma radioisotope Check Source	Cs-137			
☐ Other:				
☐ Other:				

3.3 Field Sampling Equipment

Field equipment requirements are summarized in Table B-2.

Table B-2
Field Sampling and Decontamination Equipment

Analyses and Matrix	Sampling Equipment	Dedicated or Reusable	Decontamination Solution	Resource/ Contractor
All	Pre-existing monitoring well pump	N/A	Not required	Not Applicable
All	Polypropylene bailer with filament line, or 500 ml-1 L polypropylene sampling container	Dedicated	Not required	START

3.4 Field Methods and Procedures

3.4.1 Sample/Measurement Locations.

Sample locations and location name are summarized in Attachment A. Seven wells will be sampled in the NECR mine region with one duplicate sample to be selected at random in the field depending on the ease of sample collection. Additionally, ten wells will be sampled at specific locations in the Eastern Agency of the Navajo Nation with one duplicate sample to be selected at random in the field depending on the ease of sample collection. Due to drought conditions, seasonal weather activity and/or access issues, some sources may not be able to be sampled.

Water sample access points are expected to be variable in type. Some may have pumps (wind-, electric-, or hand-powered), some may have taps (spigots), and some may need to be bailed. The preferred sampling method at each groundwater sampling location will be to collect the water in the same manner that the typical water source user obtains the water. Therefore, water sources will not be purged prior to sampling. When feasible, water temperature, pH, dissolved oxygen, conductivity, oxidation reduction potential, salinity, turbidity and total dissolved solids readings will be obtained at the sampling location. Due to the season and high elevations of some of the sampling locations, some water sampling locations may be iced over. If no liquid water component can be obtained (e.g., by breaking away covering ice), the sample cannot be collected.

Background Measurements

Background samples are not required since attribution is not within the scope of the assessment.

Groundwater Sampling

Groundwater samples will be collected in accordance with the EPA's Emergency Response Team (ERT) standard operating procedure (SOP) number 2007, Groundwater Well Sampling. If possible, the depth from the top of the well casing to the water level will be measured in accordance with ERT's SOP number 2043, Manual Water Level Measurements. These SOPs will be followed if appropriate and possible. Each location will be assessed to determine the most appropriate method to collect a representative sample. The method of sample collection will be documented in the field logbook.

Surface Water Sampling

Surface water samples will be collected in accordance with ERT's SOP number 2013, Surface Water Sampling. Each location will be assessed to determine the most appropriate method to collect a representative sample. The method of sample collection will be documented in the field logbook.

Container Sampling

Container samples will be collected in accordance with ERT's SOP number 2010, Tank Sampling. Each location will be assessed to determine the most appropriate method to collect a representative sample. The method of sample collection will be documented in the field logbook.

3.4.2 Sample Labeling and Documentation

Sample Jar Labels

Sample labels will clearly identify the particular sample and should include the following:

1. Site name
2. Time and date samples were taken
3. Sample preservation
4. Analysis requested
5. Sample location and/or identification number

Sample labels will be securely affixed to the sample container.

Chain of Custody Record

A chain of custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a secured container sealed with a custody seal.

The chain of custody record should include (at minimum) the following:

1. Sample identification number
2. Sample information
3. Sample location
4. Sample date and time
5. Names(s) and signature(s) of sampler(s)
6. Signature(s) of any individual(s) with control over samples

Custody Seals

Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the samples packaging, should be noted in the field book.

All sample documents will be completed legibly in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error. These include the logbooks, the chain of custody forms, this field QASP and any other tracking forms.

Field Logbook

The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. All entries will be dated and signed by the individuals making the entries and will include the following:

1. Site name and project number
2. Names of sampling personnel
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, especially sampling start and ending times. Include site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Identification and description of samples, sampling method, and locations
9. Conditions that may influence radiation measurements (objects, geometry, source material)
10. Subcontractor information and names of on-site personnel
11. Date and time of sample collections, along with chain of custody information
12. Record of photographs
13. Site sketches
14. Exact times of various activities and occurrences related to sampling
15. Deviations from standard procedures or methods and the rational for the deviations.

An electronic database will be generated for this projected that includes information listed above combined with validated data.

3.4.3 Sample Containers and Preservatives

Containers and preservatives are summarized in Table C.

3.5 Analytical Methods and Procedures

The analytical methods per sample and sample location are presented in Table D. General field QC considerations and requirements are presented in Table E.

Table C
Containers and Preservatives
Water Samples

Analyses	Laboratory	Container Type (per sample)	Preservation Method	Holding Time
Gross alpha/beta, EPA Method 900.0	GEL Laboratories	Three 1-liter HDPE (A total of 4 liters for MS/MSD sample)	pH<2.0 HNO_3 4 $\pm$ 2 degrees Celsius	180 days
Ra-226/228, EPA Method 903.1/904.0			pH<2.0 HNO_3 4 $\pm$ 2 degrees Celsius	180 days
TAL Metals EPA Method 9310	GEL Laboratories	One 500-ml HDPE (1000 ml for MS/MSD)	pH < 2.0 HNO_3 4 $\pm$ 2 degrees Celsius	180 days 14 days mercury
Nitrate/Nitrite, EPA 300.0 Ortho Phosphate EPA 300.0	GEL Laboratories	One 500-ml HDPE (No additional volume required for QC)	4 $\pm$ 2 degrees Celsius	48 hours
Chloride EPA 300.0 Fluoride EPA 300.0 Sulfate EPA 300.0			4 $\pm$ 2 degrees Celsius	28 days
Isotopic Thorium (238, 230, 232) (HASL 300 Th-01-RC-mod)	GEL Laboratories	One 1-Liter HDPE	pH < 2.0 HNO_3 4 $\pm$ 2 degrees Celsius	180 days
Isotopic Uranium (233/234, 235/236, 238) (HASL 300 U-02-RC mod)	GEL Laboratories	One 1-Liter HDPE	pH < 2.0 HNO_3 4 $\pm$ 2 degrees Celsius	180 days
2H/1H and 18O/16O analysis of water	Isotech Laboratories	One 125 ml HDPE	4 $\pm$ 2 degrees Celsius	180 days

Table D Sample Locations and Data Objective Summary					
Sampling Locations and Identifiers should correspond to location indicated on Figure A					
Sample Locations	**Sample Identifiers**	**Analytical Method Refer to Table A-1 and/or A-2**	**Data Use Objective(s) Refer to Section 2.1**	**Data Category Refer to Section 2.4**	**Samples & Matrix**
All	The following code will be used for identifiers: W-#####-# W = Well #####=well ID	All as indicated in Table A-1 and A-2	7	3c	Radio-nuclides, metal / water

3.6 Quality Assurance and Quality Control

QA/QC considerations and requirements for field use of radiation monitoring instruments are presented in Table E-1.

Table E-1
Quality Control Samples and Data Quality Indicator Goals

QC or QC Sample	Number/Frequency	Data Quality Indicator Goals & Evaluation Criteria	Site specific Comments
FIELD RADIATION MONITORING SPECIFIED QA/QC			
Battery Check	At least once per day	Battery must have sufficient charge (see operating manual for minimum voltage requirements for some meters). Check should be documented.	Not Applicable
Background Check	At least one set of measurements per day should be collected from an area believed to be unaffected by source contamination. Background may have to be determined off-site.	Background rates should be documented. Documented detections should be at least 2 times background.	Not Applicable
Field Duplicates or Replicates	Occasionally recheck a monitored area to determine if any variance is noted.	< 35 RPD%	Not Applicable
Reference Source Check	Check in morning or before first use, mid-day, and end of day for each day of use. If instrument is used on consecutive days then subsequent morning checks can be eliminated.	< 35 RPD%	Not Applicable
FIELD SAMPLE RADIATION MONITORING SPECIFIED QA/QC			
Battery Check	At least once per day	Battery must have sufficient charge. Check should be documented	Not Applicable
Background	At least one set of reading per day should be collected from an area believed to be unaffected by source contamination. Background may have to be determined off-site	Background rates should be documented. Documented detections should be at least 2 times background.	Not Applicable
Blank	Check a sample of standard that is documented to be non-detect every 20 samples.	Blank sample rates should be documented. Documented detections should be at background.	Not Applicable
Field Duplicates or Replicates	Recheck at every 10 samples.	< 35 RPD%	Not Applicable
Reference Source	At least one set of source reading per day should be documented.	< 35 RPD%	Not Applicable

[1] SDG = Sample Delivery Group (Maximum 20 samples)
[2] RPD = Relative Percent Difference
[3] %R = Percent Recovery

General field sampling and analytical QA/QC considerations and requirements are presented in Table E-2.

Table E-2
Quality Control Samples and Data Quality Indicator Goals

QC Sample	Number/Frequency	Data Quality Indicator Goals & Evaluation Criteria	*MANDATORY* Site specific Comments
FIELD SPECIFIED QA/QC			
Background or reference location sample Air: up-wind. Surface soil: up-slope. Surface water: upstream. Ground water: up-gradient.	At least one sample should be collected from an area believed to be unaffected by source contamination.	A contaminated sample should be at least two times background.	Not required
Field Blanks Required for water.	1 per SDG[1], per matrix, per method	A contaminated sample should be at least two times the blank.	Field blanks will be prepared for each SDG shipped to each laboratory. Field blanks will be prepared from store-bought distilled water.
Equipment Blanks Required only when the use of decontaminated non-dedicated equipment is involved.	1 per SDG, per matrix, per method	Source samples should be at least two times the blank.	Not required
Field Duplicates or Replicates Required as needed by sampling objectives. The procedure for collecting the duplicate samples can greatly affect the reproducibility.	1 per SDG, per matrix, per method	Water - 25% RPD[2] Soil - 35% RPD[2] Other - 35% RPD[2a]	10% duplicates
Performance Standards	1 per project, per matrix, per method (if required by project)	75 -125 %R[3]	Not required
SELECTED LABORATORY QA/AC			
Method Blank	1 per SDG, per matrix, per method	Standards and samples should be at least 3 times the blank.	Mandatory.
Matrix Spike	1 per SDG, per matrix, per method on field designated sample.	75 -125 %R	Designate sample on COC.
Matrix Spike Duplicate or Replicate	1 per SDG, per matrix, per method on field designated sample.	≤20 RPD for metals	Designate sample on COC.
Second Source Reference Standards	1 per SDG, per matrix, per method	75 -125 %R	If available.
Internal Standards	All samples	50 -200 %R	All GC/MS and some GC analyses only.
Laboratory Control Standards	1 per SDG, per matrix, per method	75 - 125 %R	Per method for organic analyses.

[1] SDG = Sample Delivery Group (Maximum 20 samples)
[2] RPD = Relative Percent Difference
[3] %R = Percent Recovery

4.0 Project Organization and Responsibilities

4.1 Schedule of Sampling Activities

Sampling activities are summarized in Table F.

Table F
Proposed Schedule of Work For Sampling Activities

Activity	Start Date	End Date
Collection of drinking water samples	October 2010	October 2010
Data validation	November 2010	November 2010
Draft Report	December 2010	December 2010
Final Report	January 2010	January 2010

Resultant data will be validated by a chemist experienced in data validation.

4.2 Project Laboratories

Laboratories used for this project are summarized in Table G.

Table G
Laboratories

Lab Name/ Location	Methods
Isotech Laboratories, Inc Steve Pelphrey 1308 Parkland Court Champaign, IL 61821 Office: 217-398-3490 Email: steve@isotechlabs.com	2H/1H and 18O/16O analysis of water
GEL Laboratories, Charleston, SC Ship to: Jake Crook Project Manager GEL Laboratories, LLC 2040 Savage Road Charleston, SC (USA) 29407 Direct: 843.769.7390 Main: 843.556.8171 Fax: 843.766.1178 E-mail: jhc@gel.com	EPA Methods 900.0, 903.1, and 904.0 EPA Methods 9310 HASL 300 U-02 RC mod HASL 300 Th-01 RC mod EPA Method 300

4.3 Project Personnel and Responsibilities

Personnel and responsibilities are summarized in Table H.

Table H Sample Team(s) Personnel	
Personnel (Agency)	**Responsibility**
Harry Allen, EPA ERS	Task Monitor
Mike Folan, START	Project Manager
Howard Edwards, START	Quality Assurance Officer
Craig Tiballi, START	Field Monitoring and Sampling
NNEPA and/or DiNEH	Sampling Team (TBD)

4.4 Modification or Additions to the Generic Data Quality Objective for Emergency and Time Critical Sampling

Review the generic DQO to verify that the actual project objectives were similar to generic DQO. Project specific modification to the generic DQO statements for this are summarized in Table I. Also indicate which DQO step corresponds to the addition or modification.

Table I DQO Modifications and Additions	
Additions or Modifications to the Generic DQO Output Statements	**DQO Step**

Table J
Reporting Limits, Action Levels, and Quality Control Limits

Analysis	Analyte	Action Level (mg/L)	Quantitation Limit (µg/L)	Duplicate RPD	Matrix Spike	Matrix Spike RPD
Anions by 300.0	Fluoride	4	0.10	25	75-125	20
Anions by 300.0	Chloride	250	1.0	25	75-125	20
Anions by 300.0	Nitrite as N	1	0.10	25	75-125	20
Anions by 300.0	Nitrate as N	10	0.10	25	75-125	20
Anions by 300.0	o-Phosphate, as P	Not Available	1.0	25	75-125	20
Anions by 300.0	Sulfate	250 (s)	0.50	25	75-125	20
Metals by 6010B	Aluminum	0.1	100	25	75-125	20
Metals by 6010B	Antimony	0.1	100	25	75-125	20
Metals by 6010B	Arsenic	0.01	10	25	75-125	20
Metals by 6010B	Barium	2	20	25	75-125	20
Metals by 6010B	Beryllium	0.005	5	25	75-125	20
Metals by 6010B	Cadmium	0.01	10	25	75-125	20
Metals by 6010B	Calcium	Not Available	1000	25	75-125	20
Metals by 6010B	Chromium	0.10	10	25	75-125	20
Metals by 6010B	Cobalt	Not Available	20	25	75-125	20
Metals by 6010B	Copper	1.3 (s)	20	25	75-125	20
Metals by 6010B	Iron	Not Available	50	25	75-125	20
Metals by 6010B	Lead	0.015	5	25	75-125	20
Metals by 6010B	Magnesium	Not Available	600	25	75-125	20
Metals by 6010B	Manganese	0.05 (s)	15	25	75-125	20
Metals by 6010B	Mercury	0.002	0.5	25	75-125	20
Metals by 6010B	Nickel	Not Available	20	25	75-125	20
Metals by 6010B	Potassium	Not Available	5000	25	75-125	20
Metals by 6010B	Selenium	0.05	10	25	75-125	20
Metals by 6010B	Silver	0.10 (s)	10	25	75-125	20
Metals by 6010B	Thallium	0.002	10	25	75-125	20
Metals by 6010B	Vanadium	Not Available	20	25	75-125	20
Metals by 6010B	Zinc	5 (s)	10	25	75-125	20
Gross alpha by 900.0	alpha	See table A-1	1.0 piC/L	25	75-125	20
Gross beta by 900.0	beta	See table A-1	1.0 piC/L	25	75-125	20
903.1	Ra-226	See table A-1	1.0 piC/L	25	75-125	20
904.0	Ra-228	See table A-1	1.0 piC/L	25	75-125	20
Isotopic Th by HASL 300 Th-01-RCmod	Th-238, 230, 232	See table A-1	1.0 piC/L	25	75-125	20
Isotopic U by HASL 300 U-02-RC mod	U-233/234, U-235/236, U-238	See table A-1	1.0 piC/L	25	75-125	20

Key: RPD = relative percent difference; mg/L = milligrams per liter; µ/L = micrograms per Liter NA = Not Applicable

(s) = National Secondary Drinking Water Regulation not enforceable and not an action limit for this assessment

ATTACHMENT E:
Laboratory Analytical Results

Sample#	LabMatrix	Analysis	Analyte	Result	Units	LabQualifier	MDL	MDLUnits	QCType
14T-586	GROUND WATER	SW846 3005/6010B	Aluminum	220	ug/L		68.0	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Antimony	3.00	ug/L	U	3.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Arsenic	5.00	ug/L	U	5.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Barium	13.1	ug/L		1.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Beryllium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586	GROUND WATER	EPA 300.0	Bromide	0.200	mg/L	U	0.066	mg/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Cadmium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Calcium	270000	ug/L		50.0	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Chromium	13.9	ug/L		1.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Cobalt	1.13	ug/L	B	1.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Copper	3.00	ug/L	U	3.00	ug/L	TRG
14T-586	GROUND WATER	EPA 300.0	Fluoride	1.19	mg/L		0.330	mg/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Iron	482	ug/L		30.0	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Lead	3.30	ug/L	U	3.30	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Magnesium	119000	ug/L		85.0	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Manganese	320	ug/L		2.00	ug/L	TRG
14T-586	GROUND WATER	SW846 7470A	Mercury	0.066	ug/L	U	0.066	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Nickel	71.3	ug/L		1.50	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Potassium	7430	ug/L		50.0	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Selenium	7.7	ug/L	B*	5.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Silver	1.00	ug/L	U	1.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Sodium	135000	ug/L		100	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Thallium	5.00	ug/L	U	5.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Vanadium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586	GROUND WATER	SW846 3005/6010B	Zinc	338	ug/L		3.30	ug/L	TRG
14T-586	GROUND WATER	EPA 900.0/SW846 9310	ALPHA	2.62	pCi/L	U	4.97	pCi/L	TRG
14T-586	GROUND WATER	EPA 900.0/SW846 9310	BETA	6.58	pCi/L		4.17	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Pct Uranium-235	0.00	percent	U		percent	TRG
14T-586	GROUND WATER	EPA 903.1 Modified	Radium-226	0.880	pCi/L		0.527	pCi/L	TRG
14T-586	GROUND WATER	EPA 904.0/SW846 9320 Modified	Radium-228	3.41	pCi/L		2.90	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-228	-0.0147	pCi/L	U	0.601	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-230	-0.185	pCi/L	U	0.991	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-232	-0.133	pCi/L	U	1.15	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-233/234	1.16	pCi/L		0.540	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-235/236	0.114	pCi/L	U	0.341	pCi/L	TRG
14T-586	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-238	1.20	pCi/L		0.276	pCi/L	TRG
14T-586	GROUND WATER	EPA 300.0	Chloride	14.0	mg/L		0.066	mg/L	TRG

14T-586	GROUND WATER	EPA 300.0	Nitrate	0.267	mg/L		0.033	mg/L	TRG
14T-586	GROUND WATER	EPA 300.0	Nitrite	0.100	mg/L	U	0.033	mg/L	TRG
14T-586	GROUND WATER	EPA 300.0	Ortho-phosphate	0.200	mg/L	U	0.066	mg/L	TRG
14T-586	GROUND WATER	EPA 300.0	Sulfate	1380	mg/L		100	mg/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Aluminum	82	ug/L	B	68.0	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Antimony	7.34	ug/L	B	3.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Arsenic	5.00	ug/L	U	5.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Barium	13.4	ug/L		1.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Beryllium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Bromide	0.200	mg/L	U	0.066	mg/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Cadmium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Calcium	281000	ug/L		50.0	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Chromium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Cobalt	1.00	ug/L	U	1.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Copper	3.00	ug/L	U	3.00	ug/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Fluoride	1.24	mg/L		0.330	mg/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Iron	468	ug/L		30.0	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Lead	3.30	ug/L	U	3.30	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Magnesium	122000	ug/L		85.0	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Manganese	319	ug/L		2.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 7470A	Mercury	0.066	ug/L	U	0.066	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Nickel	1.51	ug/L	B	1.50	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Potassium	7690	ug/L		50.0	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Selenium	37.7	ug/L	*	5.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Silver	1.00	ug/L	U	1.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Sodium	140000	ug/L		100	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Thallium	5.00	ug/L	U	5.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Vanadium	1.00	ug/L	U	1.00	ug/L	TRG
14T-586100	GROUND WATER	SW846 3005/6010B	Zinc	355	ug/L		3.30	ug/L	TRG
14T-586100	GROUND WATER	EPA 900.0/SW846 9310	ALPHA	5.80	pCi/L		4.91	pCi/L	TRG
14T-586100	GROUND WATER	EPA 900.0/SW846 9310	BETA	6.02	pCi/L		3.64	pCi/L	TRG
14T-586100	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Pct Uranium-235	0.00	percent	U		percent	TRG
14T-586100	GROUND WATER	EPA 903.1 Modified	Radium-226	0.540	pCi/L		0.369	pCi/L	TRG
14T-586100	GROUND WATER	EPA 904.0/SW846 9320 Modified	Radium-228	3.71	pCi/L		2.50	pCi/L	TRG
14T-586100	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-228	0.155	pCi/L	U	1.19	pCi/L	TRG
14T-586100	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-230	0.818	pCi/L	U	1.18	pCi/L	TRG
14T-586100	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-232	-0.0195	pCi/L	U	0.703	pCi/L	TRG
14T-586100	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-233/234	1.73	pCi/L		0.741	pCi/L	TRG

14T-586100	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-235/236	0.0569	pCi/L	U	0.674	pCi/L	TRG
14T-586100	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-238	0.790	pCi/L		0.545	pCi/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Chloride	14.1	mg/L		0.066	mg/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Nitrate	0.266	mg/L		0.033	mg/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Nitrite	0.100	mg/L	U	0.033	mg/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Ortho-phosphate	0.200	mg/L	U	0.066	mg/L	TRG
14T-586100	GROUND WATER	EPA 300.0	Sulfate	1310	mg/L		100	mg/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Aluminum	68.0	ug/L	U	68.0	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Antimony	6.83	ug/L	B	3.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Arsenic	7.54	ug/L	B	5.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Barium	8.24	ug/L		1.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Beryllium	1.00	ug/L	U	1.00	ug/L	TRG
15T-303	GROUND WATER	EPA 300.0	Bromide	0.200	mg/L	U	0.066	mg/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Cadmium	1.17	ug/L	B	1.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Calcium	373000	ug/L		50.0	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Chromium	1.16	ug/L	B	1.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Cobalt	1.00	ug/L	U	1.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Copper	3.00	ug/L	U	3.00	ug/L	TRG
15T-303	GROUND WATER	EPA 300.0	Fluoride	1.52	mg/L		0.330	mg/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Iron	685	ug/L		30.0	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Lead	3.30	ug/L	U	3.30	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Magnesium	144000	ug/L		85.0	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Manganese	162	ug/L		2.00	ug/L	TRG
15T-303	GROUND WATER	SW846 7470A	Mercury	0.066	ug/L	U	0.066	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Nickel	1.50	ug/L	U	1.50	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Potassium	5650	ug/L		50.0	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Selenium	43.8	ug/L	*	5.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Silver	1.00	ug/L	U	1.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Sodium	188000	ug/L		100	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Thallium	8.9	ug/L	B	5.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Vanadium	1.00	ug/L	U	1.00	ug/L	TRG
15T-303	GROUND WATER	SW846 3005/6010B	Zinc	839	ug/L		3.30	ug/L	TRG
15T-303	GROUND WATER	EPA 900.0/SW846 9310	ALPHA	-0.526	pCi/L	U	4.86	pCi/L	TRG
15T-303	GROUND WATER	EPA 900.0/SW846 9310	BETA	2.62	pCi/L	U	3.75	pCi/L	TRG
15T-303	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Pct Uranium-235	0.00	percent	U		percent	TRG
15T-303	GROUND WATER	EPA 903.1 Modified	Radium-226	1.18	pCi/L		0.263	pCi/L	TRG
15T-303	GROUND WATER	EPA 904.0/SW846 9320 Modified	Radium-228	3.34	pCi/L		2.59	pCi/L	TRG
15T-303	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-228	-0.139	pCi/L	U	1.26	pCi/L	TRG

15T-303	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-230	-0.158	pCi/L	U	1.07	pCi/L	TRG
15T-303	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-232	-0.0195	pCi/L	U	0.639	pCi/L	TRG
15T-303	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-233/234	0.317	pCi/L	U	0.520	pCi/L	TRG
15T-303	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-235/236	0.219	pCi/L	U	0.328	pCi/L	TRG
15T-303	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-238	0.442	pCi/L	U	0.625	pCi/L	TRG
15T-303	GROUND WATER	EPA 300.0	Chloride	10.5	mg/L		0.066	mg/L	TRG
15T-303	GROUND WATER	EPA 300.0	Nitrate	0.100	mg/L	U	0.033	mg/L	TRG
15T-303	GROUND WATER	EPA 300.0	Nitrite	0.100	mg/L	U	0.033	mg/L	TRG
15T-303	GROUND WATER	EPA 300.0	Ortho-phosphate	2.00	mg/L	HU	0.660	mg/L	TRG
15T-303	GROUND WATER	EPA 300.0	Sulfate	2000	mg/L		100	mg/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Aluminum	229	ug/L		68.0	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Antimony	3.00	ug/L	U	3.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Arsenic	11	ug/L	B	5.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Barium	450	ug/L		1.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Beryllium	1.00	ug/L	U	1.00	ug/L	TRG
16K-336	GROUND WATER	EPA 300.0	Bromide	0.234	mg/L		0.066	mg/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Cadmium	1.00	ug/L	U	1.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Calcium	76800	ug/L		50.0	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Chromium	1.00	ug/L	U	1.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Cobalt	1.00	ug/L	U	1.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Copper	29.7	ug/L		3.00	ug/L	TRG
16K-336	GROUND WATER	EPA 300.0	Fluoride	0.861	mg/L		0.033	mg/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Iron	2720	ug/L		30.0	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Lead	3.58	ug/L	B	3.30	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Magnesium	20600	ug/L		85.0	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Manganese	95.9	ug/L		2.00	ug/L	TRG
16K-336	GROUND WATER	SW846 7470A	Mercury	0.066	ug/L	U	0.066	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Nickel	1.50	ug/L	U	1.50	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Potassium	2540	ug/L		50.0	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Selenium	10.2	ug/L	B*	5.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Silver	1.00	ug/L	U	1.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Sodium	202000	ug/L		100	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Thallium	5.00	ug/L	U	5.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Vanadium	1.00	ug/L	U	1.00	ug/L	TRG
16K-336	GROUND WATER	SW846 3005/6010B	Zinc	153	ug/L		3.30	ug/L	TRG
16K-336	GROUND WATER	EPA 900.0/SW846 9310	ALPHA	0.129	pCi/L	U	4.55	pCi/L	TRG
16K-336	GROUND WATER	EPA 900.0/SW846 9310	BETA	4.99	pCi/L		4.02	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Pct Uranium-235	0.00	percent	U		percent	TRG

16K-336	GROUND WATER	EPA 903.1 Modified	Radium-226	1.20	pCi/L		0.460	pCi/L	TRG
16K-336	GROUND WATER	EPA 904.0/SW846 9320 Modified	Radium-228	4.58	pCi/L		2.50	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-228	0.298	pCi/L	U	1.29	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-230	-0.524	pCi/L	U	0.653	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-232	-0.0195	pCi/L	U	0.651	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-233/234	-0.171	pCi/L	U	0.858	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-235/236	0.181	pCi/L	U	0.712	pCi/L	TRG
16K-336	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-238	0.392	pCi/L	U	0.693	pCi/L	TRG
16K-336	GROUND WATER	EPA 300.0	Chloride	18.8	mg/L		0.660	mg/L	TRG
16K-336	GROUND WATER	EPA 300.0	Nitrate	2.89	mg/L	H	0.330	mg/L	TRG
16K-336	GROUND WATER	EPA 300.0	Nitrite	0.100	mg/L	U	0.033	mg/L	TRG
16K-336	GROUND WATER	EPA 300.0	Ortho-phosphate	0.291	mg/L		0.066	mg/L	TRG
16K-336	GROUND WATER	EPA 300.0	Sulfate	118	mg/L		1.00	mg/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Aluminum	126	ug/L	B	68.0	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Antimony	3.00	ug/L	U	3.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Arsenic	8.53	ug/L	B	5.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Barium	140	ug/L		1.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Beryllium	1.00	ug/L	U	1.00	ug/L	TRG
16K-340	GROUND WATER	EPA 300.0	Bromide	0.295	mg/L		0.066	mg/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Cadmium	1.00	ug/L	U	1.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Calcium	99800	ug/L		50.0	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Chromium	1.03	ug/L	B	1.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Cobalt	1.00	ug/L	U	1.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Copper	3.00	ug/L	U	3.00	ug/L	TRG
16K-340	GROUND WATER	EPA 300.0	Fluoride	0.483	mg/L		0.033	mg/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Iron	181	ug/L		30.0	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Lead	3.30	ug/L	U	3.30	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Magnesium	43500	ug/L		85.0	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Manganese	122	ug/L		2.00	ug/L	TRG
16K-340	GROUND WATER	SW846 7470A	Mercury	0.066	ug/L	U	0.066	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Nickel	1.50	ug/L	U	1.50	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Potassium	3940	ug/L		50.0	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Selenium	5.00	ug/L	U*	5.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Silver	1.00	ug/L	U	1.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Sodium	233000	ug/L		100	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Thallium	5.00	ug/L	U	5.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Vanadium	1.00	ug/L	U	1.00	ug/L	TRG
16K-340	GROUND WATER	SW846 3005/6010B	Zinc	148	ug/L		3.30	ug/L	TRG

16K-340	GROUND WATER	EPA 900.0/SW846 9310	ALPHA	5.46	pCi/L		4.24	pCi/L	TRG
16K-340	GROUND WATER	EPA 900.0/SW846 9310	BETA	2.37	pCi/L	U	4.92	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Pct Uranium-235	0.00	percent	U		percent	TRG
16K-340	GROUND WATER	EPA 903.1 Modified	Radium-226	0.464	pCi/L		0.262	pCi/L	TRG
16K-340	GROUND WATER	EPA 904.0/SW846 9320 Modified	Radium-228	0.747	pCi/L	U	3.11	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-228	-0.0682	pCi/L	U	0.929	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-230	0.0264	pCi/L	U	0.550	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-232	-0.0722	pCi/L	U	0.915	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-233/234	0.297	pCi/L		0.280	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-235/236	0.115	pCi/L	U	0.346	pCi/L	TRG
16K-340	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-238	1.40	pCi/L		0.659	pCi/L	TRG
16K-340	GROUND WATER	EPA 300.0	Chloride	22.1	mg/L		0.660	mg/L	TRG
16K-340	GROUND WATER	EPA 300.0	Nitrate	5.97	mg/L	H	0.330	mg/L	TRG
16K-340	GROUND WATER	EPA 300.0	Nitrite	0.100	mg/L	U	0.033	mg/L	TRG
16K-340	GROUND WATER	EPA 300.0	Ortho-phosphate	0.163	mg/L	J	0.066	mg/L	TRG
16K-340	GROUND WATER	EPA 300.0	Sulfate	368	mg/L		1.00	mg/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Aluminum	68.0	ug/L	U	68.0	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Antimony	3.00	ug/L	U	3.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Arsenic	5.00	ug/L	U	5.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Barium	1.64	ug/L	B	1.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Beryllium	1.00	ug/L	U	1.00	ug/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Bromide	0.361	mg/L		0.066	mg/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Cadmium	1.00	ug/L	U	1.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Calcium	2420	ug/L		50.0	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Chromium	1.43	ug/L	B	1.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Cobalt	1.00	ug/L	U	1.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Copper	20.4	ug/L		3.00	ug/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Fluoride	1.73	mg/L		0.330	mg/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Iron	9870	ug/L		30.0	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Lead	3.74	ug/L	B	3.30	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Magnesium	470	ug/L		85.0	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Manganese	51	ug/L		2.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 7470A	Mercury	0.066	ug/L	U	0.066	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Nickel	2.38	ug/L	B	1.50	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Potassium	3200	ug/L		50.0	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Selenium	26.7	ug/L	B*	5.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Silver	1.00	ug/L	U	1.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Sodium	694000	ug/L		500	ug/L	TRG

MILLWELL	GROUND WATER	SW846 3005/6010B	Thallium	6.45	ug/L	B	5.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Vanadium	1.00	ug/L	U	1.00	ug/L	TRG
MILLWELL	GROUND WATER	SW846 3005/6010B	Zinc	659	ug/L		3.30	ug/L	TRG
MILLWELL	GROUND WATER	EPA 900.0/SW846 9310	ALPHA	9.79	pCi/L		5.39	pCi/L	TRG
MILLWELL	GROUND WATER	EPA 900.0/SW846 9310	BETA	2.72	pCi/L	U	5.25	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Pct Uranium-235	0.00	percent	U		percent	TRG
MILLWELL	GROUND WATER	EPA 903.1 Modified	Radium-226	0.639	pCi/L		0.517	pCi/L	TRG
MILLWELL	GROUND WATER	EPA 904.0/SW846 9320 Modified	Radium-228	1.77	pCi/L	U	2.95	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-228	0.139	pCi/L	U	1.08	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-230	0.480	pCi/L	U	1.07	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, Th-01-RC Modified	Thorium-232	-0.0195	pCi/L	U	0.637	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-233/234	2.61	pCi/L		0.552	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-235/236	0.174	pCi/L	U	0.683	pCi/L	TRG
MILLWELL	GROUND WATER	DOE EML HASL-300, U-02-RC Modified	Uranium-238	2.82	pCi/L		0.282	pCi/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Chloride	154	mg/L		0.660	mg/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Nitrate	0.100	mg/L	U	0.033	mg/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Nitrite	0.100	mg/L	U	0.033	mg/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Ortho-phosphate	2.00	mg/L	HU	0.660	mg/L	TRG
MILLWELL	GROUND WATER	EPA 300.0	Sulfate	1460	mg/L		100	mg/L	TRG

Notes:

B = Analyte found in the associated blank, as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

HU = Not Detected and the analyte in question was quantitated using peak heights rather than peak areas for both the analyte and its internal standard.

U = Not Detected

J = Estimated Value