NAVAJO NATION
DRINKING WATER SOURCE SAMPLING
FEBRUARY – MARCH, 2008
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INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) tasked Team 9's Superfund Technical Assessment and Response Team (START) to conduct water sampling at locations on the Navajo Nation specified by the Navajo Nation Environmental Protection Agency (NNEPA). The water sampling is a part of a wider effort being conducted by the U.S. EPA Region IX to investigate potential radioactivity related public health issues on the Navajo Nation.

The NNEPA supplied the U.S. EPA with a spreadsheet containing up to 98 potential water sources that could be sampled. Over a 2-week period, the U.S. EPA and START sampled all accessible water sources that were capable of producing water. Some water sources were inaccessible due to mud or snow, and some were frozen, and therefore could not be sampled. Some additional water sources not originally on the NNEPA spreadsheet were sampled at the request of a representative of the Southwest Research and Information Center (SRIC), who was an on-site representative and knowledgeable guide to water source locations and characteristics for western areas of the Navajo Nation.

Ultimately, START collected water samples from 48 non-municipal water sources, not including quality assurance samples. This report details the water sampling activities, and presents the sampling results.

SITE LOCATION AND DESCRIPTION

The Navajo Nation Radiation assessment investigated homesites located within the Navajo Nation Reservation near the Four Corners region of the United States. Homesites are located within four main areas: Teec Nos Pos, located in the northeastern corner of Arizona; Cane Valley, located in the northwestern corner of New Mexico; and Red Valley and Tuba City, both located in the northeastern portion of Arizona.

The Navajo Nation is situated on a geologic formation rich in radioactive ores including uranium. Beginning in the 1940s, widespread mining and milling of uranium ore for national defense and energy purposes on the Navajo Nation led to a legacy of abandoned uranium mines (AUMs). Some Navajo residents may have elevated health risks due to the dispersion of radiation and heavy metal contamination in soil and water (U.S. EPA).

PURPOSE AND NEED

Previous water quality studies by the U.S. EPA, the state of New Mexico, Scientific Laboratory

Division, and the United States Department of Energy have indicated that some of the water sources used by Navajo populace contain radioactive parameters at concentrations exceeding U.S. EPA guidelines. The sampling described in this report was conducted in order to confirm contamination of the water sources, and to determine whether additional, untested water sources contain radioactive parameters at concentrations exceeding U.S. EPA guidelines. Results of the sampling will be used by the U.S. EPA to determine the areal extent of the contamination, and to determine which of the water sources might require controls to limit their use.

ANALYTICAL PARAMETERS AND ACTION LEVELS

START prepared a *Time-Critical Quality Assurance Sampling Plan for Radiation Assessment of Unregulated Drinking Water Sources*, February 22, 2008 (QASP) prior to field sampling activities (Appendix A).

The analytical parameters investigated and their site-specific action levels are presented in Table 1.

In addition to the analytical parameters of Table 1, all samples were submitted to the Navajo Tribal Utility Authority Laboratory (NTUA) in Window Rock, Arizona for "wet chemistry" and nitrate/nitrate analyses. The complete analytical suite for the NTUA analyses is presented in Table 2. The analytes presented in Table 2 do not have site-specific action levels, and were investigated for informational purposes, only. The analytical suite investigated for the sampling event described in this report and presented in Tables 1 and 2 was determined by the U.S. EPA prior to field sampling activities.

Table 1
Analytical Parameters Investigated
Radiation Assessment of Navajo Nation Unregulated Water Sources

U.S. EPA Region IX Laboratory	Analytical Method	Action Level (µg/l)
Mercury	U.S. EPA 245.1	2
Boron	U.S. EPA 200.7	None
Calcium	"	None
Iron	"	300
Magnesium	"	None
Potassium	"	None
Sodium	"	None
Aluminum	U.S. EPA 200.8	50
Antimony	"	6
Arsenic	"	10
Barium	"	2000
Beryllium	"	4

Table 1
Analytical Parameters Investigated
Radiation Assessment of Navajo Nation Unregulated Water Sources

U.S. EPA Region IX Laboratory	Analytical Method	Action Level (µg/l)
Cadmium	"	5
Chromium	"	100
Cobalt	"	None
Copper	"	1300
Lead	"	15
Manganese	"	50
Molybdenum	"	None
Nickel	"	None
Selenium	"	50
Silver	"	10
Thallium	"	2
Uranium	"	30
Vanadium	"	None
zinc	"	500
Hardness (as $CaCO_3$)	(calculation)	None
GEL Laboratories, LLC		**Action Level**
Gross alpha activity	U.S. EPA 900.0	15 pCi/l
Gross beta activity	U.S. EPA 900.0	4 mrem/yr
Radium-226	U.S. EPA 903.1 (modified)	5 (total for both)
Radium-228	U.S. EPA 904.0 (modified)	

Notes:
µg/l – micrograms per liter
mrem/yr – millirems per year
pCi/l – picocuries per liter

Table 2
NTUA Analytical Parameters
Radiation Assessment of Navajo Nation Unregulated Water Sources

Analyte	Method
Nitrate/nitrite	U.S. EPA 300.0
Chloride	
Fluoride	
Sulfate	
Ortho Phosphate	
Alkalinity	SM 2320 B
Calcium	SM 3500-Ca D
Corrosivity	SM 2330 B
Total Hardness	SM 2340 C
Magnesium	SM 3500-Mg E
pH	SM 4500-H B
Potassium	SM 3111 B
Sodium	
Total Dissolved Solids	SM 2540 C
Turbidity	SM 2130 B

DEVIATIONS FROM THE QASP

The following deviations from the QASP were necessitated by conditions encountered in the field:

- Table B-1: YSI water quality meters were used initially, but were not very portable and provided suspect results even though calibrated daily. Therefore, two Myron L Ultrameter II instruments were rented to replace the YSI units. The YSI units were used from February 26-28, 2008. The Myron L units were used from February 29 through March 7, 2008, without any problems.

- Table B-2: Polypropylene hailers were never used, because no narrow, open-top well casings were encountered. At some locations, a bucket (well rinsed) tied to a rope was used to collect water samples from cisterns or tanks.

- Section 3.4.1, paragraph 1: By the date of field activities, the number of water sources tabulated by NNEPA had grown to 98.

- Section 3.4.1, Groundwater Sampling: Water level measurements from wells could not be obtained because the wells were typically closed. Water was most typically collected from a hand pump or spigot.

- Table C: Attempts were made to field-preserve metals-analysis sample containers with nitric acid per the analytical method. However, certain characteristics of the water (possibly pH and/or dissolved solids) meant that an inordinate amount of acid had to be used to achieve a pH of <2. Therefore, START discussed the issue with the U.S. EPA Region IX laboratory and the START Quality Assurance Manager. It was determined that the samples could remain unpreserved until receipt at the laboratory. Metals samples were only acidified in the field on the first day of field work: February 26, 2008.

- Table D, Sample Identifiers: Once in the field, it was found that most water sources had more than one characteristic (e.g., tank, hand pump, trough). Therefore, sample identification was changed to "DW-(well ID). The well ID used was a well identification number, if known. Otherwise, names or descriptions were used. Each well's associated equipment (e.g., tank, hand pump, trough, etc.) was noted in a field logbook.

FIELD ACTIVITIES

A planning meeting was held at the NNEPA offices in Window Rock, Arizona on February 25, 2008. Attendees included NNEPA, U.S. EPA, and START personnel, and Mr. Chris Shuey of SRIC (via telephone conference).

Field sampling activities were conducted from February 26 through March 7, 2008. Two sampling teams were generally used, with one team consisting of two START personnel, and the other team consisting of one U.S. EPA and one START personnel. NNEPA personnel or NNEPA-arranged local guides also joined each team for most of the water source locations, and the SRIC also provided valuable guide support for water sources located in New Mexico. Prior to sampling on the grounds of any particular Navajo Tribal chapter, NNEPA or SRIC personnel contacted and/or visited that particular Chapter House and obtained approval to conduct the sampling.

The sampling teams staged out of Gallup, New Mexico; Kayenta, Arizona; and Window Rock, Arizona, moving to new staging areas as water sources in one area were completed. Some water sources that were initially inaccessible due to muddy roads were successfully sampled at a later date.

At each water source sampled, at least one digital photograph was taken; geographic coordinates were obtained with a global positioning system (GPS); and information regarding water source structures (tanks, troughs, spigots, etc.) was entered in a field logbook.

Table 3 presents the NNEPA list of water sources, with additional information regarding the date visited; whether the source was sampled; and if not sampled, the reason the source was not sampled.

Also included in Table 3 are additional water sources that were visited and sampled (when possible) but were not on the original NNEPA list. These additional water sources were added at the request of the NNEPA and/or SRIC during the course of the field work.

Table 4 presents the validated analytical results for the metals and radiological parameter analyses. As of the date of this report, analytical data from the NTUA laboratory have not been made available to START. Table 5 presents the geographical coordinates of the water sources sampled, in latitude/longitude format. Figures 1 through 7 present the locations of the sampled water sources.

ANALYTICAL RESULTS

All analytical results were validated by a START chemist following *Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan Validation Procedures*, OSWER Directive 9360.4-1, April 1990. The START data validation reports are submitted under separate cover. The data were found to be acceptable as definitive category data, and determined to be viable for project use objectives. Validated data sheets for all samples are appended to this report in Appendix B.

Table 4 presents the analytical results for the metals and radioactive parameters analyses, along with their site-specific action levels, if any. In the case of the gross beta analytical parameter, analytical results are measured in picocuries per liter (pCi/l), while the action level is measured in millirems per year (mrem/yr). For the gross beta parameter, the U.S. EPA will determine whether the analytical results exceed the site-specific action level. In addition, the Table 4 gross alpha results are reported directly from the laboratory data sheets. However, the U.S. EPA will need to adjust the analytical results for gross alpha, to exclude the component of the concentration caused by uranium decay (per Title 40, Code of Federal Regulations, § 141.25).

Not including the gross alpha and beta analytical parameters for which the resultant data will be adjusted by the U.S. EPA, 34 water sources were found to exceed at least one site-specific action level. In most cases, the action levels were exceeded due to one or more metals concentrations. Aluminum, arsenic, copper, iron, lead, manganese, selenium, and uranium were found in the samples at concentrations exceeding site-specific action levels. Three water sources contained concentrations of radium 226 and/or radium 228 at concentrations that exceeded the site-specific action level of 5 pCi/l (total for both radium 226 and 228). In all three cases, the water source also exceeded site-specific action levels for other analytes.

The "wet chemistry" and nitrate/nitrite analytical results have not been made available to START as of the date of this report.

CONCLUSION

START and U.S. EPA collected water samples from 48 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 that exceeded site-specific action levels determined by the U.S. EPA. Based on the information gained, the U.S. EPA will determine appropriate means to limit public use of the drinking water sources.

Table 3
NNEPA List of Water Sources to be Sampled, and Additional Sources Added During Field Work
February 28-March 7, 2008

Sample ID	Tribal Well ID#	Well or Spring Name	General Location	Date Visited	Sampled?	Why Not Sampled or Visited	Comments
DW-8K-433	8Å-299		Kayenta, AZ	4-Mar-08	Yes		Number is wrong, should be 8K-433
DW-Baby Rock Springs	unknown	Baby Rock Spring 8-44	Kayenta, AZ	4-Mar-08	Yes		Several families use this well
DW-Monument Pass	unknown	Monument Pass Well	Monument Valley, AZ	4-Mar-08	Yes		Hand pump, no recent tire tracks
	unknown	Sheep Dip Spring	Bidahochi, AZ		No	NEPA determined that spring was dry.	
	17T-517		Steamboat, AZ	7-Mar-08	No	Unable to locate.	
	10T-533		Tselani, AZ	4-Mar-08	No	Windmill broken, water in tank stagnant.	
	unknown	White Clay Spring	Tselani, AZ	7-Mar-08	No	Roads impassable	
	unknown	Waterfall Spring	Tselani, AZ	7-Mar-08	No	Roads impassable	
	unknown	Tinyetoh Spring	Tselani, AZ	7-Mar-08	No	Roads impassable	
	unknown	Burro Spring	Tselani, AZ	7-Mar-08	No	Roads impassable	
	unknown	Benally Spring	Tselani, AZ	7-Mar-08	No	Roads impassable	
	none	Open Pit Mine #11	Cameron, AZ	5-Mar-08	No	Removed/destroyed.	
	none	Open Pit Mine #14	Cameron, AZ	5-Mar-08	No	Removed/destroyed.	
DW-Paddock	unknown	Paddock Well	Cameron, AZ	5-Mar-08	Yes		
	unknown	Sah Tah Spring	Four Corners	3-Mar-08	No	Unable to locate.	
	none	Area 1	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	none	Area 4	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	none	Area 2	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	unknown	Water Well 309	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
DW-Project 12-7-12	unknown	Ellison Wells	Four Corners	5-Mar-08	Yes		Residents in area have NTUA water available
	unknown	Alcove Canyon Springs	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	PHS 9-8-12	Slim Wagon Well	Four Corners	3-Mar-08	No	Unable to locate well.	
DW-9T-550	9T-550		Sweetwater, AZ	3-Mar-08	Yes		
	none	Pipe Mine	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	none	Cove Mesa 2	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	none	Camp Mine	Four Corners	5-Mar-08	No	Impassable due to snow/mud	
	unknown	West Thumb Rockwell	Four Corners	5-Mar-08	No	Dry	
	unknown	Cottonwood Spring	Cottonwood, AZ		No	Unable to locate.	
DW-10R-51B	10R-51	Unknown well with tank	Tselani, AZ	4-Mar-08	Yes		
DW-9K-216	9K-216	Immanuel Mission well	Sweetwater, AZ	3-Mar-08	Yes		

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Sample ID	Tribal Well ID#	Well or Spring Name	General Location	Date Visited	Sampled?	Why Not Sampled or Visited	Comments
DW-9T-586	9T-586		Sweetwater, AZ	3-Mar-08	Yes		
	unknown	PHS 4-28-39	Northern		No	Unable to locate well.	
	unknown	Five Mile Wash Spring	Western	6-Mar-08	No	Stagnant, no fresh water.	
	unknown	LeChee Spring	Western		No	Unable to locate.	
	unknown	Tse To Bash Naali Spring	Western	5-Mar-08	No	Dry	
DW-8T-522	00T-522	2 X Tsegi	Kayenta, AZ	3-Mar-08	Yes		
	none	Moonlight Mine (MVD-1)	Northern	4-Mar-08	No		
	none	Moonlight Mine (MVD-2)	Northern	4-Mar-08	No		
	none	Jack Daniels Mine (JDD-1)	Western	5-Mar-08	No	Same as Open pit mine #11 or #14	
	none	Clay Well Spring	Western	5-Mar-08	No	Dry, according to water resource who visited a week prior	
	unknown	AZ Inspection Station Well	Western	5-Mar-08	No	Station abandoned, no electricity for pump	
	Wells that historically exceeded the uranium MCL - Leupp Area						
DW-5M-74	5M-74	Box Springs	Blackfalls, AZ	29-Feb-08	Yes		Artesian spring; appears to be popular source
DW-3A-155	3A-155	Tohatchi Spring	Blackfalls, AZ	29-Feb-08	Yes		Hand pump, shallow, not a popular source, nearby resident said they do not drink because of high U
DW-Badger Spring	unknown	Badger Spring	Blackfalls, AZ	29-Feb-08	Yes		Hand pump, shallow, 3A-PHS-36, appears to be popular source
	Wells that historically exceeded the uranium and arsenic MCLs - Many Farms District						
	402-5	Tachee Windmill	Tachee, AZ	4-Mar-08	No	Dry	
DW-4T-518	4T-518	O & M monitoring station	Tachee, AZ	4-Mar-08	Yes		
DW-10T-241A	10T-241A		Many Farms, AZ	4-Mar-08	Yes		
	10K-251		Tselani, AZ	4-Mar-08	No	Well dry	
	Wells that historically exceeded the uranium MCL - Eastern Agency						
DW-14T-586	14T-586	Kerr-McGee Public well ; Friendship-I	Coyote Canyon, NM	7-Mar-08	Yes		
DW-14K-313	14K-313	Brown Bull	Coyote Canyon, NM	7-Mar-08	Yes		Many people have visited well
DW-15K-303	15K-303	Pipeline Canyon Well	Nahodishgish, NM	7-Mar-08	Yes		No evidence of recent visitation
DW-Annie Grey	District 16	Annie Grey HP	Pinedale, NM	1-Mar-08	Yes		Unlikely that people use, difficult to get to; shallow well in the Puerco River
	16-4-10	Lime Ridge/Pine Tree HP	Church Rock, NM	26-Mar-08	No	Tank dry, windmill not working	
	16K-340	Windmill Cluster	Church Rock, NM	26-Mar-08	No	Windmill not working, tank dry	
DW-16T-513	10T-513	Uphill Road Windmill	Pinedale, NM	28-Mar-08	Yes		Open top tank
	10T-535	Second Canyon Well	Pinedale, NM	28-Feb-08	No	Tank dry, windmill not working	"Livestock only"
	16T-606	King Ranch	Church Rock, NM	26-Feb-08	No	Abandoned	
	16T-534	Superman Canyon	Church Rock, NM	26-Feb-08	No	Tank dry, windmill not working	
DW-16T-510	16T-510	Nose Rock Well	Church Rock, NM	26-Feb-08	Yes		

Table 3
NNEPA List of Water Sources to be Sampled, and Additional Sources Added During Field Work
February 25-March 7, 2008

Sample ID	Tribal Well ID#	Well or Spring Name	General Location	Date Visited	Sampled?	Why Not Sampled or Visited	Comments
	District 16	Solar Street HP	Church Rock, NM	26-Feb-08	No	SRIC determined determined source not important; difficult to access	
DW-16T-608	16T-608	Rock Springs #1 / Yazzie Family	Church Rock, NM	26-Feb-08	Yes		Water collected from bottom of trough; unlikely that people use
DW-16T-589	16T-589	Prewitt Well/Baca Community Well	Baca, NM	27-Feb-08	Yes		Popular water source
DW-16B-38	16B-38	Paddy Martinez Well	Baca, NM	27-Feb-08	Yes		
DW-16T-521	16T-521	Platero Well	Baca, NM	27-Feb-08	Yes		
DW-16T-552	16T-552	Helen Martinez Well	Baca, NM	27-Feb-08	Yes		
DW-16-2-23	16-2-23	Upper Lodge Spring	Casamero Lake, NM	27-Feb-08	Yes		
DW-16K-528	16K-528	Chapter House Well	Mariano Lake, NM	26-Feb-08	Yes		
DW-16-3-4	16-3-4	Keith Beggy Well (16-4-17)	Casamero Lake, NM	1-Mar-08	Yes		
DW-16-6-7	16-6-7	Cleveland Well	Casamero Lake, NM	27-Feb-08	Yes		
DW-16T-317	16T-317	16K-317; Old Windmill	Baca, NM	27-Feb-08	Yes		
	15B-33	Johnson Craig Windmill	Crownpoint, NM		No	SRIC and team determined location was not a priority	
	District 15	Porter Well	Crownpoint, NM		No	SRIC and team determined location was not a priority	
DW-16T-519	16T-519	Largo Corral Well	Smith Lake, NM	27-Feb-08	Yes		
	District 15	To Adohn	Nahodishgish, NM		No	SRIC and team determined location was not a priority	
	15T-545	Dalton Pass Canyon Windmill	Nahodishgish, NM	27-Feb-08	No	Dry	
	District 14	Bethlehem Church	Rock Springs, NM	28-Feb-08	No	Dry	
	District 14	Unnamed Spring	Rock Springs, NM	28-Feb-08	No	Unable to locate.	
	District 14	Unnamed Spring	Rock Springs, NM	28-Feb-08	No	Unable to locate.	
	District 15	unnamed Windmill	Standing Rock, NM		No	Roads were likely impassable; remote site	
	15T-529		Nahodishgish, NM	28-Feb-08	No	Unable to locate.	
	District 16	Unnamed Spring	Mariano Lake, NM	28-Feb-08	No	Unable to locate.	
	District 16	Unnamed well	Manuelito, NM	28-Feb-08	No	Unable to locate well.	
	16T-319	Lobo Canyon Windmill	Pinedale, NM		No	SRIC and team determined location was not a priority	
	District 16	Unnamed well	Manuelito, NM	28-Feb-08	No	Attempted to visit 2 wells, both inaccessible	
	Public water supply wells currently regulated or wells requiring regulatory attention						
	none	Rehoboth Well #1	Church Rock, NM		No	No access	
	none	Rehoboth Well #2	Church Rock, NM		No	No access	
	none	UNC Mill Well	Pinedale, NM		No	No access	
	none	Northeast Church Rock Mine Well	Church Rock, NM		No	No access	
	16T-588	Casamero Lake	Casamero Lake, NM		No	Not operating, according to NEPA	

Table 3
NNEPA List of Water Sources to be Sampled, and Additional Sources Added During Field Work
February 28-March 7, 2008

Sample ID	Tribal Well ID#	Well or Spring Name	General Location	Date Visited	Sampled?	Why Not Sampled or Visited	Comments
	GRWD PM 2	Greasewood Well	Lower Greasewood (AZ)		No	Not operating, according to NEPA	
	16T-609	Window Rock Well #3	Window Rock, AZ		No	Not operating, according to NTUA	
DW-18K-301	18K-301	Window Rock Well #2	Window Rock, AZ	28-Feb-08	Yes		Results provided to NNEPA only. This well is not considered a part of this report.
	Cane Valley wells found in USEPA radiation survey of August 1975						
DW-Site 4 Cane Valley	unknown	Luke Yazzie Site #4, West Fork Rd	Cane Valley, AZ	4-Mar-08	Yes		NTUA water available
DW-Site 16 Cane Valley	unknown	Artesian Well, Site #16	Cane Valley, AZ	4-Mar-08	Yes		Continuously flowing artesian
DW-Site 15 Cane Valley	unknown	Bessie Yellowman, Site #15	Cane Valley, AZ	4-Mar-08	Yes		NTUA water available
DW-Site 6 Cane Valley	unknown	Don Wilson, Site #6	Cane Valley, AZ	4-Mar-08	Yes		NTUA water available
DW-Site 8 Cane Valley	unknown	Thomas Adekai, Site #8	Cane Valley, AZ	4-Mar-08	Yes		NTUA water available nearby
	Added wells as of 02/22/08						
	unknown	Lena Chee	Oljato, AZ	3-Mar-08	No	Spring was frozen.	New source, pipe from hillside
	Sources added during February 28 - March 7 sampling						
DW-Dry Spring		Hard Ground/Dry Spring	Tuba City, AZ	5-Mar-08	Yes		
DW-12T-520	12T-520	Shiprock Fairground artesian well	Shiprock, NM	5-Mar-08	Yes		3000 feet deep, water warm, artesian
DW-12R-125	12R-125	Sheep Dip Spring	Cove, AZ	5-Mar-08	Yes		Shallow spring with hand pump
DW-Cove Spring	12-16	Cove Spring	Cove, AZ	5-Mar-08	Yes		Shallow spring with hand pump
DW-Project-12-4-12	12-4-12	Hidden Spring	Cove, AZ	5-Mar-08	Yes		Shallow spring with hand pump
DW-16T-514	NN0000275	Pinedale Chapter House	Pinedale, NM	28-Feb-08	Yes		
DW-Echo Rock		Echo Rock	Thoreau (NM)	27-Feb-08	Yes		
DW-15-B-2	15-B-2		NM	27-Feb-08	Yes		
DW-15T-560	15T-560		NM	27-Feb-08	Yes		
DW-16T-334	16T334	Rock Springs	Rock Springs, NM	28-Feb-08	Yes		
DW-SM-Unknown	unknown	St. Michaels	St Michaels, AZ	28-Feb-08	Yes		Popular source
	BAPHS-16	Cane Valley	Cane Valley, AZ	4-Mar-08	No	Pump broken	
		Manuelito	Manuelito (NM)	28-Feb-08	No	Well inaccessible due to erosion	This well may or may not be one of the District 16 "Manuelito" wells listed above.
		Morgan Well	Pinedale, NM	7-Mar-08	No	Windmill, tank frozen w/ 3 cm thick ice	
		Lobo	Pinedale, NM	7-Mar-08	No	Inoperable	

Table 4
Navajo Nation Water Sampling
Validated Analytical Results
Samples Collected February 26 - March 7, 2008

	Site-Specific Action Level	DW-15B-2	DW-16-2-3	DW-15T-560	DW-16T-6-7	DW-SM-Unknown	DW-16T-334	DW-3A-155
Date Sampled		2/27/2008	2/27/2008	2/27/2008	2/27/2008	2/28/2008	2/28/2008	2/29/2008
Gross Alpha (pCi/L)	15*	5.27 ± 3.82	5.03 ± 3.17	<4.71	5.81 ± 3.60	<4.61	<4.59	**83.9 ± 10.1**
Gross Beta (pCi/L)	4 mrem/yr*	5.59 ± 2.35	<3.06	5.1 ± 2.37	8.77 ± 3.51	6.81 ± 2.96	<3.99	106 ± 6.33
Ra-226 (pCi/L)	5 (total for	0.996 ± 0.411	<0.759	<0.604	<0.633	3.89 ± 0.798	<0.530	3.08 ± 0.734
Ra-228 (pCi/L)	both)	<1.11	<0.938	2.54 ± 1.12	1.70 ± 1.06	<1.49	<1.68	<1.28
Mercury (ug/L)	2	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Boron (ug/L)	none	120	<100	<100	<100	51	110	480
Calcium (ug/L)	none	14000	54000	54000	29000	130000	1100	5200
Iron (ug/L)	300	**1100**	**420**	**820**	**910**	<100	**580**	**370**
Magnesium (ug/L)	none	6000	8300	22000	2400	22000	<500	2000
Potassium (ug/L)	none	2400	2600	2800	3400	2900	<2000	1100
Sodium (ug/L)	none	310000	10000	99000	2500	49000	230000	350000
Hardness (as $CaCO_3$) (mg/L)	none	60	170	220	82	420	2.8	21
Aluminum (ug/L)	50	<20	**250**	<20	**1500**	<20	<20	<20
Antimony (ug/L)	6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (ug/L)	10	<1.0	0.91	<1.0	0.88	1.8	0.52	**39**
Barium (ug/L)	2000	18	130	16	61	260	6.6	21
Beryllium (ug/L)	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (ug/L)	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium (ug/L)	100	1.0	0.53	<1.0	1.0	<1.0	<1.0	1.2
Cobalt (ug/L)	none	<0.50	<0.50	<0.50	0.25	0.26	<0.50	<0.50
Copper (ug/L)	1300	8.7	7.9	2.5	11	3.9	12	14
Lead (ug/L)	15	<2.0	<2.0	<2.0	1.7	<2.0	<2.0	<2.0
Manganese (ug/L)	50	18	5.4	<2.0	8.6	1.8	5.8	14
Molybdenum (ug/L)	none	0.48	0.52	0.49	0.29	1.4	1.9	12
Nickel (ug/L)	none	0.82	2.2	1.9	1.5	5.4	<1.0	0.62
Selenium (ug/L)	50	<1.0	1.1	<1.0	0;.60	1.2	<1.0	9.4
Silver (ug/L)	10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Thallium (ug/L)	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (ug/L)	30	<0.50	3.3	<0.50	<0.50	3.6	<0.50	**130**
Vanadium (ug/L)	none	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	170
Zinc (ug/L)	5000	50	80	45	47	52	84	310

* - USEPA data conversion for Gross Alpha/Beta results is required, to account for uranium decay. The reported results are not immediately comparable to the action level.
J - Validator-determined estimated value

Table 4
Navajo Nation Water Sampling
Validated Analytical Results
Samples Collected February 26 - March 7, 2008

	Site-Specific Action Level	DW-Badger Spring	DW-5M-74	DW-16-3-4	DW-Annie Grey	DW-9T-586	DW-9K-216
Date Sampled		2/29/2008	2/29/2008	3/1/2008	3/1/2008	3/3/2008	3/3/2008
Gross Alpha (pCi/L)	15*	**20.6 ± 6.99**	**21.5 ± 5.83**	<4.38 J	12.2 ± 3.68	**36.5 ± 6.47**	**31.6 ± 5.54**
Gross Beta (pCi/L)	4 mrem/yr*	12.3 ± 3.86	10.7 ± 3.51	<3.22 J	35.4 ± 3.74	9.84 ± 2.60	11.4 ± 2.50
Ra-226 (pCi/L)	5 (total for	2.65 ± 0.653	3.54 ± 0.788	<0.413	0.948 ± 0.525	2.16 ± 0.639	0.958 ± 0.495
Ra-228 (pCi/L)	both)	1.83 ± 0.804	<1.25	<1.06	<1.05	<2.83	<1.92
Mercury (ug/L)	2	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Boron (ug/L)	none	480	420	51	88	66	<100
Calcium (ug/L)	none	7500	32000	510	17000	74000	21000
Iron (ug/L)	300	**470**	<100	**420**	**1300**	**710**	120
Magnesium (ug/L)	none	3400	13000	<500	3400	35000	18000
Potassium (ug/L)	none	<2000	2500	<2000	35000	2600	2800
Sodium (ug/L)	none	300000	160000	95000	33000	44000	53000
Hardness (as $CaCO_3$) (mg/L)	none	33	130	<2.3	57	330	130
Aluminum (ug/L)	50	**440**	<20	**210**	**2000**	<20	<20
Antimony (ug/L)	6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (ug/L)	10	**32**	1.4	<1.0	2.4	<1.0	0.89
Barium (ug/L)	2000	60	24	2	43	17	77
Beryllium (ug/L)	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (ug/L)	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium (ug/L)	100	2.2	2.6	5.3	2.4	<1.0	<1.0
Cobalt (ug/L)	none	<0.50	<0.50	<0.50	0.36	<0.50	<0.50
Copper (ug/L)	1300	160	13	21	4.4	1.9	3.2
Lead (ug/L)	15	<2.0	1.2	2.2	2.2	<2.0	<2.0
Manganese (ug/L)	50	8.4	1.1	2.9	6.6	**54**	2.3
Molybdenum (ug/L)	none	11	5.7	<0.50	6.8	8.9	7.1
Nickel (ug/L)	none	0.68	1.2	<1.0	1.4	3.4	0.94
Selenium (ug/L)	50	4.8	25	<1.0	0.76	<1.0	1.1
Silver (ug/L)	10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Thallium (ug/L)	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (ug/L)	30	**41**	**35**	<0.50	5.2	21	28
Vanadium (ug/L)	none	170	3.8	<4.0	5.4	<4.0	13
Zinc (ug/L)	5000	200	14	100	7.7	500	130

* - USEPA data conversion for Gross Alpha/Beta results is required, to account for uranium decay. The reported results are not immediately comparable to the action level.
J - Validator-determined estimated value

Table 4
Navajo Nation Water Sampling
Validated Analytical Results
Samples Collected February 26 - March 7, 2008

	Site-Specific Action Level	DW-9T-550	DW-14K-313	DW-15K-303	DW-14T-586	DW-16T-510	DW-16T-513	DW-16T-514
Date Sampled		3/3/2008	3/7/2008	3/7/2008	3/7/2008	2/26/2008	2/26/2008	2/26/2008
Gross Alpha (pCi/L)	15*	**39.7 ± 8.14**	<4.96 J	<8.47 J	4.45 ± 2.48 J	<5.21 J	<4.90	<4.80
Gross Beta (pCi/L)	4 mrem/yr*	18.4 ± 3.52	<4.72 J	13.8 ± 3.62 J	7.85 ± 2.12 J	<4.63 J	3.86 ± 2.12	<3.36
Ra-226 (pCi/L)	5 (total for	**5.35 ± 0.978**	<0.440	1.19 ± 0.424	1.19 ± 0.376	0.810 ± 0.434 J	<0.614	0.524 ± 0.328 J
Ra-228 (pCi/L)	both)	<1.52	1.31 ± 0.782	3.73 ± 1.16	2.25 ± 0.746	<1.33	1.29 ± 0.778	<1.27
Mercury (ug/L)	2	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Boron (ug/L)	none	68	65	110	100	880	260	200
Calcium (ug/L)	none	52000	230000	370000	240000	1600	210000	4600
Iron (ug/L)	300	120	**320**	**1000**	**2100**	**470**	**1900**	**720**
Magnesium (ug/L)	none	20000	82000	140000	120000	350	89000	2000
Potassium (ug/L)	none	4200	3700	5300	8000	1200	3800	1400
Sodium (ug/L)	none	85000	110000	140000	160000	400000	79000	240000
Hardness (as $CaCO_3$) (mg/L)	none	210	910	1500	1100	5.5	900	19
Aluminum (ug/L)	50	<20	<20	<20	<20	<20	<20	35
Antimony (ug/L)	6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (ug/L)	10	0.7	<1.0	0.71	0.97	0.6	<1.0	<1.0
Barium (ug/L)	2000	36	5.5	6.7	20	21	9.7	32
Beryllium (ug/L)	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (ug/L)	5	<1.0	<1.0	<1.0	<1.0	<1.0	0.85	<1.0
Chromium (ug/L)	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt (ug/L)	none	<0.50	0.42	0.77	1.3	<0.50	1.5	<0.50
Copper (ug/L)	1300	5.4	2.1	2.4	2.9	12	1.7	5.2
Lead (ug/L)	15	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	1.6
Manganese (ug/L)	50	11	**150**	**310**	**2000**	6.5	**1800**	17
Molybdenum (ug/L)	none	13	0.79	0.84	13	1.7	2.1	0.33
Nickel (ug/L)	none	2.4	10	16	13	0.59	11	0.73
Selenium (ug/L)	50	5.7	0.55	0.83	1.1	0.53	0.85	<1.0
Silver (ug/L)	10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Thallium (ug/L)	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (ug/L)	30	**31**	<0.50	0.38	1.5	0.59	<0.50	<0.50
Vanadium (ug/L)	none	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Zinc (ug/L)	5000	570	140	40	2000	110	1300	840

* - USEPA data conversion for Gross Alpha/Beta results is required, to account for uranium decay. The reported results are not immediately comparable to the action level.
J - Validator-determined estimated value

Table 4
Navajo Nation Water Sampling
Validated Analytical Results
Samples Collected February 26 - March 7, 2008

	Site-Specific Action Level	DW-16K-528	DW-16-4-10	DW-16T-608	DW-Echo Rock	DW-16B-38	DW-16T-521	DW-16T-589
Date Sampled		2/26/2008	2/26/2008	2/26/2008	2/27/2008	2/27/2008	2/27/2008	2/27/2008
Gross Alpha (pCi/L)	15*	**25.3 ± 6.20**	**281 ± 24.8**	<5.24	**31.3 ± 8.60**	**35.4 ± 8.22**	**62.9 ± 9.54**	14.9 ± 4.89
Gross Beta (pCi/L)	4 mrem/yr*	7.21 ± 2.70	105 ± 9.22	<3.25	13.9 ± 3.92	25.0 ± 4.33	28.7 ± 4.14	6.67 ± 2.74
Ra-226 (pCi/L)	5 (total for	<0.742	**9.39 ± 1.26 J**	<0.743	2.40 ± 0.663J	<0.575	<0.568	3.18 ± 0.699 J
Ra-228 (pCi/L)	both)	<2.03	<1.38	<1.33	<1.29	1.56 ± 0.993	2.25 ± 1.05	<1.16
Mercury (ug/L)	2	<0.030	0.14	<0.030	<0.030	<0.030	<0.030	<0.030
Boron (ug/L)	none	610	<100	2000	260	450	730	170
Calcium (ug/L)	none	1800	78000	4400	27000	9300	2000	28000
Iron (ug/L)	300	**720**	**580**	140	<100	87	**1700**	**3300**
Magnesium (ug/L)	none	<500	10000	1400	9800	4000	420	12000
Potassium (ug/L)	none	1100	1300	<2000	2000	6700	1100	1400
Sodium (ug/L)	none	89000	20000	330000	200000	230000	220000	100000
Hardness (as $CaCO_3$) (mg/L)	none	4.6	240	17	110	39	6.7	120
Aluminum (ug/L)	50	15	<20	10	16	23	<20	<20
Antimony (ug/L)	6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (ug/L)	10	7.5	0.58	2.1	2.0	2.2	**55**	<1.0
Barium (ug/L)	2000	8.4	290	25	130	33	19	65
Beryllium (ug/L)	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (ug/L)	5	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<1.0
Chromium (ug/L)	100	0.59	<1.0	<1.0	0.62	<1.0	1.5	<1.0
Cobalt (ug/L)	none	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50
Copper (ug/L)	1300	5.3	37	12	3.7	11	83	1.8
Lead (ug/L)	15	4.3	1.4	<2.0	<2.0	<2.0	4.5	<2.0
Manganese (ug/L)	50	5.4	12	4.4	<2.0	3.5	**300**	40
Molybdenum (ug/L)	none	7.2	0.68	20	0.68	4.2	3.7	6.0
Nickel (ug/L)	none	0.62	3.3	0.56	1.1	1.3	2.9	1.5
Selenium (ug/L)	50	12	**82**	1.7	4.0	27	**64**	1.1
Silver (ug/L)	10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Thallium (ug/L)	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (ug/L)	30	25	**260**	1.9	26	**54**	**63**	9.1
Vanadium (ug/L)	none	350	<4.0	9.5	4.8	<4.0	160	<4.0
Zinc (ug/L)	5000	2600	120	39	19	16	1900	340

* - USEPA data conversion for Gross Alpha/Beta results is required, to account for uranium decay. The reported results are not immediately comparable to the action level.
J - Validator-determined estimated value

Table 4
Navajo Nation Water Sampling
Validated Analytical Results
Samples Collected February 26 - March 7, 2008

	Site-Specific Action Level	DW-16T-317	DW-16T-552	DW-16T-519	DW-8T-522	DW-Baby Rock Springs	DW-Site 15 Cane Valley
Date Sampled		2/27/2008	2/27/2008	2/27/2008	3/3/2008	3/4/2008	3/4/2008
Gross Alpha (pCi/L)	15*	**19.0 ± 6.18**	<6.54	**24.2 ± 5.92**	**16.5 ± 6.17**	8.43 ± 3.92	<4.73
Gross Beta (pCi/L)	4 mrem/yr*	9.27 ± 3.80	10.5 ± 4.49	10.7 ± 2.69	8.66 ± 2.95	<3.42	6.05 ± 2.38
Ra-226 (pCi/L)	5 (total for both)	1.00 ± 0.465 J	1.32 ± 0.548 J	<0.625	<0.433	0.535 ± 0.285	<1.20
Ra-228 (pCi/L)		1.86 ± 0.978	1.72 ± 0.947	<1.56	<1.26	<0.982	0.73 ± 0.297
Mercury (ug/L)	2	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Boron (ug/L)	none	260	2600	970	130	<100	110
Calcium (ug/L)	none	99000	82000	1400	78000	1600	16000
Iron (ug/L)	300	140	<100	**850**	220	<100	84
Magnesium (ug/L)	none	23000	13000	330	26000	260	27000
Potassium (ug/L)	none	1300	8000	1000	3700	<2000	2200
Sodium (ug/L)	none	120000	120000	190000	57000	72000	190000
Hardness (as $CaCO_3$) (mg/L)	none	340	260	5.0	300	5.1	150
Aluminum (ug/L)	50	<20	<20	26	<20	<20	<20
Antimony (ug/L)	6	<1.0	4.9	<1.0	<1.0	<1.0	<1.0
Arsenic (ug/L)	10	1.2	<1.0	**30**	<1.0	7.7	<1.0
Barium (ug/L)	2000	130	7.4	9.0	29	3.8	53
Beryllium (ug/L)	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium (ug/L)	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium (ug/L)	100	<1.0	<1.0	1.3	<1.0	3.0	<1.0
Cobalt (ug/L)	none	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper (ug/L)	1300	5.3	26	9.8	2.3	1.4	1.9
Lead (ug/L)	15	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Manganese (ug/L)	50	5.0	16	8.6	28	<2.0	1.4
Molybdenum (ug/L)	none	5.6	71	3.7	1.8	<0.50	2.8
Nickel (ug/L)	none	3.9	2.9	0.55	3.4	<1.0	0.74
Selenium (ug/L)	50	15	7.9	13	0.94	<1.0	<1.0
Silver (ug/L)	10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Thallium (ug/L)	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (ug/L)	30	23	<0.50	**34**	23	5.1	<0.50
Vanadium (ug/L)	none	<4.0	<4.0	150	<4.0	21	<4.0
Zinc (ug/L)	5000	1100	750	90	24	11	4.5

* - USEPA data conversion for Gross Alpha/Beta results is required, to account for uranium decay. The reported results are not immediately comparable to the action level.
J - Validator-determined estimated value

Table 4
Navajo Nation Water Sampling
Validated Analytical Results
Samples Collected February 26 - March 7, 2008

	Site-Specific Action Level	DW-Site 4 Cane Valley	DW-Site 6 Cane Valley	DW-Site 8 Cane Valley	DW-Site 16 Cane Valley
Date Sampled		3/4/2008	3/4/2008	3/4/2008	3/4/2008
Gross Alpha (pCi/L)	15*	<4.67	6.04 ± 3.79	<4.71	6.80 ± 3.79
Gross Beta (pCi/L)	4 mrem/yr*	<3.63	<3.76	5.18 ± 3.19	<2.70
Ra-226 (pCi/L)	5 (total for both)	<0.424	0.253 ± 0.175	<0.350	0.905 ± 0.307
Ra-228 (pCi/L)		<1.59	<1.36	<1.37	<1.48
Mercury (ug/L)	2	<0.030	<0.030	<0.030	<0.030
Boron (ug/L)	none	<100	<100	440	100
Calcium (ug/L)	none	33000	20000	41000	4900
Iron (ug/L)	300	**8000**	150	**590**	<100
Magnesium (ug/L)	none	29000	45000	55000	6000
Potassium (ug/L)	none	1400	<2000	1800	<2000
Sodium (ug/L)	none	77000	86000	110000	220000
Hardness (as $CaCO_3$) (mg/L)	none	200	240	330	37
Aluminum (ug/L)	50	<20	<20	<20	<20
Antimony (ug/L)	6	<1.0	<1.0	<1.0	<1.0
Arsenic (ug/L)	10	5.3	6.1	8.0	7.5
Barium (ug/L)	2000	69	62	30	49
Beryllium (ug/L)	4	<0.50	<0.50	<0.50	<0.50
Cadmium (ug/L)	5	<1.0	<1.0	<1.0	<1.0
Chromium (ug/L)	100	1.7	2.4	<1.0	<1.0
Cobalt (ug/L)	none	0.33	<0.50	<0.50	<0.50
Copper (ug/L)	1300	**4700**	2.8	78	2.1
Lead (ug/L)	15	**320**	<2.0	2.4	<2.0
Manganese (ug/L)	50	**54**	2.8	5.4	<2.0
Molybdenum (ug/L)	none	2.5	7.9	32	6.1
Nickel (ug/L)	none	7.4	0.97	2.0	<1.0
Selenium (ug/L)	50	0.93	4.7	3.6	3.5
Silver (ug/L)	10	<0.50	<0.50	<0.50	<0.50
Thallium (ug/L)	2	<2.0	<2.0	<2.0	<2.0
Uranium (ug/L)	30	5.2	7.8	4.0	5.7
Vanadium (ug/L)	none	4.0	13	6.4	7.9
Zinc (ug/L)	5000	4200	710	140	<5.0

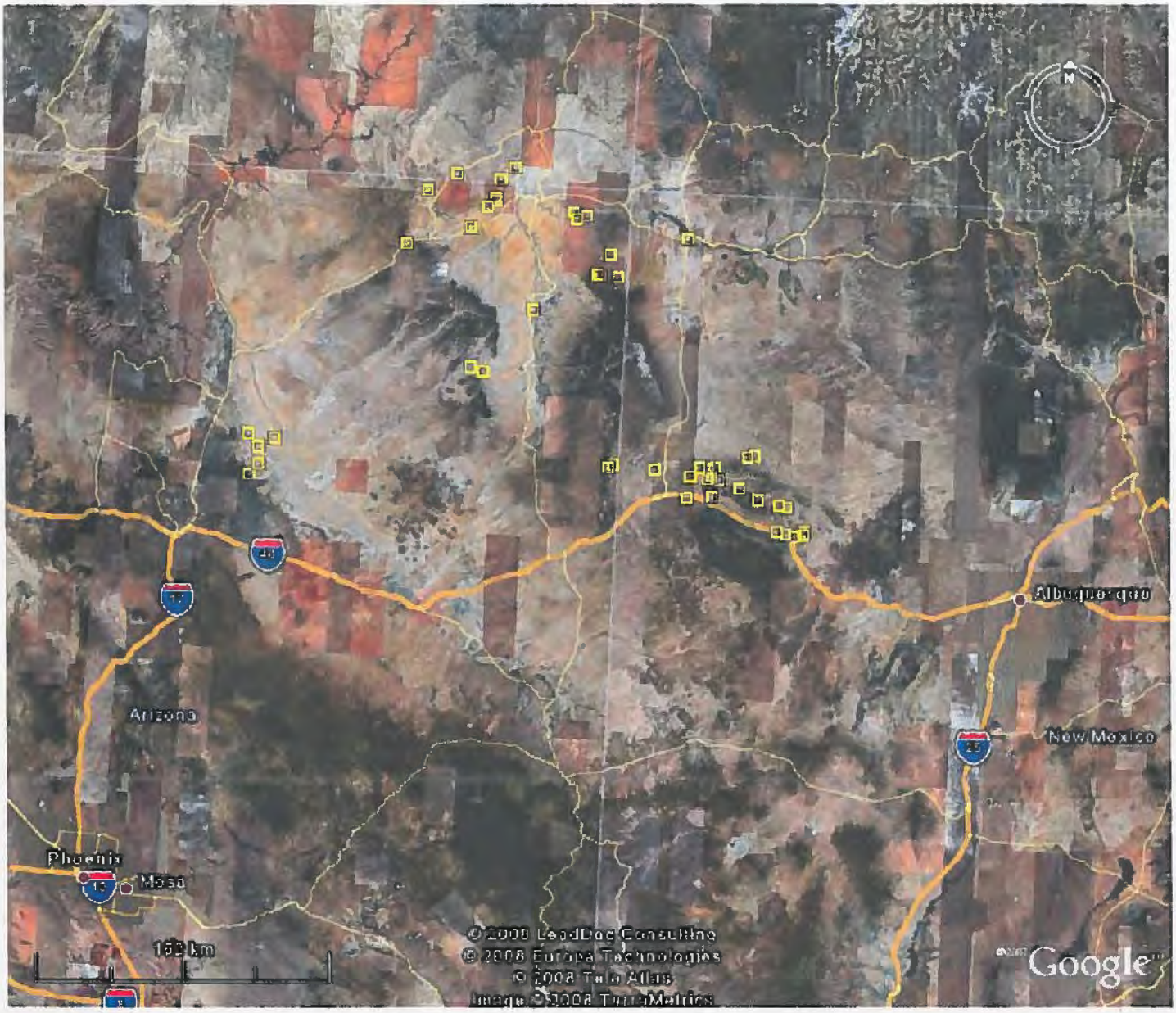
* - USEPA data conversion for Gross Alpha/Beta results is required, to account for uranium decay. The reported results are not immediately comparable to the action level.
J - Validator-determined estimated value

Table 5
GPS Data for Water Sources Sampled
Navajo Nation Water Sampling
February 26 - March 7, 2008

Water Source ID	Latitude	Longitude
10R-51B	36.075407898	-109.883681203
10T-241A	36.390337299	-109.603629489
12-16 Cove Spring	36.578386898	-109.209409378
Project 12-4-12	36.681034631	-109.157398496
12R-125	36.571629472	-109.103322674
12T-520	36.776278658	-108.694402614
14K-313	35.666196765	-108.568435298
14T-586	35.661989026	-108.515490706
15-B-2	35.725555115	-108.282647514
15K-303	35.671239854	-108.478299966
15T-560	35.736286920	-108.242226839
16-2-23	35.498380979	-108.082753320
16-3-4	35.620069281	-108.495377239
16-6-7	35.490893452	-108.033643477
16B-38	35.377146237	-107.919512018
16K-528	35.576877888	-108.324667529
16T-317	35.370509364	-108.088435810
16T-334	35.646977639	-108.836331998
16T-510	35.619354015	-108.622989515
16T-513	35.613710582	-108.516926051
16T-514	35.610339948	-108.449853397
16T-519	35.523096696	-108.212656938
16T-521	35.361122212	-107.928909993
16T-552	35.354272766	-107.974978928
16T-608	35.518732022	-108.638934806
18K-301	35.657908677	-109.080214401
Badger Spring	35.640644666	-111.196347870
3A-155	35.687219491	-111.102295587
4T-518	36.094188406	-109.961733184
5M-74	35.503076279	-111.239641514
8K-433	36.947301971	-110.291551343
8T-522	36.676215569	-110.400757792
9T-550	36.874258589	-109.389786993
9T-586	36.864218494	-109.310153357
Annie Grey	35.624270543	-108.511092363
Dry Spring	35.555646258	-111.187777951
Echo Rock	35.528601925	-108.489650377
Monument Pass	37.035391798	-110.116621459
Paddock	35.701034395	-111.260302020
Project 12-7-12	36.579014130	-109.225617578
SITE #15 Cane Valley	37.082043930	-109.758797198
SITE #16 Cane Valley	37.020070181	-109.844654074
SITE #4 Cane Valley	36.926732093	-109.866289289
SITE #6 Cane Valley	36.913930960	-109.869334563
SITE #8 Cane Valley	36.881253010	-109.915107111
SM Unknown	35.646433813	-109.108923919
9K-216	36.843661093	-109.367598964
Baby Rock Springs*	36.7758	-110.0113
16T-589**	35.36194	-108.03750

* - Field collection of GPS location did not occur. Coordinates were obtained from Google Earth aerial photo.
** - Sufficient satellites unavailable for GPS data collection. Coordinates presented are the original NEPA-provided coordinates.

FIGURES



Water sampling location

Figure 1
Overview of Sampled Water Source Locations
Navajo Nation Water Source Sampling
February 26 - March 7, 2008

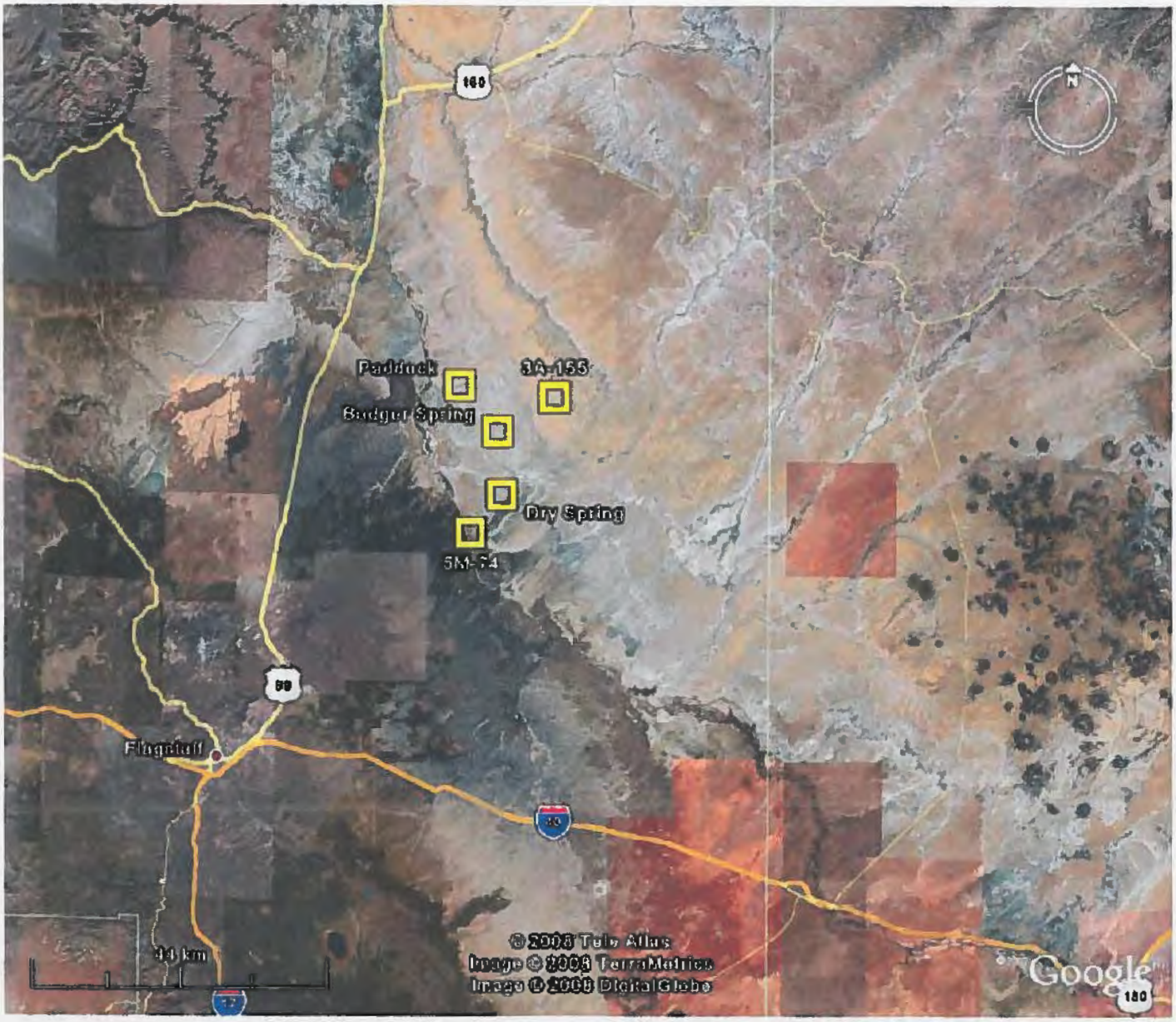


Figure 2
Water Sources Sampled, Southwestern Area
Navajo Nation Water Sampling
February 26 - March 7, 2008

Figure 3
Water Sources Sampled, South-Central Area
Navajo Nation Water Sampling
February 26-March 7, 2008

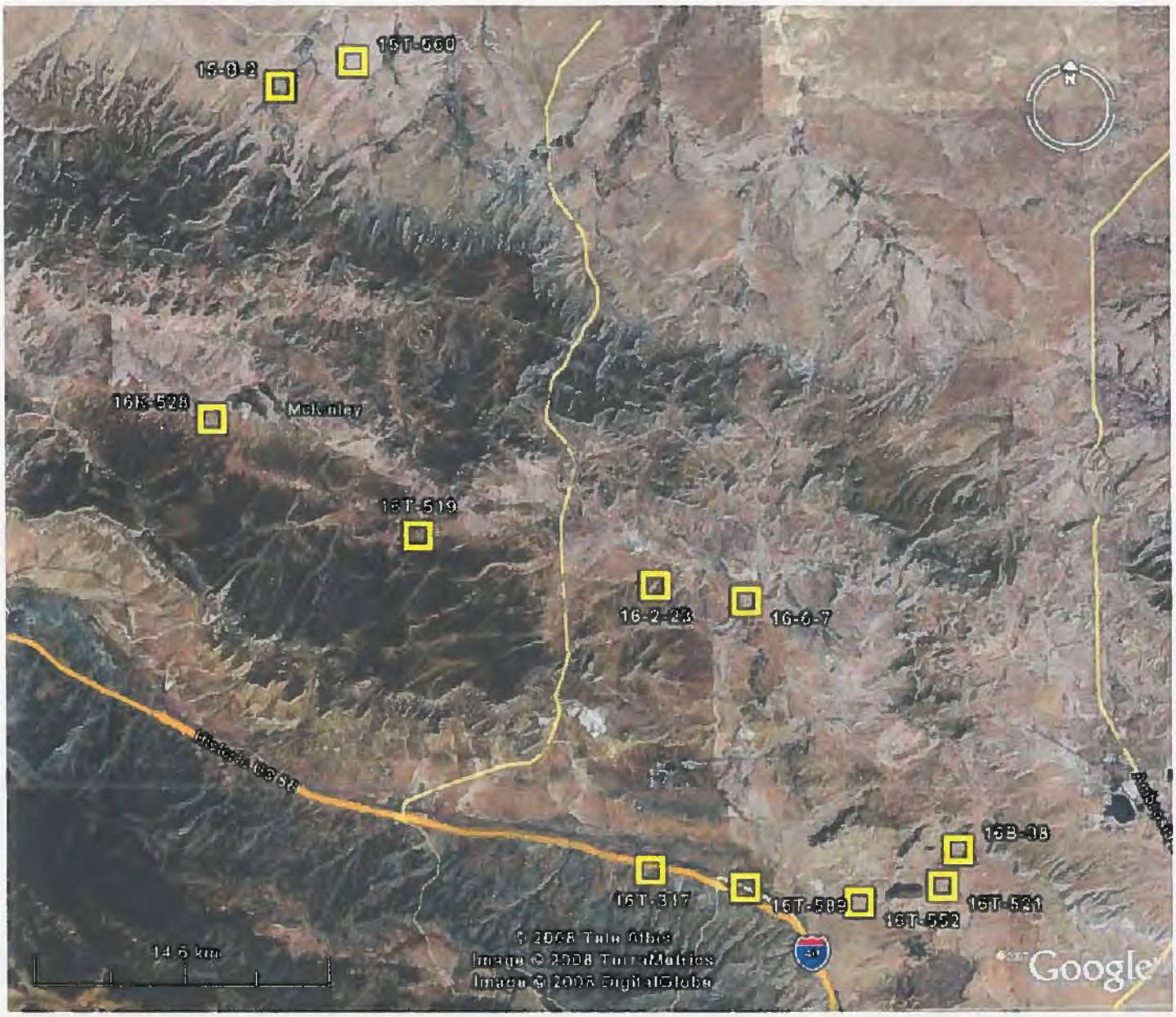


Figure 4
Water Sources Sampled, Southeastern Area
Navajo Nation Water Sampling
February 26 - March 7, 2008

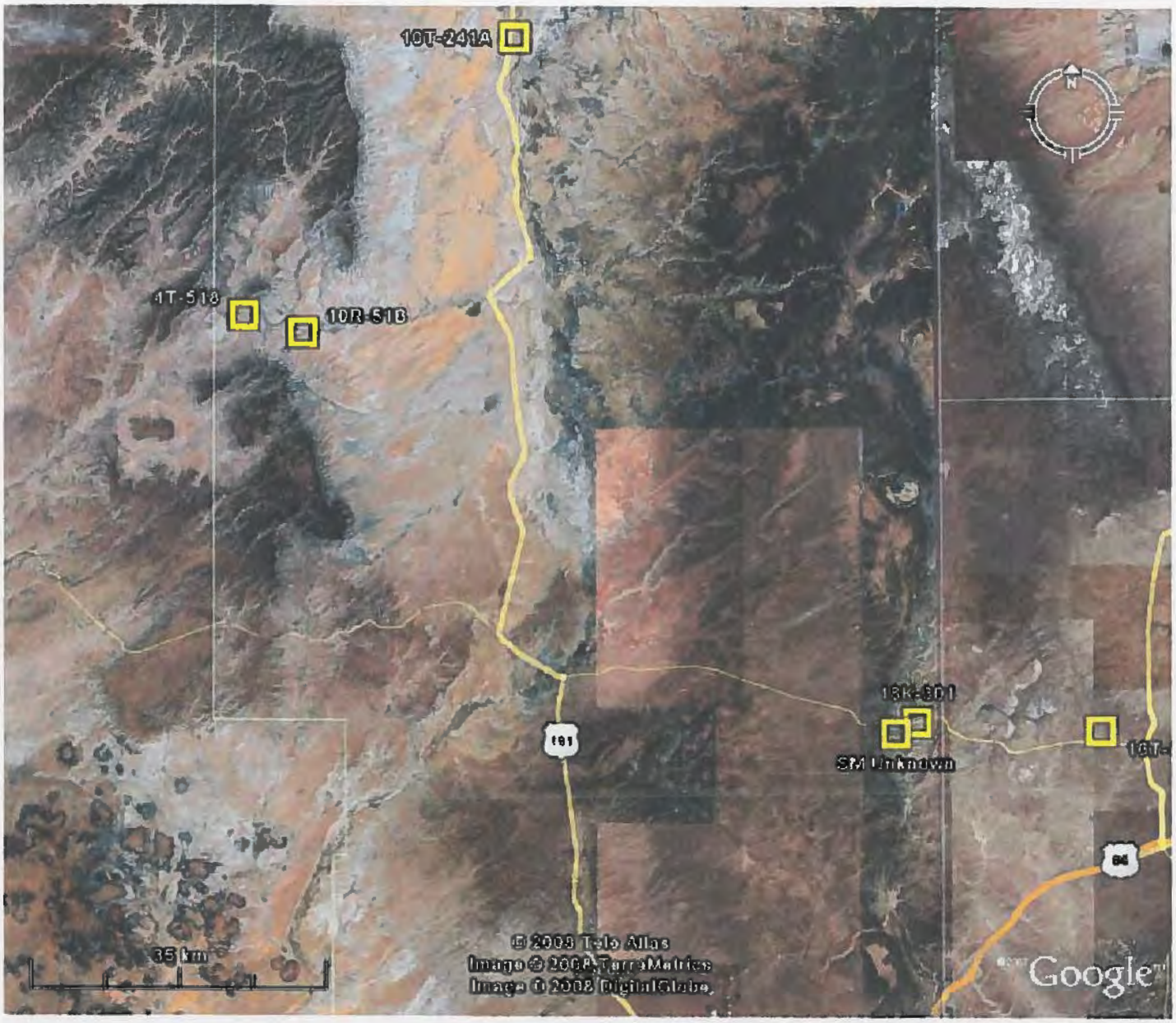


Figure 5
Water Sources Sampled, Central Area
Navajo Nation Water Sampling
February 26 - March 7, 2008

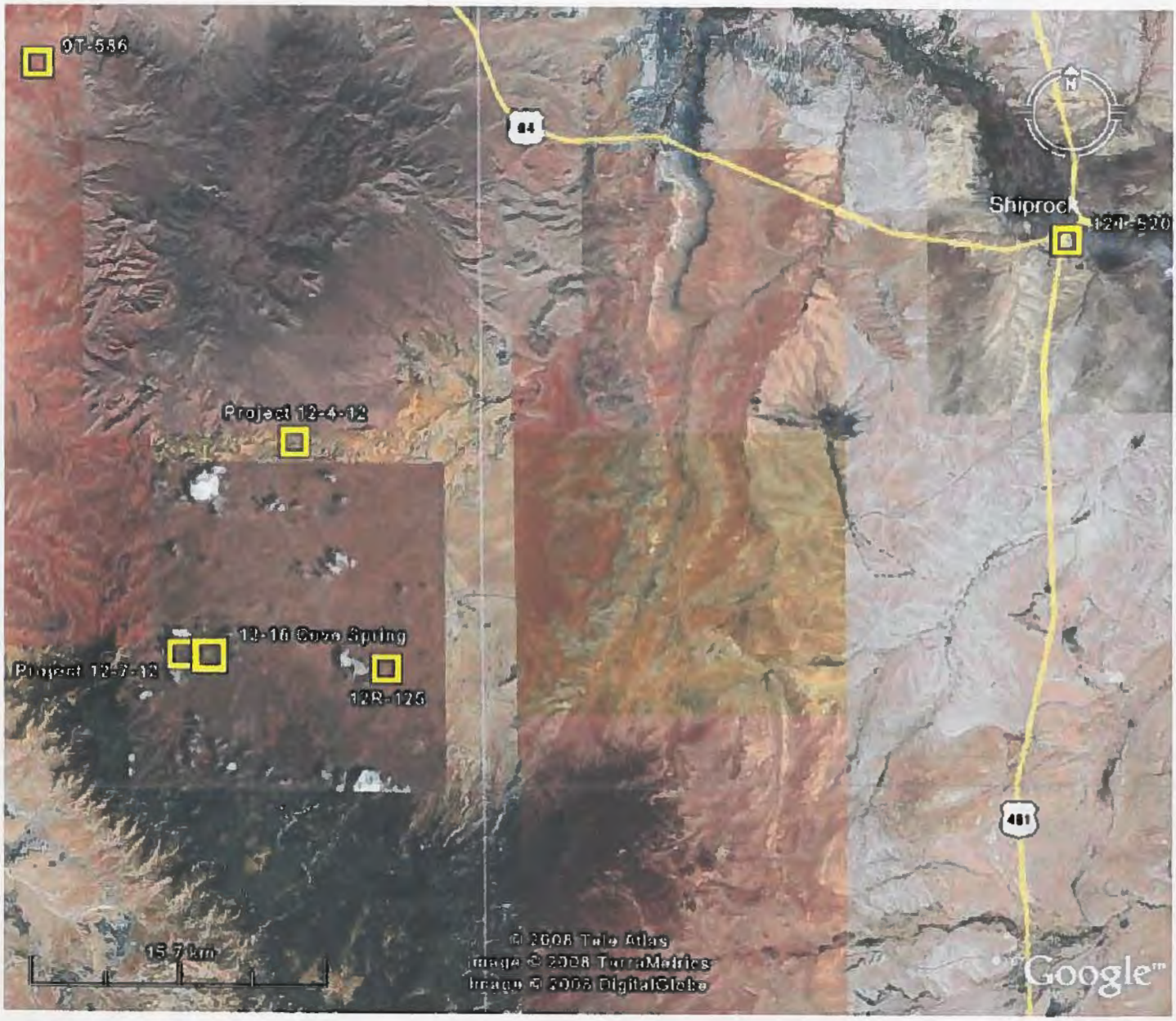


Figure 6
Water Sources Sampled, Northeastern Area
Navajo Nation Water Sampling
February 26 - March 7, 2008

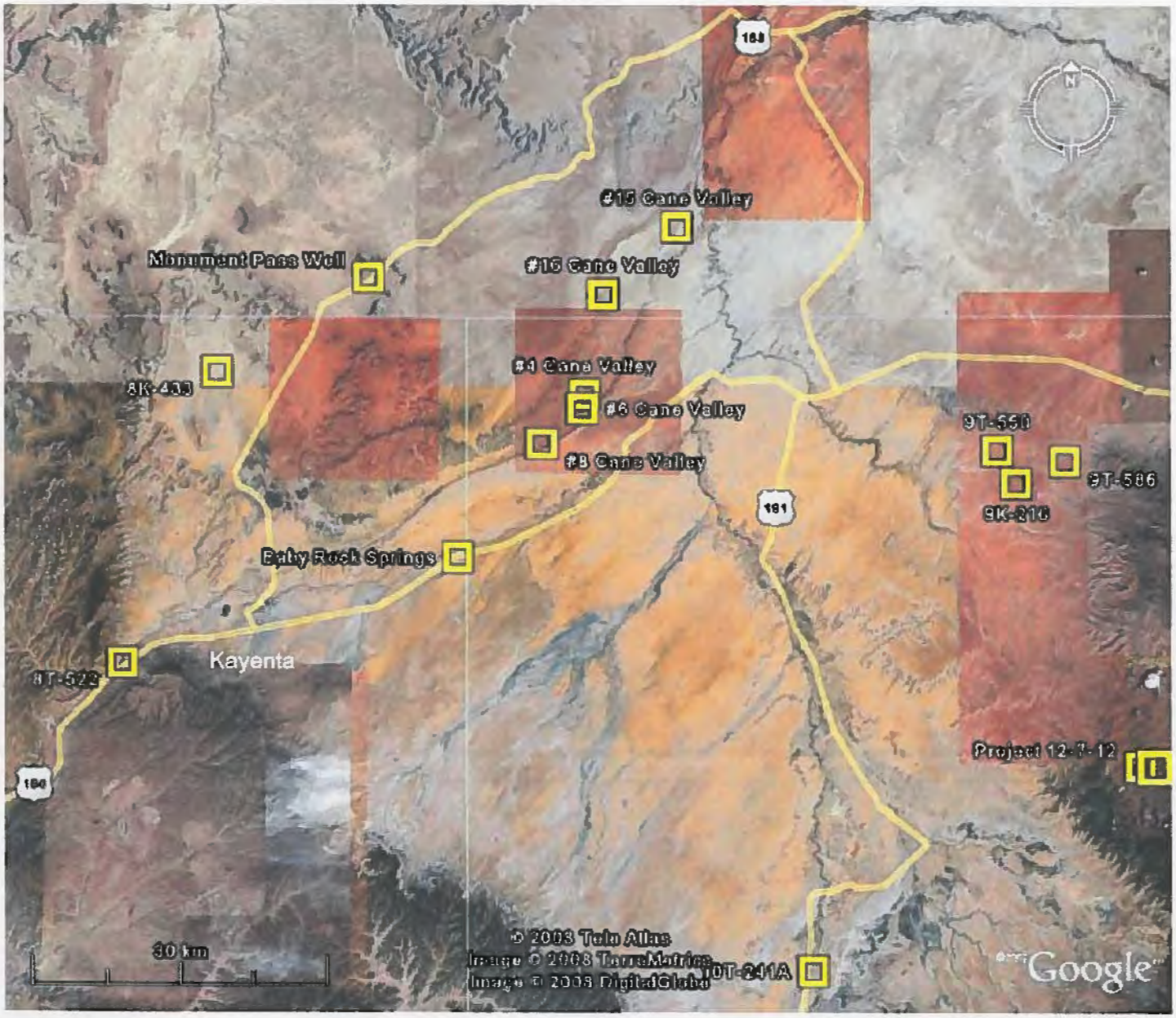


Figure 7
Water Sources Sampled, Northern Area
Navajo Nation Water Sampling
February 26 - March 7, 2008

APPENDIX A

QUALITY ASSURANCE 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 Radiation Assessment, TDD#: T05-09-07-11-0001

Date: February 22, 2008

Prepared by: Carl Palladino _____ Date:

Reviewed by:
Howard Edwards, Team 9 _____ Date:

Clancy Tenley, U.S. EPA _____ Date:
Associate Director, Tribal Program Office

Eugenia McNaughton, U.S. EPA _____ Date:
Section Chief, Quality Assurance Office

Deb Misra, Navajo EPA _____ Date:
Director, Surface and Ground Water Protection Department

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?*

Residences of the Navajo Nation Reservation may be consuming water from unregulated groundwater and surface water sources that have been contaminated with naturally occurring radioactive materials (NORM) or technically enhanced naturally occurring radioactive materials (TENORM). As the water sources are unregulated, they are not subject to a regulatory compliance program to monitor water quality and test for contaminants. The drinking water is drawn from a tap, well, spring, pit, or tank. It is unknown if residences are consuming contaminated water from the unregulated sources.

The main purpose of this assessment is to address community concerns related to water sources potentially contaminated with NORM or TENORM. Additionally, based on community concerns and at the request of Navajo Nation EPA, a full suite of stable metals and additional water parameters will be investigated. The U.S. EPA is partnering with Navajo Nation EPA in this effort. The U.S. EPA has agreed to conduct the sampling as a one-time event. Both agencies are jointly responsible for selecting water sources to be assessed, evaluating information collected during the assessments, and for disseminating the information using a variety of community involvement methods. 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. Where there is no significant imminent threat the data collected will be used for public education. 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 U.S. EPA will be responsible for the analysis of metals and radioactive parameters. The Navajo Tribal Utility Authority Laboratory (NTUA) will be responsible for the analysis of additional water parameters.

Previously, 226 drinking water sources were sampled and analyzed in 1998 by the U.S. Army Corps of Engineers (USACE 2000). Water sources sampled consisted predominately of wells. Thirty eight samples exceeded at least one EPA maximum contaminant level (MCL) for radionuclides. Navajo Nation EPA has identified approximately 50 additional water sources to be sampled and analyzed based on reports of human consumption.

The assessment of unregulated drinking water sources is one phase of the Navajo Radiation Assessment project which also includes the assessment of homesite structures and yards and the assessment of abandoned uranium mines.

The EPA's START contractor, the EPA's Region IX Regional Laboratory, and a commercial laboratory will assist with this investigation. The EPA's States, Tribes, and Site Assessment Section is the lead EPA 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 residential 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 tbe 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 900.0 or equivalent	15 pCi/L[1]	1.0 pCi/L
☒ Gross beta and photon radioactivity	EPA Method 900.0 or equivalent	4 mrem/year[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
☒ Uranium, total	EPA Method 200.8	30 µg/L	1.0 µg/L
Other Data Collection	GPS Visual	Interviews	Magnetometer

Activity (non-radiological) *(circle all that apply)*	Other Geophysical Modeling File Search Water quality parameters (pH, temperature) Depth to water Photograph of water source

Add additional pages if necessary.

Key:

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

(2) For man-made radionuclides; annual dose equivalent to the total body or any internal organ.

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

Table A-2
Metals of Concern

Metal (check all that apply)	Proposed Monitoring Method	Proposed Action Level	Available Reporting Limit
☒ Target Analyte List Metals + Uranium	EPA 200.8 by ICP/MS EPA 200.7 by ICP EPA 245.1 by CVASS	Attached	Attached
Other Data Collection Activity (non-radiological) *(circle all that apply)*	GPS Visual Interviews Magnetometer Other Geophysical Modeling Photography File Search		

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)

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-Elliptical

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 ☐ Scintillator 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-	Spectrometer Integrated with Meter		

	5mR/hour			
☐ 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 Table K. Thirty eight locations were previously sampled and had at least one contaminant above the MCL. An additional approximately 40 locations were added at the request of the Navajo Nation EPA. Therefore, 76 or more samples will be collected with up to 8 duplicates samples to be selected at random in the field depending on the ease of sample collection. Due to years of drought conditions and season weather activity, some sources may not be able to be sampled.

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.

Groundwater 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 and pH 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.

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.

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	180 days
Ra-226/228, EPA Method 903.1/904.0			pH<2.0 HNO_3	180 days
TAL Metals + Uranium EPA Methods 200.7, 200.8, 245.1	U.S. EPA Region 9 Laboratory	One 500-ml HDPE (1000 ml for MS/MSD)	pH < 2.0 HNO_3 4 ± 2 degrees Celsius	180 days 14 days mercury
Nitrate/Nitrite, EPA 300.0	NTUA Laboratory	One 125-ml HDPE (No additional volume required for QC)	4 ± 2 degrees Celsius	48 hours
Alkalinity, SM 2320 B Calcium SM 3500-Ca D Chloride EPA 300.0 Corrosivity SM 2330 B Fluoride EPA 300.0 Total Hardness SM 2340 C Magnesium SM 3500-Mg E pH SM 4500-H B Potassium SM 3111 B Sodium SM 3111 B Sulfate EPA 300.0 Total Dissolved Solids SM 2540 C Turbidity SM 2130 B Ortho Phosphate EPA 300.0		One 1-L HDPE (No additional volume required for QC)	4 ± 2 degrees Celsius	14-28 days Except pH: ASAP

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: DW##XX DW = drinking water ## = number of sample location (see Table K) X = letter designation for type of water source as follows: W = Well S = Spring H = Hand pump T = Trough P = Pond ST = Stock tank S = Stream FB = Field blank	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% [Comment B.S.: A comment received indicated this may be "a little sloppy." Is this the best a lab can do?]	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	February 2008	March 2008
Data validation	April 2008	April 2008
Draft Report	May 2008	May 2008
Final Report	June 2008	June 2008

Resultant data will be validated by a contracted service experienced in the validation of radioactivity data.

4.2 Project Laboratories

Laboratories used for this project are summarized in Table G.

Table G
Laboratories

Lab Name/ Location	Methods
EPA Region 9 laboratory, Richmond, CA Ship to: Richard Bauer U.S. EPA Region 9 Laboratory 1337 South 46th Street, Bldg 201 Richmond, CA 94804 (510) 412-2312	EPA Methods 200.7, 200.8, 245.1
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

Navajo Tribal Utility Authority Laboratory, Ft. Defiance, AZ Ship to: NTUA Central Warehouse Highway Route 12 Fort Defiance, AZ 86504 928-729-6220	SM 2130 B, 2320 B, 2330 B, 2340-C, 2540 C, 3111B, 3500-Ca D, 3500-Mg E, 4500-H-B, EPA 300.0

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 Site Assessment	Task Monitor
Carl Palladino, START	Project Manager
Howard Edwards, START	Quality Assurance Officer
Nicole Testa, START	Field Monitoring and Sampling
Mike Schwennesen, START	Team Leader

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 (mg/L)	Duplicate RPD	Matrix Spike	Matrix Spike RPD	BS
Alkalinity by 2320	Hydroxide Alkalinity	Not Available	10	20	NA	NA	85-115
Alkalinity by 2320	Carbonate Alkalinity	Not Available	10	20	NA	NA	85-115
Alkalinity by 2320	Bicarbonate Alkalinity	Not Available	10	20	NA	NA	85-115
Alkalinity by 2320	Total Alkalinity	Not Available	10	20	NA	NA	85-115
Anions by 300.0	Fluoride	4	0.10	NA	80-120	20	90-110
Anions by 300.0	Chloride	250	1.0	NA	80-120	20	90-110
Anions by 300.0	Nitrite as N	1	0.10	NA	80-120	20	90-110
Anions by 300.0	Nitrate as N	10	0.10	NA	80-120	20	90-110
Anions by 300.0	o-Phosphate, as P	Not Available	1.0	NA	80-120	20	90-110
Anions by 300.0	Sulfate	250 (s)	0.50	NA	80-120	20	90-110
Mercury by 245.1	Mercury	0.002	0.030	NA	70-130	20	85-115
Metals by 200.7	Boron	Not Available	100	NA	70-130	20	85-115
Metals by 200.7	Calcium	Not Available	100	NA	70-130	20	85-115
Metals by 200.7	Iron	0.3 (s)	100	NA	70-130	20	85-115
Metals by 200.7	Magnesium	Not Available	500	NA	70-130	20	85-115
Metals by 200.7	Potassium	Not Available	2000	NA	70-130	20	85-115
Metals by 200.7	Silica (SiO2)	Not Available	500	NA	70-130	20	85-115
Metals by 200.7	Sodium	Not Available	500	NA	70-130	20	85-115
Metals by 200.8	Aluminum	0.05 (s)	20	NA	70-130	20	85-115
Metals by 200.8	Antimony	0.006	1.0	NA	70-130	20	85-115
Metals by 200.8	Arsenic	0.010	1.0	NA	70-130	20	85-115
Metals by 200.8	Barium	2	1.0	NA	70-130	20	85-115
Metals by 200.8	Beryllium	0.004	0.50	NA	70-130	20	85-115
Metals by 200.8	Cadmium	0.005	1.0	NA	70-130	20	85-115
Metals by 200.8	Chromium	0.10	1.0	NA	70-130	20	85-115
Metals by 200.8	Cobalt	Not Available	0.50	NA	70-130	20	85-115
Metals by 200.8	Copper	1.3 (s)	2.0	NA	70-130	20	85-115
Metals by 200.8	Lead	0.015	2.0	NA	70-130	20	85-115
Metals by 200.8	Manganese	0.05 (s)	2.0	NA	70-130	20	85-115
Metals by 200.8	Molybdenum	Not Available	0.50	NA	70-130	20	85-115
Metals by 200.8	Nickel	Not Available	1.0	NA	70-130	20	85-115
Metals by 200.8	Selenium	0.05	1.0	NA	70-130	20	85-115
Metals by 200.8	Silver	0.10 (s)	0.50	NA	70-130	20	85-115
Metals by 200.8	Thallium	0.002	0.002	NA	70-130	20	85-115
Metals by 200.8	Uranium	30	0.50	NA	70-130	20	85-115
Metals by 200.8	Vanadium	Not Available	4.0	NA	70-130	20	85-115
Metals by 200.8	Zinc	5 (s)	5.0	NA	70-130	20	85-115
Solids, Total Dissolved	Total Dissolved Solids	250 (s)	20	5	NA	NA	85-115

Key: RPD = relative percent difference; mg/L = milligrams per liter; NA = Not Applicable
(s) = National Secondary Drinking Water Regulation not enforceable and not an action limit for this assessment

APPENDIX B

LABORATORY DATA SHEETS

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

DATA VALIDATION SUMMARY

The data review was conducted in accordance with the Time-Critical Quality Assurance Sampling Plan (QASP) for Radiation Assessment of Unregulated Drinking Water Sources (February 2008) and using guidance from the Science Applications International Corporation (SAIC), Laboratory Data Validation Guidelines For Evaluating Radionuclide Analyses, Revision 06, June 2000 (SAIC Document Number 143-ARCS-00.08) and evaluation of laboratory criteria, as applicable.

Indicate with a YES or NO whether each item is acceptable without qualification:

1	Holding Times	Yes
2	Initial and Continuing Calibrations	Not provided
3	Laboratory Control Sample	Yes
4	Matrix Spike	No
5	Blanks and Background Samples	No
6	Chemical Recovery	Yes
7	Duplicate Analyses	No
8	Analyte Quantitation	Yes
9	Overall Assessment of Data	Yes
10	Documentation of Laboratory Corrective Action	Yes

Comments:

The time listed for sample DW-16T317 was 10:49 on the sample container and 10:43 on the chain-of-custody (COC). The time listed for sample DW-16T552 was 11:25 on the sample container and 11:21 on the COC. The samples were logged in per the COC.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

1. HOLDING TIMES

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable

Samples were extracted and analyzed within required holding times except as noted under Comments. In addition, no problems were identified with regard to sample preservation or custody unless specified. For those samples analyzed outside holding time requirements, the detected results have been qualified as estimated (J), and the nondetected results have been qualified either as estimated (UJ) or rejected (R) based on the reviewers judgment.

[redacted]

Comments:
None

2. INITIAL AND CONTINUING CALIBRATION VERIFICATION

__NA__ Acceptable
__NA__ Acceptable with qualification
__NA__ Unacceptable

The laboratory provided the gas flow proportional counter checks. However, the energy calibration and detector efficiency calibration were not provided in the data package and therefore, the calibrations could not be verified.

Comments:
None

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

Laboratory: *General Engineering Laboratories LLC*	**Lab Project Number:** *203735*
Sampling Dates: *February 26th and 27th, 2008*	**Sample Matrix:** *Water*
Analytical Method: *Gross Alpha and Gross Beta (E900), Radium-226 (E903.1 modified), and Radium-228 (E904.0 modified)*	**Data Reviewer:** *Sheri O'Connor*

REVIEW AND APPROVAL:

Data Reviewer: Sheri O'Connor — **Date:** 4/18/08
Technical QA Reviewer: [signature] — **Date:** 04 18 08
Project Manager: _____ — **Date:** _____

SAMPLE IDENTIFICATION:

Sample No.	Sample I.D.	Laboratory I.D.
1	DW-16T510	203735001
2	DW-16T513	203735002
3	DW-16T514	203735003
4	DW-16K528	203735004
5	DW-16-4-10	203735005
6	DW-16T608	203735006
7	DW-ECHO ROCK	203735007
8	DW-16B38	203735008
9	DW-16T521	203735009
10	DW-16T589	203735010
11	DW-16T317	203735011
12	DW-16T552	203735012
13	DW-16T519	203735013
14	DW-FB-022708	203735014
15		
16		
17		
18		
19		
20		

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

DATA PACKAGE COMPLETENESS CHECKLIST:

Checklist Code:

X	Included: no problems
*	Included: problems noted in review
O	Not Included and/or Not Available
NR	Not Required
RS	Provided As Re-submission

Case Narrative:

X	Case Narrative present

Quality Control Summary Package:

X	Data Summary sheets
O	Initial and Continuing Calibration results
X	Preparation Blank results
*	Matrix Spike recoveries
*	Matrix Duplicate results
X	Laboratory Control Sample recoveries

Raw QC Data Package Section

X	Chain-of-Custody Records
X	Preparation Log
X	Analysis Run Log

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

3. LABORATORY CONTROL SAMPLE

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable
_____ No Laboratory Control Samples Analyzed

Laboratory control sample recoveries are used for a qualitative indication of accuracy (bias) independent of matrix effects. Spike recovery limits of 75% to 125% are specified in the QASP. For analytes which were outside these control limits, associated detected results are qualified as estimated (J) and the nondetect results are qualified (UJ). At the discretion of the reviewer, other limits may be used only if justification can be provided.

Comments:
All recoveries were within the acceptance limits.

4. MATRIX SPIKE

_____ Acceptable
__X__ Acceptable with qualification
_____ Unacceptable
_____ No Matrix Spikes Analyzed

Matrix spike recoveries are used for a qualitative indication of accuracy (bias) due to matrix effects. Spike recovery limits of 75% to 125% are specified in the QASP. Per SAIC guidance, if the spike recovery is <50% (<40% for solids) or >120% (>130% for solids), qualify the results for that radionuclide for associated samples as estimated (J).

Comments:
MS/MSD analyses were performed on sample DW-16T510 and DW-16T589 for Gross Alpha and Gross Beta. MS analyses were performed on sample DW-16T589 for Radium-228 and Radium-226.

The MS/MSD recoveries were within the acceptance limits.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

5. BLANKS AND BACKGROUND SAMPLES

__X__ Acceptable with Qualification
_____ Detection Limits Adjusted

The following blanks were analyzed:
__X__ Method (preparation) Blanks
__X__ Field Blanks
_____ Calibration Blanks
_____ Rinsate Blanks
_____ Background Samples

Preparation (method) blanks were prepared for each batch of samples extracted. A preparation blank was analyzed after every continuing calibration standard, prior to sample analysis unless noted below. Per SAIC guidance, all results for all associated samples that are less than 10 times the blank (method blank or field blank) value are qualified as estimated (J).

Comments:
No target analytes were detected in the method blank.

Radium-226 was detected in field blank sample DW-FB-022708 at a concentration of 1.11±0.515 pCi/L. Per SAIC guidance for method blanks which was also used for field blanks, all detected results for all associated samples that were less than 10 times the field blank value were qualified as estimated (J).

6. CHEMICAL RECOVERY

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable
_____ No chemical recovery analyzed

Chemical recoveries for samples were evaluated per SAIC guidance. Recoveries of 50-100% are considered acceptable. Abnormally low recoveries can cause large uncertainly in affected sample results. Recoveries greater than 100% may add negative bias of at least the amount greater than 100%. If the recovery is >10% and <50% or >100% and <110%, qualify the results as estimated (J/UJ). If the recovery is less than 10% qualify the data as unusable. If the recovery is >110%, professional judgment should be used to assign the qualification of estimated or unusable.

Comments:
All chemical recoveries were within the acceptance limits.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

7. DUPLICATE ANALYSES

_____ Acceptable
__X__ Acceptable with qualification
_____ Unacceptable
_____ No Duplicates Analyzed

Type of duplicates analyzed:
_____ Field Duplicates
__X__ Laboratory Duplicates

Calculate the Relative Error Ratio (RER) between the results of the duplicate pair using the equation indicated below. Qualify the results as estimated (J) for any analyte whose RER exceeds 1 per SAIC guidance.

[redacted]

Comments:
Lab Duplicate: All applicable duplicate results satisfied the RER criterion.

Matrix Spike/Matrix Spike Duplicate: The RER between the MS and MSD for gross alpha and beta for sample DW-16T510 exceeded the evaluation criterion of ≤1 with RERs of 1.6 and 3.7, respectively. As the RERs between the MS and MSD for gross alpha and gross beta for sample DW-16T589 satisfied the evaluation criterion, only the gross alpha and beta results for sample DW-16T510 were qualified as estimated (JJ).

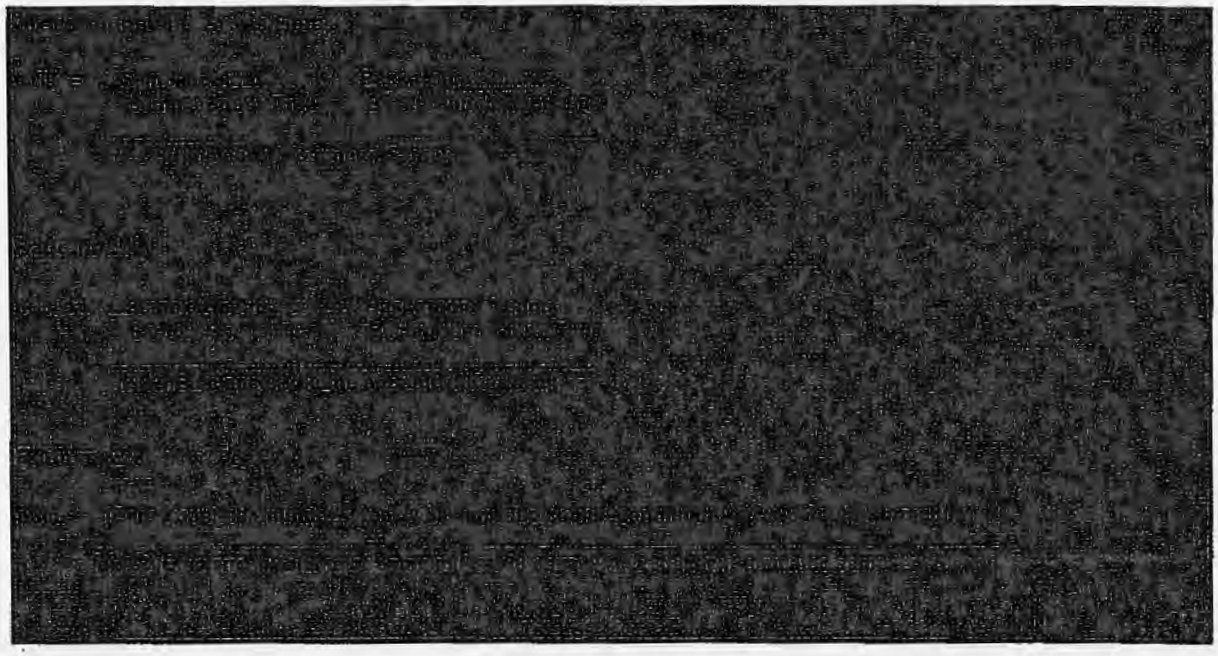
ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

8. ANALYTE QUANTITATION

Confirm that analyte quantitation was performed correctly using the following formulas:



Comments:
Ten percent of the detected sample results were recalculated and the reported activities were confirmed within ±10%.

For gross alpha and gross beta, several samples were recounted due to high or low chemical recoveries. The results reported had acceptable recoveries.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

9. OVERALL ASSESSMENT OF DATA

On the basis of this review, the following determination has been made with regard to the overall data usability for the specified level.

_____ **Acceptable**
__X__ **Acceptable with Qualification**
_____ **Rejected**

Accepted data meet the minimum requirements for the following EPA data category:

_____ **ERS Screening**
_____ **Non-definitive with 10 % Conformation by Definitive Methodology**
_____ **Definitive, Comprehensive Statistical Error Determination was performed.**
__X__ **Definitive, Comprehensive Statistical Error Determination was not performed.**

Any qualifications to individual sample analysis results are detailed in the appropriate section above or appear under the comments section below. In cases where several QC criteria are out of specification, it may be appropriate to further qualify the data usability. The data reviewer must use professional judgment and express concerns and comments on the data validity for each specific data package.

Comments:
The gross alpha required detection limit for sample DW-16T552 was not met due to low sample volume. More sample volume could not be used due to exceeding the maximum net weight limit. The sample was counted for 500 minutes. The gross alpha result for this sample was reported as nondetect at an elevated detection limit. The gross alpha detection of 6.54 pCi/L for this sample is below the proposed action limit of 15 pCi/L in the QASP. Therefore, the elevated detection limit is not considered to affect the usability of the data with respect to the project objectives.

The detection limits for gross alpha, gross beta, and radium-228 were above the reporting limits listed in the QASP. This is not considered to affect the usability of the data as all the detection limits reported are less then the proposed action levels.

Several samples for gross alpha and gross beta were recounted due to either high or low recoveries. This is not considered to affect the usability of the data as the recounted data were reported with acceptable recoveries.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

10. DOCUMENTATION OF LABORATORY CORRECTIVE ACTION

Problem:
None

Resolution:

Attached are copies of all data summary sheets, with data qualifiers indicated, and a copy of the chain of custody for the samples.

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16T510
Sample ID: 203735001
Matrix: Water
Collect Date: 26-FEB-08 11:05
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	4.10	+/-3.70	5.21	5.00	pCi/L	UJ msb-E	DXB5	03/27/08	1411	734339	1
Beta	U	4.33	+/-2.98	4.63	5.00	pCi/L	UJ msb-E					
GFPC, Ra228, Liquid												
Radium-228	U	1.16	+/-0.874	1.33	3.00	pCi/L		BXF1	03/19/08	1404	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.810	+/-0.434	0.525	1.00	pCi/L	J FB-H	DXM2	03/14/08	1815	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			67	(15%-125%)

4/15/08 0820

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16T513
Sample ID: 203735002
Matrix: Water
Collect Date: 26-FEB-08 12:57
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	0.0797	+/-2.36	4.90	5.00	pCi/L		DXB5	03/26/08	1017	734339	1
Beta		3.86	+/-2.12	3.18	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		1.29	+/-0.778	1.12	3.00	pCi/L		BXF1	03/19/08	1404	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.562	+/-0.416	0.614	1.00	pCi/L		DXM2	03/14/08	1815	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			81	(15%-125%)

4/15/08
1020

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16TS14
Sample ID: 203735003
Matrix: Water
Collect Date: 26-FEB-08 14:45
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	-0.385	+/-2.12	4.80	5.00	pCi/L		DXB5	03/26/08	1018	734339	1
Beta	U	1.59	+/-1.99	3.36	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.0145	+/-0.650	1.27	3.00	pCi/L		BXF1	03/19/08	1404	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.524	+/-0.328	0.414	1.00	pCi/L J FB-H		DXM2	03/14/08	1815	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			82	(15%-125%)

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Certificate of Analysis

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Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16K528
Sample ID: 203735004
Matrix: Water
Collect Date: 26-FEB-08 15:25
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		25.3	+/-6.20	4.15	5.00	pCi/L		DXB5	03/27/08	1411	734339	1
Beta		7.21	+/-2.70	3.43	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	1.25	+/-1.23	2.03	3.00	pCi/L		BXF1	03/19/08	1404	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.436	+/-0.456	0.742	1.00	pCi/L		DXM2	03/14/08	1815	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			72	(15%-125%)

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1020

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Suite 102
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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16-4-10
Sample ID: 203735005
Matrix: Water
Collect Date: 26-FEB-08 16:26
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		281	+/-24.8	4.49	5.00	pCi/L		DXB5	03/27/08	1411	734339	1
Beta		105	+/-9.22	4.64	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.175	+/-0.749	1.38	3.00	pCi/L		BXP1	03/19/08	1405	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		9.39	+/-1.26	0.472	1.00	pCi/L J FB-H		DXM2	03/14/08	1815	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			88	(15%-125%)

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Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16T608
Sample ID: 203735006
Matrix: Water
Collect Date: 26-FEB-08 17:40
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	4.10	+/-3.72	5.24	5.00	pCi/L		DXB5	03/27/08	1411	734339	1
Beta	U	-0.205	+/-1.58	3.25	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	-0.357	+/-0.598	1.33	3.00	pCi/L		BXF1	03/19/08	1405	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.414	+/-0.451	0.743	1.00	pCi/L		DXM2	03/14/08	1905	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			71	(15%-125%)

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Address : 3700 Industry Ave.
Suite 102
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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-ECHO ROCK
Sample ID: 203735007
Matrix: Water
Collect Date: 27-FEB-08 09:10
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		31.3	+/-8.60	5.09	5.00	pCi/L		DXB5	03/27/08	1410	734339	1
Beta		13.9	+/-3.92	4.28	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.986	+/-0.819	1.29	3.00	pCi/L		BXF1	03/19/08	1405	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		2.40	+/-0.663	0.594	1.00	pCi/L J FB-H		DXM2	03/14/08	1905	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			77	(15%-125%)

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16B38
Sample ID: 203735008
Matrix: Water
Collect Date: 27-FEB-08 11:05
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		35.4	+/-8.22	5.39	5.00	pCi/L		DXB5	03/27/08	1411	734339	1
Beta		25.0	+/-4.33	3.94	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		1.56	+/-0.993	1.51	3.00	pCi/L		BXF1	03/19/08	1405	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.200	+/-0.323	0.575	1.00	pCi/L		DXM2	03/14/08	1905	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			86	(15%-125%)

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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 27, 2008

Client Sample ID: DW-16T521
Sample ID: 203735009
Matrix: Water
Collect Date: 27-FEB-08 11:35
Receive Date: 28-FEB-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		62.9	+/-9.54	5.28	5.00	pCi/L		DXB5	03/27/08	1410	734339	1
Beta		28.7	+/-4.14	3.73	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		2.25	+/-1.05	1.45	3.00	pCi/L		BXF1	03/19/08	1405	734281	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.276	+/-0.337	0.568	1.00	pCi/L		DXM2	03/14/08	1905	733226	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			79	(15%-125%)

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Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: **Navajo Water Sampling T05-09-07-11-0001**

Report Date: March 25, 2008

Client Sample ID: DW-16T 334
Sample ID: 203966008
Matrix: Water
Collect Date: 28-FEB-08 11:12
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha	U	0.0124	+/-1.97	4.59	5.00	pCi/L		DXB5 03/24/08	1114	734312	1
Beta	U	0.470	+/-2.15	3.99	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228	U	0.0195	+/-0.879	1.68	3.00	pCi/L		BXF1 03/18/08	1532	734267	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226	U	0.110	+/-0.279	0.530	1.00	pCi/L		DXM2 03/13/08	1505	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			63	(15%-125%)

4-17-08

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: **Navajo Water Sampling T05-09-07-11-0001**

Report Date: March 25, 2008

Client Sample ID: DW-16T 334D
Sample ID: 203966009
Matrix: Water
Collect Date: 28-FEB-08 11:15
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha	U	-0.401	+/-2.26	5.00	5.00	pCi/L		DXB5 03/24/08	1114	734312	1
Beta	U	3.22	+/-2.36	3.72	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228	U	1.60	+/-1.17	1.83	3.00	pCi/L		BXF1 03/18/08	1532	734267	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226	U	0.474	+/-0.439	0.696	1.00	pCi/L		DXM 03/13/08 2	1535	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			64	(15%-125%)

4-17-08
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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
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Lakewood, California 90712
Contact: Ms. Mindy Song
Project: **Navajo Water Sampling T05-09-07-11-0001**

Report Date: March 25, 2008

Client Sample ID: DW-3A 155
Sample ID: 203966010
Matrix: Water
Collect Date: 29-FEB-08 13:15
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha		83.9	+/-10.1	4.88	5.00	pCi/L		DXB5 03/24/08	1114	734312	1
Beta		106	+/-6.33	3.21	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228	U	0.873	+/-0.799	1.28	3.00	pCi/L		BXF1 03/18/08	1532	734267	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226		3.08	+/-0.734	0.569	1.00	pCi/L		DXM2 03/13/08	1535	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			68	(15%-125%)

4-17-08
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Company : START 3 TEAM 9
Address : 3700 Industry Ave.
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Lakewood, California 90712
Contact: Ms. Mindy Song
Project: **Navajo Water Sampling T05-09-07-11-0001**

Report Date: March 25, 2008

Client Sample ID: DW-BADGER SPRING
Sample ID: 203966011
Matrix: Water
Collect Date: 29-FEB-08 14:35
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha		20.6	+/-6.99	4.04	5.00	pCi/L		DXB5 03/24/08	1114	734312	1
Beta		12.3	+/-3.86	4.58	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228		1.83	+/-0.804	1.06	3.00	pCi/L		BXF1 03/18/08	1532	734267	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226		2.65	+/-0.653	0.493	1.00	pCi/L		DXM 03/13/08 2	1535	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			88	(15%-125%)

4-17-08
DLO

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-5M74
Sample ID: 203966012
Matrix: Water
Collect Date: 29-FEB-08 11:50
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		21.5	+/-5.83	4.70	5.00	pCi/L		DXB5	03/24/08	1114	734312	1
Beta		10.7	+/-3.51	4.95	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.0256	+/-0.626	1.25	3.00	pCi/L		BXF1	03/18/08	1532	734267	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		3.54	+/-0.788	0.579	1.00	pCi/L		DXM2	03/13/08	1535	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			61	(15%-125%)

4-17-08
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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T0S-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-16-3-4
Sample ID: 203966013
Matrix: Water
Collect Date: 01-MAR-08 09:10
Receive Date: 04-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTPB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	3.15	+/-3.07	4.38	5.00	pCi/L UJ D-1		MXP1	03/24/08	1549	738751	1
Beta	U	0.286	+/-1.67	3.22	5.00	pCi/L UJ D-1						
GFPC, Ra228, Liquid												
Radium-228	U	0.463	+/-0.621	1.06	3.00	pCi/L		BXF1	03/18/08	1532	734267	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.259	+/-0.267	0.413	1.00	pCi/L		DXM2	03/13/08	1535	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			84	(15%-125%)

4-17-08
MD

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-ANNIE GREY
Sample ID: 203966014
Matrix: Water
Collect Date: 01-MAR-08 10:08
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		12.2	+/-3.68	3.49	5.00	pCi/L		DXB5	03/24/08	1114	734312	1
Beta		35.4	+/-3.74	2.70	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.566	+/-0.628	1.05	3.00	pCi/L		BXF1	03/18/08	1532	734267	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.948	+/-0.525	0.682	1.00	pCi/L		DXM2	03/13/08	1735	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			95	(15%-125%)

4-17-08

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Company : START 3 TEAM 9
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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-9T586
Sample ID: 203966015
Matrix: Water
Collect Date: 03-MAR-08 10:45
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		36.5	+/-6.47	3.76	5.00	pCi/L		DXB5	03/24/08	1114	734312	1
Beta		9.84	+/-2.60	3.24	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	-0.904	+/-1.46	2.83	3.00	pCi/L		BXF1	03/18/08	1532	734267	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		2.16	+/-0.639	0.486	1.00	pCi/L		DXM2	03/13/08	1735	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			56	(15%-125%)

4-17-08
DED

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-9K216
Sample ID: 203966016
Matrix: Water
Collect Date: 03-MAR-08 11:25
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		31.6	+/-5.54	3.90	5.00	pCi/L		DXB5	03/24/08	1114	734312	1
Beta		11.4	+/-2.50	2.79	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	1.73	+/-1.21	1.92	3.00	pCi/L		BXF1	03/18/08	1532	734267	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.958	+/-0.495	0.645	1.00	pCi/L		DXM2	03/13/08	1735	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			78	(15%-125%)

4-17-08
MD

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-9T550
Sample ID: 203966017
Matrix: Water
Collect Date: 03-MAR-08 12:10
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha		39.7	+/-8.14	3.76	5.00	pCi/L		DXB5 03/24/08	1114	734312	1
Beta		18.4	+/-3.52	3.00	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228	U	0.859	+/-0.916	1.52	3.00	pCi/L		BXF1 03/18/08	1538	734267	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226		5.35	+/-0.978	0.670	1.00	pCi/L		DXM2 03/13/08	1735	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			79	(15%-125%)

4-17-08
DKD

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 25, 2008

Client Sample ID: DW-FB-3/3/08
Sample ID: 203966018
Matrix: Water
Collect Date: 03-MAR-08 13:45
Receive Date: 04-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	-0.52	+/-0.700	2.09	5.00	pCi/L		DXB5	03/24/08	1114	734312	1
Beta	U	0.829	+/-1.40	2.45	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	1.22	+/-0.984	1.56	3.00	pCi/L		BXF1	03/18/08	1538	734267	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.361	+/-0.300	0.444	1.00	pCi/L		DXM2	03/13/08	1735	733225	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			69	(15%-125%)

4-17-08
JBD

Office of Enforcement

CHAIN OF CUSTODY RECORD

75 Hawthorne Street
San Francisco, California 94105

PROJ. NO.	PROJECT NAME
T05-09-02-11-00001	NAVAJO RADIATION ASSESSMENT

SAMPLERS: (Signature) Mollie Williams

STA. NO.	DATE 2008	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	GROSS α + β EPA 900.0	Ra-226 / Ra-228 EPA 903.1 / 904.0	REMARKS
	2/27	1540		X	DW-15B-2	3x1L	X	X	RESULTS TO: CARL PALLADINO 415-336-1556
		1420		X	DW-16-2-3		X	X	
		1620		X	DW-15T-560		X	X	
		1335		X	DW-16T-6-7		X	X	
	2/28	1035		X	DW-SM-UNKNOWN	3x1L	X	X	
		1200		X	DW-18K-301		X	X	
		1205		X	DW-18K-301D		X	X	
		1112		X	DW-16T334		X	X	
		1115		X	DW-16T334D		X	X	
	2/29	1315		X	DW-3A155		X	X	
		1135		X	DW-BADGER SPRING		X	X	
		1150		X	DW-SM74		X	X	
	3/1	0910		X	DW-16-3-4	4x1L	X	X	MS/MSD
		1008		X	DW-ANNIE GREY	3x1L	X	X	
	3/3	1045		X	DW-9T586	3x1L	X	X	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Mollie Williams	3/3/08 1630	FED-X			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	3/4/08 845	Mollie Smith			
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				FED-X 8/2 # 863057575887	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

9 29494

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

75 Hawthorne Street
San Francisco, California 94105

PROJ. NO. 105-09-04-11-0001

PROJECT NAME: NAVAJO RADIATION ASSESSMENT

SAMPLERS: (Signature) Mark Gallegos

STA. NO.	DATE 2008	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	GROSS α+β EPA 900.0	Ra-226, Ra-228 EPA 903.1 / 904.0	REMARKS
	3/3	1125		X	DW-9K216	3x1L	X	X	RESULTS TO: CARL ALLADINO 415-336-1556
	↓	1210		X	DW-9T330	↓	X	X	
	↓	1345		X	DW-FB-3/3/08	↓	X	X	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Mark Gallegos	3/3/08 1630	FED X			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	3/4/08 845	Mellie Smith			
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				FED-X a/l # 863057575887	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

9 29495

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

Laboratory: *General Engineering Laboratories LLC*	**Lab Project Number:** *204307*
Sampling Dates: *March 3rd - 5th, 2008*	**Sample Matrix:** *Water*
Analytical Method: *Gross Alpha and Gross Beta (E900), Radium-226 (E903.1 modified), and Radium-228 (E904.0 modified)*	**Data Reviewer:** *Sheri O'Connor*

REVIEW AND APPROVAL:

Data Reviewer: Sheri O'Connor — **Date:** 4/18/08
Technical QA Reviewer: — **Date:** 04/18/08
Project Manager: — **Date:**

SAMPLE IDENTIFICATION:

Sample No.	Sample I.D.	Laboratory I.D.
1	DW-8T522	204307001
2	DW-BABY ROCK SPRINGS	204307002
3	DW-SITE 15 CANE VALLEY	204307003
4	DW-SITE 4 CANE VALLEY	204307004
5	DW-SITE 6 CANE VALLEY	204307005
6	DW-SITE 8 CANE VALLEY	204307006
7	DW-SITE 16 CANE VALLEY	204307007
8	DW-MONUMENT PASS	204307008
9	DW-8K433	204307009
10	DW-10T241A	204307010
11	DW-4T518	204307011
12	DW-10R51B	204307012
13	DW-12T520	204307013
14	DW-12R125	204307014
15	DW-PROJECT-12-7-12	204307015
16	DW-COVE SPRINGS #1	204307016
17	DW-COVE SPRINGS #1D	204307017
18	DW-PROJECT-12-4-12	204307018
19	DW-FB-030508	204307019
20	DW-DRY SPRING	204307020
21	DW-3A155A	204307021
22	DW-DW-BADGER SPRING A	204307022
23	DW-PADDOCK	204307023

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

DATA PACKAGE COMPLETENESS CHECKLIST:

Checklist Code:

- X — Included: no problems
- * — Included: problems noted in review
- O — Not included and/or Not Available
- NR — Not Required
- RS — Provided As Re-submission

Case Narrative:

- X — Case Narrative present

Quality Control Summary Package:

- X — Data Summary sheets
- O — Initial and Continuing Calibration results
- X — Preparation Blank results
- X — Matrix Spike recoveries
- X — Matrix Duplicate results
- X — Laboratory Control Sample recoveries

Raw QC Data Package Section

- X — Chain-of-Custody Records
- X — Preparation Log
- X — Analysis Run Log

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

DATA VALIDATION SUMMARY

The data review was conducted in accordance with the Time-Critical Quality Assurance Sampling Plan (QASP) for Radiation Assessment of Unregulated Drinking Water Sources (February 2008) and using guidance the Science Applications International Corporation (SAIC), Laboratory Data Validation Guidelines For Evaluating Radionuclide Analyses, Revision 06, June 2000 (SAIC Document Number 143-ARCS-00.08) and evaluation of laboratory criteria, as applicable.

Indicate with a YES or NO whether each item is acceptable without qualification:

1	Holding Times	Yes
2	Initial and Continuing Calibrations	Not provided
3	Laboratory Control Sample	Yes
4	Matrix Spike	Yes
5	Blanks and Background Samples	Yes
6	Chemical Recovery	Yes
7	Duplicate Analyses	Yes
8	Analyte Quantitation	Yes
9	Overall Assessment of Data	Yes
10	Documentation of Laboratory Corrective Action	Yes

Comments:

The sample collection time was not listed on the sample containers for sample DW-MONUMENT PASS. The sample was logged with the sample collection time listed on the chain-of-custody (COC).

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

1. HOLDING TIMES

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable

Samples were extracted and analyzed within required holding times except as noted under Comments. In addition, no problems were identified with regard to sample preservation or custody unless specified. For those samples analyzed outside holding time requirements, the detected results have been qualified as estimated (J), and the nondetected results have been qualified either as estimated (UJ) or rejected (R) based on the reviewers judgement.

[redacted]

Comments:
None

2. INITIAL AND CONTINUING CALIBRATION VERIFICATION

__NA__ Acceptable
__NA__ Acceptable with qualification
__NA__ Unacceptable

The laboratory provided the gas flow proportional counter checks. However, the energy calibration and detector efficiency calibration were not provided in the data package and therefore, the calibrations could not be verified.

Comments:
None

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

3. LABORATORY CONTROL SAMPLE

__X__ **Acceptable**
_____ **Acceptable with qualification**
_____ **Unacceptable**
_____ **No Laboratory Control Samples Analyzed**

Laboratory control sample recoveries are used for a qualitative indication of accuracy (bias) independent of matrix effects. Spike recovery limits of 75% to 125% are specified in the QASP. For analytes which were outside these control limits, associated detected results are qualified as estimated (J) and the nondetect results are qualified (UJ). At the discretion of the reviewer, other limits may be used only if justification can be provided.

Comments:
All recoveries were within the acceptance limits.

4. MATRIX SPIKE

__X__ **Acceptable**
_____ **Acceptable with qualification**
_____ **Unacceptable**
_____ **No Matrix Spikes Analyzed**

Matrix spike recoveries are used for a qualitative indication of accuracy (bias) due to matrix effects. Spike recovery limits of 75% to 125% are specified in the QASP. Per SAIC guidance, if the spike recovery is <50% (<40% for solids) or >120% (>130% for solids), qualify the results for that radionuclide for associated samples as estimated (J).

Comments:
MS/MSD analyses were performed on samples DW-BABY ROCK SPRINGS and DW-PROJECT-12-4-12 for Gross Alpha and Gross Beta, samples DW-PROJECT-12-4-12 and DW-FB-030508 for Radium-228, and samples DW-PROJECT-12-4-12 and DW-3A155A for Radium-226. Sample DW-FB-030508 was not considered appropriate for assessing accuracy for Radium-228 as this is a field blank and not a site sample.

The MS/MSD recoveries were within the acceptance limits.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

5. BLANKS AND BACKGROUND SAMPLES

__X__ Acceptable
_____ Detection Limits Adjusted

The following blanks were analyzed:
__X__ Method (preparation) Blanks
__X__ Field Blanks
_____ Calibration Blanks
_____ Rinsate Blanks
_____ Background Samples

Preparation (method) blanks were prepared for each batch of samples extracted. A preparation blank was analyzed after every continuing calibration standard, prior to sample analysis unless noted below. Per SAIC guidance, all results for all associated samples that are less than 10 times the blank (method or field blank) value are qualified as estimated (J).

Comments:
No target analytes were detected in the method blank or field blank (DW-FB-030508).

6. CHEMICAL RECOVERY

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable
_____ No chemical recovery analyzed

Chemical recoveries for samples were evaluated per SAIC guidance. Recoveries of 50-100% are considered acceptable. Abnormally low recoveries can cause large uncertainty in affected sample results. Recoveries greater than 100% may add negative bias of at least the amount greater than 100%. If the recovery is >10% and <50% or >100% and <110%, qualify the results as estimated (J/UJ). If the recovery is less than 10% qualify the data as unusable. If the recovery is >110%, professional judgment should be used to assign the qualification of estimated or unusable.

Comments:
All chemical recoveries were within the acceptance limits.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

7. DUPLICATE ANALYSES

__X__ **Acceptable**
_____ **Acceptable with qualification**
_____ **Unacceptable**
_____ **No Duplicates Analyzed**

Type of duplicates analyzed:
__X__ **Field Duplicates**
__X__ **Laboratory Duplicates**

Calculate the Relative Error Ratio (RER) between the results of the duplicate pair using the equation indicated below. Qualify the results as estimated (J) for any analyte whose RER exceeds 1 per SAIC guidance.

[redacted]

Comments:
Laboratory Duplicate: The laboratory duplicate analyses were performed on samples DW-BABY ROCK SPRINGS and DW-PROJECT-12-4-12 for Gross Alpha and Gross Beta, samples DW-PROJECT-12-4-12 and DW-FB-030508 for Radium-228, and samples DW-PROJECT-12-4-12 and DW-3A155A for Radium-226. Sample DW-FB-030508 was not considered appropriate for assessing precision for Radium-228 as this is a field blank and not a site sample. The RER was ≤1 for all applicable laboratory duplicates.

Matrix Spike/Matrix Spike Duplicate: The RERs between the MS and MSD for gross alpha and gross beta were ≤1.

Field Duplicate: The field duplicate pair reported in this package is DW-COVE-SPRING #1/DW-COVE-SPRING #1D. As no criteria are provided in the QASP or SAIC guidance for RERs for field duplicate results, the reviewer used a criterion of ≤2. The RERs for the field duplicate results satisfied this criterion.

ANALYTICAL DATA REVIEW SUMMARY
Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

8. ANALYTE QUANTITATION

Confirm that analyte quantitation was performed correctly using the following formulas:

Comments:
Ten percent of the detected sample results were recalculated and the reported activities were confirmed within ±10%.

For radium-226, sample DW-8K433 was degassed and recounted to verify the activity.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

9. OVERALL ASSESSMENT OF DATA

On the basis of this review, the following determination has been made with regard to the overall data usability for the specified level.

__X__ **Acceptable**
_____ **Acceptable with Qualification**
_____ **Rejected**

Accepted data meet the minimum requirements for the following EPA data category:
_____ **ERS Screening**
_____ **Non-definitive with 10 % Conformation by Definitive Methodology**
_____ **Definitive, Comprehensive Statistical Error Determination was performed.**
__X__ **Definitive, Comprehensive Statistical Error Determination was not performed.**

Any qualifications to individual sample analysis results are detailed in the appropriate section above or appear under the comments section below. In cases where several QC criteria are out of specification, it may be appropriate to further qualify the data usability. The data reviewer must use professional judgment and express concerns and comments on the data validity for each specific data package.

Comments:
The detection limits for gross alpha, gross beta, and radium-228 were above the reporting limits listed in the QASP. This is not considered to affect the usability of the data as all the detection limits reported are less then the proposed action levels.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

10. DOCUMENTATION OF LABORATORY CORRECTIVE ACTION

Problem:
None

Resolution:

Attached are copies of all data summary sheets, with data qualifiers indicated, and a copy of the chain of custody for the samples.

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-97-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-8T522
Sample ID: 204307001
Matrix: Water
Collect Date: 03-MAR-08 18:25
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		16.5	+/-6.17	4.43	5.00	pCi/L		DXB5	03/20/08	1211	735024	1
Beta		8.66	+/-2.95	3.19	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.685	+/-0.757	1.26	3.00	pCi/L		BXF1	03/25/08	1925	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.268	+/-0.268	0.433	1.00	pCi/L		DXM2	03/25/08	1455	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			92	(15%-125%)

4/11/08 SRL

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-87-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-BABY ROCK SPRINGS
Sample ID: 204307002
Matrix: Water
Collect Date: 04-MAR-08 09:15
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		8.43	+/-3.92	3.66	5.00	pCi/L		DXB5	03/20/08	1211	735024	1
Beta	U	0.941	+/-1.94	3.42	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.631	+/-0.609	0.982	3.00	pCi/L		BXP1	03/25/08	1925	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.535	+/-0.285	0.376	1.00	pCi/L		DXM2	03/25/08	1455	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			93	(15%-125%)

4/16/08

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-SITE 15 CANE VALLEY
Sample ID: 204307003
Matrix: Water
Collect Date: 04-MAR-08 11:00
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	1.89	+/-2.77	4.73	5.00	pCi/L		DXB5	03/20/08	1212	735024	1
Beta		6.05	+/-2.38	3.27	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.574	+/-0.708	1.20	3.00	pCi/L		BXF1	03/25/08	1925	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.730	+/-0.297	0.339	1.00	pCi/L		DXM2	03/25/08	1455	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			88	(15%-125%)

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-SITE 4 CANE VALLEY
Sample ID: 204307004
Matrix: Water
Collect Date: 04-MAR-08 12:05
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GPPC, Gross A/B, liquid												
Alpha	U	4.45	+/-3.54	4.67	5.00	pCi/L		DXB5	03/26/08	1605	735027	1
Beta	U	2.24	+/-2.25	3.63	5.00	pCi/L						
GPPC, Ra228, Liquid												
Radium-228	U	0.568	+/-0.916	1.59	3.00	pCi/L		BXF1	03/25/08	1925	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.127	+/-0.232	0.424	1.00	pCi/L		DXM2	03/25/08	1455	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GPPC, Ra228, Liquid			88	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-SITE 6 CANE VALLEY
Sample ID: 204307005
Matrix: Water
Collect Date: 04-MAR-08 12:30
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		6.04	+/-3.79	3.95	5.00	pCi/L		DXB5	03/26/08	1605	735027	1
Beta	U	2.60	+/-2.38	3.76	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	1.35	+/-0.898	1.36	3.00	pCi/L		BXP1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.253	+/-0.175	0.233	1.00	pCi/L		DXM2	03/25/08	1455	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			86	(15%-125%)

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-SITE 8 CANE VALLEY
Sample ID: 204307006
Matrix: Water
Collect Date: 04-MAR-08 13:10
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst Date	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha	U	2.78	+/-3.07	4.71	5.00	pCi/L		DXB5 03/26/08	1605	735027	1
Beta		5.18	+/-3.19	4.81	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228	U	0.580	+/-0.799	1.37	3.00	pCi/L		BXF1 03/25/08	1926	734288	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226	U	0.157	+/-0.205	0.350	1.00	pCi/L		DXM 03/25/08 2	1610	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			87	(15%-125%)

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: **Navajo Water Sampling T05-09-07-11-0001**

Report Date: March 28, 2008

Client Sample ID: DW-SITE 16 CANE VALLEY
Sample ID: 204307007
Matrix: Water
Collect Date: 04-MAR-08 14:20
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		6.80	+/-3.79	4.90	5.00	pCi/L		DXB5	03/26/08	1605	735027	1
Beta	U	1.65	+/-1.70	2.70	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.343	+/-0.826	1.48	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.905	+/-0.307	0.278	1.00	pCi/L		DXM2	03/25/08	1610	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			82	(15%-125%)

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T85-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-MONUMENT PASS
Sample ID: 204307008
Matrix: Water
Collect Date: 04-MAR-08 15:22
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		42.5	+/-10.1	4.76	5.00	pCi/L		DXB5	03/26/08	1605	735027	1
Beta		22.6	+/-4.47	3.35	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.0275	+/-0.983	1.80	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.0867	+/-0.134	0.240	1.00	pCi/L		DXM2	03/25/08	1610	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			96	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
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Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-8K433
Sample ID: 204307009
Matrix: Water
Collect Date: 04-MAR-08 16:38
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		128	+/-14.7	4.95	5.00	pCi/L		DXB5	03/26/08	1605	735027	1
Beta		62.0	+/-5.77	2.63	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.948	+/-1.05	1.75	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		8.62	+/-0.861	0.170	1.00	pCi/L		DXM2	03/25/08	1610	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			73	(15%-125%)

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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-10T241A
Sample ID: 204307010
Matrix: Water
Collect Date: 04-MAR-08 15:04
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha		28.1	+/-5.54	6.36	5.00	pCi/L		DXB5 03/26/08	2001	735027	1
Beta		9.11	+/-2.68	3.98	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228	U	0.390	+/-0.679	1.20	3.00	pCi/L		BXF1 03/25/08	1926	734288	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226	U	0.0616	+/-0.175	0.332	1.00	pCi/L		DXM2 03/25/08	1610	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			94	(15%-125%)

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Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-4T518
Sample ID: 204307011
Matrix: Water
Collect Date: 04-MAR-08 12:29
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	1.83	+/-1.96	3.13	5.00	pCi/L		DXB5	03/26/08	2001	735027	1
Beta		4.15	+/-1.86	2.89	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	-0.193	+/-0.651	1.29	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.524	+/-0.271	0.353	1.00	pCi/L		DXM2	03/25/08	1750	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			98	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-10R51B
Sample ID: 204307012
Matrix: Water
Collect Date: 04-MAR-08 11:35
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		32.3	+/-8.55	9.19	5.00	pCi/L		DXB5	03/26/08	2001	735027	1
Beta		17.9	+/-5.57	8.25	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.684	+/-0.746	1.24	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.236	+/-0.184	0.264	1.00	pCi/L		DXM2	03/25/08	1750	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			92	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-12T520
Sample ID: 204307013
Matrix: Water
Collect Date: 05-MAR-08 09:50
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	-1.43	+/-2.54	5.21	5.00	pCi/L		DXB5	03/26/08	2001	735027	1
Beta		7.32	+/-2.59	3.85	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		3.15	+/-1.22	1.69	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		1.24	+/-0.359	0.307	1.00	pCi/L		DXM2	03/25/08	1750	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			94	(15%-125%)

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Company: START 3 TEAM 9
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Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-12R125
Sample ID: 204307014
Matrix: Water
Collect Date: 04-MAR-08 11:20
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		12.9	+/-4.13	4.74	5.00	pCi/L		DXB5	03/26/08	1853	735027	1
Beta		2.84	+/-1.77	2.73	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		1.37	+/-0.733	1.02	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.605	+/-0.288	0.362	1.00	pCi/L		DXM2	03/25/08	1750	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			97	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-PROJECT-12-7-12
Sample ID: 204307015
Matrix: Water
Collect Date: 04-MAR-08 11:58
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		44.3	+/-3.54	1.89	5.00	pCi/L		DXB5	03/26/08	2001	735027	1
Beta		21.0	+/-1.55	1.40	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.824	+/-0.787	1.29	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.400	+/-0.237	0.322	1.00	pCi/L		DXM2	03/25/08	1750	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			94	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-COVE SPRINGS #1
Sample ID: 204307016
Matrix: Water
Collect Date: 04-MAR-08 12:40
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		18.9	+/-2.40	1.46	5.00	pCi/L		DXB5	03/26/08	2001	735027	1
Beta		7.69	+/-1.32	1.79	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	1.09	+/-0.865	1.38	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.628	+/-0.267	0.209	1.00	pCi/L		DXM2	03/25/08	1945	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			96	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T0S-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-COVE SPRINGS #1D
Sample ID: 204307017
Matrix: Water
Collect Date: 04-MAR-08 12:44
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		16.7	+/-2.28	1.43	5.00	pCi/L		DXB5	03/26/08	2001	735027	1
Beta		10.9	+/-1.20	1.21	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.248	+/-0.566	1.03	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.486	+/-0.252	0.310	1.00	pCi/L		DXM2	03/25/08	1945	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			95	(15%-125%)

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Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
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Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-PROJECT-12-4-12
Sample ID: 204307018
Matrix: Water
Collect Date: 04-MAR-08 13:37
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	1.18	+/-1.89	3.41	5.00	pCi/L		DXB5	03/27/08	0939	735027	1
Beta	U	0.0631	+/-1.73	3.39	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		1.17	+/-0.745	1.09	3.00	pCi/L		BXF1	03/25/08	1926	734288	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.566	+/-0.277	0.346	1.00	pCi/L		DXM2	03/25/08	1945	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			90	(15%-125%)

4/16/08
MD

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-FB-030508
Sample ID: 204307019
Matrix: Water
Collect Date: 04-MAR-08 15:00
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	0.440	+/-1.73	3.60	5.00	pCi/L		DXB5	03/26/08	1817	735027	1
Beta	U	-0.124	+/-1.71	3.35	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.749	+/-0.587	0.908	3.00	pCi/L		BXF1	03/25/08	1550	734293	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.143	+/-0.186	0.316	1.00	pCi/L		DXM2	03/25/08	1945	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			86	(15%-125%)

4/16/08
BRO

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-DRY SPRING
Sample ID: 204307020
Matrix: Water
Collect Date: 04-MAR-08 11:04
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		13.5	+/-4.92	4.52	5.00	pCi/L		DXB5	03/26/08	1852	735027	1
Beta		9.35	+/-2.99	3.84	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		1.09	+/-0.575	0.773	3.00	pCi/L		BXF1	03/25/08	1550	734293	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.126	+/-0.184	0.321	1.00	pCi/L		DXM 2	03/25/08	1945	734398	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			94	(15%-125%)

4/16/08

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-3A155A
Sample ID: 204307021
Matrix: Water
Collect Date: 04-MAR-08 12:15
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		56.8	+/-10.8	4.90	5.00	pCi/L		DXB5	03/27/08	0939	735027	1
Beta		33.7	+/-4.80	2.90	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.554	+/-0.505	0.802	3.00	pCi/L		BXF1	03/25/08	1550	734293	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		3.35	+/-0.805	0.677	1.00	pCi/L		DXM2	03/20/08	1355	734399	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			91	(15%-125%)

4/16/08
SRO

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-DW-BADGER SPRING A
Sample ID: 204307022
Matrix: Water
Collect Date: 04-MAR-08 12:58
Receive Date: 07-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		22.9	+/-6.28	4.74	5.00	pCi/L		DXB5	03/27/08	0939	735027	1
Beta		10.6	+/-2.86	3.29	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.623	+/-0.603	0.985	3.00	pCi/L		BXF1	03/25/08	1550	734293	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.794	+/-0.426	0.514	1.00	pCi/L		DXM2	03/20/08	1355	734399	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			96	(15%-125%)

4/16/08
DMD

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: **Navajo Water Sampling T05-09-07-11-0001**

Report Date: March 28, 2008

Client Sample ID: DW-PADDOCK
Sample ID: 204307023
Matrix: Water
Collect Date: 04-MAR-08 13:54
Receive Date: 07-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		42.2	+/-10.0	4.66	5.00	pCi/L		DXB5	03/27/08	0939	735027	1
Beta		18.7	+/-4.21	3.85	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	-0.0203	+/-0.763	1.42	3.00	pCi/L		BXF1	03/25/08	1550	734293	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		0.894	+/-0.410	0.430	1.00	pCi/L		DXM2	03/20/08	1355	734399	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			90	(15%-125%)

4/16/08 DLW

Page: 1 of 3
Project #: 125-09-07-LC-0001
GEL Quote #:
COC Number [1]:
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 204307

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: DRS-TEAM 9 MINDY SONG
Phone #: 415-828-9356
Project/Site Name: NAVAJO RADIATION ASSESSMENT
Fax #:
Address:
Collected by:
Send Results To: CARL PALLADINO 415 336 1556

Sample Analysis Requested [3] (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code [2]	Field Filtered [3]	Sample Matrix [4]	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	Gross Alpha EPA 900.0	Ra-226/228 EPA 903.1/904.0	<-- Preservative Type (6)	Comments
DW-8T522	3/3/08	1825	3X	1	2				X	X		Note: extra sample is required for sample specific QC
DW-BABY ROCK SPRINGS	3/4/08	0915							X	X		
DW-SITE 15 CANE VALLEY		1100							X	X		
DW-SITE 4 CANE VALLEY		1205							X	X		
DW-SITE 6 CANE VALLEY		1230							X	X		
DW-SITE 8 CANE VALLEY		1310							X	X		
DW-SITE 16 CANEVALLEY		1420							X	X		
DW-MONUMENT PASS		1522							X	X		
DW-8K433		1638							X	X		
DW-10T241A	↓	1504		↓					X	X		

TAT Requested: Normal: Rush: Specify: (Subject to Surcharge) Fax Results: Yes / No
Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards

Sample Collection Time Zone: Eastern / Central / Mountain / Pacific / Other

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	3/6/08	730	1 FEDEX		
2			2	3/9/08	9:45
3			3		

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment: Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: 3 C

WHITE = LABORATORY YELLOW = FILE PINK = CLIENT

Page: 2 of 3
Project #: URS-09-03-11-0001
GEL Quote #:
COC Number [1]:
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 204307

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: URS-TEAM 9 MINDY SONG
Phone #: 415-828-9556
Project/Site Name: NAVAJO RADIATION ASSESSMENT
Address:
Collected by:
Send Results To: CARL PALLADINO 415-336-1556

Sample Analysis Requested [3] (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code [2]	Field Filtered [3]	Sample Matrix [4]	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	6010B 7470A 9040B	Ra-226 9315/7128	E900 9035/7140	← Preservative Type (6)	Comments Note: extra sample is required for sample specific QC
DW-4T518	3/4/08	1229	3X	1L.					X	X			
DW-10R51B	↓	1135		↓					X	X			
DW-12T520	3/5/08	0950							X	X			
DW-12R125		1120							X	X			
DW-PROJECT-12-7-12		1158							X	X			
DW-COVE SPRINGS #1		1240							X	X			
DW-COVESPRINGS#1D		1244		↓					X	X			
DW-PROJECT-12-4-12		1337	4X	1L.					X	X			MS/MSD
DW-FB-030508		1500	3X	1L.					X	X			
DW-DRY SPRING	↓	1104	3X	1L.					X	X			

TAT Requested: Normal: Rush: Specify: (Subject to Surcharge) Fax Results: Yes / No Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards

Sample Collection Time Zone: Eastern Pacific Central Other _____ Mountain

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	3/6/08	930	1 FEDEX		
2			2	3/7/08	9:45
3			3		

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment: Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate. If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: 3 °C

WHITE = LABORATORY YELLOW = FILE PINK = CLIENT

Page: 3 of 3
Project #: TDS-09-07-11-0001
GEL Quote #:
COC Number [1]:
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 204307

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: URS-TEAM 9 MINDY SOOLE
Phone #: 415-820-9356
Project/Site Name: NAVAJO RADIATION ASSESSMENT
Fax #:
Address:
Collected by:
Send Results To: CARL PALLADINO 415-336-1556

Sample Analysis Requested [5] (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code [2]	Field Filtered [3]	Sample Matrix [4]	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	Gross α+β EPA 900.0	Ra-226/228 EPA 903.1/904.0	<-- Preservative Type (6)	Comments
DW-3A155A	3-5-08	1125	3X	1L					X	X		Note: extra sample is required for sample specific QC
DW-BADGER SPRING-A	↓	1258		↓					X	X		
DW-PADDOCK	↓	1354		↓					X	X		

TAT Requested: Normal: Rush: Specify: (Subject to Surcharge)
Fax Results: Yes / No
Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards

Sample Collection Time Zone: Eastern Pacific Central Other _____ Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	[signature]	3/6/08	930	FEDEX		
2				[signature]	3/7/08	7:45
3						

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment:
Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, P=Paint, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: 2 °C

WHITE = LABORATORY YELLOW = FILE PINK = CLIENT

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

Laboratory: *General Engineering Laboratories LLC*	**Lab Project Number:** *204360*
Sampling Dates: *March 7th, 2008*	**Sample Matrix:** *Water*
Analytical Method: *Gross Alpha and Gross Beta (E900), Radium-226 (E903.1 modified), and Radium-228 (E904.0 modified)*	**Data Reviewer:** *Sheri O'Connor*

REVIEW AND APPROVAL:

Data Reviewer: Sheri O'Connor — **Date:** 4/18/08
Technical QA Reviewer: [signature] — **Date:** 04/18/8
Project Manager: _____ — **Date:** _____

SAMPLE IDENTIFICATION:

Sample No.	Sample I.D.	Laboratory I.D.
1	DW-14K-313	204360001
2	DW-15K-303	204360002
3	DW-14T-586	204360003
4	DW-FB-030708	204360004
5		
6		
7		
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9		
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11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

DATA PACKAGE COMPLETENESS CHECKLIST:

Checklist Code:

- X — Included: no problems
- * — Included: problems noted in review
- O — Not Included and/or Not Available
- NR — Not Required
- RS — Provided As Re-submission

Case Narrative:

- X — Case Narrative present

Quality Control Summary Package:

- X — Data Summary sheets
- O — Initial and Continuing Calibration results
- X — Preparation Blank results
- * — Matrix Spike recoveries
- * — Matrix Duplicate results
- X — Laboratory Control Sample recoveries

Raw QC Data Package Section

- X — Chain-of-Custody Records
- X — Preparation Log
- X — Analysis Run Log

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

DATA VALIDATION SUMMARY

The data review was conducted in accordance with the Time-Critical Quality Assurance Sampling Plan (QASP) for Radiation Assessment of Unregulated Drinking Water Sources (February 2008) and using guidance from the Science Applications International Corporation (SAIC), Laboratory Data Validation Guidelines For Evaluating Radionuclide Analyses, Revision 06, June 2000 (SAIC Document Number 143-ARCS-00.08) and evaluation of laboratory criteria, as applicable.

Indicate with a YES or NO whether each item is acceptable without qualification:

1	Holding Times	Yes
2	Initial and Continuing Calibrations	Not provided
3	Laboratory Control Sample	Yes
4	Matrix Spike	No
5	Blanks and Background Samples	Yes
6	Chemical Recovery	Yes
7	Duplicate Analyses	No
8	Analyte Quantitation	Yes
9	Overall Assessment of Data	Yes
10	Documentation of Laboratory Corrective Action	Yes

Comments:

One of sample containers was missing for sample DW-14K 313. However, one sample container was received with sample ID DW-1KK131 and the sample container should have been labeled DW-14K 313.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

1. HOLDING TIMES

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable

Samples were extracted and analyzed within required holding times except as noted under Comments. In addition, no problems were identified with regard to sample preservation or custody unless specified. For those samples analyzed outside holding time requirements, the detected results have been qualified as estimated (J), and the nondetected results have been qualified either as estimated (UJ) or rejected (R) based on the reviewers judgement.

Comments:
None

2. INITIAL AND CONTINUING CALIBRATION VERIFICATION

__NA__ Acceptable
__NA__ Acceptable with qualification
__NA__ Unacceptable

The laboratory provided the gas flow proportional counter checks. However, the energy calibration and detector efficiency calibration were not provided in the data package and therefore, the calibrations could not be verified.

Comments:
None

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

3. LABORATORY CONTROL SAMPLE

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable
_____ No Laboratory Control Samples Analyzed

Laboratory control sample recoveries are used for a qualitative indication of accuracy (bias) independent of matrix effects. Spike recovery limits of 75% to 125% are specified in the QASP. For analytes which were outside these control limits, associated detected results are qualified as estimated (J) and the nondetect results are qualified (UJ). At the discretion of the reviewer, other limits may be used only if justification can be provided.

Comments:
All recoveries were within the acceptance limits.

4. MATRIX SPIKE

_____ Acceptable
__X__ Acceptable with qualification
_____ Unacceptable
_____ No Matrix Spikes Analyzed

Matrix spike recoveries are used for a qualitative indication of accuracy (bias) due to matrix effects. Spike recovery limits of 75% to 125% are specified in the QASP. Per SAIC guidance, if the spike recovery is <50% (<40% for solids) or >120% (>130% for solids), qualify the results for that radionuclide for associated samples as estimated (J).

Comments:
MS/MSD analyses performed on sample DW-14K 313 for Gross Alpha and Gross Beta. MS analyses performed on sample DW-14K 313 for Radium-228 and Radium-226.

With the exception of the recoveries for gross alpha, the MS/MSD recoveries were within the acceptance limits. The MS and MSD recoveries for gross alpha for sample DW-14K 313 were below the acceptance range of 75-125% with recoveries of 50% and 60%. As these are the only MS and MSD results reported in this package, the gross alpha results for all site samples were qualified as estimated.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

5. BLANKS AND BACKGROUND SAMPLES

__X__ Acceptable
_____ Detection Limits Adjusted

The following blanks were analyzed:
__X__ Method (preparation) Blanks
__X__ Field Blanks
_____ Calibration Blanks
_____ Rinsate Blanks
_____ Background Samples

Preparation (method) blanks were prepared for each batch of samples extracted. A preparation blank was analyzed after every continuing calibration standard, prior to sample analysis unless noted below. Per SAIC guidance, all results for all associated samples that are less than 10 times the blank (method or field blank) value are qualified as estimated (J).

Comments:
No target analytes were detected in the method blank or field blank.

6. CHEMICAL RECOVERY

__X__ Acceptable
_____ Acceptable with qualification
_____ Unacceptable
_____ No chemical recovery analyzed

Chemical recoveries for samples were evaluated per SAIC guidance. Recoveries of 60-100% are considered acceptable. Abnormally low recoveries can cause large uncertainly in affected sample results. Recoveries greater than 100% may add negative bias of at least the amount greater than 100%. If the recovery is >10% and <50% or >100% and <110%, qualify the results as estimated (J/UJ). If the recovery is less than 10% qualify the data as unusable. If the recovery is >110%, professional judgment should be used to assign the qualification of estimated or unusable.

Comments:
All chemical recoveries were within the acceptance limits.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

7. DUPLICATE ANALYSES

____ Acceptable
__X__ Acceptable with qualification
____ Unacceptable
____ No Duplicates Analyzed

Type of duplicates analyzed:
____ Field Duplicates
__X__ Laboratory Duplicates

Calculate the Relative Error Ratio (RER) between the results of the duplicate pair using the equation indicated below. Qualify the results as estimated (J) for any analyte whose RER exceeds 1 per SAIC guidance.

Comments:
Lab Duplicate: The results for the laboratory duplicate performed on sample DW-14K 313 were reported as nondetect.

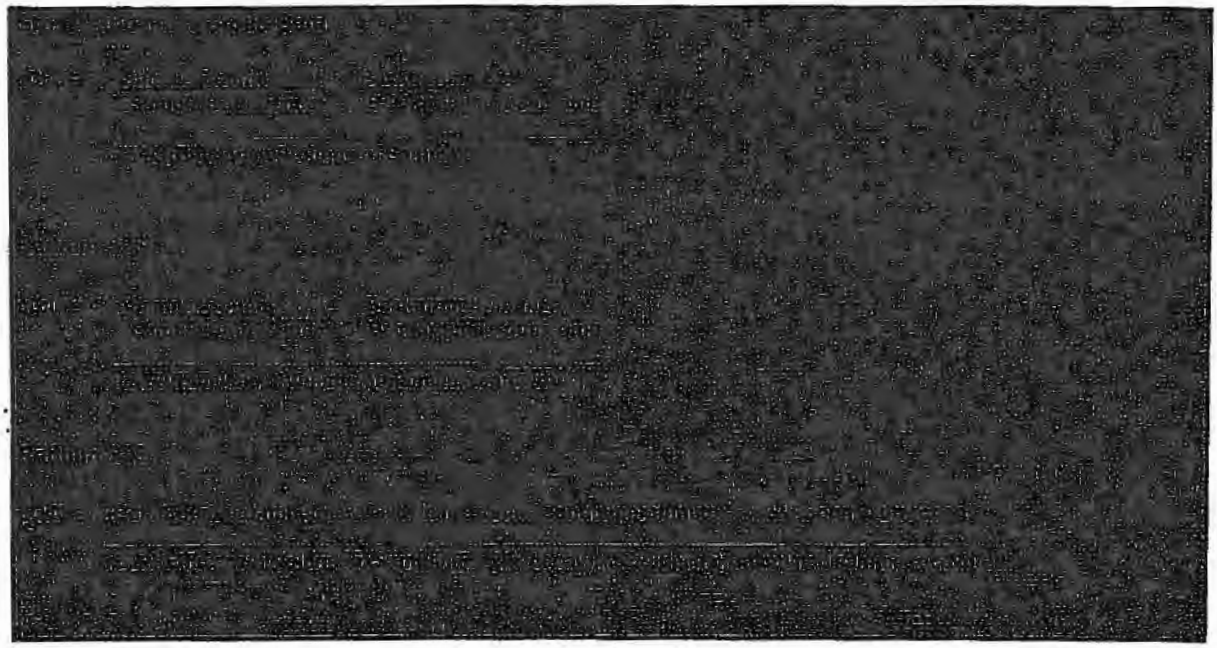
Matrix Spike/Matrix Spike Duplicate: The RER between the MS and MSD for gross beta for sample DW-14K 313 exceeded the SAIC evaluation criterion of ≤1 with a RER of 1.2. Therefore, the gross beta results for all site samples were qualified as estimated.

ANALYTICAL DATA REVIEW SUMMARY
Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

8. ANALYTE QUANTITATION

Confirm that analyte quantitation was performed correctly using the following formulas:



Comments:
Ten percent of the detected sample results were recalculated and the reported activities were confirmed within ±10%.

For gross alpha and gross beta, sample DW-14K 313 and the duplicate were recounted due to high RER. The recounted results were reported.

For radium-228, the method blank was recounted due to a suspected blank false positive result. The recounted method blank result was reported.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

9. OVERALL ASSESSMENT OF DATA

On the basis of this review, the following determination has been made with regard to the overall data usability for the specified level.

_____ **Acceptable**
__X__ **Acceptable with Qualification**
_____ **Rejected**

Accepted data meet the minimum requirements for the following EPA data category:
_____ **ERS Screening**
_____ **Non-definitive with 10 % Conformation by Definitive Methodology**
_____ **Definitive, Comprehensive Statistical Error Determination was performed.**
__X__ **Definitive, Comprehensive Statistical Error Determination was not performed.**

Any qualifications to individual sample analysis results are detailed in the appropriate section above or appear under the comments section below. In cases where several QC criteria are out of specification, it may be appropriate to further qualify the data usability. The data reviewer must use professional judgment and express concerns and comments on the data validity for each specific data package.

Comments:
The gross alpha required detection limit for sample DW-15K-303 was not met due to low sample volume. More sample volume could not be used due to exceeding the maximum net weight limit. The sample was counted for 500 minutes. The gross alpha result for this sample was reported as nondetect at an elevated detection limit. The gross alpha detection limit of 8.47 pCi/L for this sample is below the proposed action limit of 15 pCi/L in the QASP. Therefore, the elevated detection limit is not considered to affect the usability of the data with respect to the project objectives.

The detection limits for gross alpha, gross beta, and radium-228 were above the reporting limits listed in the QASP. This is not considered to affect the usability of the data as all the detection limits reported are less then the proposed action levels.

Several samples for gross alpha and gross beta were recounted to due to either high or low recoveries. This is not considered to affect the usability of the data as the recounted data were reported with acceptable recoveries.

ANALYTICAL DATA REVIEW SUMMARY

Tier 2 Validation

Site Name: *Navajo Water Sampling*	**Location:** *Navajo Radiation Assessment*
Project TDD Number: *T05-09-07-11-0001*	**PAN:** *Not provided*

10. DOCUMENTATION OF LABORATORY CORRECTIVE ACTION

Problem:
None

Resolution:

Attached are copies of all data summary sheets, with data qualifiers indicated, and a copy of the chain of custody for the samples.

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-14K 313
Sample ID: 204360001
Matrix: Water
Collect Date: 07-MAR-08 08:35
Receive Date: 10-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	4.25	+/-3.51	4.96	5.00	pCi/L		DXB5	03/25/08	1040	736488	1
Beta	U	4.40	+/-3.02	4.72	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228		1.31	+/-0.782	1.12	3.00	pCi/L		BXF1	03/27/08	1215	736482	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.288	+/-0.276	0.440	1.00	pCi/L		DXM2	03/17/08	1735	735004	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			75	(15%-125%)

4/16/08

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

Certificate of Analysis

Company: START 3 TEAM 9
Address: 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-15K-303
Sample ID: 204360002
Matrix: Water
Collect Date: 07-MAR-08 10:02
Receive Date: 10-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proportional Counting											
GFPC, Gross A/B, liquid											
Alpha	U	0.895	+/-4.80	8.47	5.00	pCi/L		DXB5 03/24/08	2032	736488	1
Beta		13.8	+/-3.62	5.30	5.00	pCi/L					
GFPC, Ra228, Liquid											
Radium-228		3.73	+/-1.16	1.32	3.00	pCi/L		BXF1 03/27/08	1215	736482	2
Rad Radium-226											
Lucas Cell, Ra226, liquid											
Radium-226		1.19	+/-0.424	0.459	1.00	pCi/L		DXM2 03/17/08	1735	735004	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			68	(15%-125%)

4-16-08

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-14T-586
Sample ID: 204360003
Matrix: Water
Collect Date: 07-MAR-08 10:57
Receive Date: 10-MAR-08
Collector: Client

Project: CTEE00208
Client ID: CTEE002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha		4.45	+/-2.48	3.57	5.00	pCi/L J MBL		DXB5	03/24/08	2032	736488	1
Beta		7.85	+/-2.12	3.05	5.00	pCi/L J D-L						
GFPC, Ra228, Liquid												
Radium-228		2.25	+/-0.746	0.810	3.00	pCi/L		BXF1	03/27/08	1215	736482	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226		1.19	+/-0.376	0.340	1.00	pCi/L		DXM 2	03/17/08	1735	735004	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			93	(15%-125%)

4-16-08 DLO

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

Certificate of Analysis

Company : START 3 TEAM 9
Address : 3700 Industry Ave.
Suite 102
Lakewood, California 90712
Contact: Ms. Mindy Song
Project: Navajo Water Sampling T05-09-07-11-0001

Report Date: March 28, 2008

Client Sample ID: DW-FB-030708
Sample ID: 204360004
Matrix: Water
Collect Date: 07-MAR-08 12:30
Receive Date: 10-MAR-08
Collector: Client

Project: CTEB00208
Client ID: CTEB002

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid												
Alpha	U	0.807	+/-0.882	1.46	5.00	pCi/L		DXB5	03/24/08	2059	736488	1
Beta	U	-0.443	+/-0.794	1.42	5.00	pCi/L						
GFPC, Ra228, Liquid												
Radium-228	U	0.657	+/-0.623	1.00	3.00	pCi/L		BXF1	03/27/08	1215	736482	2
Rad Radium-226												
Lucas Cell, Ra226, liquid												
Radium-226	U	0.544	+/-0.377	0.550	1.00	pCi/L		DXM2	03/17/08	1815	735004	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 900.0	
2	EPA 904.0 Modified	
3	EPA 903.1 Modified	

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid			79	(15%-125%)

4/16/08 JRO

Page: 1 of 1
Project #:
GEL Quote #:
COC Number [1]:
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number: 204360

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: URS - TEAM 9 MINDY SONG Phone #: 415-828-9556

Project/Site Name: NAVAJO RADIATION ASSESSMENT Fax #:

Address:

Collected by: NS Send Results To: CARL MALLADINO 415-336-1556

Sample Analysis Requested [5] (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (Optional)	QC Code [2]	Field Filtered [3]	Sample Matrix [4]	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	GEL 903.0 Ra-226 / 228 EPA 903.1 / 904.0	EPA 900.0	← Preservative Type (6)	Comments
DW-14K313	3/7/08	0835	4X	1L					X	X		MS/MSD
DW-15K303	3/7/08	01002	3X	1L					X	X		
DW-14T-586	3/7/08	1057	3X	1L					X	X		
~~DW Morgan Well~~	~~3/7/08~~		~~3X~~	~~1L~~					~~X~~	~~X~~	←	NO SAMPLE
DW-EB-030708	3/7/08	1230	3X	1L					X	X		

TAT Requested: Normal: Rush: Specify: (Subject to Surcharge) Fax Results: Yes / No Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards

Sample Collection Time Zone: Eastern Pacific Central Other _____ Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	[signature]	3/7/08	~1530	FED-X Bill # 863057575924		
2				[signature]	3/10/08	15:15
3						

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment: Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate. If no preservative is added = leave field blank

WHITE = LABORATORY YELLOW = FILE PINK = CLIENT

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: 3 C

APPENDIX C

PHOTODOCUMENTATION

PHOTOGRAPHIC LOG

Navajo Radiation Assessment – Water Source Sampling

Navajo Nation Reservation

Photo No.	Date:
1	2/26/08

Description:
Sampling activities at 16T-514 water source (Pinedale Chapter House).

Photo No.	Date:
2	

Description:

Sampling activities at 16-4-10 water source.

PHOTOGRAPHIC LOG

Navajo Radiation Assessment – Water Source Sampling

Navajo Nation Reservation

Photo No.	Date:
3	2/27/08

Description:

16T-521 water source.

Photo No.	Date:
4	2/29/08

Description:
3A-155 (Tohatchie) water source.

PHOTOGRAPHIC LOG

Navajo Radiation Assessment – Water Source Sampling

Navajo Nation Reservation

Photo No.	Date:
5	3/4/08

Description:

Site 4 Cane Valley water source.

Photo No.	Date:
6	3/5/08

Description:

Project 12-7-12 (Allison) water source.

PHOTOGRAPHIC LOG

Navajo Radiation Assessment – Water Source Sampling

Navajo Nation Reservation

Photo No.	Date:
7	3/5/08

Description:

Project 12-4-12 (Hidden Spring) water source.

Photo No.	Date:
8	3/7/08

Description:

15K-303 (Pipeline) water source.