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Table 1. Physical characteristics of wells sampled near the White Mesa uranium mill, San Juan County, Utah 2007–09.

[Abbreviations: ft, foot; –, not available; *, approximate]

Station number	Field name	Station name	Aquifer	Primary use of water	Altitude of land surface, (ft)	Depth of well, (ft)	Well open interval	
							Depth to top of openings, (ft)	Depth to bottom of openings, (ft)
372954109293601	East well	(D–38–22)10bcc–1 WM East monitoring well	Surficial	Monitoring	5,440	110	70	90
372930109310701	West well	(D–38–22) 8dcd–1 WM West monitoring well	Surficial and Morrison formation	Monitoring	5,450	110	89	109
373442109291501	Lyman well	(D–37–22) 10cdc–1 LY well	Surficial	Domestic	5,790	120	–	–
373612109273201	Bayless well	(D–37–22) 2aad–1 BAY well	Surficial	Domestic	5,860	–	–	–
372817109275701	North well	(D–38–22) 23acb–1 WM North well	Navajo aquifer	Public supply	5,280	1,515	927	1,135
372756109280901	South well	(D–38–22) WM South well	Navajo aquifer	Public supply	5,300	1,739	1,277	1,739
373501109310801	Millview well	(D–37–22) 8dba– 1 Millview well ¹	–	Livestock	5,830	300*	–	–
373116109305601	MW3A	(D–37–22) 32ddc–1 MW3A	Surficial	Monitoring	5,550	95	75	95
373233109301001	MW18	(D–37–22) 28acc–1 MW18	Surficial	Monitoring	5,650	148	–	134

¹ This well was sampled once in September 2007. The casing collapsed, or an object was lodged in the casing, sometime between September 2007 and March 2008.

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Table 2. Summary of water sample bottle type, preservative, storage environment, and laboratory used for analysis of water samples collected near the White Mesa uranium mill, San Juan County, Utah, 2007–09.

[**Abbreviations:** ICP-MS, inductively coupled plasma mass spectrometry; mL, milliliter; N, acid normality; NAU, Northern Arizona University; NWQL, National Water Quality Laboratory; U of U, University of Utah; USGS, U.S. Geological Survey]

Analyte	Bottle type	Filtered	Preservative	Storage	Laboratory
Major ions, dissolved	500-mL plain polyethylene	Yes	None	Room temperature	NWQL
Trace metals, dissolved	250-mL polyethylene, acid rinsed	Yes	7.7 N ultra-pure nitric acid	Room temperature	NWQL
Trace metals, total	250-mL polyethylene, acid rinsed	No	7.7 N ultra-pure nitric acid	Room temperature	NWQL
Nutrients (nitrate+nitrite and orthophosphate), dissolved	125-mL polyethylene, opaque	Yes	None	4 degrees Celsius	NWQL
Oxygen/deuterium stable isotopes in water	60-mL glass	No	None	Room temperature	USGS Reston Stable Isotope Lab
Sulfur-34/Sulfur-32 and oxygen stable isotopes in dissolved sulfate	1,000-mL plain polyethylene	No	None	Room temperature	USGS Reston Stable Isotope Lab
Uranium-234, 235, 236, and 238 isotopes	1,000-mL plain polyethylene	Yes	7.7 N ultra-pure nitric acid	Room temperature	NAU ICP-MS lab
Tritium	1,000-mL plain polyethylene with polyseal cap	No	None	Room temperature	U of U Dissolved Gas Lab and NWQL
Tritium	1,000-mL glass with polyseal cap	No	None	Room temperature	Lawrence Livermore Lab
Dissolved Gases	Passive-diffusion sampler	No	None	Room temperature	U of U Dissolved Gas Lab
Dissolved Gases	Copper tube	No	None	Room temperature	Lawrence Livermore Laboratory

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Table 3. Acceptance criteria for cation/anion balances, White Mesa mill study area, Utah.

[Abbreviations: meq/L, milliequivalents per liter; >, greater than; ±, plus or minus; %, percent]

Ionic strength (meq/L)	Acceptable cation/ anion balance
0–0.2809	± 28%
0.281–0.561	± 22%
0.561–0.8309	± 15%
0.831–1.109	± 10%
1.11–1.409	± 8%
1.41–1.709	± 6%
>1.71	± 5%

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Table 4. Upper 92–percent confidence limits for contamination by trace elements and nutrients in the 70th percentile of all samples on the basis of data from field blanks prepared at spring and groundwater sampling sites, White Mesa mill study area, Utah.

[Abbreviations: mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; *, confidence interval for orthophosphate is 67.2 percent because of smaller sample size]

Analyte	Number of blanks	Most common detection limit filtered, (unfiltered)	Concentration units	Upper 92-percent confidence limit (filtered)	Upper 92-percent confidence limit (unfiltered)
Aluminum	7	4 (4)	µg/L	<4.0	248
Antimony	7	0.14	µg/L	0.09	–
Arsenic	7	0.06 (0.6)	µg/L	0.07	<0.60
Barium	7	0.4	µg/L	<0.4	–
Beryllium	7	0.01	µg/L	<0.02	–
Boron	7	6	µg/L	<6	–
Cadmium	7	0.04	µg/L	<0.04	–
Chromium	7	0.12 (0.40)	µg/L	0.25	7.5
Cobalt	7	0.02	µg/L	<0.02	–
Copper	7	1.0 (1.2)	µg/L	<1.0	<4.0
Iron	7	8 (6)	µg/L	<8	269
Lead	7	0.08 (0.06)	µg/L	<0.08	0.3
Lithium	7	1	µg/L	<1.0	–
Manganese	7	0.2 (0.4)	µg/L	0.9	7.8
Molybdenum	7	0.2 (0.1)	µg/L	<0.2	1.3
Nickel	7	0.2 (0.12)	µg/L	0.31	6.2
Selenium	7	0.04 (0.08)	µg/L	<0.06	<0.12
Silver	7	0.1	µg/L	<0.1	–
Strontium	7	0.8	µg/L	4.08	–
Thallium	7	0.04	µg/L	<0.04	–
Uranium	7	0.02 (0.02)	µg/L	<0.02	0.024
Vanadium	7	0.16 (1.6)	µg/L	0.2	0.61
Zinc	7	1.8 (2.0)	µg/L	<2.0	3.8
Nitrate + nitrite	7	0.04	mg/L	<0.04	–
Orthophosphate*	5	0.008	mg/L	<0.008	–

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Table 5. Upper 92–percent confidence limits for contamination by major ions in the 70th percentile of all samples on the basis of data from seven field blanks prepared at spring and groundwater sampling sites, White Mesa mill study area, Utah.

[Abbreviations: mg/L, milligrams per liter; <, less than]

Analyte	Most common detection limit (mg/L)	Upper 92–percent confidence limit (mg/L)
Calcium	0.04	0.41
Chloride	0.12	<0.12
Fluoride	0.12	<0.12
Magnesium	0.02	0.075
Potassium	0.06	0.06
Silica	0.02	0.03
Sodium	0.12	<0.12
Sulfate	0.18	<0.18

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Table 6. Estimates of variability of filtered trace elements and nutrients, White Mesa mill study area, Utah.

[Abbreviations: µg/L, micrograms per liter]

Chemical constituent	Number of replicate sets	95-percent confidence interval for a single sample (µg/L)	Minimum significance difference between any two individual measurements (µg/L)
Aluminum	6	0.2	0.3
Antimony	5	0.01	0.02
Arsenic	6	0.04	0.06
Barium	6	2	2
Beryllium	6	–	–
Boron	5	5	7
Cadmium	6	0.02	0.02
Chromium	6	0.06	0.09
Cobalt	6	0.01	0.02
Copper	6	–	–
Iron	6	1	2
Lead	6	0.002	0.003
Lithium	6	2.7	3.8
Manganese	6	1.6	2.3
Molybdenum	6	0.4	0.6
Nickel	5	0.05	0.07
Selenium	6	0.1	0.1
Silver	6	–	–
Strontium	5	31	44
Thallium	6	–	–
Uranium	5	0.35	0.5
Vanadium	6	0.06	0.08
Zinc	6	0.1	0.1
Nitrate + nitrite	5	0.01	0.02
Orthophosphate	5	0.002	0.002

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Table 7. Estimates of variability of unfiltered trace elements for six replicate sets, White Mesa mill study area, Utah.

[Abbreviations: µg/L, micrograms per liter]

Chemical constituent	95-percent confidence interval for a single sample (µg/L)	Minimum significance difference between any two individual measurements (µg/L)
Aluminum	59.4	84
Arsenic	0.1	0.2
Chromium	0.1	0.2
Copper	0.3	0.4
Iron	59.1	83.6
Lead	0.2	0.2
Manganese	1.6	2.3
Molybdenum	0.2	0.3
Nickel	0.2	0.3
Selenium	0.1	0.2
Uranium	0.4	0.5
Vanadium	0.4	0.6
Zinc	0.3	0.5

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Table 8. Estimates of variability of major ions, White Mesa mill study area, Utah.

[Abbreviations: mg/L, milligram per liter]

Chemical constituent	Number of replicate sets	95-percent confidence interval for a single sample (mg/L)	Minimum significance difference between any two individual measurements (mg/L)
Bicarbonate	3	8	12
Calcium	6	2.5	3.6
Chloride	5	0.7	0.9
Fluoride	5	0.13	0.18
Magnesium	6	0.4	0.6
Potassium	5	0.1	0.14
Silica	6	0.2	0.2
Sodium	6	1.7	2.4
Sulfate	5	8	11

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Table 9. Analytical results for spiked and unspiked samples, and comparison of percent recoveries to EPA percent recovery allowable limits for analytical methods 200.7 and 200.8. For unspiked results that are less than the analytical detection limit, one half the detection limit was used to compute percent recoveries. Unfiltered samples were spiked.

[Abbreviations: mm/dd/yyyy, month/day/year; µg, micrograms; µg/L, micrograms per liter; US EPA, United States Environmental Protection Agency; <, less than]

Local identifier	Field identifier	Station number	Sample date (mm/dd/yyyy)	Parameter	Spike amount, (µg)	Analytical result, unspiked sample, (µg/L)	Analytical result, spiked sample, (µg/L)	Percent recovery	US EPA percent recovery allowable limits
(D-37-22)31dcb-S1	Cow Camp Spring	373122109321501	09/17/2008	Iron	100	323	431	108	70-130
				Aluminum	50	499	552	106	70-130
				Lead	50	0.5	52.8	105	70-130
				Molybdenum	50	1.6	55	107	70-130
				Uranium	50	9.18	65.7	113	70-130
				Arsenic	50	2	50.4	97	70-130
				Chromium	50	0.5	51	101	70-130
				Copper	50	0.574	46.2	91	70-130
				Nickel	50	0.43	47.4	94	70-130
				Selenium	50	1.6	44	85	70-130
				Vanadium	50	1.56	54.4	106	70-130
				Zinc	50	1.04	40.8	80	70-130
(D-37-22)27ccc-S1	Entrance Spring	373202109293401	11/11/2008	Iron	100	43.5	150	107	70-130
				Aluminum	50	66.1	116	99	70-130
				Lead	50	0.114	53.0	106	70-130
				Molybdenum	50	3.87	58.3	109	70-130
				Uranium	50	25.7	80.0	109	70-130
				Arsenic	50	2.32	53.0	101	70-130
				Chromium	50	<0.4	49.9	99	70-130
				Copper	50	<4	45.2	86	70-130
				Nickel	50	0.41	46.3	92	70-130
				Selenium	50	8.95	55.9	94	70-130
				Vanadium	50	5.35	56.3	102	70-130
				Zinc	50	<2	43.1	84	70-130
(D-38-22)8dcd-1	West well	372930109310701	04/21/2009	Iron	100	219	313.0	94	70-130
				Aluminum	50	<18	54.9	92	70-130
				Lead	50	4.74	57.3	105	70-130
				Molybdenum	50	43.5	85.6	84	70-130
				Uranium	50	18	73	110	70-130
				Arsenic	50	2.5	47.8	91	70-130
				Chromium	50	4.1	55.5	103	70-130
				Copper	50	13	57.9	90	70-130
				Nickel	50	10	53.4	87	70-130
				Selenium	50	0.52	42.3	84	70-130
				Vanadium	50	<4.8	53	101	70-130
				Zinc	50	24.8	56.4	63	70-130

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Table 9. Analytical results for spiked and unspiked samples, and comparison of percent recoveries to EPA percent recovery allowable limits for analytical methods 200.7 and 200.8. For unspiked results that are less than the analytical detection limit, one half the detection limit was used to compute percent recoveries. Unfiltered samples were spiked.—Continued

[**Abbreviations:** mm/dd/yyyy, month/day/year; µg, micrograms; µg/L, micrograms per liter; US EPA, United States Environmental Protection Agency; <, less than]

Local identifier	Field identifier	Station number	Sample date (mm/dd/yyyy)	Parameter	Spike amount, (µg)	Analytical result, unspiked sample, (µg/L)	Analytical result, spiked sample, (µg/L)	Percent recovery	US EPA percent recovery allowable limits
(D-37-22)27ccc-S1	Entrance Spring	373202109293401	09/23/2009	Iron	50	46.2	90.6	89	70-130
				Aluminum	50	51.6	107.4	112	70-130
				Lead	50	0.28	47.5	94	70-130
				Molybdenum	50	3.87	69.2	131	70-130
				Uranium	50	20.2	80.4	120	70-130
				Arsenic	50	2.31	53	101	70-130
				Chromium	50	<0.4	52.7	105	70-130
				Copper	50	<4	46.6	89	70-130
				Nickel	50	0.64	47.4	94	70-130
				Selenium	50	8.1	56.8	97	70-130
				Vanadium	50	5.24	58.1	106	70-130
				Zinc	50	2.07	47.4	91	70-130

Table 10. Dissolved-gas, recharge temperature, and tritium/helium-3 data for groundwater and spring water near White Mesa, Utah.

[**Abbreviations:** mm/dd/yyyy, month/day/year; cm³STP/g, cubic centimeters per gram at standard temperature and pressure; °C, temperature in degrees Celsius; TU, tritium units; R/Ra, Measured ³He:⁴He isotopic ratio relative to the helium isotopic ratio of air; ⁴He_{terr}, terrigenic helium; ³He_{trit}, tritogenic helium, TU, tritium units; ND, no data; NC, not calculated, <, less than; >, greater than]

Site name	Sampling date (mm/dd/yyyy)	Sampling altitude (meters)	Dissolved gases						Excess air (cm ³ STP/g)	Most probable recharge temperature (°C)
			Nitrogen (cm ³ STP/g)	Argon-40 (cm ³ STP/g)	Krypton-84 (cm ³ STP/g)	Xenon-129 (cm ³ STP/g)	Neon-20 (cm ³ STP/g)	Helium-4 (cm ³ STP/g)		
Cow Camp Spring ¹	09/19/2007	1,511	1.25E-02	3.40E-04	4.30E-08	3.22E-09	1.61E-07	4.27E-08	0.103	9
Entrance Spring ¹	09/20/2007	1,691	9.62E-03	2.53E-04	2.98E-08	2.26E-09	1.35E-07	3.68E-08	0.100	20
Millview well ¹	09/18/2007	1,772	1.14E-02	2.84E-04	3.73E-08	2.65E-09	1.46E-07	3.90E-08	0.101	14
Oasis Seep ¹	09/19/2007	1,905	9.75E-03	2.45E-04	3.20E-08	2.18E-09	1.29E-07	3.28E-08	0.100	19
South well ²	09/11/2007	1,615	ND	3.92E-04	8.36E-08	1.21E-08	2.69E-07	1.38E-07	0.006	9
North well ²	09/11/2007	1,612	ND	3.88E-04	8.45E-08	1.23E-08	2.54E-07	1.24E-07	0.005	8
East well ²	09/11/2007	1,662	ND	2.76E-04	6.07E-08	8.61E-09	1.77E-07	3.90E-08	0.001	17
West well ²	09/11/2007	1,664	ND	2.56E-04	5.96E-08	8.20E-09	1.49E-07	3.37E-08	0.001	18
Ruin Spring ²	09/11/2007	1,644	ND	2.82E-04	6.33E-08	8.21E-09	1.87E-07	4.18E-08	0.001	19
Cow Camp Spring ²	09/19/2007	1,511	ND	2.88E-04	6.47E-08	9.46E-09	1.57E-07	3.57E-08	0.001	14

Site name	Sampling date (mm/dd/yyyy)	³ H (TU)	R/Ra	³ He/ ⁴ He	⁴ He _{terr} (cm ³ STP/g)	³ He _{trit} (TU)	Calculated Initial ³ H (TU)	Apparent ³ H/ ³ He age (years)	Apparent recharge year
Cow Camp Spring ¹	09/19/2007	5.3	1.369	1.89E-06	2.06E-09	9.9	15.2	18-19	1990
Entrance Spring ¹	09/20/2007	4.2	0.957	1.32E-06	5.07E-10	0.0	4.2	modern	Recent
Millview well ¹	09/18/2007	<0.3	0.927	1.28E-06	1.33E-09	0.0	< 0.3	>50	Pre-1950s
Oasis Seep ¹	09/19/2007	3.6	0.992	1.37E-06	-2.62E-09	0.0	3.6	modern	Recent
South well ²	09/11/2007	<0.3	0.492	6.80E-07	7.06E-08	ND	NC	>50	Pre-1950s
North well ²	09/11/2007	<0.3	0.519	7.19E-07	6.07E-08	ND	NC	>50	Pre-1950s
East well ²	09/11/2007	<0.3	0.963	1.33E-06	ND	ND	NC	>50	Pre-1950s
West well ²	09/11/2007	0.5	0.978	1.35E-06	ND	ND	NC	>50	Pre-1950s
Ruin Spring ²	09/11/2007	<0.3	0.971	1.34E-06	ND	ND	NC	>50	Pre-1950s
Cow Camp Spring ²	09/19/2007	5.6	1.260	1.74E-06	ND	ND	11.0	³ 12	1995

¹ Sample analysis performed at the University of Utah Noble Gas Laboratory.

² Sample analysis performed at Lawrence Livermore National Laboratory.

³ Lawrence Livermore National Laboratory reported value.

Table 11. Transfer of minerals in groundwater (millimoles per liter).[Negative values represent minerals removed from groundwater. **Abbreviations:** mmol, millimoles]

	Bayless domestic well, December 2007	Lyman domestic well, December 2007	Oasis Spring, November 2008	Entrance Spring, April 2009	Mill Spring, March 2008	Ruin Spring, September 2008	Cow Camp Spring, September 2008	East monitoring well, September 2008
Calcite	–	–0.418	0.220	–	–	–0.610	0.501	2.02
Dolomite	1.18	1.25	0.631	1.15	1.39	1.28	1.01	0.057
Halite	1.55	0.658	0.860	1.23	0.96	0.678	3.13	0.402
Gypsum	1.59	1.89	0.909	1.47	4.13	4.84	3.72	0.664
Orthoclase	0.068	0.048	0.032	0.100	0.050	0.084	0.145	0.030
Albite	0.744	0.110	0.624	0.028	0.069	0.011	–	0.028
Quartz	–1.38	–	–1.11	–	–	–	–	–
Kaolinite	–0.406	–0.079	–0.328	–0.064	–0.059	–0.048	–0.072	–0.029
CaX ₂	–	–0.209	–	–0.627	–2.15	–1.96	–3.03	–2.58
NaX	–	0.419	–	1.25	4.31	3.93	6.06	5.45

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Table 12. Measurement errors for trace elements calculated from two reference materials that were submitted and analyzed with sediment samples collected from ephemeral drainages surrounding the White Mesa mill site, Utah, during June 2008.

[Abbreviations: ND, not determined; µg/g, micrograms per gram; %, percent; <, less than lower reporting limit]

Chemical constituent	Green River Shale (SGR-1b) reference material, measured value, (µg/g)	Green River Shale (SGR-1b) reference material, expected value, (µg/g)	Green River Shale (SGR-1b) measurement error, (percent)	Mica Schist (SDC-1) reference material, measured value, (µg/g)	Mica Schist (SDC-1) reference material, expected value, (µg/g)	Mica Schist (SDC-1) measurement error, (percent)
Arsenic	64.0	67.0	-4.5	<1	0.2	ND
Barium	294.0	290.0	1.4	681.0	630.0	8.1
Beryllium	1.5	ND	ND	3.7	3.0	23.3
Cadmium	1.1	0.9	22.2	<0.1	ND	ND
Cerium	35.5	36.0	-1.4	90.8	93.0	-2.4
Cobalt	11.9	12.0	-0.8	18.3	18.0	1.7
Chromium	28.0	30.0	-6.7	60.0	64.0	-6.3
Cesium	5.0	5.2	-3.8	<5	4.0	ND
Copper	60.8	66.0	-7.9	26.0	30.0	-13.3
Gallium	9.5	12.0	-21.2	24.3	21.0	15.7
Lanthanum	19.2	20.0	-4.0	42.1	42.0	0.2
Lithium	128.0	147.0	-12.9	33.0	34.0	-2.9
Manganese	233.0	267.0	-12.7	839.0	880.0	-4.7
Molybdenum	35.2	35.0	0.6	0.2	ND	ND
Niobium	4.9	5.2	-5.8	15.7	21.0	-25.2
Nickel	26.5	29.0	-8.6	29.6	38.0	-22.1
Lead	40.2	38.0	5.8	21.2	25.0	-15.2
Rubidium	82.9	ND	ND	126.0	127.0	-0.8
Antimony	2.7	3.4	-22.1	0.5	0.5	-3.7
Selenium	5.0	4.6	8.7	16.0	17.0	-5.9
Tin	0.7	1.9	-63.2	2.9	3.0	-3.3
Strontium	377.0	420.0	-10.2	170.0	180.0	-5.6
Thorium	4.3	4.8	-10.4	11.0	12.0	-8.3
Thallium	0.5	ND	ND	0.5	0.7	-28.6
Uranium	5.4	5.4	0.0	2.7	3.1	-12.9
Vanadium	146.0	130.0	12.3	113.0	102.0	10.8
Tungsten	1.9	2.6	-26.9	0.6	0.8	-25.0
Yttrium	9.1	13.0	-30.0	31.7	ND	ND
Zinc	72.0	74.0	-2.7	102.0	103.0	-1.0
Selenium	2.5	3.5	-28.6	<0.2	ND	ND
Median			8.6			7.2
Mean			12.4			10.3

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Table 13. Measurement errors calculated for National Institute of Standards and Technology (NIST) reference material that was submitted and analyzed with vegetation samples collected from areas surrounding the White Mesa mill site, Utah, during September 2009.

[Abbreviations: mg/kg, milligrams per kilogram; NIST, National Institute of Standards; ND, not determined; µg/g, micrograms per gram; %, percent; *, element concentration determined but not NIST certified]

Chemical constituent and concentration units	NIST reference material (1573a, tomato leaves), measured value 1, concentration as specified	NIST reference material (1573a, tomato leaves), measured value 2, concentration as specified	NIST reference material (1573a, tomato leaves), measured value 3, concentration as specified	NIST reference material (1573a, tomato leaves), expected value, concentration as specified	NIST reference material (1573a, tomato leaves) average measurement error, (percent)
Aluminum (mg/kg)	560.0000	570.0000	560.0000	598.0000	5.8
Antimony (mg/kg)	0.0600	0.0640	0.0660	0.0630	3.7
Arsenic (mg/kg)	ND	ND	ND	0.1120	ND
Boron (mg/kg)	ND	ND	ND	33.3000	ND
Cadmium (mg/kg)	1.3000	1.5000	1.5000	1.5200	5.7
Chromium (mg/kg)	1.9000	1.8000	1.6000	1.9900	11.2
Cobalt (mg/kg)	0.5000	0.6000	0.6000	0.5700	7.6
Copper (mg/kg)	4.3000	4.4000	4.3000	4.7000	7.8
Iron (mg/kg)	350.0000	350.0000	330.0000	368.0000	6.7
Manganese (mg/kg)	221.5000	223.5000	220.4000	246.0000	9.8
Mercury (mg/kg)	ND	ND	ND	0.0340	ND
Nickel (mg/kg)	1.3000	1.2000	1.3000	1.5900	20.3
Rubidium (mg/kg)	10.3910	10.1890	9.1880	14.8900	33.4
Selenium (mg/kg)	ND	ND	ND	0.0540	ND
Sodium (mg/kg)	140.0000	180.0000	140.0000	136.0000	12.7
Vanadium (mg/kg)	0.6000	0.6000	0.6000	0.8350	28.1
Zinc (mg/kg)	26.1000	26.0000	26.0000	30.9000	15.7
*Magnesium (%)	0.9670	0.9760	0.9640	1.2000	19.3
*Sulfur (%)	0.9190	0.9350	0.9290	0.9600	3.4
*Barium (mg/kg)	58.8000	59.2000	58.1000	63.0000	6.8
*Bromine (mg/kg)	ND	ND	ND	1,300.0000	ND
*Cerium (mg/kg)	1.4000	1.5000	1.5000	2.0000	26.7
*Cesium (mg/kg)	ND	ND	ND	0.0530	ND
*Gadolinium (mg/kg)	ND	ND	ND	0.1700	ND
*Hafnium (mg/kg)	ND	ND	ND	0.1400	ND
*Lanthanum (mg/kg)	2.0000	2.2000	2.3000	2.3000	5.8
*Molybdenum (mg/kg)	0.4000	0.4000	0.4000	0.4600	13.0
*Tin (mg/kg)	0.0830	0.1230	0.1440	0.1000	28.0
*Silver (mg/kg)	ND	ND	ND	0.0170	ND
*Strontium (mg/kg)	79.5000	79.3000	78.7000	85.0000	6.9
*Thorium (mg/kg)	0.1000	0.1200	0.1200	0.1200	5.6
*Uranium (mg/kg)	0.0410	0.0410	0.0410	0.0350	17.1

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Table 14. Comparison of analytical results from laboratory splits of sagebrush samples collected from areas surrounding the White Mesa mill site, Utah, during September 2009.

[Abbreviations: <, less than lower reporting limit; >, greater than upper reporting limit; ND, not determined; *, mean percent difference calculated with at least one missing value; ppm, parts per million]

Site ID	Aluminum, (percent dry weight)	Calcium, (percent dry weight)	Iron, (percent dry weight)	Potassium, (percent dry weight)	Magnesium, (percent dry weight)	Sodium, (percent dry weight)	Sulfur, (percent dry weight)	Titanium, (percent dry weight)	Silver, (ppm dry weight)	Barium, (ppm dry weight)
10-1a	0.67	10.7	0.33	12.3	4.98	0.18	3.97	0.03	<1	262
10-1b	0.61	10.4	0.3	13.1	4.9	0.17	4	0.03	<1	258
Percent difference	9.4	2.8	9.5	6.3	1.6	5.7	0.8	0.0	ND	1.5
12-1a	0.43	9.94	0.23	>15	2.18	0.11	3.25	0.02	<1	370
12-1b	0.44	9.89	0.23	13.7	2.19	0.1	3.28	0.02	<1	369
Percent difference	2.3	0.5	0.0	ND	0.5	9.5	0.9	0.0	ND	0.3
14-2a	1.16	10.4	0.58	12.3	2.97	0.24	3.18	0.06	<1	388
14-2b	1.04	10.6	0.53	12.5	3.02	0.22	3.22	0.05	<1	377
Percent difference	10.9	1.9	9.0	1.6	1.7	8.7	1.3	18.2	ND	2.9
31-1a	0.68	9.75	0.35	10.9	3.27	0.16	3.07	0.03	<1	356
31-1b	0.65	9.68	0.34	11	3.27	0.16	3.09	0.03	<1	357
Percent difference	4.5	0.7	2.9	0.9	0.0	0.0	0.6	0.0	ND	0.3
38-1a	0.81	9.55	0.41	9.81	3.01	0.15	3.14	0.02	<1	335
38-1b	0.79	9.37	0.4	11.4	3	0.15	3.02	0.02	<1	347
Percent difference	2.5	1.9	2.5	15.0	0.3	0.0	3.9	0.0	ND	3.5
40-2a	0.87	7.91	0.45	>15	2.38	0.13	2.3	0.03	<1	313
40-2b	0.82	7.84	0.43	15	2.31	0.12	2.23	0.02	<1	304
Percent difference	5.9	0.9	4.5		3.0	8.0	3.1	40.0		2.9
Mean percent difference (+/-)	5.9	1.5	4.7	6.0*	1.2	5.3	1.8	9.7	ND	1.9

Table 14. Comparison of analytical results from laboratory splits of sagebrush samples collected from areas surrounding the White Mesa mill site, Utah, during September 2009.—Continued

[Abbreviations: <, less than lower reporting limit; >, greater than upper reporting limit; ND, not determined; *, mean percent difference calculated with at least one missing value; ppm, parts per million]

Site ID	Beryllium, (ppm dry weight)	Bismuth, (ppm dry weight)	Cadmium, (ppm dry weight)	Cerium, (ppm dry weight)	Cobalt, (ppm dry weight)	Chromium, (ppm dry weight)	Cesium, (ppm dry weight)	Copper, (ppm dry weight)	Gallium, (ppm dry weight)	Indium, (ppm dry weight)	Lanthanum, (ppm dry weight)
10-1a	0.4	0.66	1.2	11	3.7	7	<5	207	2.05	<0.02	7.4
10-1b	0.3	0.63	1.1	10.5	3.6	8	<5	202	1.9	<0.02	7
Percent difference	28.6	4.7	8.7	4.7	2.7	13.3	ND	2.4	7.6	ND	5.6
12-1a	<0.1	0.12	1.2	5.06	1.5	5	<5	203	1.42	<0.02	2.6
12-1b	<0.1	0.11	1.1	4.99	1.4	4	<5	206	1.38	<0.02	2.6
Percent difference	ND	8.7	8.7	1.4	6.9	22.2	ND	1.5	2.9	ND	0.0
14-2a	0.3	0.45	1.6	13.7	4.4	15	<5	196	3.11	0.03	9.5
14-2b	0.3	0.43	1.6	12.8	4.2	8	<5	195	3.04	0.09	9.4
Percent difference	0.0	4.5	0.0	6.8	4.7	60.9	ND	0.5	2.3	100.0	1.1
31-1a	0.2	0.12	1.5	7.58	3.3	9	<5	151	1.83	<0.02	4.7
31-1b	0.2	0.11	1.5	7.24	3.2	6	<5	145	1.77	<0.02	4.5
Percent difference	0.0	8.7	0.0	4.6	3.1	40.0	ND	4.1	3.3	ND	4.3
38-1a	0.2	0.09	1.1	7.95	2.6	7	<5	191	1.96	<0.02	5.2
38-1b	0.2	0.1	1.2	8.14	2.7	7	<5	187	2.1	<0.02	5.3
Percent difference	0.0	10.5	8.7	2.4	3.8	0.0	ND	2.1	6.9	ND	1.9
40-2a	0.2	0.08	1.7	9.69	2.8	24	<5	141	2.27	<0.02	6
40-2b	0.2	0.06	1.6	9.05	2.6	8	<5	136	2.07	<0.02	5.6
Percent difference	0.0	28.6	6.1	6.8	7.4	100.0	ND	3.6	9.2	ND	6.9
Mean percent difference (+/-)	5.7*	10.9	5.4	4.4	4.8	39.4	ND	2.4	5.4	ND	3.3

Table 14. Comparison of analytical results from laboratory splits of sagebrush samples collected from areas surrounding the White Mesa mill site, Utah, during September 2009.—Continued

[Abbreviations: <, less than lower reporting limit; >, greater than upper reporting limit; ND, not determined; *, mean percent difference calculated with at least one missing value; ppm, parts per million]

Site ID	Lithium, (ppm dry weight)	Manganese, (ppm dry weight)	Molybdi- um, (ppm dry weight)	Niobium, (ppm dry weight)	Nickel, (ppm dry weight)	Phosphorous, (ppm dry weight)	Lead, (ppm dry weight)	Rubidium, (ppm dry weight)	Antimony, (ppm dry weight)	Scandium, (ppm dry weight)	Tin, (ppm dry weight)
10-1a	11	780	26.9	2.9	28.8	>10,000	13.8	26.8	0.37	1.7	8.1
10-1b	12	761	27.1	2.1	28.6	>10,000	12.4	23.9	0.29	1.5	2.1
Percent difference	8.7	2.5	0.7	32.0	0.7	ND	10.7	11.4	24.2	12.5	117.6
12-1a	58	755	21.7	0.9	9.7	>10,000	3.7	41.2	0.25	0.9	0.3
12-1b	60	764	20.9	0.9	9.6	>10,000	4.4	38	0.28	0.8	0.4
Percent difference	3.4	1.2	3.8	0.0	1.0	ND	17.3	8.1	11.3	11.8	28.6
14-2a	17	944	27.6	2.1	18.9	>10,000	12.3	34.8	0.33	2.2	1.7
14-2b	18	979	31	2.2	17.7	>10,000	11.4	34.9	0.31	2.2	1.7
Percent difference	5.7	3.6	11.6	4.7	6.6	ND	7.6	0.3	6.3	0.0	0.0
31-1a	19	649	17.4	1.5	23.3	>10,000	4.6	23	0.36	1.2	0.3
31-1b	16	647	17.1	1.5	23.2	>10,000	4.2	22.5	0.43	1.2	0.4
Percent difference	17.1	0.3	1.7	0.0	0.4	ND	9.1	2.2	17.7	0.0	28.6
38-1a	16	731	13.2	1.2	13.8	>10,000	4.4	25.1	0.29	1.3	0.3
38-1b	17	724	14.8	1.5	13.7	>10,000	4.7	30.4	0.39	1.5	0.3
Percent difference	6.1	1.0	11.4	22.2	0.7	ND	6.6	19.1	29.4	14.3	0.0
40-2a	10	789	11.6	1.2	21.3	>10,000	5.3	34.2	0.32	1.4	0.4
40-2b	9	773	11.2	1.1	20.6	>10,000	4.8	31.4	0.33	1.3	0.4
Percent difference	10.5	2.0	3.5	8.7	3.3	ND	9.9	8.5	3.1	7.4	0.0
Mean percent difference (+/-)	8.6	1.8	5.5	11.3	2.1	ND	10.2	8.3	15.3	7.7	29.1

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Table 14. Comparison of analytical results from laboratory splits of sagebrush samples collected from areas surrounding the White Mesa mill site, Utah, during September 2009.—Continued

[Abbreviations: <, less than lower reporting limit; >, greater than upper reporting limit; ND, not determined; *, mean percent difference calculated with at least one missing value; ppm, parts per million]

Site ID	Strontium, (ppm dry weight)	Tellurium, (ppm dry weight)	Thorium, (ppm dry weight)	Thallium, (ppm dry weight)	Uranium, (ppm dry weight)	Vanadium, (ppm dry weight)	Tungsten, (ppm dry weight)	Yttrium, (ppm dry weight)	Zinc, (ppm dry weight)	Arsenic, (ppm dry weight)	Selenium, (ppm dry weight)
10-1a	1,220	<0.1	1.8	<0.1	56.8	250	2.7	3.2	447	1.1	0.4
10-1b	1,210	<0.1	1.7	<0.1	49.5	229	2.4	2.9	443	0.9	0.3
Percent difference	0.8	ND	5.7	ND	13.7	8.8	11.8	9.8	0.9	20.0	28.6
12-1a	1,360	<0.1	0.8	<0.1	2.3	14	0.2	1.7	556	2	0.5
12-1b	1,380	<0.1	0.7	<0.1	2.2	14	0.2	1.7	563	<0.6	0.5
Percent difference	1.5	ND	13.3	ND	4.4	0.0	0.0	0.0	1.3	ND	0.0
14-2a	1,100	<0.1	2.2	<0.1	44.9	165	2.1	4.8	340	0.8	0.7
14-2b	1,110	<0.1	2	<0.1	40.6	150	2	4.6	329	0.9	0.7
Percent difference	0.9	ND	9.5	ND	10.1	9.5	4.9	4.3	3.3	11.8	0.0
31-1a	1,030	<0.1	1.3	<0.1	15.3	61	0.3	2.9	271	<0.6	0.2
31-1b	1,020	<0.1	1.2	<0.1	14.9	59	0.3	2.7	268	1.5	0.2
Percent difference	1.0	ND	8.0	ND	2.6	3.3	0.0	7.1	1.1	ND	0.0
38-1a	1,090	<0.1	1.3	<0.1	8.1	40	0.4	2.9	329	0.7	0.2
38-1b	1,110	<0.1	1.3	<0.1	8.4	39	0.4	3.2	329	0.7	<0.2
Percent difference	1.8	ND	0.0	ND	3.6	2.5	0.0	9.8	0.0	0.0	ND
40-2a	604	<0.1	1.6	<0.1	7.6	31	0.4	3.4	261	<0.6	0.4
40-2b	603	<0.1	1.5	<0.1	6.7	29	0.4	3.1	253	<0.6	0.4
Percent difference	0.2	ND	6.5	ND	12.6	6.7	0.0	9.2	3.1	ND	0.0
Mean percent difference (+/-)	1.0	ND	7.2	ND	7.9	5.1	2.8	6.7	1.6	10.6*	5.7*

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Table 15. Comparison of analytical results from sagebrush samples collected within each sample grid (200-meter separation distance) from areas surrounding the White Mesa mill site, Utah, during September 2009.

[ppm, parts per million; <, less than lower reporting limit; >, greater than upper reporting limit]

Site ID	Aluminum, in percent dry weight	Calcium, in percent dry weight	Iron, in percent dry weight	Potassium, in percent dry weight	Magnesium, in percent dry weight	Sodium, in percent dry weight	Sulfur, in percent dry weight	Titanium, in percent dry weight	Silver, in ppm dry weight	Barium, in ppm dry weight	Beryllium, in ppm dry weight	Bismuth, in ppm dry weight
10-0	1.31	9.1	0.62	12.9	3.11	0.22	2.68	0.04	<1	370	0.6	3
10-2	0.59	9.94	0.28	14.1	3.87	0.15	3.83	0.02	<1	174	0.3	1.46
12-0	0.68	11.3	0.36	13.4	2.89	0.13	2.94	0.04	<1	573	0.2	0.16
12-2	0.32	9.66	0.18	>15	2.58	0.07	2.29	0.02	<1	185	<0.1	0.12
14-0	1.34	9.7	0.69	11.8	2.67	0.26	2.75	0.05	<1	356	0.4	0.81
14-2a	1.16	10.4	0.58	12.3	2.97	0.24	3.18	0.06	<1	388	0.3	0.45
15-0	0.58	9.69	0.31	12.6	2.87	0.11	3.09	0.03	<1	277	0.1	0.29
15-2	0.3	7.43	0.18	>15	3.88	0.67	>5	0.02	<1	143	<0.1	0.16
17-0	0.73	8.44	0.38	12.2	2.77	0.17	3.02	0.03	<1	270	0.2	0.16
17-2	0.52	10.3	0.28	11.4	2.83	0.11	3.2	0.02	<1	330	0.1	0.08
22-0	0.98	9	0.57	12.5	2.79	0.24	1.99	0.02	<1	303	0.3	0.32
22-2	1.02	10.1	0.54	11.4	2.9	0.23	2.55	0.03	<1	359	0.2	0.36
23-0	0.89	9.66	0.45	12.6	2.95	0.15	2.96	0.04	<1	287	0.2	0.17
23-2	0.53	10.9	0.28	11.5	2.99	0.11	3.14	0.02	<1	376	<0.1	0.18
31-0	0.64	10.6	0.33	11.5	2.37	0.13	2.89	0.03	<1	259	0.2	0.09
31-2	0.9	8	0.45	12.2	3.01	0.17	2.9	0.03	<1	266	0.2	0.12
38-0	0.75	10	0.37	8.92	2.88	0.13	3.02	0.02	<1	325	0.2	0.09
38-2	0.78	9.84	0.39	10.8	3.26	0.14	3	0.03	<1	377	0.2	0.1
40-0	0.56	11.2	0.29	11.9	3	0.09	3.12	0.02	5	324	<0.1	0.07
40-2a	0.87	7.91	0.45	>15	2.38	0.13	2.3	0.03	<1	313	0.2	0.08

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Table 15. Comparison of analytical results from sagebrush samples collected within each sample grid (200-meter separation distance) from areas surrounding the White Mesa mill site, Utah, during September 2009.—Continued

[ppm, parts per million; <, less than lower reporting limit; >, greater than upper reporting limit]

Site ID	Cadmium, in ppm dry weight	Cerium, in ppm dry weight	Cobalt, in ppm dry weight	Chromium, in ppm dry weight	Cesium, in ppm dry weight	Copper, in ppm dry weight	Gallium, in ppm dry weight	Indium, in ppm dry weight	Lanthanum, in ppm dry weight	Lithium, in ppm dry weight	Manganese, in ppm dry weight	Molybdenum, in ppm dry weight
10-0	1.9	25	6.7	11	<5	166	3.64	0.83	16.1	25	700	35
10-2	1	11.7	3.7	17	<5	264	1.96	0.03	7.9	27	760	42
12-0	1.4	7.57	2.1	4	<5	192	2.03	<0.02	4	16	941	21.7
12-2	1.7	3.91	1.3	4	<5	171	1.1	<0.02	2.1	12	851	12.7
14-0	1	16.3	5.6	10	<5	250	3.49	0.03	12.6	20	798	45.3
14-2a	1.6	13.7	4.4	15	<5	196	3.11	0.03	9.5	17	944	27.6
15-0	5	7.34	6.7	6	<5	235	1.63	<0.02	4.2	43	678	10.7
15-2	1.5	3.23	1.4	4	<5	246	1.12	<0.02	1.8	134	570	7.5
17-0	1.2	7.98	3.1	5	<5	185	2.07	<0.02	4.4	12	723	15
17-2	2	6.04	2.3	6	<5	175	1.56	<0.02	3.4	8	707	12.3
22-0	2.3	12.5	4	14	<5	199	2.64	<0.02	7.5	15	869	18.7
22-2	2.3	13.3	3.9	10	<5	176	2.82	<0.02	7.6	14	665	43.6
23-0	1.1	10.5	2.5	10	<5	157	2.37	<0.02	6.3	19	587	15.8
23-2	1.5	6.77	2	5	<5	158	1.46	<0.02	4.2	9	741	10.2
31-0	1.4	7.96	2	6	<5	168	1.71	<0.02	4.7	12	599	12.1
31-2	1.3	9.91	2.7	8	<5	163	2.29	<0.02	5.9	13	920	13.1
38-0	1	8.15	2.5	8	<5	151	1.92	<0.02	5	14	679	13.6
38-2	1.3	8.29	2.6	7	<5	155	2	<0.02	5.1	14	837	15.3
40-0	1.6	6.15	2.2	6	<5	155	1.63	<0.02	3.8	9	834	20.3
40-2a	1.7	9.69	2.8	24	<5	141	2.27	<0.02	6	10	789	11.6

Table 15. Comparison of analytical results from sagebrush samples collected within each sample grid (200-meter separation distance) from areas surrounding the White Mesa mill site, Utah, during September 2009.—Continued

[ppm, parts per million; <, less than lower reporting limit; >, greater than upper reporting limit]

Site ID	Niobium, in ppm dry weight	Nickel, in ppm dry weight	Phosphorous, in ppm dry weight	Lead, in ppm dry weight	Rubidium, in ppm dry weight	Antimony, in ppm dry weight	Scandium, in ppm dry weight	Tin, in ppm dry weight	Strontium, in ppm dry weight	Tellurium, in ppm dry weight	Thorium, in ppm dry weight	Thallium, in ppm dry weight
10-0	19.2	28.9	>10,000	33.3	34	1.44	3.7	84	872	<0.1	5.1	0.1
10-2	2.4	27.6	>10,000	15.4	41.4	0.31	1.9	4.2	1,790	<0.1	2.4	<0.1
12-0	1.3	11.9	>10,000	3.7	30.6	0.29	1.3	0.4	1,560	<0.1	1.1	<0.1
12-2	0.7	17.7	>10,000	2.1	37.7	0.3	0.7	0.2	734	<0.1	0.6	<0.1
14-0	1.9	23.3	>10,000	17.7	26.7	0.35	2.7	2.7	1,080	<0.1	2.8	0.1
14-2a	2.1	18.9	>10,000	12.3	34.8	0.33	2.2	1.7	1,100	<0.1	2.2	<0.1
15-0	1.5	40	>10,000	5.9	36.7	0.28	1.2	3	1,290	<0.1	1.2	<0.1
15-2	0.6	23.1	>10,000	2.7	51.1	0.2	0.7	0.4	1,010	<0.1	0.5	<0.1
17-0	1.5	23.6	>10,000	4.5	31.7	0.37	1.4	0.4	1,080	<0.1	1.3	<0.1
17-2	1.2	21.9	>10,000	3.2	28.8	0.3	1	0.3	1,280	<0.1	1	<0.1
22-0	1.3	49.8	>10,000	8.7	43.8	0.29	1.7	2.9	800	<0.1	2	<0.1
22-2	1.5	44.7	>10,000	9.1	33.7	0.43	1.9	0.9	983	<0.1	2.1	<0.1
23-0	1.6	20.7	>10,000	6.6	26.2	0.51	1.5	0.7	901	<0.1	1.7	<0.1
23-2	1.4	15.4	>10,000	5	36.7	0.53	1	0.7	1,050	<0.1	1	<0.1
31-0	1.3	14.3	>10,000	3.9	25.3	0.2	1	0.3	865	<0.1	1.3	<0.1
31-2	1.7	13.7	>10,000	5.3	22.4	0.33	1.5	0.4	646	<0.1	1.7	<0.1
38-0	1.5	16.6	>10,000	4.1	28	0.29	1.3	0.5	1,050	<0.1	1.4	<0.1
38-2	1.5	14.8	>10,000	4.8	26.8	0.26	1.4	0.3	1,190	<0.1	1.4	0.3
40-0	1	22	>10,000	5.2	44.5	0.22	1	0.2	1,040	<0.1	1	<0.1
40-2a	1.2	21.3	>10,000	5.3	34.2	0.32	1.4	0.4	604	<0.1	1.6	<0.1

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Table 15. Comparison of analytical results from sagebrush samples collected within each sample grid (200-meter separation distance) from areas surrounding the White Mesa mill site, Utah, during September 2009.—Continued

[ppm, parts per million; <, less than lower reporting limit; >, greater than upper reporting limit]

Site ID	Uranium, in ppm dry weight	Vanadium, in ppm dry weight	Tungsten, in ppm dry weight	Yttrium, in ppm dry weight	Zinc, in ppm dry weight	Arsenic, in ppm dry weight	Selenium, in ppm dry weight
10-0	171	582	11.5	7	515	1.2	0.6
10-2	74	220	3.1	3.5	474	0.8	0.5
12-0	3	19	0.3	2.7	421	<0.6	3.3
12-2	1.3	9	0.2	1.3	712	<0.6	<0.2
14-0	72.8	278	3.9	5.9	352	1.5	1
14-2a	44.9	165	2.1	4.8	340	0.8	0.7
15-0	15.7	55	1	2.4	615	1.7	0.2
15-2	5	15	0.3	1.1	679	<0.6	0.7
17-0	17.8	54	0.4	2.8	317	<0.6	0.2
17-2	9.4	31	0.3	2.2	285	1	0.4
22-0	41.9	91	1.4	3.9	286	0.9	0.3
22-2	40.5	80	1.5	4	237	1.6	0.4
23-0	15.3	45	0.7	3.5	294	0.7	<0.2
23-2	13.4	41	0.8	2.1	240	<0.6	<0.2
31-0	6.6	31	0.3	2.7	390	<0.6	<0.2
31-2	9.9	44	0.4	3.5	329	<0.6	<0.2
38-0	7.3	31	0.3	2.8	262	<0.6	0.4
38-2	7.1	32	0.3	2.9	281	<0.6	0.2
40-0	7	22	0.3	2.2	229	<0.6	0.4
40-2a	7.6	31	0.4	3.4	261	<0.6	0.4

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Table 16. Analytical results from tree cores collected at spring sites surrounding the White Mesa mill site near Blanding, Utah.

[**Abbreviations:** mm/dd/yyyy, month/day/year; µg/g, micrograms per gram; <, less than]

Tree-coring site	Sample date (mm/dd/yyyy)	Uranium concentration, (µg/g dry weight)	Water present in biota tissue, (percent of dry weight)
Oasis Spring	11/12/2008	<0.1	69
Mill Spring	11/12/2008	<0.1	58
Entrance Spring	11/11/2008	<0.1	86
Cow Camp Spring	11/13/2008	<0.1	69
Ruin Spring	11/12/2008	<0.1	69