



UTAH DEPARTMENT of
ENVIRONMENTAL QUALITY
**WATER
QUALITY**

Evaluation of USEPA Water Quality Data for Dissolved Metals Collected in Response to the Gold King Mine Release

Data Collected: August 8, 2015 – October 12, 2015

Prepared and Reviewed by:

Utah Department of Environmental Quality, Division of Water Quality

Utah Department of Environmental Quality, Division of Drinking Water

Utah Department of Health, Environmental Epidemiology Program

Utah Department of Natural Resources, Division of Wildlife Resources

Utah Department of Agriculture and Food

These data were obtained on January 28, 2016 from EPA's [Gold King Mine release website](#). The EPA data were not validated by DEQ and with the exception of removing what appeared to be duplicate entries, the data was used as presented.

Summary

The U.S. Environmental Protection Agency (EPA) collected data in August, September, and October 2015. Some of these data was posted data at <http://www.epa.gov/goldkingmine/data-gold-king-mine-response>. The EPA sampling locations are shown below on Figure 1. DEQ became aware of these data on January 28, 2016 and have compiled and evaluated the data with review from the Utah Department of Health, Utah Department of Agriculture and Food, and the Utah Department of Natural Resources (Division of Wildlife Resources). The EPA data were not validated by DEQ and with the exception of removing what appeared to be duplicate entries, the data was used as presented. The data were compared against Utah's water quality criteria for domestic source water, aquatic life, and agriculture. The data were also compared to screening values for irrigation and livestock.

The EPA data for total metals appears to be similar to the DEQ results, posted separately, in August and September 2015. The EPA analyzed more samples for dissolved metals in September and early October 2015 than DEQ therefore it is difficult to compare that portion of the EPA data to DEQ data. DEQ split water quality samples with EPA on October 26, 2015 but EPA has not yet released data from this date. Once EPA releases data from late October, a more robust comparison of the two datasets will be conducted. The EPA data indicate high concentrations of several dissolved metals that exceed Utah's water quality criteria for all uses in Fall 2015 (Tables 1 – 7). Most, but not all, of these exceedances appear to be coincident with storms in the upper watershed (Colorado and New Mexico). DEQ is exploring the relationship of water quality exceedances with storm activity and river turbidity. This will be an integral component of the long-term monitoring plan that DEQ is currently developing. Table 1 summarizes the number of days that EPA data exceed Utah's water quality criteria and agricultural screening values. Other tables show the data values by metal and date that exceed Utah's water quality criteria for domestic source water (Table 2), aquatic life (Tables 3 and 4), agricultural uses (Table 5), and agricultural screening values (Tables 6 and 7).

The dissolved water concentrations of metals and metalloids were compared to the Utah's water quality criteria for the Class 1C use of protected for domestic purposes with prior treatment. The EPA data indicate exceedances on three separate occasions in the San Juan River at the Four Corners (stateline) sample site, McElmo Wash, and Mexican Hat. Exceedances were measured for arsenic, barium, beryllium, chromium, and lead on September 24, 2015 and September 28, 2015. These exceedances appear to correlate with an increase in discharge on September 24 and 25, 2015 related to precipitation, although by September 28 the river had returned to pre-storm flows. The EPA dataset also indicates one exceedance of the domestic source water criteria for lead on August 11, 2015 at McElmo Wash. A similar exceedance was not recorded in DEQ's data although there was one exceedance of the lead criteria in DEQ's data on August 28, 2015. None of the public water systems regulated by the State of Utah has surface water intake directly from San Juan River.

The dissolved water concentrations of metals and metalloids were also compared to agricultural screening values, including Utah's water quality criteria for the Class 4 agricultural use. Water concentrations exceeded Utah's agricultural water quality criteria for chromium, copper, and lead at the Four Corners site on September 24, 2015. Aluminum, lead, and vanadium screening values for stock watering uses were exceeded on 9 days at Four Corners, Montezuma Creek, McElmo Wash, Bluff Bridge, and Mexican Hat sample sites. The short-term screening values for the irrigation use were exceeded on 2 days at the Four Corners and Mexican Hat locations. UDAF has analyzed the data and compared to current toxicology knowledge and scientific data concerning animal and plant life safety. DAF found no long term exposure potential risks from use of the water for livestock, wildlife, or crop irrigation. Though concentrations on certain days tested may exceed specific element's normal levels, the concentrations and duration of exceedance does not cause major concerns for consumption or absorption of the minerals from the water. Therefore, we find no adverse health risk for livestock or agricultural uses at this time.

Crop irrigation with waters that may contain elevations of specific metallic elements, i.e. iron and sulfates, may lead to accumulation in the soils over time and therefore potentially be taken up by plants to then be ingested by livestock. Though these concentrations may be lower than the toxic criteria levels, they may have an accumulating

effect to be considered in long term use, especially when elevated water levels of these same elements may also be in the diet of consuming livestock drinking from this same water source. It may take multiple growing seasons to evaluate and determine the effects of these accumulated elements in the agricultural lands and crops harvested from them.

The dissolved water concentrations of metals and metalloids were also compared to Utah's water quality criteria for the Class 3B warm water aquatic life use. EPA did not report hardness so hardness was calculated based on calcium and magnesium concentrations for the hardness-dependent criteria. Exceedances of the acute aquatic life criteria for aluminum, copper, iron, and zinc were measured at the Four Corners, Montezuma Creek, McElmo Wash, Bluff Bridge, and Mexican Hat sample sites. Exceedances of the chronic criteria for aluminum, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium and zinc were measured at the same locations.

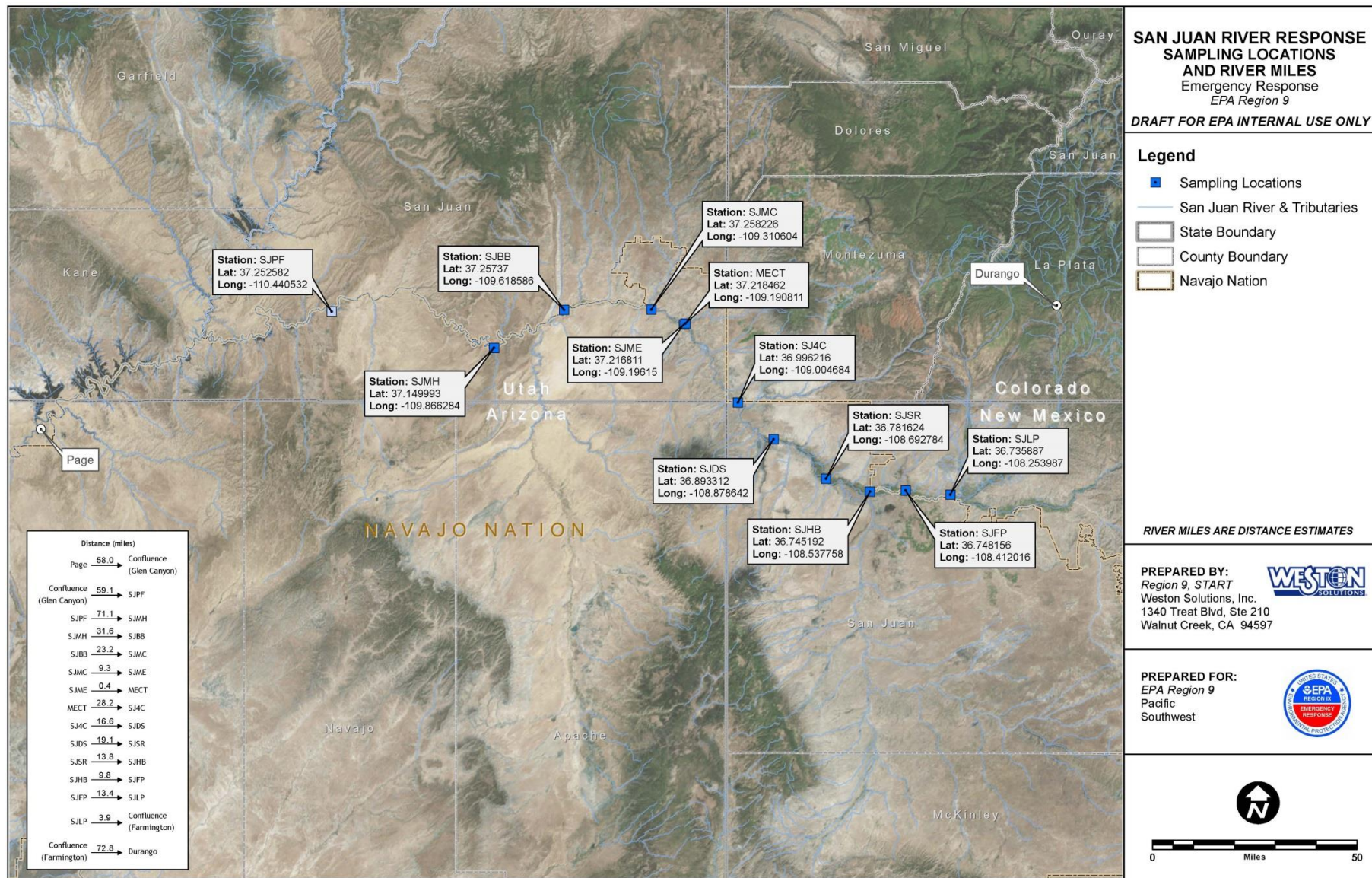


Figure 1. Map showing EPA sampling sites.

These data were obtained on January 28, 2016 from EPA's [Gold King Mine release website](#). The EPA data were not validated by DEQ and with the exception of removing what appeared to be duplicate entries, the data was used as presented.

**Exceedances Counts of Dissolved Metals Water Quality Standards and Screening Values in San Juan River
EPA Data August 9 through October 12, 2015**

Table 1. Exceedances Counts of Dissolved Metals Water Quality Standards and Screening Values in San Juan River EPA Data August 9 through October 12, 2015							
	Utah Water Quality Criterion or Screening Value	San Juan Four Corners	San Juan McElmo Wash	San Juan Montezuma Creek	San Juan Bluff Bridge	San Juan Mexican Hat	
Aluminum, Dissolved							
	Max Concentration (ug/L)	250,000	12,000	15,000	13,000	120,000	
	Count of Result	25	15	26	15	27	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	NA	NA	NA	NA	NA	
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	750	6	5	8	2	6
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	87	15	7	14	9	9
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Livestock Water Screening Values	5,000	1	4	3	1	4
	Irrigation Water Short-term (NAS, 1972)	20,000	1	0	0	0	1
	Irrigation Water Long-term (NAS, 1972)	5,000	1	4	3	1	4
Arsenic, Dissolved							
	Max Concentration (ug/L)	30	3.8	3.6	3.7	13	
	Count of Result	25	15	26	15	27	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	10	1	0	0	0	1
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	340	0	0	0	0	0
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	150	0	0	0	0	0
	Utah DWQ Agricultural Use Criteria (R317-2-14)	100	0	0	0	0	0
	Livestock Water Screening Values	200	0	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	2,000	0	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	100	0	0	0	0	0
Barium, Dissolved							
	Max Concentration (ug/L)	3,900	270	260	250	1,400	
	Count of Result	25	15	26	15	26	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	1,000	1	0	0	0	1
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)		NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)		NA	NA	NA	NA	NA
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Livestock Water Screening Values		NA	NA	NA	NA	NA
	Irrigation Water Short-term (NAS, 1972)		NA	NA	NA	NA	NA
	Irrigation Water Long-term (NAS, 1972)		NA	NA	NA	NA	NA
Beryllium, Dissolved							
	Max Concentration (ug/L)	24	0.95	0.98	1.1	8.9	
	Count of Result	25	15	25	15	26	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	4	1	0	0	0	1
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)		NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)		NA	NA	NA	NA	NA
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Livestock Water Screening Values		NA	NA	NA	NA	NA
	Irrigation Water Short-term (NAS, 1972)		NA	NA	NA	NA	NA
	Irrigation Water Long-term (NAS, 1972)		NA	NA	NA	NA	NA

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Table 1. Exceedances Counts of Dissolved Metals Water Quality Standards and Screening Values in San Juan River EPA Data August 9 through October 12, 2015						
	Utah Water Quality Criterion or Screening Value	San Juan Four Corners	San Juan McElmo Wash	San Juan Montezuma Creek	San Juan Bluff Bridge	San Juan Mexican Hat
Cadmium, Dissolved						
	Max Concentration (ug/L)	5	0.051	0.5		1.5
	Count of Result	25	15	26	15	26
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	10	0	0	0	0
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	2*	0	0	0	0
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	0.25*	3	0	3	1
	Utah DWQ Agricultural Use Criteria (R317-2-14)	10	0	0	0	0
	Livestock Water Screening Values	50	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	50	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	10	0	0	0	0
Chromium, Dissolved						
	Max Concentration (ug/L)	180	6.7	9.7	5.4	84
	Count of Result	4	7	7	4	7
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	50	1	0	0	1
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	570*	0	0	0	0
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	74*	1	0	0	1
	Utah DWQ Agricultural Use Criteria (R317-2-14)	100	1	0	0	0
	Livestock Water Screening Values	1,000	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	1,000	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	100	1	0	0	0
Cobalt, Dissolved						
	Max Concentration (ug/L)	160	5.3	5.7	5.7	52
	Count of Result	25	15	26	15	26
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)		NA	NA	NA	NA
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)		NA	NA	NA	NA
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)		NA	NA	NA	NA
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA
	Livestock Water Screening Values	1,000	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	5,000	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	50	1	0	0	0
Copper, Dissolved						
	Max Concentration (ug/L)	330	16	24	17	120
	Count of Result	25	15	26	15	27
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)		0	0	0	0
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	13*	2	0	0	1
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	9*	2	0	1	2
	Utah DWQ Agricultural Use Criteria (R317-2-14)	200	1	0	0	0
	Livestock Water Screening Values	500	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	5,000	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	200	1	0	0	0

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		Utah Water Quality Criterion or Screening Value	San Juan Four Corners	San Juan McElmo Wash	San Juan Montezuma Creek	San Juan Bluff Bridge	San Juan Mexican Hat
Iron, Dissolved							
Max Concentration (ug/L)			220,000	8,700	11,000	6,000	96,000
Count of Result			25	15	26	15	27
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	1,000	2	5	5	1	4
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	1,000	2	5	5	1	4
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Livestock Water Screening Values		NA	NA	NA	NA	NA
	Irrigation Water Short-term (NAS, 1972)	20,000	1	0	0	0	1
	Irrigation Water Long-term (NAS, 1972)	5,000	1	2	2	1	3
Lead, Dissolved							
Max Concentration (ug/L)			190	17	11	11	66
Count of Result			25	15	26	14	26
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	15	1	1	0	0	1
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	65*	0	0	0	0	0
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	2.5*	1	2	3	1	1
	Utah DWQ Agricultural Use Criteria (R317-2-14)	100	1	0	0	0	0
	Livestock Water Screening Values	100	1	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	10,000	0	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	5,000	0	0	0	0	0
Manganese, Dissolved							
Max Concentration (ug/L)			9,100	320	300	330	2,700
Count of Result			25	14	25	14	27
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)		NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)		NA	NA	NA	NA	NA
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Livestock Water Screening Values		NA	NA	NA	NA	NA
	Irrigation Water Short-term (NAS, 1972)	10,000	0	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	200	2	2	3	1	4
Mercury, Dissolved							
Max Concentration (ug/L)			0.31	0.11	Non-detect	Non-detect	0.21
Count of Result			25	15	26	15	25
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	2	0	0	0	0	0
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)		NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	0.012	2	1	0	0	2
	Utah DWQ Agricultural Use Criteria (R317-2-14)		NA	NA	NA	NA	NA
	Livestock Water Screening Values	10	0	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)		NA	NA	NA	NA	NA
	Irrigation Water Long-term (NAS, 1972)		NA	NA	NA	NA	NA

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Table 1. Exceedances Counts of Dissolved Metals Water Quality Standards and Screening Values in San Juan River EPA Data August 9 through October 12, 2015							
	Utah Water Quality Criterion or Screening Value	San Juan Four Corners	San Juan McElmo Wash	San Juan Montezuma Creek	San Juan Bluff Bridge	San Juan Mexican Hat	
Molybdenum, Dissolved							
	Max Concentration (ug/L)	3	3.1	3.5	2.1	5	
	Count of Result	25	15	26	15	27	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	NA	NA	NA	NA	NA	
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	NA	NA	NA	NA	NA	
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	NA	NA	NA	NA	NA	
	Utah DWQ Agricultural Use Criteria (R317-2-14)	NA	NA	NA	NA	NA	
	Livestock Water Screening Values	NA	NA	NA	NA	NA	
	Irrigation Water Short-term (NAS, 1972)	50	0	0	0	0	
	Irrigation Water Long-term (NAS, 1972)	10	0	0	0	0	
Nickel, Dissolved							
	Max Concentration (ug/L)	200	7.2	10	7.8	75	
	Count of Result	25	15	26	15	27	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	NA	NA	NA	NA	NA	
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	468	0	0	0	0	
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	52	1	0	0	1	
	Utah DWQ Agricultural Use Criteria (R317-2-14)	NA	NA	NA	NA	NA	
	Livestock Water Screening Values	NA	NA	NA	NA	NA	
	Irrigation Water Short-term (NAS, 1972)	NA	NA	NA	NA	NA	
	Irrigation Water Long-term (NAS, 1972)	200	0	0	0	0	
Selenium, Dissolved							
	Max Concentration (ug/L)	12	2.7	4.2	4.5	5.4	
	Count of Result	25	15	26	15	26	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	50	0	0	0	0	
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	18.4	0	0	0	0	
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	4.6	2	0	0	1	
	Utah DWQ Agricultural Use Criteria (R317-2-14)	50	0	0	0	0	
	Livestock Water Screening Values	50	0	0	0	0	
	Irrigation Water Short-term (NAS, 1972)	20	0	0	0	0	
	Irrigation Water Long-term (NAS, 1972)	20	0	0	0	0	
Silver, Dissolved							
	Max Concentration (ug/L)	1.3	Non-detect	0.36	Non-detect	0.42	
	Count of Result	25	15	26	15	26	
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	50	0	0	0	0	
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	1.6	0	0	0	0	
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	NA	NA	NA	NA	NA	
	Utah DWQ Agricultural Use Criteria (R317-2-14)	NA	NA	NA	NA	NA	
	Livestock Water Screening Values	NA	NA	NA	NA	NA	
	Irrigation Water Short-term (NAS, 1972)	NA	NA	NA	NA	NA	
	Irrigation Water Long-term (NAS, 1972)	NA	NA	NA	NA	NA	

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Table 1. Exceedances Counts of Dissolved Metals Water Quality Standards and Screening Values in San Juan River EPA Data August 9 through October 12, 2015						
	Utah Water Quality Criterion or Screening Value	San Juan Four Corners	San Juan McElmo Wash	San Juan Montezuma Creek	San Juan Bluff Bridge	San Juan Mexican Hat
Vanadium, Dissolved						
	Max Concentration (ug/L)	280	23	23	21	150
	Count of Result	25	15	26	15	27
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	NA	NA	NA	NA	NA
	Utah DWQ Agricultural Use Criteria (R317-2-14)	NA	NA	NA	NA	NA
	Livestock Water Screening Values	100	1	0	0	1
	Irrigation Water Short-term (NAS, 1972)	1,000	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	100	1	0	0	1
Zinc, Dissolved						
	Max Concentration (ug/L)	700	42	41	36	310
	Count of Result	25	15	26	15	26
Exceedances (count)	Utah Domestic Source Criteria (R317-2-14)	NA	NA	NA	NA	NA
	Utah Aquatic Life Use Criteria (1-hr) (R317-2-14)	120*	1	0	0	1
	Utah Aquatic Life Use Criteria Chronic (4-day) (R317-2-14)	120*	1	0	0	1
	Utah DWQ Agricultural Use Criteria (R317-2-14)	NA	NA	NA	NA	NA
	Livestock Water Screening Values	25,000	0	0	0	0
	Irrigation Water Short-term (NAS, 1972)	10,000	0	0	0	0
	Irrigation Water Long-term (NAS, 1972)	2,000	0	0	0	0

* Note: Aquatic life water quality criteria for Cadmium, Chromium, Copper, Lead, Nickel, Silver and Zinc are hardness dependent. Criteria at hardness 100 mg/L are shown here for comparison purposes.

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
EPA Data August 9 through October 12, 2015

Table 2. Summary of Data (ug/L) that Exceed Utah's Water Quality Criteria for Domestic Source Water¹

		San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Mexican Hat
☒ Arsenic, Dissolved				
	9/24/2015	30		
	9/28/2015			13
☒ Barium, Dissolved				
	9/24/2015	3,900		
	9/28/2015			1,400
☒ Beryllium, Dissolved				
	9/24/2015	24		
	9/28/2015			8.9
☒ Chromium, Dissolved				
	9/24/2015	180		
	9/28/2015			84
☒ Lead, Dissolved				
	8/11/2015		17	
	9/24/2015	190		
	9/28/2015			66
¹Utah's Domestic Water Quality Criteria - R317-2				
		Contaminant	Units	Criteria
		Arsenic, Dissolved	µg/L	10
		Barium, Dissolved	µg/L	1,000
		Beryllium, Dissolved	µg/L	4
		Chromium, Dissolved	µg/L	50
		Lead, Dissolved	µg/L	15

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
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Table 3. Summary of Data (ug/L) that Exceed Utah's Acute Water Quality Criteria for Warm-water Aquatic Life²						
		San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Town of Montezuma	San Juan R @ Bluff Bridge	San Juan R @ Mexican Hat
Aluminum, Dissolved						
	8/9/2015		5,700			
	8/10/2015		2,200	2,300		
	8/11/2015		9,300		1,600	
	8/12/2015	840				
	8/14/2015		12,000	10,000	13,000	10,000
	8/17/2015					17,000
	8/18/2015	1,300				
	8/27/2015		7,800			
	8/31/2015	780		2,500		9,600
	9/3/2015	3,100		14,000		
	9/24/2015	250,000		1,600		
	9/28/2015	890		15,000		120,000
	9/30/2015					960
	10/5/2015			850		
	10/8/2015			1,100		1,400
Copper, Dissolved						
	9/24/2015	330				
	9/28/2015					120
	10/8/2015	24				
Iron, Dissolved						
	8/9/2015		3,500			
	8/10/2015		1,600	1,800		
	8/11/2015		8,700			
	8/14/2015		5,200	4,700	6,000	3,700
	8/17/2015					13,000
	8/27/2015		3,900			
	8/31/2015			1,400		6,100
	9/3/2015	2,000		11,000		
	9/24/2015	220,000				
	9/28/2015			11,000		96,000

Table 3. Summary of Data (ug/L) that Exceed Utah's Acute Water Quality Criteria for Warm-water Aquatic Life ²						
		San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Town of Montezuma	San Juan R @ Bluff Bridge	San Juan R @ Mexican Hat
Zinc, Dissolved						
	9/24/2015	700				

² Utah's Acute Aquatic Life Water Quality Criteria - R317-2		
Contaminant	Units	Criteria
Aluminum, Dissolved	µg/L	750
Arsenic, Dissolved	µg/L	340
Cadmium, Dissolved*	µg/L	2
Chromium, Dissolved*	µg/L	570
Copper, Dissolved*	µg/L	13
Iron, Dissolved	µg/L	1000
Lead, Dissolved*	µg/L	65
Nickel, Dissolved*	µg/L	468
Selenium, Dissolved	µg/L	18.4
Silver, Dissolved*	µg/L	1.6
Zinc, Dissolved*	µg/L	120

* Note: Aquatic life water quality criteria for Cadmium, Chromium, Copper, Lead, Nickel, Silver and Zinc are hardness dependent. Criteria at hardness 100 mg/L are shown here for comparison purposes.

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
 EPA Data August 9 through October 12, 2015

Table 4. Summary of Data (ug/L) that Exceed Utah's Chronic Water Quality Criteria for Warm-water Aquatic Life ³						
		San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Town of Montezuma	San Juan R @ Bluff Bridge	San Juan R @ Mexican Hat
☐ Aluminum, Dissolved						
	8/9/2015		5,700			
	8/10/2015		2,200	2,300	200	
	8/11/2015		9,300		1,600	
	8/12/2015	840		560		
	8/14/2015	230	12,000	10,000	13,000	10,000
	8/15/2015	470			390	
	8/16/2015			170	110	
	8/17/2015	240		98	630	17,000
	8/18/2015	1,300	310	460	100	540
	8/24/2015		210			
	8/25/2015	160			230	
	8/26/2015	130				
	8/27/2015		7,800	690		
	8/31/2015	780		2,500		9,600
	9/3/2015	3,100		14,000		
	9/10/2015	220		450		430
	9/21/2015	200				
	9/24/2015	250,000		1,600		
	9/28/2015	890		15,000		120,000
	9/30/2015					960
	10/5/2015			850		720
	10/8/2015	570		1,100		1,400
	10/12/2015	690				
☐ Cadmium, Dissolved						
	9/15/2015	0.5		0.5		
	9/21/2015	0.5		0.5		
	9/24/2015	5				
	9/28/2015					1.5
	10/5/2015			0.5		
☐ Chromium, Dissolved						
	9/24/2015	180				
	9/28/2015					84

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
 EPA Data August 9 through October 12, 2015

Table 4. Summary of Data (ug/L) that Exceed Utah's Chronic Water Quality Criteria for Warm-water Aquatic Life ³						
		San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Town of Montezuma	San Juan R @ Bluff Bridge	San Juan R @ Mexican Hat
☐ Copper, Dissolved						
	8/14/2015					39
	9/24/2015	330				
	9/28/2015					120
	10/5/2015			24		
	10/8/2015	24				
☐ Iron, Dissolved						
	8/9/2015		3,500			
	8/10/2015		1,600	1,800		
	8/11/2015		8,700			
	8/14/2015		5,200	4,700	6,000	3,700
	8/17/2015					13,000
	8/27/2015		3,900			
	8/31/2015			1,400		6,100
	9/3/2015	2,000		11,000		
	9/24/2015	220,000				
	9/28/2015			11,000		96,000
☐ Lead, Dissolved						
	8/11/2015		17			
	8/14/2015		11	11	11	
	9/3/2015			8.4		
	9/24/2015	190				
	9/28/2015			8.8		66
☐ Mercury, Dissolved						
	8/14/2015		0.11			0.19
	9/24/2015	0.31				
	9/28/2015					0.21
	9/30/2015	0.14				
☐ Nickel, Dissolved						
	9/24/2015	200				
	9/28/2015					75

Table 4. Summary of Data (ug/L) that Exceed Utah's Chronic Water Quality Criteria for Warm-water Aquatic Life³						
		San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Town of Montezuma	San Juan R @ Bluff Bridge	San Juan R @ Mexican Hat
☐ Selenium, Dissolved						
	8/27/2015	7.3				5.4
	9/24/2015	12				
☐ Zinc, Dissolved						
	9/24/2015	700				
	9/28/2015					310

³Utah's Chronic Aquatic Life Water Quality Criteria - R317-2			
	Contaminant	Units	Criteria
	Aluminum, Dissolved	µg/L	87
	Cadmium, Dissolved*	µg/L	0.25
	Chromium, Dissolved*	µg/L	74
	Copper, Dissolved*	µg/L	9
	Iron, Dissolved	µg/L	1000
	Lead, Dissolved*	µg/L	2.5
	Mercury, Dissolved	µg/L	0.012
	Nickel, Dissolved*	µg/L	52
	Selenium, Dissolved	µg/L	4.6
	Zinc, Dissolved*	µg/L	120

* Note: Aquatic life water quality criteria for Cadmium, Chromium, Copper, Lead, Nickel, Silver and Zinc are hardness dependent. Criteria at hardness 100 mg/L are shown here for comparison purposes.

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
 EPA Data August 9 through October 12, 2015

Table 5. Summary of Data (ug/L) that Exceed Utah's Water Quality Criteria for Agricultural Uses⁴	
	San Juan R @ Four Corners
Chromium, Dissolved	
9/24/2015	180
Copper, Dissolved	
9/24/2015	330
Lead, Dissolved	
9/24/2015	190

⁴Utah's Agricultural Water Quality Criteria - R317-2		
Contaminant	Units	Criteria
Chromium, Dissolved	µg/L	100
Copper, Dissolved	µg/L	200
Lead, Dissolved	µg/L	100

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
 EPA Data August 9 through October 12, 2015

Table 6. Summary of Data (ug/L) that Exceed Screening Values for Livestock Uses⁵

	San Juan R @ Four Corners	San Juan R @ McElmo Wash	San Juan R @ Town of Montezuma	San Juan R @ Bluff Bridge	San Juan R @ Mexican Hat
Aluminum, Dissolved					
8/9/2015		5,700			
8/11/2015		9,300			
8/14/2015		12,000	10,000	13,000	10,000
8/17/2015					17,000
8/27/2015		7,800			
8/31/2015					9,600
9/3/2015			14,000		
9/24/2015	250,000				
9/28/2015			15,000		120,000
Lead, Dissolved					
9/24/2015	190				
Vanadium, Dissolved					
9/24/2015	280				
9/28/2015					150

⁵Screening Values for
Livestock Uses

Contaminant	Units	Criteria
Aluminum, Dissolved	µg/L	5,000
Lead, Dissolved	µg/L	100
Vanadium, Dissolved	µg/L	100

Summary of Dissolved Metals Data that Exceed Water Quality Standards and/or Screening Values in San Juan River
 EPA Data August 9 through October 12, 2015

Table 7. Summary of Data (ug/L) that Exceed Short-term screening Values for Irrigation Water Uses⁶		
	San Juan R @ Four Corners	San Juan R @ Mexican Hat
Aluminum, Dissolved		
9/24/2015	250,000	
9/28/2015		120,000
Iron, Dissolved		
9/24/2015	220,000	
9/28/2015		96,000

⁶Screening Values for Irrigation Uses		
Contaminant	Units	Criteria
Aluminum, Dissolved	µg/L	20,000
Iron, Dissolved	µg/L	20,000