

Rationale for Lake Powell being Safe for Recreational Use

Prepared by the Arizona Department of Environmental Quality Water Quality Division

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ADEQ analyzed the San Juan River water quality data collected by the Utah Department of Environmental Quality (UDEQ) near Mexican Hat, Utah in relation to Arizona's applicable water quality standards (AZWQS) meant to protect recreational users. These AZWQS are developed to protect users when they swim or are submerged in lake or stream water and with protection levels based on total metal concentrations. This site was chosen for this analysis because it is the closest sampling location to Lake Powell with data available before and after the Gold King Mine spill plume passed by the site. Data prior to the August 11th 3:43 pm sample are considered pre-plume while the data including this sample and after are considered post-plume.

While Utah's San Juan River data show elevated total metals concentrations, only total lead exceeded AZWQS in all samples. The only other exceedance of an AZWQS for recreational use observed was one arsenic test result from August 14th. Subsequent tests for arsenic met AZWQS. Table 1 contains the Utah data along with pre- and post- plume average concentrations and the associated Arizona Full Body Contact AZWQS. It is important to note that the total lead exceedances occurred pre-plume arrival and continued after the plume.

In analyzing the UDEQ data, ADEQ found that total metals concentrations were generally consistent with background levels; this finding was also reached by UDEQ in its "Preliminary Analysis of Immediate Effects of Gold King Mine Release on Water Quality in the San Juan River, Utah," which is available at <http://www.deq.utah.gov/Topics/Water/goldkingmine/docs/2015/08Aug/ImmediateEffectsSanJuanFINAL.pdf>

All metals listed in Table 1 had higher average concentrations pre-plume arrival than post-plume arrival with the exception of antimony. The San Juan River has naturally high background metals concentrations and sediment load as a result of the local geology and hydrology. These high levels of metals and sediment are reflected in the data as pre-plume concentrations were higher than post-plume concentrations. The increased concentrations that resulted from two monsoon events that occurred on August 8th (the day sampling began pre-plume arrival) and August 12th (post-plume arrival) outweighed any impact directly attributable to the spill.

Based on the Mexican Hat water quality data ADEQ has determined the Gold King Mine spill did not impact the recreational use of Lake Powell due to several factors:

- High total metals concentrations occur naturally in the San Juan River and are higher than concentrations associated with the spill plume at Mexican Hat as evidenced by elevated metals concentrations in the San Juan River prior to the plume arriving
- Average metals concentrations were lower after the plume passed through Mexican Hat than prior to its arrival
- There were no spill-associated elevated total metals levels seen in the San Juan River water quality sampling data
- The naturally high sediment load from the San Juan River will dilute and sequester any contaminated sediment as it enters Lake Powell

San Juan R @ Mexican Hat US163 Crossing

Collection Date	Collection Time	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
8/8/15	5:40 PM	63,400	1.31	16.3	1,540	7.23	1.5	167	29.4	41.5	103	51,900	86.7	30,600	2,800	0.18	1.3	47.8	14,400	1.43	0.56	63,900	0.84	70.5	261
8/10/15	11:53 AM	90,800	0.171	20.6	2,300	7.61	1.53	314	43.1	40.2	72.8	43,400	82.1	57,000	3,230	ND	0.65	70.9	19,700	1.37	0.4	46,100	0.62	80	843
8/10/15	4:44 PM	80,600	0.316	22.7	1,910	6.12	1.27	254	36.8	32.8	69.8	38,100	171	49,400	2,430	ND	0.67	58.4	18,100	1.28	1.1	52,600	0.44	83.3	815
8/11/15	11:31 AM	111,000	0.193	22.2	2,430	8.13	1.39	259	43.5	38.5	74.3	47,300	102	57,400	2,710	0.175	0.58	64.6	22,200	1.25	0.59	57,800	0.83	88.4	209
8/11/15	3:43 PM	56,400	0.345	13.3	1,350	5.09	1.09	150	23.5	25.3	61	25,900	75.1	30,100	1,660	ND	0.77	34.2	11,700	0.93	0.48	41,500	0.59	57.2	168
8/12/15	12:09 PM	54,700	0.775	17.5	1,350	6.77	1.17	186	23.2	33.2	80.8	37,500	82.9	33,300	2,170	ND	0.31	38.9	10,700	1.22	0.49	44,400	0.6	63.7	190
8/12/15	5:50 PM	71,400	0.224	22.7	2,010	8.74	1.55	282	28.5	40.1	82.4	38,600	101	47,900	3,070	0.18	0.23	51.7	14,000	1.53	0.54	55,600	0.63	78.5	210
8/13/15	12:05 PM	44,700	1.9	16.5	1,450	5.44	1.25	246	18.3	25	49.5	21,600	62.5	41,900	1,840	ND	0.68	39.2	12,500	1.59	0.52	48,800	0.43	66.1	145
8/14/15	11:43 AM	124,000	1.14	37.2	4,320	15.2	3.74	720	51.1	59.6	84.2	46,900	166	105,000	5,630	0.372	0.92	111	30,400	2.41	1.11	78,600	0.99	115	270
8/15/15	9:43 AM	63,700	1.16	16.8	1,620	7.29	1.46	207	29.8	35.5	79	45,100	86.7	40,700	2,330	0.198	0.96	47.8	14,000	1.57	0.63	59,600	0.86	75.5	220
8/16/15	11:58 AM	34,300	0.18	9.96	892	2.87	0.6	111	17.1	16.3	40.2	13,500	27.1	22,600	976	0.077	0.79	24	10,600	0.97	0.19	47,600	0.42	40.5	294
8/17/15	3:04 PM	16,800	0.698	6.85	496	2.07	0.429	92.3	8.24	9.82	24.3	23,000	83.4	18,000	641	0.063	1.06	14.1	6,410	0.98	0.33	38,400	0.26	26.2	72.6
	Average Pre-plume	86,450	0.50	20	2,045	7.3	1.4	249	38	38	80	45,175	110	48,600	2,793	0.18	0.80	60	18,600	1	1	55,100	1	81	532
	Average Post-plume	58,250	0.8	18	1,686	6.7	1.4	249	25	31	63	31,513	86	42,438	2,290	0.18	0.72	45	13,789	1	1	51,813	1	65	196
	Full Body Contact WQS	NNS	747	30	98000	1867	700	NNS	NNS	NNS	1300	NNS	15	NNS	130667	280	NNS	28000	NNS	4667	4667	NNS	75	NNS	280000
	Notes:																								
	NNS= no applicable numeric water quality standard																								
	WQS exceedances are highlighted in red																								
	Gold King Mine plume arrived at Mexican Hat on 8/11/15																								