



The Gold King Mine Spill: Update on Utah's Monitoring and Assessment Efforts



Western States Water Council

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UTAH DEPARTMENT of
**ENVIRONMENTAL
QUALITY**

What Happened?

- On 8/5/15, an EPA contractor triggered a 3 million gallon release from GKM into Cement Creek
- This caused a real-time, visual change in river color, influenced public outrage with the EPA, and initiated charges for potential damages.



<https://www.denverite.com/lawmakers-push-epa-repay-costs-mine-spill-response-25272/>

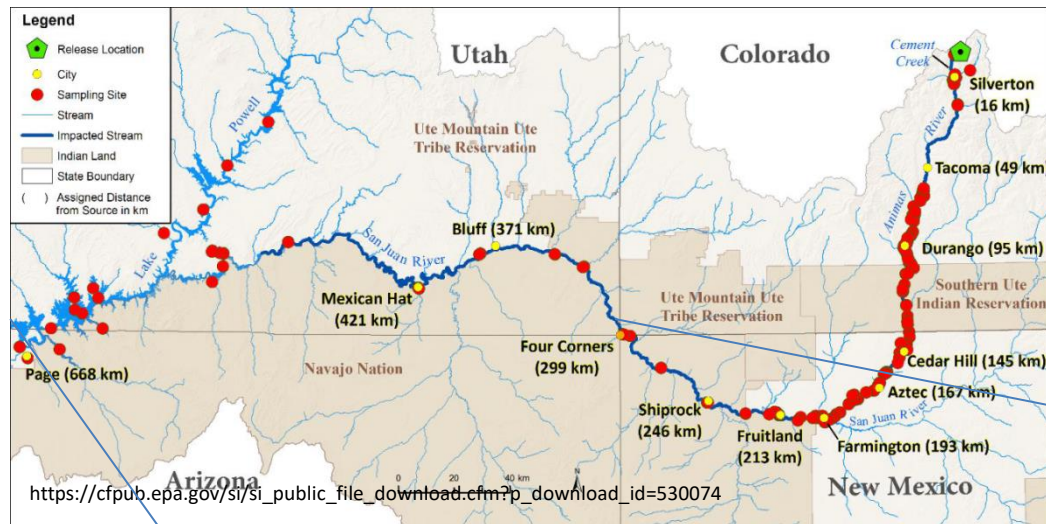


<http://www.washingtontimes.com/news/2015/aug/10/gold-king-mine-spill-exposes-obama-hypocrisy-threa/>

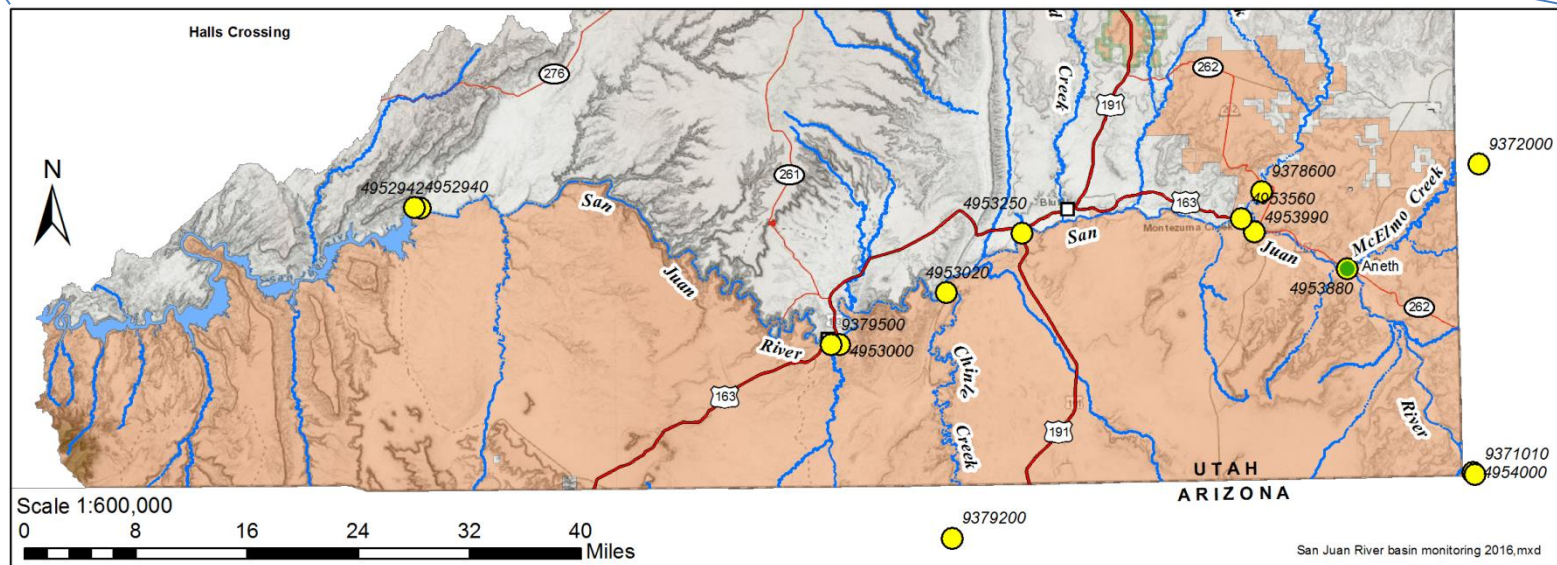


<https://twitter.com/KOB4>

Response: Monitoring Phases



- Phase 1: Initial Response
August – October, 2015
- Phase 2: Spring Runoff
February – July, 2016
- Phase 3: Long-Term
Monitoring and Assessment

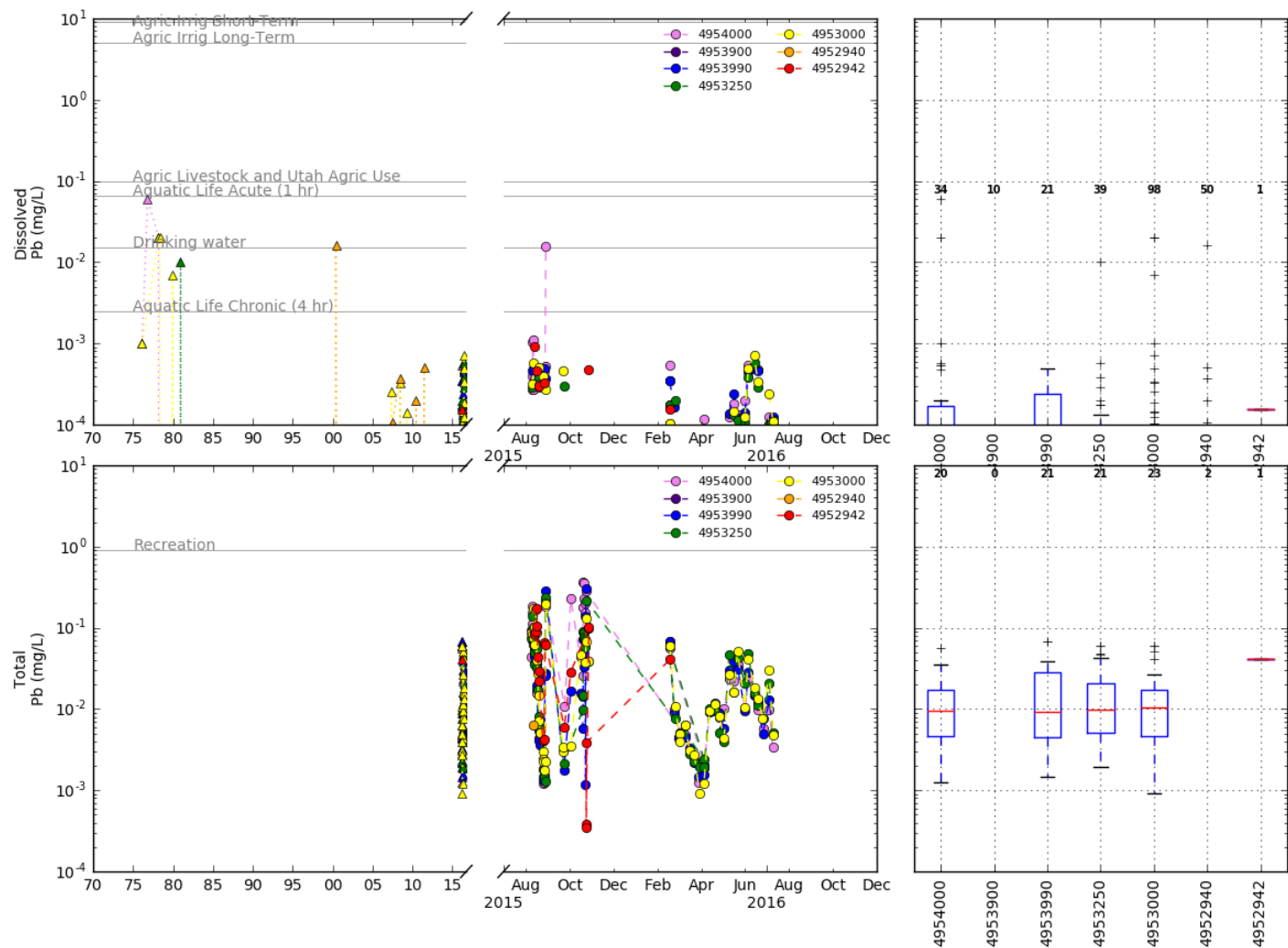


Utah Screening Results – Water Column

Aquatic Life Use (Dissolved Metals)																								
		No Exceedence		Above Screening Level																				
				Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	
Utah Aquatic Life Use 1-hour				750		340			2	570		13	1000	65					468	18.4	1.6			120
Utah Aquatic Life Use 4-hour				87		150			0.25	74		9	1000	2.5			0.012		52	4.6				120
Monitoring Location	Site Description	Collection Date	Collection Time	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	
		8/8/2015	1:23 PM	47,400	0.5	1.3	222.0	0.0	ND	ND	0.1	2.2	95.8	ND	2.9	ND	1.9	ND	0.7	ND	ND	4.9	15.3	
		8/9/2015	12:02 PM	33,900	0.3	0.6	274.0	ND	ND	ND	0.1	2.5	119.0	ND	2.7	ND	2.0	ND	0.6	0.0	ND	1.8	18.5	
			3:05 PM	26,700	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
			6:00 PM	24,600	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
			9:02 PM	31,000	0.3	0.9	341.0	0.0	ND	ND	0.1	3.5	198.0	0.3	4.1	ND	1.9	ND	0.5	ND	ND	2.1	15.4	
		8/10/2015	9:11 AM	39,900	0.5	1.0	233.0	ND	ND	ND	0.1	3.2	103.0	0.4	1.6	ND	2.0	ND	0.6	ND	ND	1.7	19.7	
			2:06 PM	43,700	0.7	1.3	220.0	0.1	ND	ND	0.4	3.4	732.0	1.0	12.8	ND	1.9	0.8	0.6	0.1	ND	3.6	18.0	
		8/11/2015	8:50 AM	77,000	0.4	1.7	451.0	0.1	ND	ND	0.5	4.9	1,520.0	1.1	19.0	0.0	1.7	1.2	1.0	ND	ND	3.9	19.1	
			1:17 PM	56,900	0.1	1.3	334.0	ND	ND	ND	0.2	3.0	366.0	0.3	5.1	ND	1.6	ND	0.8	ND	ND	2.5	14.9	
		8/12/2015	9:50 AM	31,100	0.6	0.9	178.0	ND	ND	ND	0.1	2.4	ND	ND	ND	ND	1.5	ND	0.8	0.0	ND	1.9	14.8	
			12:09 PM	28,500	0.5	1.2	151.0	ND	ND	ND	0.0	2.6	ND	ND	1.8	ND	1.5	ND	0.7	ND	ND	2.9	16.5	
		8/13/2015	10:01 AM	38,700	0.2	1.3	213.0	0.0	ND	ND	0.1	3.7	148.0	0.4	3.2	ND	1.9	ND	0.9	ND	ND	2.1	21.9	
		8/14/2015	8:50 AM	44,300	0.4	1.7	72.3	0.0	ND	ND	0.1	3.9	ND	ND	1.8	ND	3.7	3.1	1.1	ND	0.0	4.1	ND	
		8/15/2015	9:43 AM	14,200	0.4	1.4	65.2	ND	ND	ND	0.1	1.4	ND	ND	ND	ND	2.3	ND	0.6	ND	ND	2.6	ND	
		8/16/2015	9:15 AM	9,500	1.1	0.9	179.0	0.0	ND	ND	ND	2.9	ND	ND	ND	ND	1.7	ND	0.6	0.2	ND	1.9	12.6	
		8/18/2015	9:56 AM	3,640	0.7	1.3	148.0	ND	ND	ND	0.1	2.3	ND	0.3	ND	ND	1.7	ND	0.6	0.0	ND	1.9	12.3	
		8/19/2015	9:30 AM	4,070	0.7	1.3	106.0	ND	ND	ND	0.1	1.7	ND	ND	ND	ND	1.7	ND	0.5	0.0	ND	1.9	8.4	
		8/20/2015	9:44 AM	3,650	0.8	1.3	132.0	ND	ND	ND	0.1	1.9	ND	ND	ND	ND	1.8	ND	0.6	0.1	0.0	1.9	8.1	
		8/24/2015	3:10 PM	1,760	0.3	1.4	62.4	ND	ND	ND	0.0	2.2	ND	ND	1.9	ND	1.6	1.1	0.5	ND	ND	2.3	5.5	
		8/25/2015	3:30 PM	1,500	0.5	1.4	63.4	ND	ND	ND	ND	2.1	ND	ND	1.9	ND	1.6	ND	0.6	ND	ND	2.5	ND	
		8/26/2015	2:50 PM	1,540	0.6	1.5	70.5	0.1	ND	ND	0.3	2.8	554.0	0.5	21.8	ND	1.6	1.1	0.6	0.1	0.0	3.3	8.0	
		8/27/2015	3:40 PM	117,000	0.3	1.0	121.0	0.1	ND	ND	0.4	3.3	605.0	0.5	11.4	ND	3.3	2.0	0.9	ND	ND	3.4	6.2	
		8/28/2015	4:25 PM	196,000	0.2	5.6	340.0	1.6	0.3	12.0	9.0	27.7	16,700.0	15.7	413.0	0.0	1.5	12.7	0.8	0.1	0.2	26.2	72.8	
		9/23/2015	6:30 PM	5,120	0.7	1.0	81.5	0.1	ND	ND	0.3	1.9	ND	ND	9.3	ND	1.8	1.3	0.7	0.1	0.1	1.8	ND	
		10/2/2015				183,000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

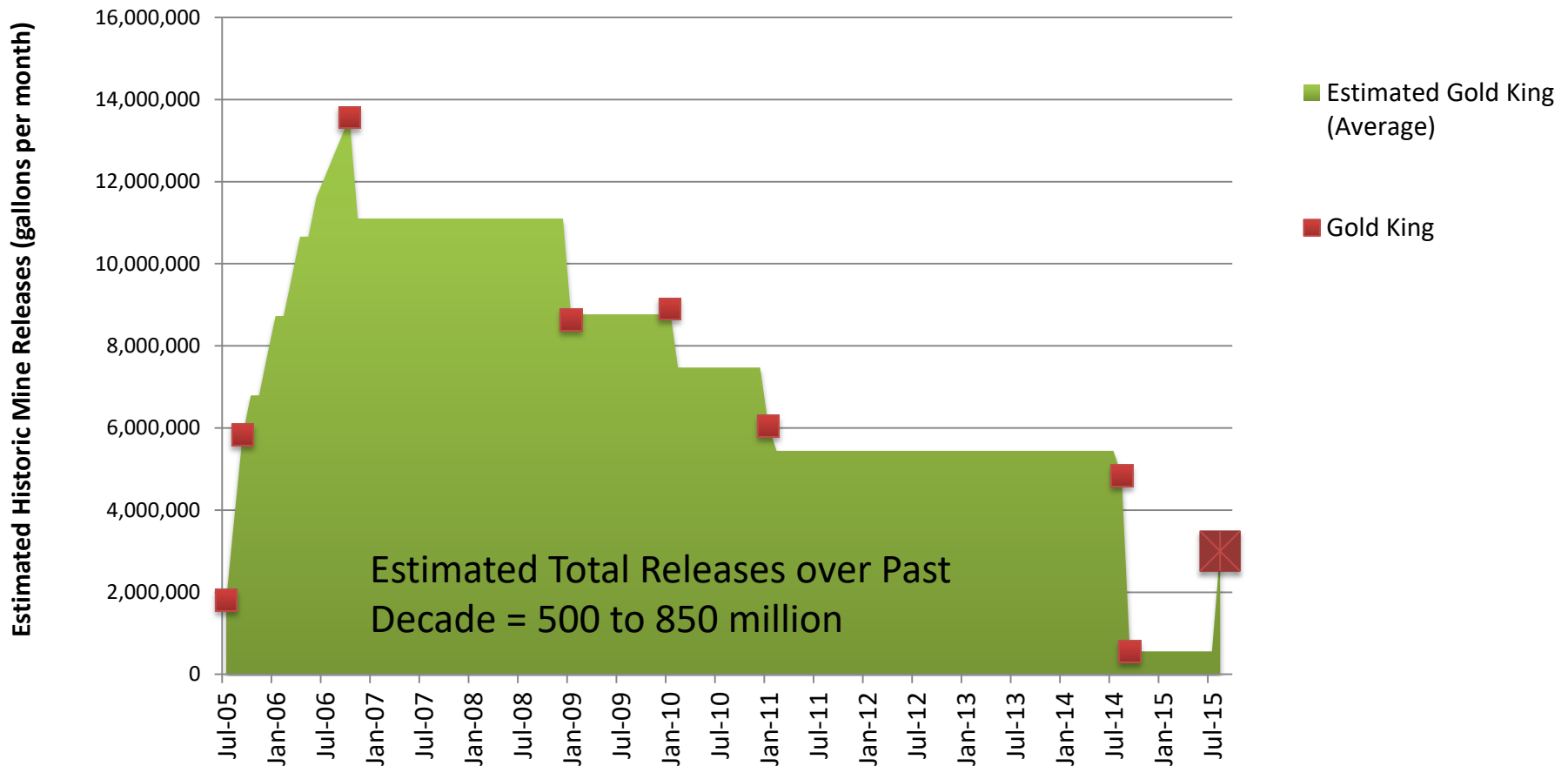
Standard or Benchmark	Phase 1 Exceedances	Phase 2 Exceedances
Domestic Water	1 (Pb)	0
Aquatic Life	16 (Cd, Cu, Fe, Pb, Zn) 149 (Al)	126 (Al)
Recreational	0	0
Agricultural	6 (Al, Fe, Mn)	1 (Mo)

Utah San Juan River Metal Concentration



Cumulative Releases Over a Decade

Estimated Historic Mine Releases (gallons per month)



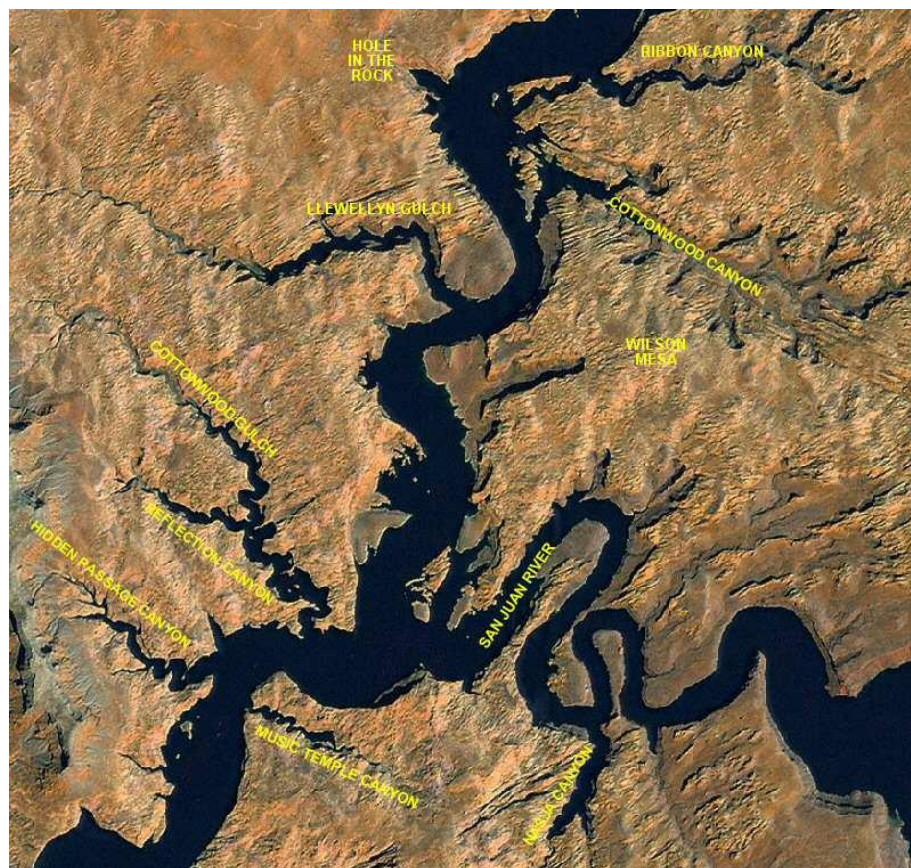
Long-term effects on San Juan River and Lake Powell

San Juan Arm, Lake Powell

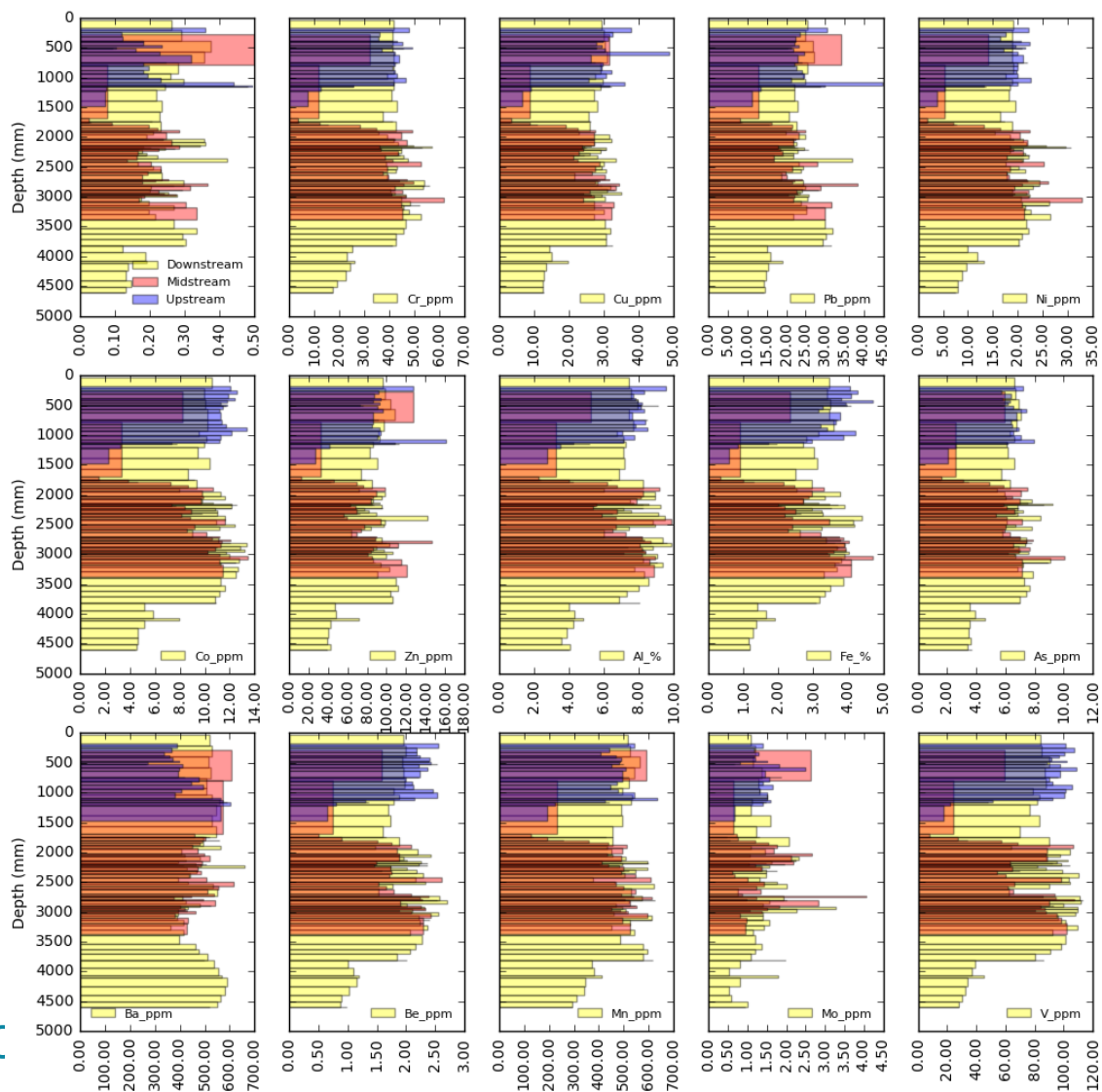
- ❑ Depositional area for historic and current mine releases in San Juan system

Historic releases:

- ❑ Estimated release of 8.6 million tons of tailings discharged to river system over life of the mines
- ❑ EPA estimates 5.5 million gallons per day of releases
- ❑ 1974 – 116,000 tons
- ❑ 1978 - 500 million gallon release



2010 USGS Sediment Cores in San Juan R. Delta



Aquatic Life Screening Value Exceedances

- Exceedances of Al, As, Cr, Cu, Fe, Pb, Mn, Ni, Zn
- Across all 3 cores and at multiple depths
- Recreation & aquatic screening levels exceeded in dozens of intervals

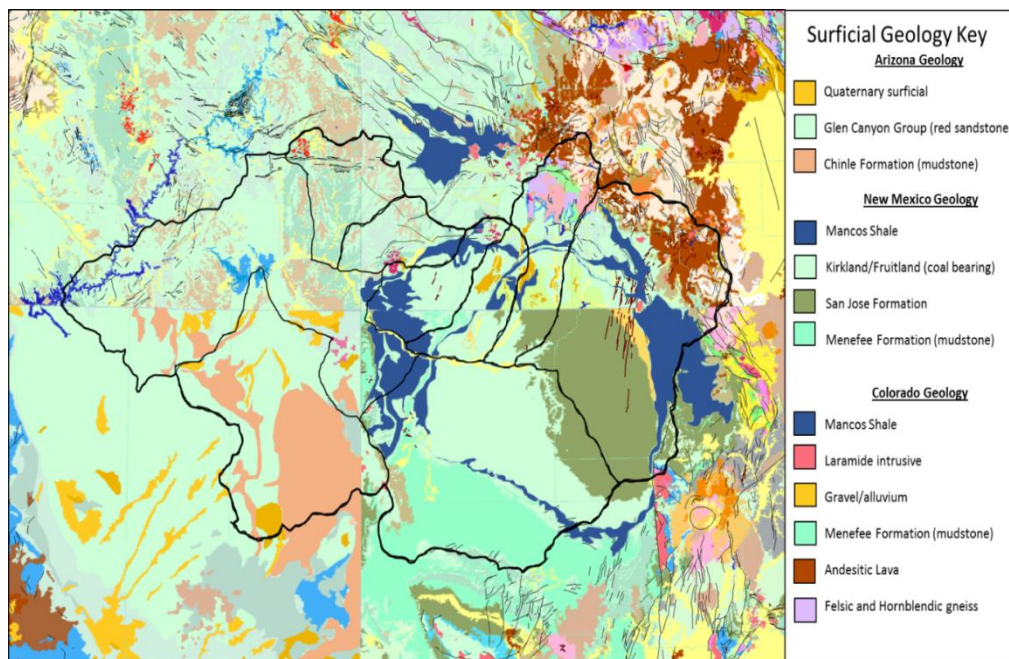
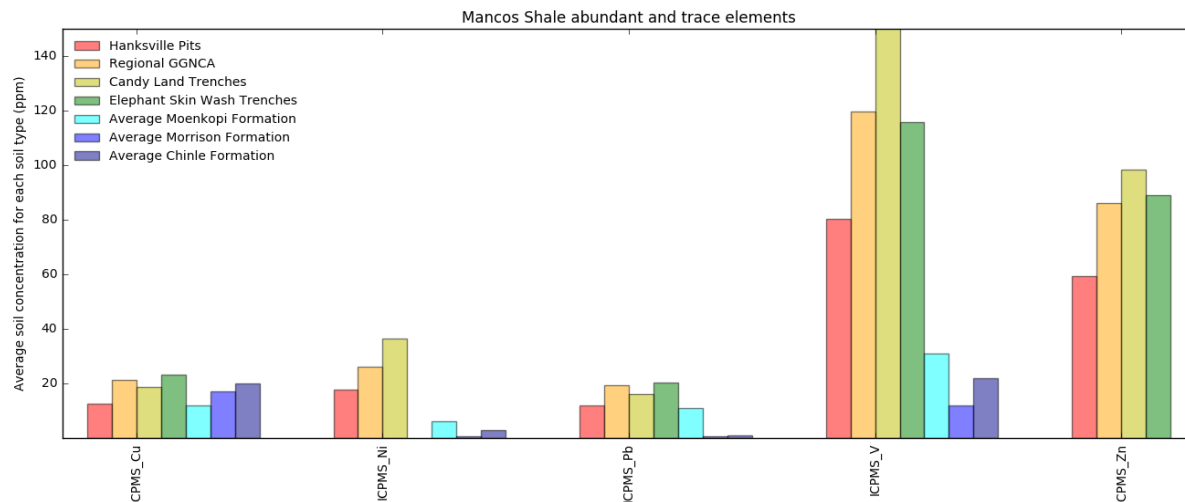
USGS Sediment Traps in Lake Powell Delta

- Three sediment trap periods at three separate locations (Up-, mid-, downstream)
- Analysis complicated by monsoonal storms



Recreation & aquatic life screening values exceeded upstream at nearly every interval

Source Identification



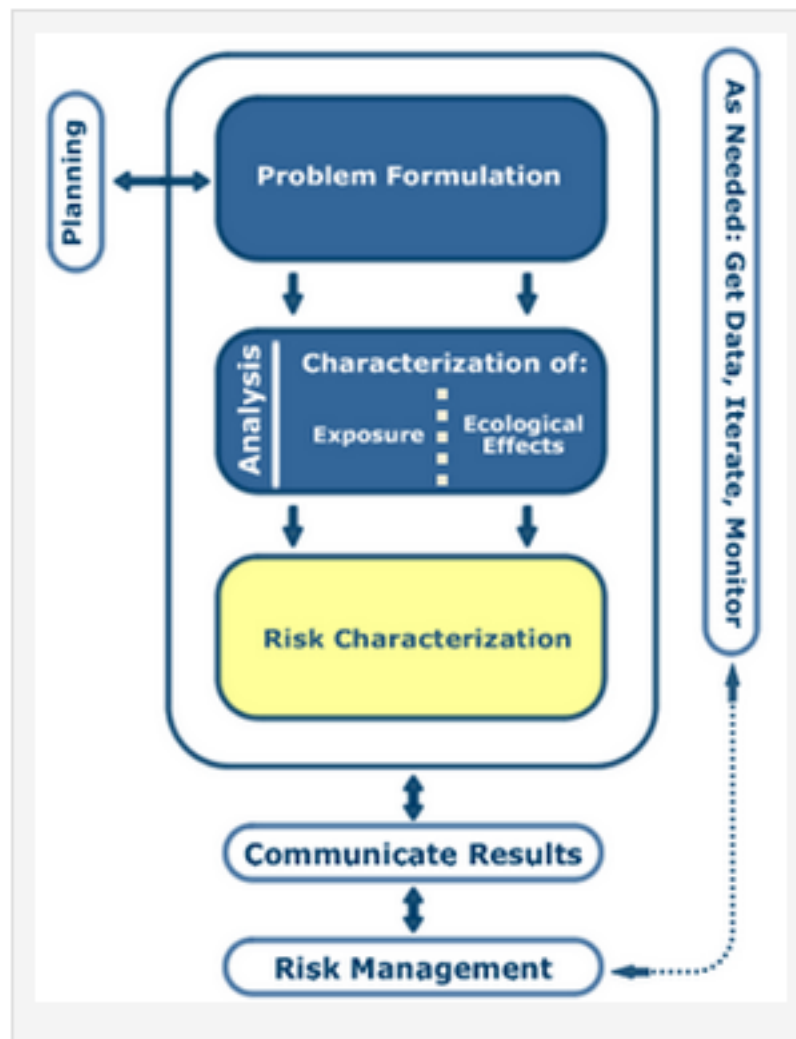
Phase III Project will identify:

- the relative importance of natural and mining sources in basin
- different elemental contributions from different geologic sources (e.g., Mancos Shale)
- isotopic and ion ratio “fingerprinting” of sources

Ecological and Human Health Risk Assessment

Assess the potential for adverse effects to invertebrates, fish, birds and mammals from exposure via food items using pollutant concentrations measured in invertebrates and water.

Assess the potential human health risk presented by use of the San Juan River and Lake Powell for culinary water, recreation, or agricultural activities using water and sediment data.



Costs and Reimbursement

- Phase 1: \$463,902 total DEQ incurred costs
 - Fully reimbursed by EPA
- Phase 2: \$215,603 total DEQ incurred costs
 - EPA provided preliminary approval for reimbursement)
- Phase 3 – Long-term Monitoring and Assessment (EPA grant \$465,000)
 - Public Drinking Water Systems and Private Well Monitoring (\$15,536)
 - Metals Load Analysis and Mining Sources Inventory (\$76,252) with Univ. of Utah
 - Historic Metal Concentrations in Lake Powell (\$220,000) with USGS
 - Ecological Risk and Human Health Risk Assessment (\$98,212) with TetraTech
 - Project Management (\$55,000)
- Spring 2016: States and tribes successfully petitioned EPA to fund installation of continuous monitoring in Animas and San Juan River

Legal Efforts

- State of Utah filed a Notice of Intent to sue EPA in Feb 2016
- State of Utah continues to be in settlement negotiations with EPA
- Justice Department determined that EPA had immunity from the spill in response to litigation from Navajo Nation and State of New Mexico
- Water Infrastructure Improvements for the Nation Act (WIIN Act) includes congressional appropriations of \$4 million per year for 5 years to cover GKM related issues