1185688 - R8 SDMS

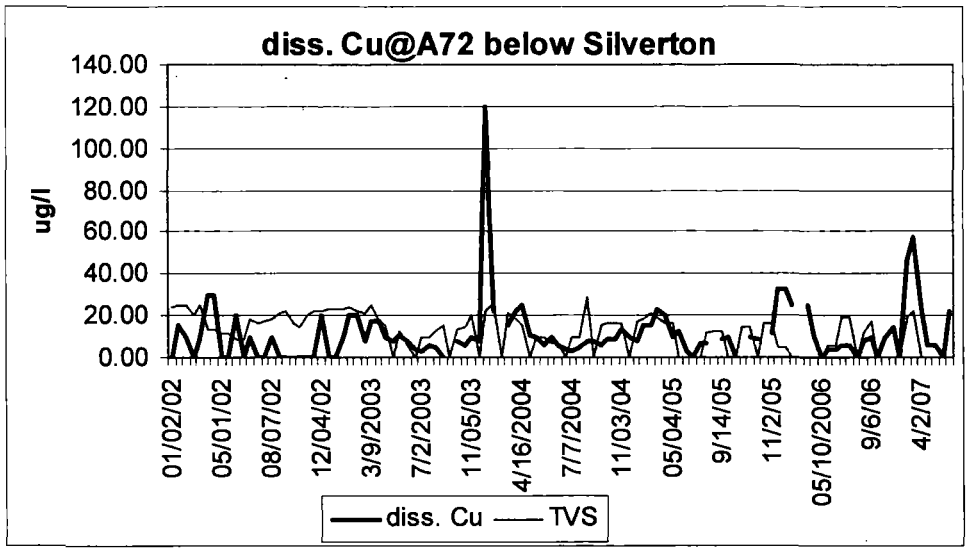
Upper Animas Mining District
EPR Management Briefing
May 13, 2010

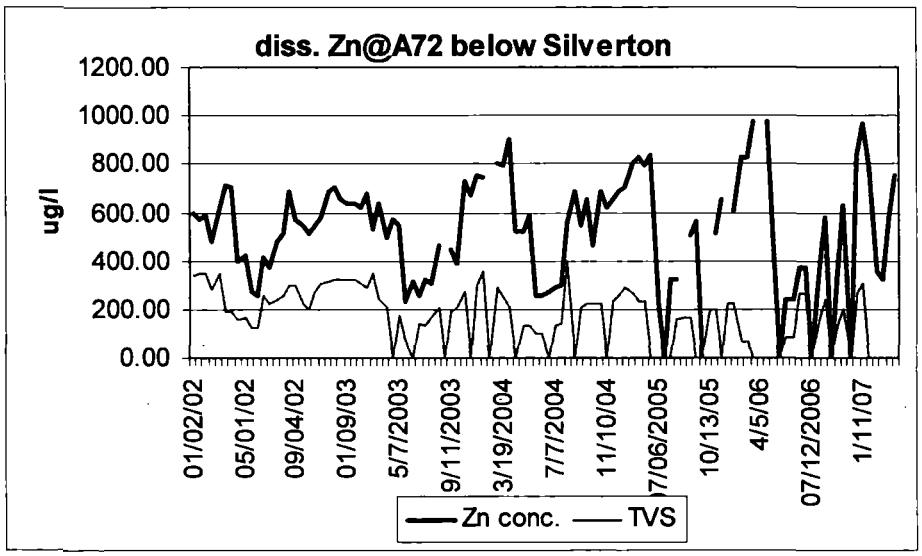
Background

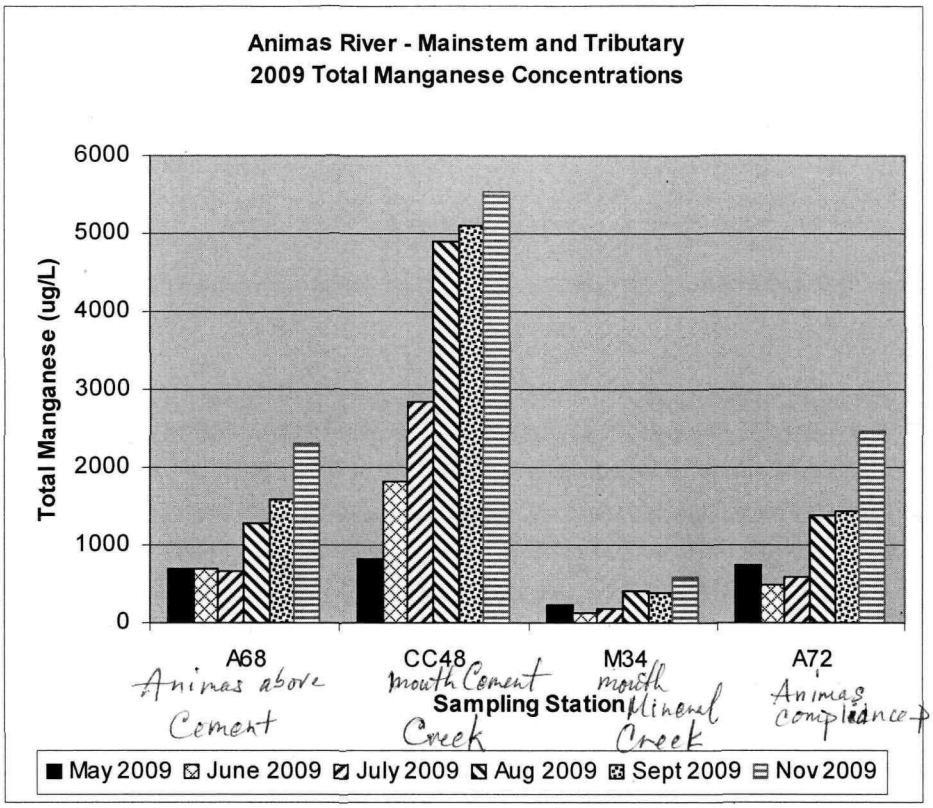
- Since 1994, there have been remediation efforts in Mineral Creek, the Upper Animas, and Cement Creek.\
- BLM has had a large Abandoned Mined Land focus in the entire watershed since the mid 1990s.
- Others, using EPA, state, and mining interests' funds have spent millions in the watershed doing primarily waste site remediation.
- In the Cement Creek drainage, active water treatment began by SMC in 1970s and was updated over the years by Sunnyside. Since 1996, the American Tunnel has had three bulkheads installed, flow has decreased from 1,600 gpm to about 150 gpm. The Red & Bonita Mine, and other upgradient adits' and seeps discharges are now making up the difference in the American Tunnel flow. Gladstone's active water treatment was intermittent from about 2002 – 2005 and stopped in 2005; settling ponds reclaimed in 2006.

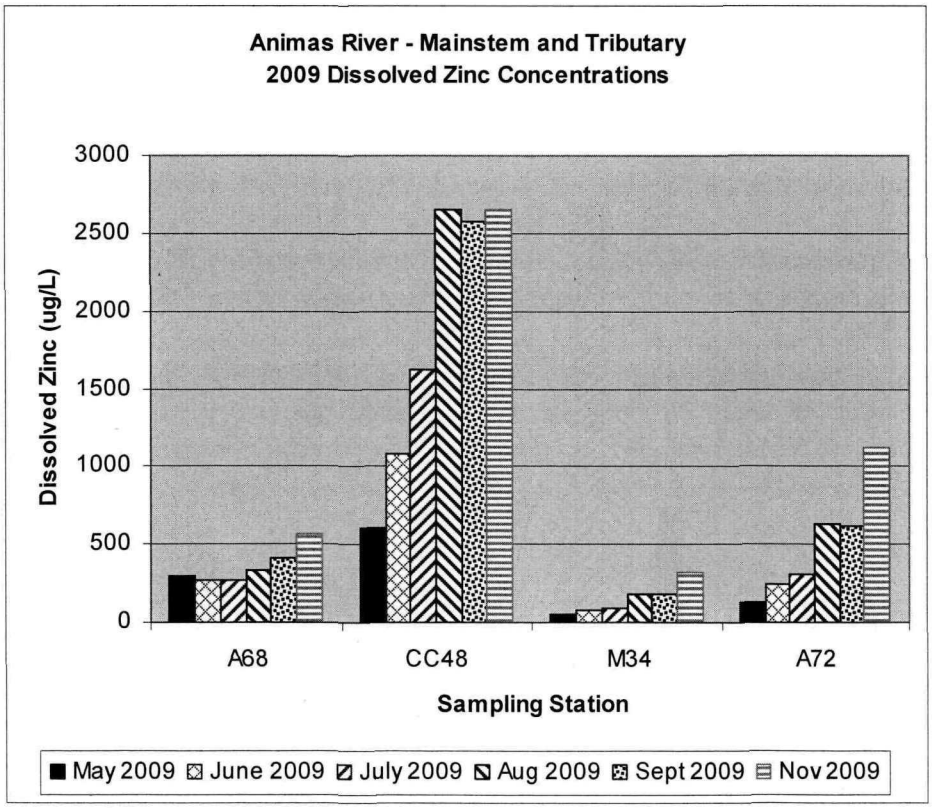
Problem

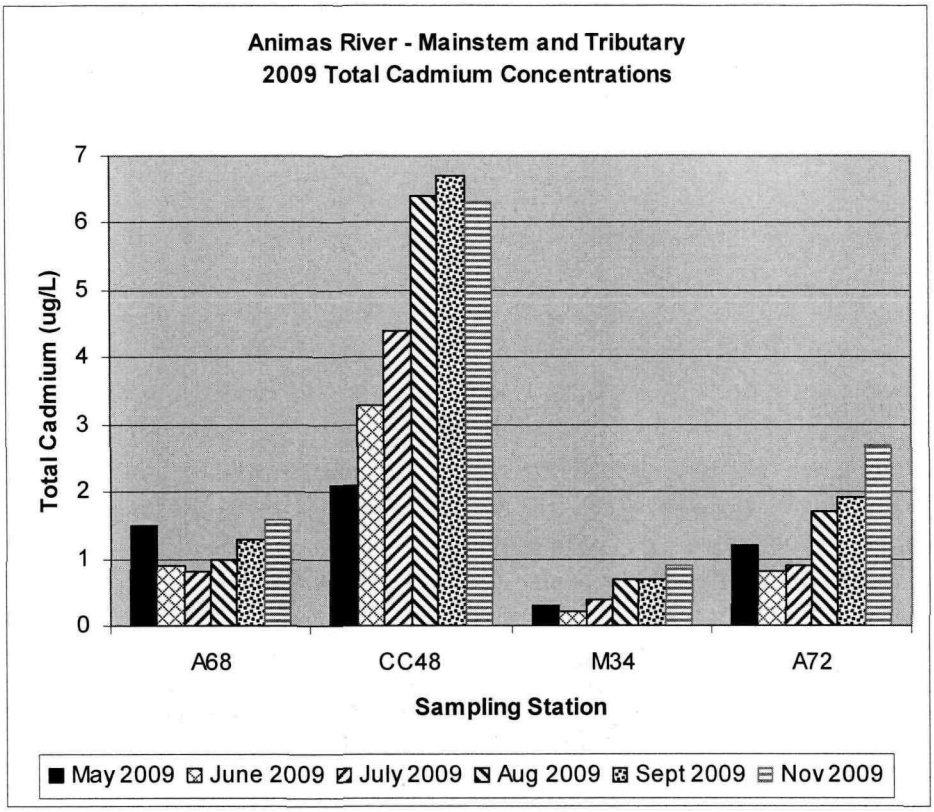
- Upper Cement Creek still contributes a large negative impact on the TMDL compliance point, known as A72. Since
    - Landowners: BLM/USFS and Private landowners and mining interests
- A72 is about 8 miles downstream of Gladstone. (See table showing relationship of five Upper Cement Creek sources to the 2001 compilation of 34 adits' impacts on loads. Various waste dumps also, but adits contribute about 85% of loads, mine waste about 15%).
- Therefore Cement Creek is a focus area for EPA and BLM.

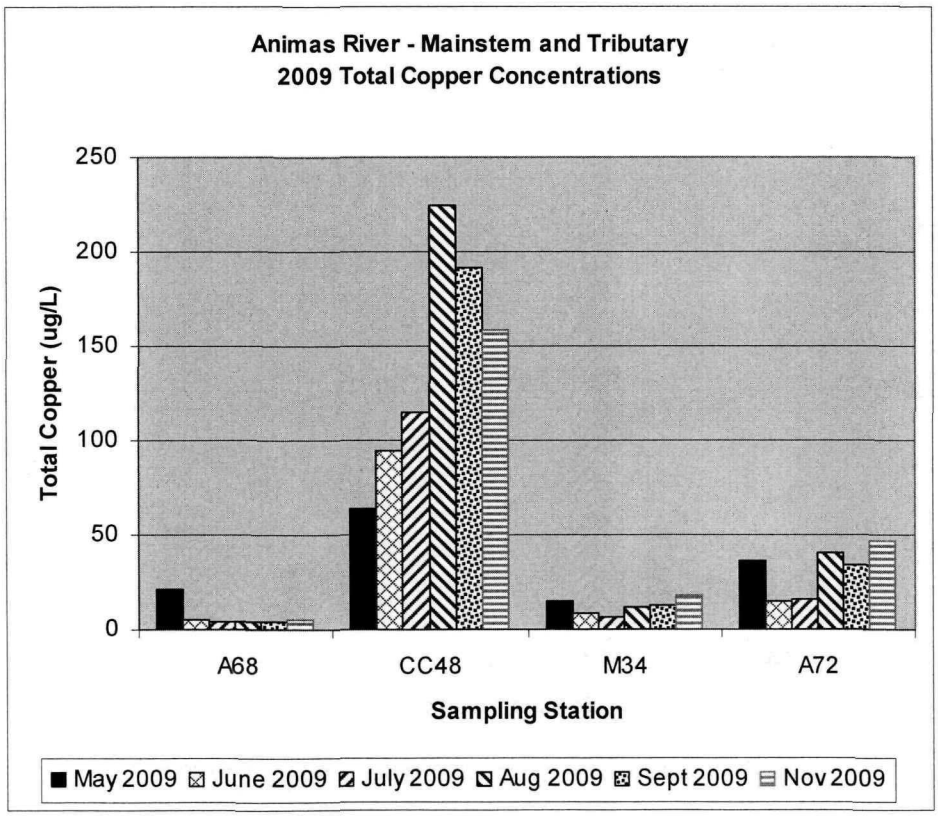

diss. Cu@A72 below Silverton
ug/l
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/02/02
05/01/02
08/07/02
12/04/02
3/9/2003
7/2/2003
11/05/03
4/16/2004
7/7/2004
11/03/04
05/04/05
9/14/05
11/2/05
05/10/2006
9/6/06
4/2/07
diss. Cu
TVS


diss. Zn@A72 below Silverton
ug/l
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
01/02/02
05/01/02
09/04/02
01/09/03
5/7/2003
9/11/2003
3/19/2004
7/7/2004
11/10/04
7/06/2005
10/13/05
4/5/06
07/12/2006
1/11/07
Zn conc.
TVS


Animas River - Mainstem and Tributary
2009 Total Manganese Concentrations
Total Manganese (ug/L)
6000
5000
4000
3000
2000
1000
0
A68
CC48
M34
A72
Animas above Cement
mouth Cement Creek
mouth Mineral Creek
Animas compliance point
Sampling Station
May 2009
June 2009
July 2009
Aug 2009
Sept 2009
Nov 2009


Animas River - Mainstem and Tributary
2009 Dissolved Zinc Concentrations
Dissolved Zinc (ug/L)
3000
2500
2000
1500
1000
500
0
A68
CC48
M34
A72
Sampling Station
May 2009
June 2009
July 2009
Aug 2009
Sept 2009
Nov 2009


Animas River - Mainstem and Tributary
2009 Total Cadmium Concentrations
Total Cadmium (ug/L)
0
1
2
3
4
5
6
7
A68
CC48
M34
A72
Sampling Station
May 2009
June 2009
July 2009
Aug 2009
Sept 2009
Nov 2009


Animas River - Mainstem and Tributary
2009 Total Copper Concentrations
Total Copper (ug/L)
0
50
100
150
200
250
A68
CC48
M34
A72
Sampling Station
May 2009
June 2009
July 2009
Aug 2009
Sept 2009
Nov 2009

Potential Solutions

- Water Treatment – BLM willing to build a WTP, but can't do O&M
- Plug adits
- Combine WTP and plugging
- Remove American Tunnel bulkheads (three) and treat water indefinitely from one location.

Possible EPA Approaches

- Coordinated removal with EPA and BLM/USFS + Enforcement actions on viable PRPs (including leveraging landowner contributions where applicable)
- Fund lead removal actions + BLM/USFS
- Enforcement of PRP-lead actions (Sunnyside + others)
- Use of settlement funds from SMC
- NPL

Local Concerns

- Against listing
- Want mining in their future

Watershed Challenges

- Lack of water treatment in Gladstone is impacting the TMDL compliance point below Silverton at A72.
- Water quality flow and loads have been changing since the last bulkhead went into the American Tunnel (2002).
- The worst sources are the Gold King Mine 7 level; Red & Bonita Mine, American Tunnel, and the Mogul Mine (Grand Mogul to lesser degree).

Ongoing Issues/Considerations

- BLM may not support listing
- CDPHE and past CD with Sunnyside
- State has lead on ASARCO $4 Million trust from Silver Lake settlement

Next Steps

- PRP search and viability determined
- Technical info/data
- Agency(ies) discussions regarding preferences and implications
- Communications with local government

in UAA format

Pounds/Day (total)

		High Flow							Low Flow							Ave.
		Al	Cd	Cu	Fe	Mn	Zn	Pb	Al	Cd	Cu	Fe	Mn	Zn	Pb	pH
Grand Mogul	cc01c	1.17	0.01	0.274	1.52	1.13	2.23	0.018	0.312	0.003	0.1	1.86	0.218	0.834	0.001	3.2
Mogul	cc02d	3.15	0.05	0.04	32.2	27.2	29.1	0.157	2.01	0.034	0.017	20.7	19.1	21.1	0.135	3.5
Red & Bonita	cc03d	13.3	0.13	0.081	318	118	56.6	0.189	13.5	0.136	0.021	356	129	61.9	0.146	6.21
Gold King	cc06	98.7	0.186	17.6	360	73.9	71.4	0.052	60.1	0.161	10.3	224	86.2	60.3	0.049	3.15
Amer. Tunnel	cc19	8.6	0.004	0.011	215	74.8	29.1	0.006	6.98	0.003	0.0083	192	66	26.4	0.004	5.09
Total:		124.92	0.38	18.006	926.72	295.03	188.43	0.422	82.902	0.337	10.446	794.56	300.52	170.53	0.335	
North Fork	cc07	151.5	0.344	24.5	402	102	102.6	0.177	87.8	0.216	16.7	211	97	70	0.463	3.19

→ downstream of Gold King/upstream of Cement Creek

compare to totals

Notes: No flow at R &B in Nov, but there are concentrations.
No flow at Grand Mogul in Aug & Nov, but there are concentrations.

Steve Fearn looked at Fe/Al ratios; tells about sources/pat

		pH	Pb	Cu
*	Flood 3:1	3		✓
* Very diff. water from GK Flood →	R&B 20:1	5-6		
	Mogul 10:1	3		
	D Mogul 2:1	3		
	AT 3:1	3		

* Target water

Table 11.1 Metal loads from selected adits in the Upper Animas Basin

			Pounds per day											
			High Flow						Low Flow					
Mine	**Phase 1 % Removal**	**Cost $ 1000's**	**Al**	**Cd**	**Cu**	**Fe**	**Mn**	**Zn**	**Al**	**Cd**	**Cu**	**Fe**	**Mn**	**Zn**
Cement Creek														
Mogul	80%	1,000	1	0.04	1.7	14	4	2	1	0.02	0.7	5	1	3
Silver Ledge	50%	300	25	0.09	0.6	222	33	15	4	0.03	0.0	56	11	3
Grand Mogul	0%	60	15	0.15	5.3	33	10	27	1	0.01	0.2	0	0	1
Mammoth	30%	60	1	0.00	0.0	14	2	8	1	0.00	0.0	16	2	0
Anglo-Saxon	30%	60	0	0.00	0.0	15	10	2	0	0.01	0.0	15	5	1
Joe & Johns	30%	300	0	0.00	0.2	1	1	1	0	0.00	0.0	1	0	0
Big Colorado	50%	300	1	0.00	0.0	3	3	0	1	0.00	0.0	6	0	0
Porcupine	30%	60	0	0.00	0.0	14	5	1	0	0.00	0.0	10	5	1
Evelyn	50%	1,000	1	0.00	0.0	2	0	0	2	0.00	0.0	3	0	0
Lewis property*	50%	60	0	0.01	0.4	2	0	1	0	0.01	0.4	2	0	1
Total Cement Creek			44	0.29	8.3	320	68	57	10	0.07	1.3	113	25	12
Mineral Creek														
Kohler	50%	60	33	0.36	30.7	321	10	91	28	0.25	28.3	264	8	78
1st SW Drain-MF Min**	50%	300	60	0.01	0.1	162	3	1	60	0.01	0.1	162	3	1
North Star	50%	300	0	0.02	0.1	6	16	4	1	0.02	0.2	6	11	3
Junction Mine	50%	300	13	0.07	2.2	126	3	14	0	0.00	0.1	3	0	0
Bandora Mine	30%	60	0	0.04	0.1	5	4	10	0	0.02	0.0	2	2	4
Upper Bonner	50%	300	1	0.00	0.0	1	1	1	2	0.01	0.0	2	1	1
Ferrocrete Mine	50%	300	2	0.00	0.0	31	5	1	3	0.01	0.0	32	7	1
Paradise **	0%	60	28	0.00	0.1	246	20	2	28	0.00	0.1	246	20	2
Brooklyn Mine*	30%	300	1	0.01	0.2	8	2	2	1	0.01	0.2	8	2	2
Bonner Mine	50%	300	1	0.01	0.0	1	1	1	2	0.00	0.0	2	1	0
Lower Bonner	30%	300	1	0.00	0.0	1	0	0	2	0.00	0.0	2	1	1
Little Dora	50%	300	1	0.33	0.9	5	653	48	0	0.00	0.0	0	2	0
Total Mineral Creek			141	0.86	34.4	913	718	175	125	0.32	29.0	728	57	94
Animas above Eureka														
Vermillion Mine	50%	300	0	0.04	0.2	2	1	9	0	0.01	0.1	1	0	3
Columbus	50%	300	1	0.01	0.3	3	0	9	0	0.02	0.1	1	0	4
Lower Comet	0%	10	2	0.00	0.1	2	2	1	2	0.00	0.0	1	1	1
N side of Calif. Mtn.**	30%	60	4	0.01	0.0	1	5	2	4	0.01	0.0	1	5	2
Sound Democrate	50%	60	0	0.00	0.1	0	4	1	0	0.00	0.0	0	2	0
Mountain Queen	50%	300	0	0.00	0.2	1	0	1	0	0.00	0.1	0	0	0
Silver Wing	30%	0	0	0.00	0.1	0	0	0	0	0.00	0.3	1	1	1
Bagley	30%	300	0	0.01	0.0	0	13	7	0	0.01	0.0	0	6	3
Senator	30%	300	0	0.00	0.0	21	7	0	1	0.00	0.0	23	14	2
Total Animas above Eureka			8	0.08	1.0	30	33	29	8	0.06	0.7	29	29	15
Animas below Eureka														
Royal Tiger	50%	300	5	0.04	0.8	0	3	7	0	0.00	0.1	0	0	0
Pride of the West	30%	60	0	0.01	0.0	0	0	3	0	0.01	0.0	0	0	2
Little Nation	30%	300	0	0.00	0.0	9	2	1	0	0.00	0.0	4	1	0
Total Animas below Eureka			6	0.06	0.8	9	5	10	0	0.02	0.1	4	2	3
GRAND TOTAL			198	1.3	44.5	1,272	825	271	143	0.46	31.0	875	113	124

* No low flow data. Low flow loads are extrapolated from high flow data

** No high flow data. High flow loads are extrapolated from low flow data.

Table 11.2 Metal loads from selected mine waste rock sites in the Upper Animas Basin

				Load in pounds per year					
Site Name	Acres	% Reduction	Cost $1000	Al	Cd	Cu	Fe	Mn	Zn
Cement Creek									
Galena Queen	1.09	90	300	154	36.8	832	6,895	0.0	6137
Kansas City #2	0.46	40	60	159	7.1	39	3,979	0.0	1172
Hercules	1.26	90	300	163	30.6	168	6,712	0.0	4711
Upper Joe & Johns	0.02	40	300	2	0.1	2	19	0.0	23
Grand Mogul - East	0.53	35	300	47	2.0	29	745	0.0	385
Kansas City #1	0.48	40	60	82	1.2	19	1,618	0.2	282
Black Hawk	0.20	50	60	82	0.5	6	124	0.1	108
Lead Carbonate	0.62	55	300	120	0.8	27	1,228	0.0	179
Henrietta 3	0.86	20	60	217	0.7	107	4,972	0.0	113
Ross Basin	0.15	10	60	9	0.3	18	234	0.0	49
Lark	0.66	90	60	18	0.8	40	886	0.0	168
Pride of the Rockies	0.05	45	60	7	0.1	0	383	0.1	7
Henrietta # 7	1.19	40	300	101	0.8	25	1,685	0.0	159
Mogul	1.16	35	300	51	1.2	32	942	0.0	261
Cement Creek Total	8.72			1,210	83.1	1,343	30,421	0.5	13,754
Mineral Creek									
Brooklyn	0.25	90	300	58	0.8	8	993	117	118
Bullion King:Lower	0.86	90	300	641	6.0	14	9,945	190	629
Upper Browns Trench	0.11	40	10	27	0.1	8	198	3	9
Congress Shaft	0.35	40	60	11	0.2	16	109	11	20
Brooklyn Upper	2.57	20	60	661	3.1	38	9,909	176	163
Upper Browns	0.51	90	60	82	0.3	5	1,610	6	25
Little Dora	1.39	30	300	94	0.4	43	452	471	66
Brooklyn Lower	0.86	20	60	110	0.6	9	672	122	105
Mineral Creek Total	7			1,684	11.5	142	23,888	1,095	1,135
Animas above Eureka									
Ben Butler	0.34	40	300	28	0.8	8	225	1	165
Silver Wing	1.21	50	60	98	1.0	123	393	172	131
Tom Moore	0.19	90	60	15	0.3	1	8	43	73
Eagle	0.07	90	60	1	0.1	1	0	7	18
Lucky Jack	0.70	90	60	16	0.6	3	14	32	95
Animas above Eureka Total	3			157	2.8	136	639	256	482
Animas below Eureka									
Clipper	0.09	90	60	6	0.2	7	80	57	70
Buffalo Boy	0.38	90	60	17	0.8	24	13	73	141
Ben Franklin	0.37	90	60	81	0.4	13	612	99	95
Caledonia	0.57	30	60	23	1.0	15	1	50	255
Sunnyside	2.50	90	1,000	40	2.3	10	0	536	664
Animas below Eureka Total	4			168	4.6	69	706	815	1,224
GRAND TOTAL	22			3,219	102	1,691	55,655	2,167	16,595

Five largest discharges in Cement Creek

		Pounds/Day (total)														
		High Flow							Low Flow							Ave.
		Al	Cd	Cu	Fe	Mn	Zn	Pb	Al	Cd	Cu	Fe	Mn	Zn	Pb	pH
Grand Mogul	cc01c	1.17	0.01	0.274	1.52	1.13	2.23	0.018	0.312	0.003	0.1	1.86	0.218	0.834	0.001	3.2
Mogul	cc02d	3.15	0.05	0.04	32.2	27.2	29.1	0.157	2.01	0.034	0.017	20.7	19.1	21.1	0.135	3.5
Red & Bonita	cc03d	13.3	0.13	0.081	318	118	56.6	0.189	13.5	0.136	0.021	356	129	61.9	0.146	6.21
Gold King Flow	cc06	98.7	0.186	17.6	360	73.9	71.4	0.052	60.1	0.161	10.3	224	86.2	60.3	0.049	3.15
Amer. Tunnel	cc19	8.6	0.004	0.011	215	74.8	29.1	0.006	6.98	0.003	0.0083	192	66	26.4	0.004	5.09
Total:		124.92	0.38	18.006	926.72	295.03	188.43	0.422	82.902	0.337	10.446	794.56	300.52	170.53	0.335	
North Fork	cc07 ← upstr of CC & downstr of GR7	151.5	0.344	24.5	402	102	102.6	0.177	87.8	0.216	16.7	211	97	70	0.463	3.19
All 3rd prioritized in 2001 adits from Table 11.1 of UAA		195	1.3	44.5	1272	825	271		143	0.46	51.0	875	113	124		

Notes: No flow at R &B in Nov, but there are concentrations.
No flow at Grand Mogul in Aug & Nov, but there are concentrations.

UAA indicates 85% of loads are from adits/discharges and 15% are from mine waste rock sites

Table 11.1 Metal loads from selected adits in the Upper Animas Basin

			Pounds per day											
			High Flow						Low Flow					
Mine	**Phase I % Removal**	**Cost $ 1000's**	**Al**	**Cd**	**Cu**	**Fe**	**Mn**	**Zn**	**Al**	**Cd**	**Cu**	**Fe**	**Mn**	**Zn**
Cement Creek														
Mogul	80%	1,000	1	0.04	1.7	14	4	2	1	0.02	0.7	5	1	3
Silver Ledge	50%	300	25	0.09	0.6	222	33	15	4	0.03	0.0	56	11	3
Grand Mogul	0%	60	15	0.15	5.3	33	10	27	1	0.01	0.2	0	0	1
Mammoth	30%	60	1	0.00	0.0	14	2	8	1	0.00	0.0	16	2	0
Anglo-Saxon	30%	60	0	0.00	0.0	15	10	2	0	0.01	0.0	15	5	1
Joe & Johns	30%	300	0	0.00	0.2	1	1	1	0	0.00	0.0	1	0	0
Big Colorado	50%	300	1	0.00	0.0	3	3	0	1	0.00	0.0	6	0	0
Porcupine	30%	60	0	0.00	0.0	14	5	1	0	0.00	0.0	10	5	1
Evelyn	50%	1,000	1	0.00	0.0	2	0	0	2	0.00	0.0	3	0	0
Lewis property*	50%	60	0	0.01	0.4	2	0	1	0	0.01	0.4	2	0	1
Total Cement Creek			44	0.29	8.3	320	68	57	10	0.07	1.3	113	25	12
Mineral Creek														
Kohler	50%	60	33	0.36	30.7	321	10	91	28	0.25	28.3	264	8	78
1st SW Drain-MF Min**	50%	300	60	0.01	0.1	162	3	1	60	0.01	0.1	162	3	1
North Star	50%	300	0	0.02	0.1	6	16	4	1	0.02	0.2	6	11	3
Junction Mine	50%	300	13	0.07	2.2	126	3	14	0	0.00	0.1	3	0	0
Bandora Mine	30%	60	0	0.04	0.1	5	4	10	0	0.02	0.0	2	2	4
Upper Bonner	50%	300	1	0.00	0.0	1	1	1	2	0.01	0.0	2	1	1
Ferrocrete Mine	50%	300	2	0.00	0.0	31	5	1	3	0.01	0.0	32	7	1
Paradise **	0%	60	28	0.00	0.1	246	20	2	28	0.00	0.1	246	20	2
Brooklyn Mine*	30%	300	1	0.01	0.2	8	2	2	1	0.01	0.2	8	2	2
Bonner Mine	50%	300	1	0.01	0.0	1	1	1	2	0.00	0.0	2	1	0
Lower Bonner	30%	300	1	0.00	0.0	1	0	0	2	0.00	0.0	2	1	1
Little Dora	50%	300	1	0.33	0.9	5	653	48	0	0.00	0.0	0	2	0
Total Mineral Creek			141	0.86	34.4	913	718	175	125	0.32	29.0	728	57	94
Animas above Eureka														
Vermillion Mine	50%	300	0	0.04	0.2	2	1	9	0	0.01	0.1	1	0	3
Columbus	50%	300	1	0.01	0.3	3	0	9	0	0.02	0.1	1	0	4
Lower Comet	0%	10	2	0.00	0.1	2	2	1	2	0.00	0.0	1	1	1
N side of Calif. Mtn.**	30%	60	4	0.01	0.0	1	5	2	4	0.01	0.0	1	5	2
Sound Democrate	50%	60	0	0.00	0.1	0	4	1	0	0.00	0.0	0	2	0
Mountain Queen	50%	300	0	0.00	0.2	1	0	1	0	0.00	0.1	0	0	0
Silver Wing	30%	0	0	0.00	0.1	0	0	0	0	0.00	0.3	1	1	1
Bagley	30%	300	0	0.01	0.0	0	13	7	0	0.01	0.0	0	6	3
Senator	30%	300	0	0.00	0.0	21	7	0	1	0.00	0.0	23	14	2
Total Animas above Eureka			8	0.08	1.0	30	33	29	8	0.06	0.7	29	29	15
Animas below Eureka														
Royal Tiger	50%	300	5	0.04	0.8	0	3	7	0	0.00	0.1	0	0	0
Pride of the West	30%	60	0	0.01	0.0	0	0	3	0	0.01	0.0	0	0	2
Little Nation	30%	300	0	0.00	0.0	9	2	1	0	0.00	0.0	4	1	0
Total Animas below Eureka			6	0.06	0.8	9	5	10	0	0.02	0.1	4	2	3
GRAND TOTAL			198	1.3	44.5	1.272	825	271	143	0.46	31.0	875	113	124

* No low flow data. Low flow loads are extrapolated from high flow data

** No high flow data. High flow loads are extrapolated from low flow data.

Table 11.2 Metal loads from selected mine waste rock sites in the Upper Animas Basin

				Load in pounds per year					
Site Name	**Acres**	**% Reduction**	**Cost $1000**	**Al**	**Cd**	**Cu**	**Fe**	**Mn**	**Zn**
Cement Creek									
Galena Queen	1.09	90	300	154	36.8	832	6.895	0.0	6137
Kansas City #2	0.46	40	60	159	7.1	39	3.979	0.0	1172
Hercules	1.26	90	300	163	30.6	168	6.712	0.0	4711
Upper Joe & Johns	0.02	40	300	2	0.1	2	19	0.0	23
Grand Mogul - East	0.53	35	300	47	2.0	29	745	0.0	385
Kansas City #1	0.48	40	60	82	1.2	19	1,618	0.2	282
Black Hawk	0.20	50	60	82	0.5	6	124	0.1	108
Lead Carbonate	0.62	55	300	120	0.8	27	1,228	0.0	179
Henrietta 3	0.86	20	60	217	0.7	107	4.972	0.0	113
Ross Basin	0.15	10	60	9	0.3	18	234	0.0	49
Lark	0.66	90	60	18	0.8	40	886	0.0	168
Pride of the Rockies	0.05	45	60	7	0.1	0	383	0.1	7
Henrietta # 7	1.19	40	300	101	0.8	25	1.685	0.0	159
Mogul	1.16	35	300	51	1.2	32	942	0.0	261
Cement Creek Total	8.72			1.210	83.1	1.343	30.421	0.5	13.754
Mineral Creek									
Brooklyn	0.25	90	300	58	0.8	8	993	117	118
Bullion King:Lower	0.86	90	300	641	6.0	14	9.945	190	629
Upper Browns Trench	0.11	40	10	27	0.1	8	198	3	9
Congress Shaft	0.35	40	60	11	0.2	16	109	11	20
Brooklyn Upper	2.57	20	60	661	3.1	38	9.909	176	163
Upper Browns	0.51	90	60	82	0.3	5	1.610	6	25
Little Dora	1.39	30	300	94	0.4	43	452	471	66
Brooklyn Lower	0.86	20	60	110	0.6	9	672	122	105
Mineral Creek Total	7			1.684	11.5	142	23.888	1.095	1.135
Animas above Eureka									
Ben Butler	0.34	40	300	28	0.8	8	225	1	165
Silver Wing	1.21	50	60	98	1.0	123	393	172	131
Tom Moore	0.19	90	60	15	0.3	1	8	43.	73
Eagle	0.07	90	60	1	0.1	1	0	7	18
Lucky Jack	0.70	90	60	16	0.6	3	14	32	95
Animas above Eureka Total	3			157	2.8	136	639	256	482
Animas below Eureka									
Clipper	0.09	90	60	6	0.2	7	80	57	70
Buffalo Boy	0.38	90	60	17	0.8	24	13	73	141
Ben Franklin	0.37	90	60	81	0.4	13	612	99	95
Caledonia	0.57	30	60	23	1.0	15	1	50	255
Sunnyside	2.50	90	1,000	40	2.3	10	0	536	664
Animas below Eureka Total	4			168	4.6	69	706	815	1.224
GRAND TOTAL	22			3.219	102	1.691	55.655	2.167	16.595

from AR SG 2010

Cement Creek adit flows - comparison of 2009 to 1996-97 flows in GPM

Adit	Designation	1996 Low Flow	1997 High flow	2009 range of flows (May-Sept.)	
Grand Mogul	CC01C	5.4	610.4	1.8 to 70.5	
Mogul	CC02D	9	27	48.5 to 116	
Gold Point	CC02E	0 or possibly 4.8	7.6	27 GPM first taken in Sept.only	
Pride of Bonita	CC02K	0	0	.5 GPM first observed in Sept. only	
Red and Bonita	CC03C	0	4.5	298 to 336	
Gold King	CC06	no flow at times	high of 29.6	161 to 252	1995-2001
American Tunnel	CC19	over 1,000 GPM	over 2,000 GPM	95-143	
Mogul Sublevel 1 drainages	CC02i	NA	NA	6.3 to 9.9	