

## ATTACHMENT 3

Utah Department of Environmental Quality

July 24 and 25, 1996

Water Quality Sampling Results  
in Vicinity of  
Atlas Uranium Mill Tailings

Utah State Health Laboratory Report

UTAH STATE HEALTH DEPARTMENT  
DIVISION OF LABORATORY SERVICES  
Environmental Chemistry Analysis Report

UDEQ - DWQ  
ARNE HULTQUIST  
288 N 1460 W  
PO BOX 144870  
SLC

UT 84114-4870

538-6146

Description: COLORADO R AT US191 XING NEAR MOAB  
Site ID: 495700 Source: 03 Inorganic Review: 09/09/96  
Cost Code: 354 Organic Review:  
Lab Number: 9606383 Type: 04 Radiochemistry Review: 09/16/96  
Sample Date: 07/25/96 Time: Microbiology Review:  
Tot. Cations: 184 mg/l Cations: 9.4 me/l  
Tot. Anions: 365 mg/l Anions: 9.1 me/l  
Grand Total: 549 mg/l

Laboratory Analyses

L-pH *	8.48		B.O.D. 5	<3 mg/l	
T.Sus.Sol	50.8 mg/l		NO2+NO3, N	0.46 mg/l	
T.K.N.	0.262 mg/l		Ammonia N	0.052 mg/l	
D-Arsenic	<5.0 ug/l		D-Barium	78.0 ug/l	
D-Cadmium	<1.0 ug/l		D-Calcium	84.4 mg/l	
D-Chromium	<5.0 ug/l		D-Copper	<12.0 ug/l	
D-Iron	<20.0 ug/l		D-Lead	<3.0 ug/l	
D-Magnesium	23.9 mg/l		D-Mangan	<5.0 ug/l	
D-Nickel	<10.0 ug/l		D-Potassum	3 mg/l	
D-Selenium	3.8 ug/l		D-Silver	<2.0 ug/l	
D-Sodium	72.6 mg/l		D-Zinc	<30.0 ug/l	
Bicarbonate	158 mg/l		Carb. Diox	1 mg/l	
Carbonate	0 mg/l		Chloride	67 mg/l	
Fluoride	0.415 mg/l		Hydroxide	0 mg/l	
Sulfate	220.0 mg/l		T. Phos.	0.06 mg/l	
Tot. Alk.	129 mg/l		T. Hardns.	308.9 mg/l	
Turbidity	28.7 NTU		L-Sp. Cond	891 umhos	
TDS @ 180C	558 mg/l		Alpha, grs	15 pCi/l	+/-1.0
Beta gross	<10 pCi/l	+/-3.6	Radium 226	<0.5 pCi/l	+/-0.3
Radium 228	<1 pCi/l	+/-3.6	D-Aluminum	<30.0 ug/l	
D-Beryllium	<1.0 ug/l		D-Molybdum	7.9 ug/l	
D-Vanadium	<40.0 ug/l		T-Uranium	1.0 pCi/l	+/-1.0
D-Thallium	<1.0 ug/l		D-Antimony	<3.0 ug/l	
D-Mercury	<0.2 ug/l		CO3 Solids	78 mg/l	

Comments on test results:

L-pH.....pH should be performed as a field test.

END OF REPORT

UTAH STATE HEALTH DEPARTMENT  
DIVISION OF LABORATORY SERVICES  
Environmental Chemistry Analysis Report

UDEQ - DWQ  
ARNE HULTQUIST  
288 N 1460 W  
PO BOX 144870  
SLC

UT 84114-4870

538-6146

Description: COLORADO R BL ATLAS MILL TAILINGS PILE  
Site ID: 495656 Source: 03 Inorganic Review: 09/09/96  
Cost Code: 354 Organic Review:  
Lab Number: 9606382 Type: 04 Radiochemistry Review: 09/16/96  
Sample Date: 07/25/96 Time: 16:22 Microbiology Review:  
Tot. Cations: 185 mg/l Cations: 9.4 me/l  
Tot. Anions: 352 mg/l Anions: 8.8 me/l  
Grand Total: 537 mg/l

Laboratory Analyses

L-pH *	8.44		T.Sus.Sol	44.4 mg/l	
NO2+NO3, N	0.46 mg/l		T.K.N.	0.368 mg/l	
Ammonia N	0.158 mg/l		D-Arsenic	<5.0 ug/l	
D-Barium	80.0 ug/l		D-Cadmium	<1.0 ug/l	
D-Calcium	82.9 mg/l		D-Chromium	<5.0 ug/l	
D-Copper	<12.0 ug/l		D-Iron	<20.0 ug/l	
D-Lead	<3.0 ug/l		D-Magnesium	23.5 mg/l	
D-Mangan	5.2 ug/l		D-Nickel	<10.0 ug/l	
D-Potassium	3.3 mg/l		D-Selenium	3.8 ug/l	
D-Silver	<2.0 ug/l		D-Sodium	75.4 mg/l	
D-Zinc	<30.0 ug/l		Bicarbonate	155 mg/l	
Carb. Diox	1 mg/l		Carbonate	0 mg/l	
Chloride	66 mg/l		Fluoride	0.413 mg/l	
Hydroxide	0 mg/l		Sulfate	210.2 mg/l	
T. Phos.	0.05 mg/l		Tot. Alk.	127 mg/l	
T. Hardns.	303.5 mg/l		Turbidity	22.8 NTU	
L-Sp. Cond	903 umhos		TDS @ 180C	562 mg/l	
Alpha, grs	22 pCi/l	+/-1.3	Beta gross	<10 pCi/l	+/-3.9
Radium 226	<0.5 pCi/l	+/-0.3	Radium 228	<1 pCi/l	+/-3.6
D-Aluminum	<30.0 ug/l		D-Beryllium	<1.0 ug/l	
D-Molybdenum	8.7 ug/l		D-Vanadium	<40.0 ug/l	
T-Uranium	2.8 pCi/l	+/-1.0	D-Thallium	<1.0 ug/l	
D-Antimony	<3.0 ug/l		D-Mercury	<0.2 ug/l	
CO3 Solids	76 mg/l				

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Comments on test results:

L-pH.....pH should be performed as a field test.

END OF REPORT

UTAH STATE HEALTH DEPARTMENT  
DIVISION OF LABORATORY SERVICES  
Environmental Chemistry Analysis Report

UDEQ - DWQ  
ARNE HULTQUIST  
288 N 1460 W  
PO BOX 144870  
SLC

UT 84114-4870

538-6146

Description: ARCH'S PARK HEADQUARTERS WELL  
Site ID: Source: 00 Inorganic Review: 09/10/96  
Cost Code: 350 Organic Review:  
Lab Number: 9606388 Type: 04 Radiochemistry Review: 09/16/96  
Sample Date: 07/24/96 Time: 16:00 Microbiology Review:  
Tot. Cations: 333 mg/l Cations: 16.4 me/l  
Tot. Anions: 645 mg/l Anions: 16.7 me/l  
Grand Total: 978 mg/l

Laboratory Analyses

L-pH *	7.73		T.Sus.Sol	<4.0 mg/l	
NO2+NO3, N	3.43 mg/l		T.K.N.	0.152 mg/l	
Ammonia N	<0.05 mg/l		D-Arsenic	<5.0 ug/l	
D-Barium	33.0 ug/l		D-Cadmium	<1.0 ug/l	
D-Calcium	94.6 mg/l		D-Chromium	<5.0 ug/l	
D-Copper	<12.0 ug/l		D-Iron	28.7 ug/l	
D-Lead	<3.0 ug/l		D-Magnesium	38.1 mg/l	
D-Mangan	<5.0 ug/l		D-Nickel	<10.0 ug/l	
D-Potassium	9.6 mg/l		D-Selenium	9.3 ug/l	
D-Silver	<2.0 ug/l		D-Sodium	191.0 mg/l	
Bicarbonate	226 mg/l		Carb. Diox	7 mg/l	
Carbonate	0 mg/l		Chloride	260 mg/l	
Hydroxide	0 mg/l		Sulfate	273.7 mg/l	
T. Phos.	<0.01 mg/l		Tot. Alk.	185 mg/l	
T. Hardns.	392.8 mg/l		Turbidity	0.303 NTU	
L-Sp. Cond	1614 umhos		TDS @ 180C	966 mg/l	
Alpha, grs	24 pCi/l	+/-2.0	Beta gross	13.9 pCi/l	+/-4.0
Radium 226	<0.5 pCi/l	+/-0.3	Radium 228	1 pCi/l	+/-3.6
T-Uranium	9.1 pCi/l	+/-2.0	CO3 Solids	111 mg/l	

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Comments on test results:

L-pH.....pH should be performed as a field test.

END OF REPORT

## **ATTACHMENT 4**

Utah Division of Radiation Control

Summary of  
Atlas Seep  
Water Quality Data.

DRC Spreadsheet  
SEEP.XLS - Inorg.

Atlas Tailings Pile Seep on North Bank of Colorado River Bank: Inorganics (W. Side of Mouth of Moab Wash)													Avg. Conc.	Ratio of Avg.
	Sample Date:	9/21/95	12/7/95	1/18/96	2/28/96	4/11/96								
	Lab No.:	9510256	9512287	9600382	9601424	9602315								
Parameter	Units	GWQS	< Conc.	< Conc.	< Conc.	< Conc.	< Conc.	< Conc.	< Conc.	Avg.	Std. Dev.	Count	Exceeds GWQS?	Conc. / GWQS
Ammonia N	mg/l	30	300	220	n/a	2.12	219	185.28	127.9	4	YES			6.2
Bicarbonate	mg/l	n/a	724	762	764	782	137	633.8	278.5	5				
Carbon Dioxide	mg/l	n/a	28	69	32	24	2	31	24.2	5				
Carbonate	mg/l	n/a	0	0	0	0	0	0	0.0	5				
Chloride	mg/l	250	90	787.5	650	800	610	711.9	96.1	4	YES			2.8
CO3 Solids	mg/l	n/a	356	375	376	385	68	312	136.8	5				
D-Aluminum	ug/l	200	105	n/a	110	180	70	116.25	46.1	4				
D-Antimony	ug/l	6	n/a	0	< 3	< 3	< 3	< 2.25	1.5	4				
D-Arsenic	ug/l	50	< 5	6	< 13	< 12	< 5	< 8.2	4.0	5				
D-Barium	ug/l	2000	81	50	45	48	72.8	59.4	16.4	5				
D-Beryllium	ug/l	4	n/a	< 1	< 1	< 1	< 1	< 1	0.0	4				
D-Cadmium	ug/l	5	< 1	< 1	< 1	2	< 1	< 1.2	0.4	5				
D-Calcium	mg/l	n/a	350	370	300	330	340	338	25.9	5				
D-Chromium	ug/l	100	< 5	< 5	< 5	< 5	< 5	< 5	0.00	5				
D-Copper	ug/l	1300	27	30	21	40	28	29.2	6.9	5				
D-Iron	ug/l	300	81	48	33	140	87.8	77.96	41.5	5				
D-Lead	ug/l	15	< 3	< 3	< 3	< 3	< 3	< 3	0.0	5				
D-Magnesium	mg/l	n/a	290	340	290	270	29	243.8	122.8	5				
D-Manganese	ug/l	40	2300	3600	2200	2000	3470	2714	758.6	5	YES			67.9
D-Mercury	ug/l	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.0	5				
D-Molybdenum	ug/l	40	n/a	1200	1200	1550	1550	1375	202.1	4	YES			34.4
D-Nickel	ug/l	100	n/a	< 10	< 10	12	< 10	< 10.5	1.0	4				
D-NO2+NO3 (N)	mg/l	10	29.41	n/a	n/a			29.41	#DIV/0!	1	YES			2.9
D-Potassium	mg/l	n/a	48	61	52	57	53.4	54.3	4.9	5				
D-Selenium	ug/l	50	< 1	1	3	1	< 1	< 1.4	0.89	5				
D-Silver	ug/l	100	< 2	< 2	< 2	< 22	< 2	< 6	8.9	5				
D-Sodium	mg/l	n/a	1200	1800	1400	8900	146	2689.2	3525.3	5				
D-Thallium	ug/l	2		< 11	< 1	< 5	< 1	< 4.5	4.7	4	?			
D-Total P	mg/l	n/a	0.02	n/a	n/a	n/a	n/a	0.02	#DIV/0!	1				
D-Vanadium	ug/l	60		140	280	278	96.1	198.5	94.6	4	YES			3.3
D-Zinc	ug/l	5000	60	48	< 30	110	96.8	< 69.0	33.5	5				
Fluoride	mg/l	4		1.98	2.1	1.92	1.74	1.94	0.1	4				
Hydroxide	mg/l	n/a	0	0	0	0	0	0	0.0	5				
L-pH		6.5-8.5	7.62	7.25	7.58	7.71	7.97	7.626	0.3	5				
L-Sp. Cond.	umhos	n/a	1022	11790	10200	10990	1043	8,506	5,017	4				
NO2+NO3 (N)	mg/l	10	n/a	129.32	n/a	136.12	96.93	120.8	20.9	3	YES			12.1
Sulfate	mg/l	250	4507.2	5152.4	3881	5064.3	4106.4	4542.3	564.2	5	YES			18.2
T-Aluminum	ug/l	n/a	n/a	n/a	n/a	n/a	172000	172000	#DIV/0!	1				
T-Antimony	ug/l	6	< 3	n/a	n/a	1934.3	< 3	< 646.8	1115.0	3	YES			107.8
T-Arsenic	ug/l	50	n/a	n/a	n/a	n/a	170	170	#DIV/0!	1	YES			3.4

Atlas Tailings Pile Seep on North Bank of Colorado River Bank: Inorganics (W. Side of Mouth of Moab Wash)												Avg.	Ratio of
Sample Date:		9/21/95	12/7/95	1/18/96	2/28/96	4/11/96	Avg.		Std.	Avg.		Conc.	Avg.
Lab No.:		9510256	9512287	9600382	9601424	9602315	Avg.		Dev.	Exceeds		Conc. /	
Parameter	Units	GWQS	< Conc.	< Conc.	< Conc.	< Conc.	< Conc.	< Conc.	Count	GWQS?	GWQS		
T-Barium	mg/l	2	n/a	n/a	n/a	n/a	1.96	1.96	#DIV/0!	1			
T-Beryllium	ug/l	4	< 1	n/a	n/a	n/a	13	< 7	8	2	YES	1.8	
T-Cadmium	ug/l	5	n/a	n/a	n/a	n/a	14	14	#DIV/0!	1	YES	2.8	
T-Chromium	ug/l	100	n/a	n/a	n/a	n/a	700	700	#DIV/0!	1	YES	7.0	
T-Copper	ug/l	1300	n/a	n/a	n/a	n/a	458	458	#DIV/0!	1			
T-Iron	mg/l	300	n/a	n/a	n/a	n/a	379	379	#DIV/0!	1	YES	1.3	
T-Lead	ug/l	15	n/a	n/a	n/a	n/a	305	305	#DIV/0!	1	YES	20.3	
T-Manganese	ug/l	40	n/a	n/a	n/a	n/a	16000	16000	#DIV/0!	1	YES	400.0	
T-Mercury	ug/l	2	n/a	n/a	n/a	n/a	1.2	1.2	#DIV/0!	1			
T-Molybdenum	ug/l	40	1390	n/a	n/a	n/a	980	1185	290	2	YES	29.6	
T-Nickel	ug/l	100	< 10	n/a	n/a	n/a	525	< 267.5	364	2	YES	2.7	
T-Selenium	ug/l	50	n/a	n/a	n/a	n/a	< 1	< 1	#DIV/0!	1			
T-Silver	ug/l	100	n/a	n/a	n/a	n/a	3	3	#DIV/0!	1			
T-Thallium	ug/l	2	< 1	n/a	n/a	n/a	< 2	< 1.5	0.7	2			
T-Vanadium	ug/l	60	84	n/a	n/a	n/a	1100	592	718.4	2	YES	9.9	
T-Zinc	ug/l	5000	n/a	n/a	n/a	n/a	1800	1800	#DIV/0!	1			
T. Hardness	mg/l	n/a	2066.5	2322.1	1941.7	n/a	967.6	1824.5	592.8	4			
T. Phos. (as PO4)	mg/l	n/a	0.67	5.25	n/a	13.783	20.52	10.1	8.8	4			
T.K.N.	mg/l	n/a	303.63	249.54	n/a	256.32	NO	269.8	29.5	3			
T.Sus.Solids	mg/l	n/a	706	16200	29340	12910	37950	19421	14,532	5			
TDS @ 180C	mg/l	n/a	7446	8820	7536	8380	8068	8050	576.9	5			
Tot. Alkalinity	mg/l	n/a	594	625	626	641	113	519.8	228.0	5			
Turbidity	NTU	n/a	240	68	236	400	440	276.8	148.7	5			
YES Count:											6		
Total:											63		
% YES:											9.5%		
Sample QA Note: r = rejected value, see attached notes for reasons.													
GWQS Key: = GWQS defined in GW Regs													
<b>Bold</b> = EPA DW MCLs or draft MCLs													
<b>italics</b> = EPA DW Lifetime Health Advisories (LHA: Mo, B, NH3, & Sr)													
normal = EPA Secondary MCLs (Al, Cl, Fe, SO4, & TDS)													
normal = Derived DW LHA, based on EPA Reference Dose values (acetone, Mn, and V)													
Original 1987 NRC Tailings Effluent Contaminants Omitted from State Analysis													
Boron	Total Organic Carbon				Zirconium								
Bromide	Silica				Methylene Chloride								
Cyanide	Tin				Acetone								
Cobalt	Strontium				Thorium-230								
Gallium	Sulfide				Lead-210								
Lithium	Titanium												

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Atlas Tailings Pile Seep on North Bank of Colorado River: Radiologics																				All units = pCi/l				
2	(W. side of Mouth of Moab Wash)																								
3	Sample	Lab	Gross Alpha		Gross Beta		Ra-226		Ra-228		Ra-226+Ra-228		T-Uranium												
4	Date	No.	<Conc.	+/-	<Conc.	+/-	<Conc.	+/-	<Conc.	+/-	<Conc.	+/-	<Conc.	+/-	<Conc.	+/-									
5	9/21/95	9510256	r298	29	493	21	6	1	<	1	<	7	1	948	12										
6	12/7/95	9512287	r201	23	539.8	21	<	0.5		2	2	<	2.5	2	955	14									
7	1/18/96	9600382	r101	22	238.5	14.8	10.3	1.1		2	3.5	12.3	3.7	1,186.8	15.4										
8	2/28/96	9601424	900	150	237	17	9.7	1		3.6	2	13.3	2.2	786.6	16.4										
9	4/11/96	9602315	r720	5	890	74.3	6.5	0.8		5.4	2.3	11.9	2.4	825	15.4										
10																									
11																									
12																									
13	Avg. Conc.:		900		479.7		6.6		2.8		9.4		940.3												
14	Std. Dev.:		####		268.9		3.9		1.7		4.6		156.5												
15	GWQS:		15		n/a		n/a		r/a		5		30												
16																									
17																									
18	Avg. Conc. Exceeds GWQS?																								
19	Yes/no:		YES		no		n/a		n/a		YES		YES												
20	Ratio:		60.00								1.88		31.34												
21																									
22	Sample QA Note: r = rejected value, see attached notes for reasons.																								
23																									
24	All samples = field filtered (dissolved species).																								

**Cell:** D5

**Note:** Gross Alpha: 9/21/95, 12/7/95, 1/18/96, and 4/11/96 samples suspect because gross alpha activity reported was less than reported uranium activity. Possibly caused by self-absorption due to elevated sample TDS.