State of Utah
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTRCL

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
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[redacted] 40-3453

December 11, 1996

Mr. Joseph Holonich
Chief, Uranium Recovery Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: State Update Report for Intensive Ammonia Sampling of Colorado River and Request for Additional Studies: Atlas Uranium Tailings Near Moab, Utah.

Dear Mr. Holonich:

The purpose of this letter is to transmit to you an update report regarding recent intensive ammonia sampling of the Colorado River in the vicinity of the Atlas tailings pile near Moab, Utah.

From the results of the State sampling, it appears that the Atlas tailings pile is a local source of ammonia discharge to the river. The elevated ammonia concentrations found on the Atlas side of the river suggest other studies are warranted to fully assess and characterize the concentration and distribution of other known tailings contaminants.

Dramatic increases in ammonia seen in the river's profile suggest preferred paths exist in the shallow aquifer by which tailings contaminated groundwater is discharged to the river. The presence of such pathways deserve further investigation and characterization.

Downstream distribution of ammonia in the river suggests that the mixing zone required to regain State water quality standards for ammonia below the tailings pile may need to be a mile or more long. Additional studies should also be expanded to determine the length of mixing zone needed for other known tailings contaminants.

Atlas should be required to complete these additional studies as a part of its upcoming groundwater corrective action investigations and remedial action plans.

If you have any questions about this study, please call Loren Morton of my staff at (801) 536-4250. We appreciate your cooperation and consideration of this information in resolution of the Atlas reclamation and groundwater corrective action plans for the facility.

NL05

1/1

Sincerely,

William J. Sinclair, Director
Division of Radiation Control

Enclosure

WJS/LBM:lm

cc: Larry Mize, DWQ (w/attach.)
Richard Denton, DWQ (w/attach.)
Bruce Rodgers, NPS-Canyonlands (w/attach.)
Roy Irwin, NPS-Fort Collins (w/attach.)
Ronette Reisenburg, U.S.FWS-SLC (w/attach.)
Mike Layton, NRC (w/attach.)
Robert Reed, ORNL (w/attach.)
Richard Blubaugh, Atlas (w/attach.)
Grant Ohland, Harding Lawson Assoc. (w/attach.)

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File: Atlas Surface Water Quality Studies

State of Utah
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt
Governor

Dianne R. Nielson, Ph.D.
Executive Director

William J. Sinclair
Director

MEMORANDUM

TO: Bill Sinclair

FROM: Loren Morton

DATE: December 11, 1996

SUBJECT: Atlas Tailings: Results of September, 1996 Intensive Ammonia Sampling of Colorado River.

The purpose of this memo is to summarize and interpret intensive water quality sampling efforts conducted by the Division of Water Quality (DWQ) in September, 1996 on the Colorado River in the vicinity of the Atlas tailings pile.

Ammonia was selected for intensive study by DWQ due to its confirmed occurrence as a tailings contaminant, known toxicity for aquatic species, existence of established State water quality standards, and ease of laboratory analysis. Although other contaminants could have been and need to be selected for study, it was DWQ's intent to use ammonia as an indicator parameter with the hope that it may disclose important information about local water quality conditions and contaminant distribution.

During the September 5, 1996 sampling event, DWQ staff collected 18 separate samples of ammonia (N) from the river in the vicinity of the Atlas tailings pile. Half of these samples were collected from the Atlas side of the river, or north and west riverbank (see Figure 1, samples A1 thru A9). The remaining nine samples were collected from the Moab side of the river, i.e., south and east riverbank at locations that were approximately directly across from the "A" series samples (see Figure 1, samples B1 thru B9). All the samples collected were grab-type measurements taken within a short distance of the riverbank. As has been done with all previous DWQ sampling, sample collection and preservation was completed in accordance with the DWQ water quality monitoring quality assurance plan. All analysis was completed by the Utah State Health Laboratory; an EPA certified environmental laboratory.

Results of the September, 1996 sampling are tabulated and graphically summarized in Attachment 1, below . Laboratory results for both the Atlas side ("A" series) and Moab side ("B" series) river samples are provided in Attachments 2 and 3, respectively.

STAFF FINDINGS

After review of the September 5, 1996 DWQ data several conclusions can be drawn, as follows:

1. Significantly Higher Ammonia Concentrations on Atlas Side - available data shows that the highest ammonia (N) was found on the Atlas side of the river, where an average concentration of about 2.57 mg/l was measured (see Attachment 1, DRC spreadsheet NH3_9-96). In contrast, all samples collected from the Moab side were found below minimum detectable concentration levels (< 0.05 mg/l).

   Both the average (2.57 mg/l) and maximum (10.8 mg/l) ammonia concentrations seen on the Atlas side of the river exceed the State surface water quality standard (0.44 mg/l, Water Quality Numeric Criteria, or WQNC). As a result, the potential exists for local adverse impact to the Colorado River water quality. Consequently, Atlas should be required to complete additional water quality studies to determine local extent and long-term effects of the discharge of tailings contaminants to the river.

2. Background River Concentration and Concentration Trend (Atlas Side) - background concentrations on the Atlas side of the Colorado River appear to have been found at upstream stations A1 and A2 where ammonia (N) content was found below 0.05 mg/l (see Attachment 1, DRC spreadsheet and graph). However, downstream of station A2 a dramatic increase in ammonia content was observed. Somewhere between stations A2 and A3 ammonia (N) concentrations rose from below detectable levels (< 0.05 mg/l) to 10.8 mg/l; an increase of more than two orders of magnitude across a distance of only about 1,250 feet.

   Downstream of station A3 a consistent decreasing trend was apparent with ammonia concentrations falling from 10.8 mg/l to 0.13 mg/l between stations A3 and A9 (ibid.). This dramatic ammonia increase near station A3 followed by gradual declines downstream to station A9 suggest the Atlas tailings pile is a local point source of ammonia discharge to the Colorado River.

3. Apparent Preferred Groundwater Flow (Atlas Side) - the dramatic increase in ammonia (N) concentration near station A3 followed by decreasing downstream concentrations may be explained by a preferred path of contaminant discharge to the river from the tailings pile. In such a scenario, greater rates and/or concentrations of ammonia and other tailings contaminants would be discharged to the river near station A3 by a preferred path of groundwater flow.

   This possible explanation contradicts previous interpretations of local groundwater flow rendered for the shallow aquifer by Atlas. In an earlier report Atlas suggested leachate and groundwater flow away from the tailings pile may be uniformly distributed across the shallow aquifer; as depicted by the shape and spacing of equipotential lines found on an

Atlas water table contour map (Smith Environmental Technologies Corporation Report, Figure 1). However, if such homogeneous and isotropic conditions existed in the water table aquifer, one would expect the discharge of ammonia contaminated groundwater to the river to be uniformly distributed up and down the riverbank near the tailings pile.

In contrast, it appears that the majority of the ammonia discharged to the river from the Atlas riverbank is focused somewhere near station A3. As a result of this apparent conflict with previous interpretations, additional water quality and hydrogeologic studies are needed to better characterize local hydrogeologic conditions. Such studies need to include characterization of local groundwater contaminant concentrations, and efforts to determine or confirm the presence and location of preferred groundwater flow pathways. These studies should be required of Atlas during completion of its Groundwater Corrective Action Program.

4. Downstream Extent of Elevated Ammonia Concentrations (Atlas Side) - review of the September 5, 1996 data suggests that the ammonia (N) concentrations are elevated above background values for a distance of more than 7,800 feet below the river's confluence with Moab Wash (see Attachment 1).

5. Apparent Downstream Extent of Mixing Zone (Atlas Side) - review of the September 5, 1996 data shows that the State WQNC (0.44 mg/l) was exceeded on the Atlas side of the riverbank for a distance of about 4,500 feet between stations A3 to A7 (see Attachment 1). Depending on the exact location of the upstream ammonia discharge to the river between stations A2 and A3, and the point at which the WQNC is regained between stations A7 and A8, it is possible that in-stream WQNC for ammonia could have been exceeded for a mile or more along the Atlas side of the river.

From the information available it is clear that Atlas should be required to complete additional river sampling to better define and characterize the zone of contaminant impact in the river and the full extent of the mixing zone needed to regain State water quality standards (WQNC). Such additional study should include samples collected at both low flow conditions and through other seasons of the year to determine both average and worse case conditions. Because mixing zone length is contaminant specific, these additional studies should be expanded to include other key tailings contaminants. In order to gain a comprehensive understanding of impact of the tailings contaminants on the river, sediment quality and biotic studies may also need to be included.

CONCLUSIONS

Based on intensive ammonia (N) sampling conducted by DWQ of the Colorado River in the vicinity of the Atlas facility on September 5, 1996, it appears that the Atlas tailings pile is a source of

ammonia discharge to the river. The elevated ammonia concentrations found in the river suggest other studies are warranted to fully assess and characterize the concentration and distribution of other known tailings contaminants. Dramatic increases in ammonia seen on the Atlas side of the river suggest preferred paths exist in the shallow aquifer by which tailings contaminants and groundwater are discharged to the river. The presence of such pathways deserve further investigation and characterization. Downstream distribution of ammonia in the river suggests that the mixing zone required of the Atlas discharge to regain State water quality standards below the tailings pile may need to be a mile or more long. Additional studies should also be expanded to determine the length of mixing zone needed for other known tailings contaminants. Atlas should be required to complete these studies as a part of its upcoming groundwater corrective action investigations and remedial action plans.

REFERENCES

Smith Environmental Technologies Corporation, February 7, 1996 Report, "Response to NRC Open Issues: Atlas Corporation Reclamation Plan, Uranium Mill and Tailings Disposal Area, Moab, Utah", unpublished consultants report, 8 pp. plus tables and figures.

LBM:lm

attachments

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File: Atlas Surface Water Quality

FIGURE 1

Utah Division of Water Quality

Ammonia (as N) Sampling Location Map

DEQ September, 1996 Intensive Sampling Project


COLORADO
Matrimony Spring
Updraft Arch
MOAB
Trailer Park
TRAINS LINE
The Portal
MESA
DWQ 9/5/96 Colorado River
Intensive Ammonia Sampling Project
"A" series = Atlas side of river
"B" series = Moab side of river
scale: 1 inch ~ 2,000 ft
source: USGS Moab 7.5 Minute Quadrangle

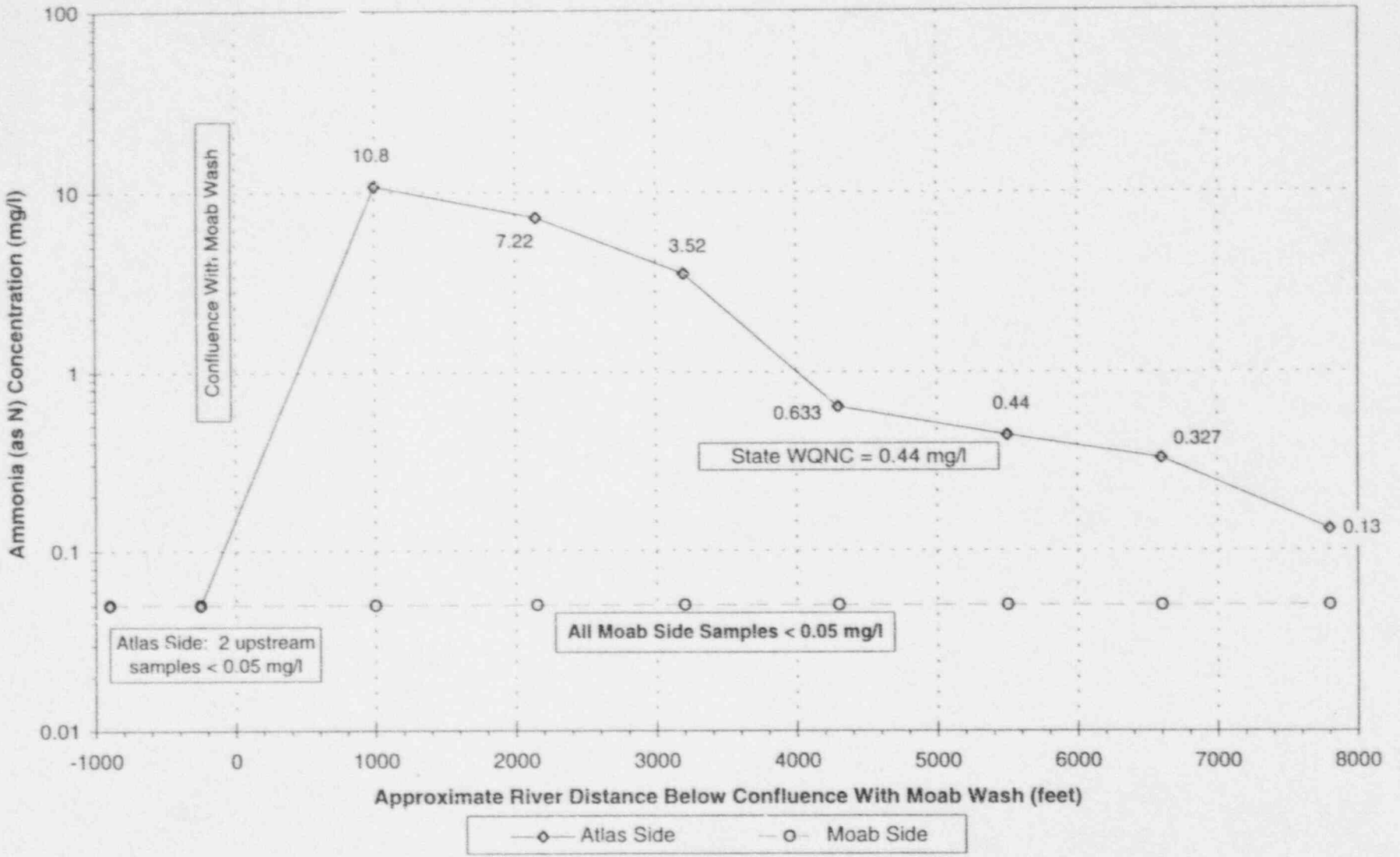
ATTACHMENT 1

Summary Table and Graph:

DEQ September, 1996
Intensive Ammonia Sampling of
Colorado River
in vicinity of
Atlas Tailings Pile

Division of Radiation Control Spreadsheet and Graph
NH3INTSV.XLS, Sheet NH3_9-96 and Chart 3

Atlas Tailings: DEQ 9/5/96 Intensive Ammonia Sampling of Colorado River (grab samples)



Atlas Tailings: Intensive Colorado River Sampling for Ammonia (N)						
			Approx.	Approx.		
		Approx.	Map Distance	Down-		
		Intra-station	Relative to	stream		9/5/96
		Distance	Confluence w/	Distance		Conc.
Riverbank	Station No.	(ft)	Moab Wash	(ft)	<	mg/l
Atlas Side	A1		~ 900 ft above	-900	<	0.05
	A2	650	~ 250 ft above	-250	<	0.05
	A3	1200	~ 1000 ft below	1000		10.8
	A4	1150		2150		7.22
	A5	1050		3200		3.52
	A6	1100		4300		0.633
	A7	1200		5500		0.44
	A8	1100		6600		0.327
	A9	1200		7800		0.13
				Average:		2.574
Moab Side	B1		~ 900 ft above	-900	<	0.05
	B2	650	~ 250 ft above	-250	<	0.05
	B3	1200	~ 1000 ft below	1000	<	0.05
	B4	1150		2150	<	0.05
	B5	1050		3200	<	0.05
	B6	1100		4300	<	0.05
	B7	1200		5500	<	0.05
	B8	1100		6600	<	0.05
	B9	1200		7800	<	0.05
				Average:	<	0.05

ATTACHMENT 2

DEQ September, 1996
Intensive Ammonia (as N) Sampling Project
of Colorado River
near Atlas Tailings Pile

Atlas Side Samples
"A" Series: Samples A1 thru A9

Utah State Health Laboratory Results

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-1 200 YRDS AB MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608103 Type: 04
Sample Date: 09/05/96 Time: 08:35

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-2 100 YRDS AB MILL TAILINGS
Site ID: Source: 03 Date of Review and QA Validation
Cost Code: 358 Inorganic Review: 09/24/96
Lab Number: 9608104 Type: 04 Organic Review:
Sample Date: 09/05/96 Time: 08:45 Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

UT[illegible] STATE HEALTH DEPARTMENT
DIVISION OF LABORATORY SERVICES
Environmental Chemistry Analysis Report

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-3 100 YRDS BELOW MILL TAILINGS
Site ID: Source: 03 Date of Review and QA Validation
Cost Code: 358 Inorganic Review: 09/24/96
Lab Number: 9608105 Type: 04 Organic Review:
Sample Date: 09/05/96 Time: 08:48 Radiochemistry Review:
Tot. Cations: 11 Microbiology Review:
Tot. Anions
Grand Total: 11 mg/l

Laboratory Analyses

Ammonia N	10.8	mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-4 BELOW MILL TAILINGS
Site ID: Source: 03 Date of Review and QA Validation
Cost Code: 358 Inorganic Review: 09/24/96
Lab Number: 9608106 Type: 04 Organic Review:
Sample Date: 09/05/96 Time: 08:48 Radiochemistry Review.
Tot. Cations: 7 Microbiology Review:
Tot. Anions:
Grand Total: 7 mg/l

Laboratory Analyses

Ammonia N	7.22	mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-5
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608107 Type: 04
Sample Date: 09/05/96 Time: 08:55
Tot. Cations: 4
Tot. Anions:
Grand Total: 4 mg/l

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	3.52	mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-6 BELOW MILL TAILING
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608108 Type: 04
Sample Date: 09/05/96 Time: 09:00
Tot. Cations: 1
Tot. Anions:
Grand Total: 1 mg/l

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	0.633	mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-7 BELOW MILL TAILING
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608109 Type: 04
Sample Date: 09/05/96 Time: 09:00

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	0.44 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-8
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608110 Type: 04
Sample Date: 09/05/96 Time: 09:02

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	0.327 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER A-9 BELOW 495656 1/4 MILE
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608111 Type: 04
Sample Date: 09/05/96 Time: 09:10

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	0.13 mg/l

ATTACHMENT 3

DEQ September, 1996
Intensive Ammonia (as N) Sampling Project
of Colorado River
near Atlas Tailings Pile

Moab Side Samples
"B" Series: Samples B1 thru B9

Utah State Health Laboratory Results

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B-1 200 YRDS AB MILL TAILINGS
Site ID: Source: 03 Date of Review and QA Validation
Cost Code: 358 Inorganic Review: 09/24/96
Lab Number: 9608121 Type: 04 Organic Review:
Sample Date: 09/05/96 Time: 09:39 Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B-2 100 YRDS AB MILL TAILINGS
Site ID: Source: 03 Date of Review and QA Validation
Cost Code: 358 Inorganic Review: 09/24/96
Lab Number: 9608120 Type: 04 Organic Review:
Sample Date: 09/05/96 Time: 09:35 Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B3 200 YRD BEL MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608113 Type: 04
Sample Date: 09/05/96 Time: 09:15

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B4 BELOW MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608114 Type: 04
Sample Date: 09/05/96 Time: 09:17

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B-5 BELOW MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608115 Type: 04
Sample Date: 09/05/96 Time: 09:20

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05	mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B-6 BELOW MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608116 Type: 04
Sample Date: 09/05/96 Time: 09:23

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B-7 BELOW MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608117 Type: 04
Sample Date: 09/05/96 Time: 09:27

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B-8 BELOW MILL TAILINGS
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608118 Type: 04
Sample Date: 09/05/96 Time: 03:31

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l

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

UDEQ - DWQ
ARNE HULTQUIST
288 N 1460 W
SLC UT 84114-4870 538-6146

Description: COLORADO RIVER B9 BELOW 495656 1/4 MILE
Site ID: Source: 03
Cost Code: 358
Lab Number: 9608112 Type: 04
Sample Date: 09/05/96 Time: 09:12

Date of Review and QA Validation
Inorganic Review: 09/24/96
Organic Review:
Radiochemistry Review:
Microbiology Review:

Laboratory Analyses

Ammonia N	<0.05 mg/l