United States Department of the Interior
FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

In Reply Refer To
(CO/KS/NE/UT)

February 15, 1996

Joseph J. Holonich
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: Biological Assessment for the Proposed Reclamation of the Atlas Mill Tailings Site in Moab, Utah

Dear Mr. Holonich:

This acknowledges the U.S. Fish and Wildlife Service's (Service) November 6, 1995 receipt of your November 1, 1995 letter and attached biological assessment for the proposed reclamation of the Atlas Mill Tailings site in Moab, Utah. In your letter you requested formal consultation with the Service. Upon receipt of a request for formal consultation, the Service's internal policies allow 30 days for review of a biological assessment to determine if the information provided is sufficient for the Service to make its determination on the projects effects to threatened and endangered species.

Section 7 of the Endangered Species Act of 1973, as amended (Act) allows the Service up to 90 days to conclude formal consultation with your agency and an additional 45 days to prepare our biological opinion (unless we mutually agree to an extension). However, the 90 days does not begin until we have reviewed the documents and determined that they provide sufficient information for the Service to make its determination on the projects effects to threatened and endangered species.

Due to understaffing and the government furloughs in November, December, and January, the Service review of this document was delayed until late in January. Limited review of the draft Biological Assessment prompted us to request additional materials and analysis. Our initial review indicated that the project could affect individual endangered fish. Limited data was collected from stream segments both upstream and downstream as well as adjacent to the site. However the data collected was limited. A decision based on this data would likely be extremely conservative due the potential impacts to the endangered fish species. We have now received the report of the data collected during May 1995, the Draft EIS, and have sent samples in for analysis which were collected by a joint interagency Department of Interior team last spring. Pending receipt of the results of these analysis we will complete the Biological Opinion. If results are delayed unacceptably, we will be forced to only use the

existing data. Again, because of the nature of the site, other potential contaminant sources and the lack of a top quality study of the risk to endangered species, a conservative opinion is still likely.

We would also like to indicate that we are now in receipt of the Draft Environmental Impact Statement for the proposed action and will provide comments to you within the near future. However, we would like to caution you regarding moving into a final Environmental Impact Statement without having more information that can be disclosed to the public relative to potential impacts to endangered species. We are committed to working with you and doing all we can to have both the ESA and National Environment Police Act processes complement each other.

If you have any question or concerns regarding this consultation or the consultation process, please feel free to contact Bob Williams or Janet Mizzi at the Salt Lake City Field Office at (801) 524-5001.

Sincerely,

for Robert D. Williams
Assistant Field Supervisor

United States Department of the Interior

NATIONAL PARK SERVICE
Water Resources Division
1201 Oak Ridge Drive, Suite 250
Fort Collins, Colorado 80525

IN REPLY REFER TO

L54(479)
RMR

Memorandum

To: Chief, Water Resources Division

Thru: William L. Jackson, Chief, Water Operations Branch 5-2-95

From: Roy Irwin, Contaminants Specialist, Water Operations Branch Roy Irwin

Subject: Trip Report for Travel to Canyonlands and Arches National Parks, April 5-7, 1995.

PURPOSE: The purpose of this trip was to lead a DOI group in the development of objectives and protocols for a proposed Atlas Mining/NRC study of the Colorado River below the Atlas tailings pile at Moab (see detailed notes attached).

ITINERARY: Departed Fort Collins on April 4, 1995 and arrived at Moab Utah, the same day. Departed on April 8 and returned to Fort Collins.

CONTACTS:

Those participating included:

National Park Service:
Walt Dabney, Superintendent, Canyonlands NP
Noel Poe, Superintendent, Arches NP
Roy Irwin, NPS, WRD
Bruce Rodgers, Resource Management, Canyonlands NP
Craig Hauke, Canyonlands NP
Michael Hill, Canyonlands NP
Kristi Dubois, Fish and Wildlife Service
Chuck McAda, FWS, endangered Fish Office
Dale Wilberg, USGS Salt Lake City
Gerald Eddlemon, Oak Ridge National Lab
Allen Mullins, NRC, Atlas Project Manager
John Bradbury, NRC, Hydrologist
Melissa Trammel, State of Utah
Tom Chart, State of Utah
Mike Klish, West Water Engineering
George Kidd, West Water Engineering
Dale Edwards, Atlas Site Manager

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In Reply Refer To
(CO/KS/NE/UT)

July 22, 1996

Myron Fliegel, Project Manager
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Section 7 Consultation for the Proposed Reclamation of the Atlas Mill Tailings Site in Moab, Utah

Dear Mr. Fliegel:

Per our phone conversation of July 1, 1996, the Fish and Wildlife Service (Service) has reviewed all available information and data concerning the Nuclear Regulatory Commissions (NRC) request for formal section 7 consultation for the proposed reclamation of the Atlas Mill Tailings site in Moab, Utah. The Service has previously, November 1, 1995, received the biological assessment and a letter requesting formal consultation for the project. We reviewed the biological assessment and provided comments, dated February 15, 1996. In these comments we expressed our concern that the limited data collected did not accurately assess potential impacts to the endangered fish species in the Colorado River. Additionally, we stated that we would complete a biological opinion upon receipt of the results of some additional analyses. We have since received the results of those analyses and have had the opportunity to more thoroughly review the data reported in the biological assessment and the Draft EIS. Our comments are provided below.

Prior to the issuance of the Draft EIS, a joint meeting of all parties involved in the Atlas project was held in Moab in early April, 1995. At this meeting the Federal representatives developed a list of recommended objectives and protocols for the Atlas Mining/ NRC study of the Colorado River below the Atlas tailings pile in Moab. These objectives and protocols are summarized as follows: 1) perform a screening survey to determine if contaminants of concern are present in significant amounts in three important endangered fish habitats downstream of the site compared to three upstream of the site; 2) determine the size of the exclusion zone (if one exists) for fish and invertebrates as a result of the mixing zone/sedimentation zone in the area of, and downstream from, the discharge into the river from the tailings pile; 3) sample and analyze water from the Nature Preserve to see if there is a water signature/fingerprint in the preserve similar to the area near the tailings pile; and 4) map the zone of stressed vegetation using tamarisk during peak color differences in late

summer/early fall. In addition to these, specific collection sites, a detailed list of analytes and radionucleides of concern for laboratory analyses, a Service approved sampling protocol, an EPA analytical protocol, and standard EPA chain of custody protocols for the collection of samples for contaminant analysis, were recommended.

These recommendations were submitted to NRC and Oak Ridge staff. Both NRC and Oak Ridge staff suggested that the data requirements be cut back. Roy Irwin, of the National Park Service (NPS), informed you at that time that the NPS, the Service, and others may not be satisfied with the data as being complete if you cut back on the recommended data requirements. When sampling was conducted, high flows apparently limited the ability of personnel to collect the recommended data. The identification of an exclusion zone for fish and invertebrates was not determined. Sampling of the known seep was not performed. Further observations of any additional seeps upstream of the tailings pile was not conducted. Invertebrates were not sampled. Tamarisk stress surveys were not conducted and comparison water samples were not collected upstream or downstream of the tailings site. Additionally, standard operating procedures and recommended protocols were not followed, compromising the validity of the laboratory results. Due to analytical cost concerns, sediment samples that were to be in replicate, were later analyzed as a composite, compromising statistical validity. The lack of consistency in collection and performance of tissue, sediment, and radionuclide samples invalidates any comparison of data sets.

Given the above-mentioned data concerns, as well as the inconsistency in data results, available information concerning possible effects to the endangered Colorado River fishes is inconclusive. Therefore, the Service cannot conclude that the tailings pile, if capped in place, would not harm the endangered fish of the Colorado River system, or would not result in the destruction or adverse modification of designated critical habitat. We would prefer to base our opinion on additional data collections that would address the objectives previously recommended to NRC and Atlas. It is our recommendation, at this time, that additional data collections be made that would satisfy the data gaps. To this end, we recommend a meeting between NRC, the Service, and the applicant (unless they choose to be represented by NRC) to determine, and agree upon, specific data collection and analysis requirements.

Endangered Species Act regulations require that the Service use the best scientific and commercial data available when rendering a biological opinion. Therefore, if NRC requests that the Service go ahead with the issuance of a biological opinion based on currently available data, we would be required to do so. However, given the nature of the site, and the potentially significant impacts to the endangered Colorado River fishes and designated critical habitat, the Service must render a conservative opinion to provide for the protection of the endangered fish. As we have previously stated, given the available information, the Service's determination is that NRC's preferred alternative, reclamation of the tailings pile by capping it in place, may effect, and is likely to adversely affect, the endangered Colorado River fish and would likely result in the destruction or adverse modification of designated critical habitat. Additionally, we may determine that the project, as proposed, would result in jeopardy to the species.

The DEIS identifies an additional alternative of moving the tailings pile to another site out of the Colorado River floodplain. Moving the tailings pile to another site reduces and/or eliminates most of the environmental impacts associated with reclaiming the tailings pile at the Moab site. For these reasons, the Service recommends moving the tailings pile rather than capping it in place.

The Service is earnestly concerned about the existing impacts from the tailings pile and the potential impacts of the proposed action and, for this reason, would like to have current, valid information before rendering a biological opinion. We would like to work cooperatively with NRC and Atlas towards alleviating these concerns. We recommend moving the tailings pile as opposed to reclamation in place, and if that is not feasible, we would like to see some additional analyses performed to determine the potential impacts from the Atlas Mill tailings to the endangered fishes of the Colorado River and designated critical habitat.

We look forward to hearing from you. Questions concerning these comments should be addressed to Bob Williams or Janet Mizzi at (801) 524-5001.

Sincerely,

for Robert D. Williams
Assistant Field Supervisor

Enclosure

cc: Miles Moreti, UDWR, Price, UT
Roy Irwin, NPS, Fort Collins, CO

United States Department of the Interior

TAKE PRIDE IN AMERICA

NATIONAL PARK SERVICE
Water Resources Division
1201 Oak Ridge Drive, Suite 250
Fort Collins, Colorado 80525

REFER TO

L54(479)
RMR

Memorandum

To: Regional Director, Rocky Mountain Region

From: Dan B. Kimball, Chief, Water Resources Division

Subject: Report for Travel by Roy Irwin to Canyonlands and Arches National Parks, April 5-7, 1995.

The attached trip report concerns travel by Roy Irwin to Canyonlands and Arches National Parks. Roy led a DOI group which developed objectives and protocols for a proposed Atlas Mining/NRC study of the Colorado River below the Atlas tailings pile at Moab (see detailed notes attached).

If you have any questions, please call Bill Jackson at (970) 225-3503 or Roy Irwin at (970) 225-3520.

Dan B Kimball.

Attachment

cc: 479 - Jackson, Rosenlieb, Flora
RMR - Moon, Wise
CANY - Superintendent, Rodgers, Hauke
ARCH - Superintendent
DOI - Lillian Stone
MMB - Shaver
AQD - Christiano
Utah - McNeil, Morton
FWS - Waddell, McCada, DuBois
EPA - Berry
USGS - Wilburg

Important Contacts Who Did Not Attend the Moab Meetings:

NRC Staff Member Mike Fliegel did not attend meeting but will be Atlas Project Manager after 5-1-95

DOI Lead Lillian Stone, helped set up meeting but did not attend.

DISCUSSION:

Highlights of the River Trip:

The river trip working sessions on April 5 and 6 went exceptionally well, thanks to excellent boat support provided by Canyonlands and the State of Utah, as well as good weather.

Three good habitats for the endangered Colorado Squawfish were found a few miles upstream, as were three similar sites downstream (see outline below). These 6 sites were recommended for further study since they were good fish habitat and also were deposition sites for sediment fines. Additional mixing zone studies will related to protection of endangered fish (passage zones) and other aquatic biota will be required in the Colorado River in the vicinity of the Atlas pile.

There appeared to be point source discharges from the pile in the vicinity of the old Moab Wash channel, which runs under the pile. The conductivity of point source water coming out of the bank in that area approached 18,000 microsiemens, whereas the conductivity in the river was typically under 1,000 microsiemens. The alluvial fan in the area may be contaminated with both chemical and radiological contaminants from the pile.

Potential collecting sites as well as sites where previous data have been collected, were examined on Atlas Property as well as on the wetlands nature preserve across the river from the Atlas site.

Conductivity, pH, and GPS data for all sites were collected on the river trip. This information is presented below as part of the outline prepared for NRC.

Highlights of the Working Group Meeting Session at CANY:

On April 6 and 7, 1995, the Federal representatives working under my coordination prepared the following outline comprising DOI recommendations which were transmitted to NRC via internet the following working day:

Outline of Tasks to be Performed to determine potential downstream effects of the Atlas Mining uranium tailings pond on Colorado River Resources:

1. Endangered Fish:

Objective: Perform a screening survey to determine if contaminants of concern are present in significant amounts in three important endangered fish habitats downstream of the site compared to three upstream sites.

Basic Experimental Design: 3 sites clearly upstream, 3 sites clearly downstream, 3 replicates (spatially separated) at each site, each replicate a composite of three samples:

Note: Use protocols and detection limits as per Standard FWS contract labs. Use FWS contract labs if possible for chemical contaminants. Use NRC approved labs and methods for radiological analytes. Use sampling sites 1, 1A, and 2 upstream, and 8, 9, and 10 downstream. The sites are marked on maps with lat and long. GPS data which can be supplied by Roy Irwin. If the river has shifted the sites slightly, Atlas contractors can shift to nearby equivalent (presence of sediment fines and endangered fish habitat should be equivalent) as required.

A) Sediment Contaminants Samples: Include Grain Size, TOC, pH, AVS, wet and dry weight.

B) Invertebrate Contaminants Samples: Try to get minimum sample sizes (5 grams for metals, 20 for rads), do metals only if insufficient size for rads.

Collection preferences: 1) Chironomids, 2) Simulids (Black Fly Larvae), 3) Other invertebrates present and associated closely with sediments, if any, or 4) Non-invertebrate Alternative: Periphyton. If periphyton used, use USGS NAWQA Protocols for periphyton collection and handling.

C) Fish: Use one species available at all sites: in this order of preference: 1) Fathead minnows, 2) Red Shiners, and 3) Sand Shiners. Get state and federal collecting permits and ask a very knowledgeable person to come along to make sure no endangered fish are collected.

Collecting Sites:

Upstream:

Site 1: River Mile 66.7, 38 degrees 26.51 minutes N, 109 degrees 32.53 minutes West: Good Endangered Species (SE) habitat, fairly good sediment fines (deposition zone), pH 8.6, conductivity 800 microsiemens.

Site 1A: Just upstream a short distance (see Map mark for site) at the mouth of Negro Bill Creek. Very similar but smaller site.

Site 2: River Mile 65.2, 38 degrees 37.21 minutes N, 109 degrees 33.69 minutes West: Fair Endangered Species (SE) habitat, good sediment fines, pH 8.5, conductivity 730 microsiemens.

Site Considered Less desirable:

Site 3: Just west of highway 191 bridge, s. side of river. River Mile 64, 38 degrees 36.2 minutes N, 109 degrees 34.7 minutes West: Marginal (rare) Endangered Species (SE) habitat, good sediment fines, pH 8.4, conductivity 730 microsiemens. Concerns: close to bridge and other potentially disturbed areas.

Downstream Sites:

Site 8: River Mile 61.2, west side of river just downstream of high tensions wires crossing river, 38 degrees 34.21 minutes N, 109 degrees 34.79 minutes West: Fair Endangered Species (SE) habitat, fair sediment fines, pH 8.6, conductivity 800 microsiemens.

Site 9: River Mile 60.2, 38 degrees 33.5 minutes N, 109 degrees 35.21 minutes West: Very Good Endangered Species (SE) habitat, good sediment fines, pH 8.6 everywhere, conductivity 860 microsiemens on outer (river) side, becoming slightly higher (940-1050) as one progresses up towards the uplands corner of the backwater.

Site 10: River Mile 59.9, 38 degrees 33.36 minutes N, 109 degrees 35.38 minutes West: Fairly Good Endangered Species (SE) habitat (a bit ephemeral), fair sediment fines, pH 8.6, conductivity 810 microsiemens on the river side, a bit higher (880-1000) in the backwater.

Sites considered less desirable:

Site 5: River Mile 63, 38 degrees 35.6 minutes N, 109 degrees 33.45 minutes West: Fair Endangered Species (SE) and fish habitat, poor (too sandy) sediment fines, pH 8.6, conductivity 860 microsiemens. Wrong side of river.

Site 11E: River Mile 62.2. The site Atlas had earlier said was a possibility. Problem: too sandy, wrong side of river. Ephemeral: often dry.

Site 6: River Mile 61.6, east (wrong) side of sand bar, sand bar on wrong side of river, 38 degrees 34.56 minutes N, 109 degrees 34.76 minutes West: Good Endangered Species (SE) habitat, good sediment fines, pH 8.6, conductivity 770 microsiemens. Pretty good in most ways except for wrong side of sand bar, sand bar on wrong side of river, and too close to sewage outfall (although a bit upstream). Potential "additional site."

Site 7: River Mile 61.7, 38 degrees 34.56 minutes N, 109 degrees 34.76 minutes West: Fairly Good Endangered Species (SE) habitat, but a bit too sandy (fair to poor sediment fines, pH 8.4, conductivity 770 microsiemens. On right (west side) of a sand bar which was on the wrong side of the river.

Site 11: Dredged Creek Outlet from preserve, River Mile 61.9. In the creek the conductivity was 2,300 microSiemens, pH 7.8. Proceeding downstream from Atlas on the wrong side of the river, this is the first place where drainage water comes out of the S side of the preserve. Given a site name just to mark it.

Site 12: Sewage Outfall, River Mile 61.4 (approximate). Marked 12 POTW on map.

Site 13: Mill Creek 100 yards upstream of confluence with Colorado River., Just upstream of Portal Power Lines Crossing Colorado River. pH 8.1, Conductivity 1200-1300 microSiemens. Thick alkali deposits on banks of this creek looked a bit like those on site 4, but may have different chemical composition. 38 degrees 34.38 minutes N, 109 degrees 34.56 minutes west.

2) Possible Mixing Zone Exclusion Zone: The objective of this survey is to determine the size of the exclusion zone (if one exists) for fish and invertebrates as a result of the mixing zone/sedimentation zone in the immediate area, and just downstream from the discharge into the river from the pile. See previous DOI comments.

Location: Site 4 (seems in the general area of Atlas previous zone 1 site): River Mile 63.3, west side of river adjacent to Atlas Pile, just downstream of current mouth of Moab Wash (in the general area where Moab Wash used to come into the river and appears to be still be serving as a point source conduit from the pile to the river): 38 degrees 35.88 minutes N, 109 degrees 35.45 minutes West: poor Endangered Species (SE) habitat but the fish need to be able navigate up and down the shallow water habitat near the banks and the question is whether or not the mixing zone might interfere with that migration, good sediment fines in the area below the point source, possibly partly a deposition area for the pile, pH 8.3 in the river, pH 7.4 in the point sources coming out of the river bank (analyzed 3 small effluent channels coming from the old Moab Wash channel as the channels made their way across the delta towards the river only a few feet away), conductivity 800 microsiemens in the river adjacent to the site. Conductivity 7,000 microsiemens in the adjacent channel crossing the delta towards the river only a few feet away. (Note: the previously mentioned 700,000 figure may have been a decimal/conversion error in the interchange between Irwin and Eddlemon when jointly taking measurements and notes in the field at twilight). In a second location, the value in the river was 1000 uS and the value in an adjacent channel 18,000 uS. In a third location, it was 1,000 in the river, greater than 20,000 in a seep channel. These figures are in line with the SO4 and Chloride data from the monitoring wells. The bottom line: high conductivity in the point source water from the pile.

Note: Use protocols and detection limits as per Standard FWS contract labs. Use FWS contract labs if possible for chemical contaminants. Use NRC approved labs and methods for radiological analytes.

Tasks:

A) Exclusion Zones for Fish and Invertebrates (Compare mixing zone area to similar areas clearly upstream):

For Fish Use Standard Length 20 foot interval Seine Hauls using a 12 foot minnow seine, 3/16 inch mesh along the River Adjacent to the Tailings Pile. Begin at the mouth of Moab Wash and continue seining downstream stopping and recording presence of fish to species levels, recording at every other 20 foot intervals until reaching a spot 2,000 feet downstream of Moab Wash. Perform a similar survey in similar habitats clearly upstream and compare the results. If an area of diminishing effects seems to occur downstream of the tailings pile influence, document where it is. Alternative fish collection plans would be alright if approved by both the Endangered Fish office of the FWS in Grand Junction and the State Personnel in Moab (Melissa Trammel or Tom Chart at (801) 259-3780.

For invertebrates: use same general upstream/downstream zones for invertebrates but use quantitative protocols as recently developed for the NPS by:

Dennis Shiozawa. BYU, Dept. of Zoology Provo, Utah 84602 801 378-4972

B) Sediments: same as 1A above, map deposition zones which occur in the mixing zone, if any occur.

C) Water Samples from 3 seep areas from the river bank and from at least 3 separate areas of the nearshore mixing zone.

D) Pore Water Samples from deposition fines near the seeps.

E) Fish and Invertebrates (perhaps Simulids on snags) and Periphyton Tissues, as per 1B&C above. Is there accumulation of hazardous substances?

F) If problems found related to 2A through 2E, do water and sediments toxicity tests to further define the extent of toxicity in the mixing zone.

3) The Nature Preserve: In response to question raised by BOR and DOI, sample and analyze water from the largest spring in the NACL- dominated section of the preserve (the center section per the Cooper Report) and the largest spring in the SO4 dominated southern section (per the Cooper Report), for all analytes listed below, using similar protocols as used at the seeps (2C above), to see if there is a water signature/fingerprint in the preserve similar to the area near the pile.

4) Tamarisk Stress Zone: Map the zone of stressed vegetation during peak color differences of late summer\early fall.

5) Solids Analysis of Tailings Pile: Three Samples at Each of Three Sampling Locations, one below existing water, two others spread out opposite directions from there. Three depths at each site: shallow, mid depth, and near the bottom. Use all contaminants of concern as documented below. NRC representative said Atlas would not let us sample. Atlas representative (Dale Edwards) said that Atlas wanted solids data too, to calculate DAC air pollution values, but that NRC had prevented them (Atlas) from sampling solids in the pile. Alleged reason: no labs now have NRC certification for solids analysis of product or byproduct (the pile is considered a by product).

6) Well water being pumped back to the top of the pile. Data is lacking about the quality of this water. It should be sampled for all contaminants of concern (below) to help characterize the water in the pile.

Contaminants of Concern (COCs) and Water Quality Analytes of Potential Concern: Including Metals, Rads, Nutrients, and Ions:

Note: GWQS = acronym for various Groundwater and Drinking Water Standards as Assembled by State of Utah (Loren Morton).

Acid Volatile Sulfides:

Include in all sediment samples.

Alkalinity as CACO3:

standard Water Quality parameter for water quality samples only.

Alpha, gross:

Definitely Include as major COC from pile rads. 15 picocuries per liter as the most stringent aquatic life for State of Utah standard has been broken at least once downstream above the confluence. River often fairly close to the standard both up and downstream. Twenty times as high in well AMM-2 between pile and river as in so called "control" well AMM-1 at eastern corner of the site. Higher yet in well ATP-2S at surface at toe of middle of pile in March 95. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the maximum values for groundwater protection (NRC Table 5c) were detected in one or both down gradient well locations."

Ammonia-NH3:

Exceeded GWQS by 75 times. River Water Data Present Definitely Include (Gerald Eddlemon), used in process 2400 ppm in pond on top the pile.

Aluminum (Inductively Coupled Plasma/ICP method OK):

Definitely Include. Data Present in River Definitely Include in ICP due to enrichment in leachate and presence of low pH. No well data. 450 ppm in pond on top the pile. Used in process.

Antimony (Sb, Inductively Coupled Plasma/ICP method OK):

Less than 2 ppm in pond on top the pile. Definitely include since exceeds GWQS and also include as a marker that comes as part of ICP scan anyway.

Arsenic (Either Hydride Generation or Graphite Furnace Atomic Absorption, Do not use ICP):

Definitely Include: Eddlemon and Group 88 groundwater data available River data available 0.263 ppm in groundwater in preserve 0.999 ppm in surface water of preserve 8.1 ppm in preserve sediments 1.8 ppm in pond on top tailings in 87

Barium (Inductively Coupled Plasma/ICP method OK):

Part of Process to Treat Radiological Wastes: Include partly as marker, comes as part of ICP scan anyway.
Definitely Include 0.250 ppm in surface water of preserve: Cooper Report 0.167 in Groundwater in preserve 570 ppm in preserve sediments 0.25 ppm in pond on top of pile.

Beryllium (Inductively Coupled Plasma/ICP method OK): Definitely Include, exceeded GWQS. Present in Pond on top pile. 0.00325 ppm in Groundwater in the preserve (Cooper)

2 ppm in sediment in Preserve 0.14 ppm in tailings liquid.

Beta, gross:

Definitely Include as part of rad scan. Present in Preserve Surface water at Levels Just above state standards (USGS Data from Collins 1994). Data present in sediments. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the maximum values for groundwater protection (NRC Table 5c) were detected in one or both down gradient well locations."

Bismuth:

Present (less than 10 ppm) in preserve sediments. Bismuth radionuclides possible. Should be included partly for fingerprint unless logically shown not to be an issue.

Boron (Inductively Coupled Plasma/ICP method OK):

Definitely Include, exceeded GWQS. 1.080 ppm in groundwater of preserve, 0.180 in surface water, 2 ppm in sediment (USGS and Cooper, all preserve) less than 0.80 ppm in pond on top of pile.

Cadmium (Inductively Coupled Plasma/ICP method OK):

Hazards to fish and wildlife, definitely include. 0.019 ppm 0.49 ppm in pond on top of pile. Permit Violation in 1977 (Atlas). EPA

Calcium:

Present in area naturally but needed to compare to signature in preserve and river water

Chloride:

Needed to Compare water signatures of Seeps to Preserve Water and River Water. However, 50% more chloride in AMM-1 than in amm-2 and 3, but some worry that AMM-1 i. not truly a control. Lower in well AMM-2 between pile and river compared to so called "control" well AMM-1 at eastern corner of the site.

Chromium (Inductively Coupled Plasma/ICP method OK):

Definitely include, exceeded GWQS. Part of license monitoring. Data from Groundwater and river, John Bradbury 1.3 ppm in pond on top of pile, less than 0.01 in all groundwater wells, comes as part of ICP scan. Comes as part of ICP scan anyway.

Conductivity:

Data Present in Groundwater and River Water Potential Marker of Pile Influence Seep Water Greatly Elevated Compared to River Water Somewhat Redundant with TDS: Suggest deleting TDS if anything

Copper (Inductively Coupled Plasma/ICP method OK):

Definitely Include: was produced at facility, exceeded GWQS. Large amount in pile, definitely include due to potential direct toxicity in the mixing zone. 88 Groundwater Data River Data Present 11 mg/L in the pond on top the pile: 87.

Frothing Agent:

Used in Alkaline and Copper Circuits: Find out exactly what was used and then what can be tested for now: Foam Seen downstream of tailings greater than elsewhere.

Grain Size:

Definitely include as a normalization parameter in all sediment or soil analyses.

Hardness:

Definitely Include in Water Samples

Iron (Inductively Coupled Plasma/ICP method OK):

Definitely Include Potential Issue in mixing zone, include in icp scan. Groundwater Data Present 88 River Water Data Present 650 ppm in pond on top of pile. used in process. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the Utah State primary and secondary drinking water standards were detected in one or both down gradient well locations."

Lead (Inductively Coupled Plasma/ICP method OK):

Hazards to fish and wildlife, definitely include. Groundwater Data Present In the preserve, stations along the river exceeded both the one hour state lead standard and the four day average. for aquatic: Cooper report. no appreciably differences between am1 and contaminated well, but comes as part of ICP scan anyway. less than 2 ppm in pond on top of pile, 1987.

Lead 210

Data present in sediments and river: John Bradbury Definitely include (Eddlemon). Limited data but pond above pile exceeded GWQS by 1,308 times.

Lithium:

One level is 3.7 in the pond above the pile. This is above the 3.0 ppm Shallow Groundwater Ecological Risk Assessment Screening Benchmark for Terrestrial Plants Listed by Oak Ridge National Lab, 1994. Since there are evident effects on river bank plants and since lithium may help fingerprint pile effects, include lithium at detection limits not greater than 0.1 ppm.

Magnesium (Inductively Coupled Plasma/ICP method OK):

Include as part of ICP scan for fingerprinting purposes. 200 to 500 in the pond on top the pile.

Manganese (Inductively Coupled Plasma/ICP method OK):

Definitely Include, Exceeds GWQS by 500 times: Used in process. One State upstream/downstream study indicated elevation downstream, although the downstream station was 60 miles downstream. Concentrations in the river below the pile are above two aquatic life benchmarks. Included on ICP scan anyway. See DOI comments. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the Utah State primary and secondary drinking water standards were detected in one or both down gradient well locations."

Mercury (Cold Vapor Atomic Absorption Method, use lower detection limits, lower than ICP):

Definitely include due to potential importance in Colorado river, lack of data, potential bioconcentration. Less than 0.0005 ppm in pond on top of pile.

Molybdenum (Inductively Coupled Plasma/ICP method OK):

Definitely include due to high groundwater concentrations in groundwater wells between pile and river, high related to background wells. High in monitoring wells below pile. Exceeded GWQS. A big jump in groundwater from background. data from groundwater and river, John Bradbury 0.52 ppm in pond on top of pile, up to 1.5 ppm in groundwater wells, less than or equal to 0.06 ppm in background well. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the Utah State primary and secondary drinking water standards were detected in one or both down gradient well locations."

Nickel (Inductively Coupled Plasma/ICP method OK):

Exceeded GWQS, Definitely include. Nickel some indications of problems. groundwater data present: John Bradbury Some in groundwater and sediments, include as part of ICP scan. 1.1 mg/L in tailings pond on top of pile. Equivocal data from wells. EPA Permit Violation in 1977 at Atlas. Comes as part of ICP scan anyway.

Nitrate:

Exceeded GWQS, definitely include. Look because of ammonia and contribution of the pile. Groundwater at AM2 94 ppm at AMM-2 12/94. Two hundred times as high in March 1995 in well AMM-2 between pile and river as in so called "control" well

AMM-1 at eastern corner of the site. River Water Data Present less than 500 ppm in pond on top of pile. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the Utah State primary and secondary drinking water standards were detected in one or both down gradient well locations."

Nitrite:

Include in all water samples, exceeded GWQS. pH Needed as potential marker of Pile influence Groundwater and River Water Data Present 2.17 in pond on top of pile, 7.1 to 7.5 in groundwater

pH

Include in water and sediment samples.

Polonium 210:

Definitely Include as major COC due to bioaccumulation, source from the pile, and one of the more important rads.

Potassium:

Used in the process. Include as part of Ca and Na analysis. If free, might have some use for fingerprinting leachate vs. preserve water.

Radioactivity in General:

Definitely include an assessment of the data related to humans and fish and wildlife. Is there any risk to humans (River Guides, those living in Park Service housing near Arches HQ, those eating fish frequently, those frequenting mixing zone or deposition zones including deposition zone at Lake Powell. At least a one page discussion of this should be included in the EIS and other Atlas related studies due to the high number of people using the river. At least a 3 catfish samples (fillets from at least 3 separate fish) should be assessed for rad parameters and mercury and selenium. The solids in the pile and on site should be assessed in more detail and an analysis should be made of what is blowing around in the air: both radiological and chemical toxicants: What is the risk to those living nearby?

Radium 226:

Definitely include: 530 picocuries per liter in pond on top of pile. groundwater and river water present: John Bradbury definitely include as part of rad scan 226 will be

determined in plant soils and need to compare data Seems to be much less in the pile, concentrations in river and pile seem low, but take it if included in standard rad scan. Include for long term monitoring. Permit Violation in 1977 from Atlas. Atlas must monitor for license. Ten times as high in well AMM-2 between pile and river as in so called "control" well AMM-1 at eastern corner of the site. Radium 226 is proposed as the marker for background radiation from other sites and action levels for soil cleanup at Atlas (Appendix F of March 95 Canonie Environmental Report, Project 88-067).

Radium 228:

Groundwater data present not high even at toe of pile compared to state surface water standards (most conservative 5 picocuries per liter) Atlas must monitor for license. Exceeded GWQS by 110 times. Three times as high in well AMM-2 between pile and river as in so called "control" well AMM-1 at eastern corner of the site.

Selenium (Either Hydride Generation or Graphite Furnace Atomic Absorption, Do not use ICP):

Definitely Include groundwater data present: John Bradbury Equivocal data in groundwater: but control well may not be true control. 0.45 ppm in pond on top of pile. Have to monitor for license. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the maximum values for groundwater protection (NRC Table 5c) were detected in one or both down gradient well locatio:..."

Silver (Inductively Coupled Plasma/ICP method OK):

Only data appears to be less than 0.5 ppm in pond above the pile. Lowest water benchmarks and standards are 0.00012 ppm. Include due to lack of data. Equivocal data in groundwater. Identified as COC by Western Technologies. Available as part of ICP scan.

Sodium:

Needed in Water Samples to Compare Signature of Pile Seep with Signature of Water in Preserve and River Water. 800 - 1800 in pond on top of pile Groundwater Data Present. Twice as high in well AMM-2 between pile and river as in so called "control" well AMM-1 at eastern corner of the site.

Solids, Total Dissolved (TDS):

Data Present in Groundwater and River Water Potential Marker of Pile Influence TDS greater than 24,000 ppm in pond on top of pile.

Solvents:

Both organic and kerosene were used in all circuits in the process. Determine which ones were used and look for those solvents and their likely breakdown products in the seep water and groundwater samples only.

Strontium (Inductively Coupled Plasma/ICP method OK):

Consider including as part of ICP scan due to association with uranium products and fingerprinting. Where there was Uranium processing in Jordan river, deformities in bone of muskrats, muskrats were high in strontium 90, report from the 50's (Kristi). 1.7 to 3.6 mg/L in pond on top of pile. Parent strontium comes as part of ICP scan anyway. Radiological strontium may be unnecessary unless is comes as part of a radiological scan at no extra cost.

Sulfate:

Very important. Highly Present in Pile Data Available in Groundwater and River Water 12,100 ppm in AMM-2 between pile and river, 12/94 Up to 30,000 ppm in pond on top of pile. Ten times as high in well AMM-2 between pile and river as in so called "control" well AMM-1 at eastern corner of the site. A bit higher than AMM-2 in well ATP-2S at surface at toe of middle of pile in March 95. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the Utah State primary and secondary drinking water standards were detected in one or both down gradient well locations."

Thallium (Inductively Coupled Plasma/ICP method OK):

Include since adequate data is lacking, since GWQS was exceeded by 25 times, and since available as part of ICP scan.

Thorium 230 and 232:

Definitely include: quite a bit of 230 in the pile, probably 232 as well but no current data. Need to document radiological contribution. Thorium 230 exceeded GWQS by 7560 times in water above the pile.

Tin:

Not a high priority but include as a free additional marker as part of ICP scan

Total Organic Carbon:

Include in all sediment samples

Uranium:

Definitely Include. Most of the comparative data gathered so far by Atlas is Uranium-natural. Why aren't the other uranium radionuclides being addressed? Large quantities (8.9 ppm) in pond on top of pile, elevated in mixing zone sediments Groundwater, sediment, and river water data present 16000-5200 in wells amm2,3,atp-25 Exceeded GWQS by 322 times. One hundred times as high in well AMM-2 between pile and river as in so called "control" well AMM-1 at eastern corner of the site. Higher yet in well ATP-2S at surface at toe of middle of pile in March 95. Western Technologies Incorporated, in document entitled "Atlas Moab Mill Groundwater Detection Monitoring Program" regarding field studies done in 1988, stated "concentrations of this contaminant above the maximum values for groundwater protection (NRC Table 5c) were detected in one or both down gradient well locations."

Vanadium (Inductively Coupled Plasma/ICP method OK):

Definitely Include: a lot (53 ppm) in the pond on top the pile. Large amounts in pile, definitely include, detection limits should be below 80 ug/L in water. Exceeded GWQS by 640 times. Some enrichment in groundwater wells. Groundwater and river water data present: John Bradbury Some values above benchmarks: see DOI comments. Have to monitor for license. Vanadium was one of the metals produced at the facility.

Wet and Dry Weight and %moisture:

Include for all sediment, soil, solids, and tissue data.

Zinc (Inductively Coupled Plasma/ICP method OK):

Definitely Include because a lot in the pile, 5.9 ppm in the leachate, concern for water toxicity in the mixing zone.

Include the Following as Normalization/Standard Water Quality Parameters:

Acid Volatile Sulfides:

Include in all sediment samples.

Alkalinity as CACO3:

Standard Water Quality parameter for water quality samples only.

alpha, gross:

Include in at least some water and sediment samples using NRC protocols, to see if radiological parameters could be elevated.

beta, gross:

Include in at least some water and sediment samples using NRC protocols, to see if radiological parameters could be elevated.

Grain Size:

Definitely include as a normalization parameter in all sediment or soil analyses.

Hardness:

Definitely Include in Water Samples

Total Organic Carbon:

Include in all sediment and soil samples

Wet and Dry Weight and %moisture:

Include for all sediment, soil, solids, and tissue data.

Standard Protocols Recommended to NRC/Atlas:

Collecting Fish: For general population/species survey work, use methods spelled out above: Otherwise use protocols recommended by FWS. For contaminants work, use EPA/FWS protocols. Rinse net between seine hauls, place fish directly in precleaned plastic bottles, chill on ice immediately, freeze fish at end of day, send samples to lab on dry ice avoiding weekend holds.

Invertebrate Collections: For general population/species survey work, Use Protocols developed by BYU. For contaminants work, use protocols similar to those spelled out for fish.

Sediments: Use EPA protocols for collection and holding for chemical contaminants, use list of analytes above, use FWS detection limits.

Water: Use EPA protocols and holding times. Use detection limits below lowest bench marks, to the extent the labs can do it. Exclude labs not up to current detection limit standards. In no case use detection limits higher than those recommended by FWS/NPS.

Other Contaminants Considered: The group tentatively Decided to exclude these. However, we need to look at the site corrective action plan for more data and general insight.

Cesium 137: probably not needed: mostly explosion product francium
titanium zirconium, gallium tungsten platinum (could be included as part of ICP scan)
gold: less than 8 ppm in the bottom sediments in preserve: moab slough Cobalt: look closer but probably exclude.

Summary of Important Findings and Surprises:

Probably the biggest surprise/finding was the extent of the apparent point source discharge into the Colorado River from the Atlas pile. This suggests the need for an NPDES point source water discharge permit, at least a stormwater permit at the discharge from the old channel of Moab Slough. Obvious seeps from the river bank were characterized by very high (18,000-7,000 microsiemens) conductivity and a point lower pH. Below the river bank, on the bench soil/sediment delta buildup areas, it looked like the solids in the area could be subject to oxidation, possibly followed by slug release during flooding. The extent of the dead/stressed tamarisk was a surprise. The lack of solids data from the pile, was a very big surprise, bringing up the issue of potential unknown air hazards from unknown constituents in pile (since there is no solids data, we have a very incomplete idea of what is in the pile).

Radiological compounds are not only hazard in the pile. Subsidence/dissolution issues are being discussed separately by Atlas: these issues could affect the future of the pile versus the river.

ACTION ITEMS:

Continue to assist Park Staff on Contaminants Issues. As work progresses, help the parks with additional guidance on appropriate protocols and strategies. Responsible Party: Roy Irwin.

RECENT DEVELOPMENTS:

On April 20, 1995, Allan Mullins called to tell me that they had responded to my electronic mail messages by restoring some the metals analyses they were previously going to cut out. He also notified me that as of May 1, 1995, Mike Fliegel of NRC (301) 415-6692 would be taking over management of the project from Allan.

I also provided 13 pages of additional information NRC listing potential radionuclides of concern, requesting that NRC and/or Atlas should document why a more complete list of radionuclides should not be analyzed, especially radionuclides of the metals known to be present from the site.

I have already contacted EPA regarding the need for an NPDES permit since the old channel of Moab wash appears to be a point source of potentially dangerous chemical and radiological contaminants; it will require some sort of NPDES permit and possibly toxicity monitoring. The EPA contact was Vern Berry of the regional office in Denver. If necessary, I will also contact Wes Wilson, Regional office in Denver and Steve McNeil (801) 538-6146 of the state of Utah.

Since the Moab meetings, I have provided NRC staff (Allan Mullins) and Oak Ridge Staff (Gerald Eddlemon) with the following reactions electronic mail replies to their suggestions that the data requirements be cut back:

> We are glad you accepted some of what we suggested, but we object to most of what you are suggesting be cut out, including:
>
> > 1) Many of the contaminants and detection limits we said should be included. I disagree with this, since many are free as part of the ICP scan. Why not have Atlas report them since they are free as part of the ICP scan they will have to do anyway? We provided good cases for why they should be included and NRC or Atlas will be ignoring our well-thought-out rationales at their peril (We and the endangered fish folks of FWS, and others may not be satisfied with the data as being complete when they are done).

2) All water sampling in the preserve. BOR and FWS will probably object, partly for endangered fish reasons.

3) All Fish sampling in the mixing zone and a comparative area upstream. I argued this was easy, so why not do it. All mention of 2,000 foot distance downstream as a minimum was excluded.

4) All Solids Sampling in the Pile: Even Atlas wants solids data, and it is silly to decide whether or not to move the pile when no one knows what is in the pile. It is important for air pollution aspects, subsidence, long term potential for the pile eroding into the river following subsidence. etc. It doesn't get much more basic than this, and we only asked for 9 samples.

I also provided NRC with the following recommendations on detections limits:

Detection Limits and Normalization Parameters: Typical NPS/FWS default recommendations (Roy Irwin, National Park Service, Personal Communication, 1995):

Arsenic

Use either Hydride Generation or Graphite Furnace Atomic Absorption, Do not use ICP. Detection limits 0.50 ppm dry weight in tissues, sediments, and soils, 0.005 ppm wet weight in water.

Mercury

Cold Vapor Atomic Absorption Method, (detection limits inadequate in ICP scan):

Detection limits 0.20 ppm dry weight in tissues, sediments, and soils; 0.004 ppm wet weight in water.

Selenium

Use either Hydride Generation or Graphite Furnace Atomic Absorption, Do not use ICP. Detection limits 0.50 ppm dry weight in tissues, 1.0 ppm DW in sediments and soils: 0.005 ppm wet weight in water.

For Most other metals, ICP Scan is acceptable as long as the lab can meet the following detection limits (list not all inclusive in the case of Atlas pile):

Aluminum

Detection limits 5.0 ppm dry weight in tissues, 10 ppm in sediments and soils; 0.05 ppm wet weight in water.

Barium

Detection limits 1.0 ppm dry weight in tissues, sediments, and soils; 0.005 ppm wet weight in water.

Beryllium

Detection limits 0.10 ppm dry weight in tissues, 0.20 ppm in sediments and soils, 0.0005 ppm wet weight in water.

Boron

Detection limits 2 ppm dry weight in tissues, 10 ppm in sediments and soils, 0.1 ppm wet weight in water.

Cadmium

Detection limits 0.10 ppm dry weight in tissues, 0.20 ppm in sediments and soils, 0.0005 ppm wet weight in water.

Chromium

Detection limits 0.50 ppm dry weight in tissues, 1.0 ppm in sediments and soils, 0.003 ppm wet weight in water.

Copper

Detection limits 0.50 ppm dry weight in tissues, 1.0 ppm in sediments and soils; 0.005 ppm wet weight in water.

Iron

Detection limits 5.0 ppm dry weight in tissues, 10 ppm in sediments and soils; 0.10 ppm wet weight in water.

Magnesium

Detection limits 5 ppm dry weight in tissues, 10 ppm in sediments and soils; 0.10 ppm wet weight in water.

Manganese

Detection limits 1 ppm dry weight in tissues, 5 ppm in sediments and soils; 0.05 ppm wet weight in water.

Molybdenum

Detection limits 2 ppm dry weight in tissues, 5 ppm in sediments and soils; 0.05 ppm wet weight in water.

Nickel

Detection limits 0.50 ppm dry weight in tissues, 5 ppm in sediments and soils; 0.005 ppm wet weight in water.

Lead

Detection limits 0.5 ppm dry weight in tissues, 5.0 ppm in sediments and soils; 0.01 ppm wet weight in water.

Strontium

Detection limits 0.50 ppm dry weight in tissues, 5.0 ppm in sediments and soils; 0.001 ppm wet weight in water.

Vanadium

Detection limits 0.50 ppm dry weight in tissues, 1.0 ppm in sediments and soils; 0.001 ppm wet weight in water.

Zinc

Detection limits 1.0 ppm dry weight in tissues, 5.0 ppm in sediments and soils; 0.01 ppm wet weight in water.