

Office of Environmental Management – Grand Junction



Biota Monitoring Plan Moab Site, Utah

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Moab Project

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1.0 Introduction

The Moab UMTRA Project Site (Moab site) is a former uranium-ore processing facility located approximately 3 miles northwest of the city of Moab in Grand County, Utah. The plant was constructed in 1956 by the Uranium Reduction Company, which operated the mill until 1962 when the assets were sold to the Atlas Minerals Corporation (Atlas). Operations continued under Atlas until 1984. When the processing operations ceased in 1984, the mill had accumulated an estimated 16 million yards of uranium mill tailings in an unlined impoundment in the floodplain of the Colorado River. The tailings pile covers approximately 130 acres, is about 0.5 mile in diameter, averages about 94 feet in height above the surface of the Colorado River terrace, and is located about 750 feet west of the Colorado River. Atlas placed an interim cover over the tailings pile as part of decommissioning activities ongoing between 1988 and 1995. In October 2001, the title of the property and responsibility for remediation of the tailings pile and contaminated ground water beneath the site were transferred to the U.S. Department of Energy (DOE).

It has been known for years and results of a number of investigations, including the most recent one completed by DOE (DOE 2003), indicate that contaminants have leached from the tailings pile into the ground water. Several site-related contaminants have been identified, but the most pervasive and highest concentration constituent is ammonia. DOE's studies have identified two plumes of ammonia associated with the site—a deep plume beneath the tailings pile and a shallower plume emanating from the toe of the tailings pile to the Colorado River. Ground water from the shallow plume has been demonstrated to discharge to the Colorado River and to have a localized impact on surface water quality. Degradation of surface water quality is of concern because of potential effects on aquatic species in the area—particularly endangered fish. In its final Biological Opinion issued as part of the DOE's final environmental impact statement (FEIS) for the site (DOE 2005a), the U.S. Fish and Wildlife Service (USFWS) identified several actions required by DOE to address concerns regarding endangered fish.

DOE has initiated an interim action to pump contaminated ground water from the shallow plume to an evaporation pond on top of the tailings pile. Another interim action includes the injection of diverted Colorado River water into the alluvial aquifer. This is accomplished by 10 wells near the west bank of the river. The goal of the action is to reduce contaminant mass in the aquifer and be protective of potential endangered fish habitat in backwater areas of the river until a full-scale remediation system can be designed and installed. The interim action has been in place since summer 2003. Each of the 20 extraction wells in the system is equipped to withdraw groundwater at rates between 1 and 7 gpm. In its FEIS for remediation of the Moab site (DOE 2005a), DOE has proposed to intercept ground water and control discharge of contaminants to the river until concentrations in the alluvial system are reduced to levels that permit unrestricted discharge to the river. This proposed action could involve scaling up of the interim action system or augmenting it in some other way.

2.0 Purpose and Scope

The objectives of the tasks described in this plan are to identify, collect, and preserve for subsequent identification any injured, stressed, or dead fish along the banks of the Colorado River adjacent to the site for purposes of estimating “take” as a result of site-related contamination. It is anticipated that multiple years of biota monitoring may be needed to

accomplish this due to natural variations in river conditions. Results of the first year of monitoring will help guide any necessary revisions and refinements to this plan. Any modifications will be made in consultation with the USFWS.

3.0 Monitoring Approach

3.1 Survey Timing

Young of year endangered fish are most likely to be present in the river adjacent to the site on the descending limb of the hydrograph for the river. Monitoring will commence after the hydrograph has peaked and descended to approximately 7,000 cfs (as measured at the Cisco gaging station). If the river flow does not reach 7,000 cfs, monitoring will start on approximately July 10. Monitoring will continue through September 30. By the end of September, young of year endangered fish should have reached a size of approximately 40 mm and have the ability to avoid harmful conditions. In addition, baseflow conditions should have stabilized and river temperatures will be cooling.

3.2 Survey Frequency and Requirements

A visual survey of the river should be conducted at least once and up to four times a week (the length of the onsite work week) for the duration of the monitoring period. The survey frequency will be dependent on river flows and access (e.g., after storm events, access may be difficult and unnecessary due to increased river flows), scheduling constraints, and the results of previous surveys. If earlier surveys indicated that favorable habitat is widespread or if dead or injured fish were previously identified, survey frequency may be increased. A survey log will be maintained which will include recording the river flow for the day, a general description of the river and presence or absence of suitable habitat, and any photographs that might be useful. A narrative description (similar to a trip report) is adequate for the survey log. After completion of the monitoring period, the survey log will be useful for determining how often suitable habitat developed in the survey area and how rapidly the shoreline was subject to change.

The main fish of concern are Colorado Pikeminnow, which are known to use the river adjacent to the Moab site. Three other endangered fish cited in the final biological opinion (DOE 2005) are less well known in the area. Several important habitat characteristics that appear to influence habitat use by pikeminnow have been identified. These include water depth, habitat surface area, water velocity, turbidity, and temperature. The main criteria that have been used in habitat sampling to date are that waters must be low velocity and fairly shallow. Ideally, pikeminnow prefer backwater areas that are separate from the main river channel and connected on the downstream side. Generally, isolated pools of water would not be considered suitable habitat unless they are sufficiently large and have a probability of reconnecting with the river if flows were to increase slightly. Pools surrounded by saturated sediments that have only recently become disconnected from the river could serve as temporary refuge for young of year fish until river flows increase. Pools surrounded by desiccated sediments and evidence of salt precipitation are deemed uninhabitable based on natural processes. These types of features and characteristics should be noted in the survey log.

During recent sampling events, the areal extent of potentially suitable fish habitat was very limited. Areas with habitat characteristics were shallow enough and clear enough that any fish

present were likely to be visible. However, river conditions may be such that habitat areas with turbid waters develop. Under these conditions the presence of dead or dying fish may not be able to be detected visually. If it is determined that habitat is present in sufficient size that it is likely to contain fish, the area can be swept with a dipnet (circular or D-shaped head; 1/16" mesh) to determine the presence of fish. Alive fish should be released immediately. Any dead or nearly dead fish should be preserved as described in Section 4.2.1. Sweeps should be pulled slowly at the sediment/water interface at lengths up to a few meters. One or two sweeps are sufficient, depending on habitat size.

3.3 Survey Location

Site-related contamination is only likely to affect river water quality in areas where the main contaminant plumes discharge to the river. These are the areas where the interim actions and associated monitoring networks are located (Figure 1). Additionally, the confluence of Moab Wash with the Colorado River is also potential habitat area, particularly when river water backs up into the wash. It is anticipated that the survey would consist of observations made in the vicinity of Moab Wash and along the length of the interim action wellfields. At low flows it is generally possible to walk along the river bed in this stretch of river. Several access points have been maintained to conduct routine sampling activities. During times of increased river flow when it may not be possible or is not safe to walk along the river bank, observations of "take" will only be made from these positions. This portion of the river is the most likely area in which potentially suitable habitat may develop due to the presence of sand bars.

3.4 Personnel

The biota monitoring surveys and any required sampling will be conducted by personnel trained in appropriate sampling techniques and methods. USFWS personnel may want to participate in some of the initial surveys to provide input regarding any special concerns they may have.

4.0 Sampling Methods

4.1 Fish Sampling Procedures

Fish will be collected that are dead or nearly dead. Fish that are nearly dead are incapable of orienting themselves in low flow waters. The presence of "stressed" fish should also be noted.

4.2 Field Forms

Field forms will be completed noting river flow site conditions, and if fish were observed. Field forms will be completed with additional information for all locations where injured or dead fish are observed and collected. These forms will describe river conditions at the time of the survey. Information includes river flows, location descriptions, water depth, size of backwater or habitat, concentration, and a description of recent weather conditions. Locations will also be photographed before collection of fish samples. A surface water sample will be collected at each location where fish are collected according to the methods described in Section 4.3. Standard field parameters will be collected at these locations (dissolved oxygen, redox potential, pH, specific conductance, turbidity, temperature).

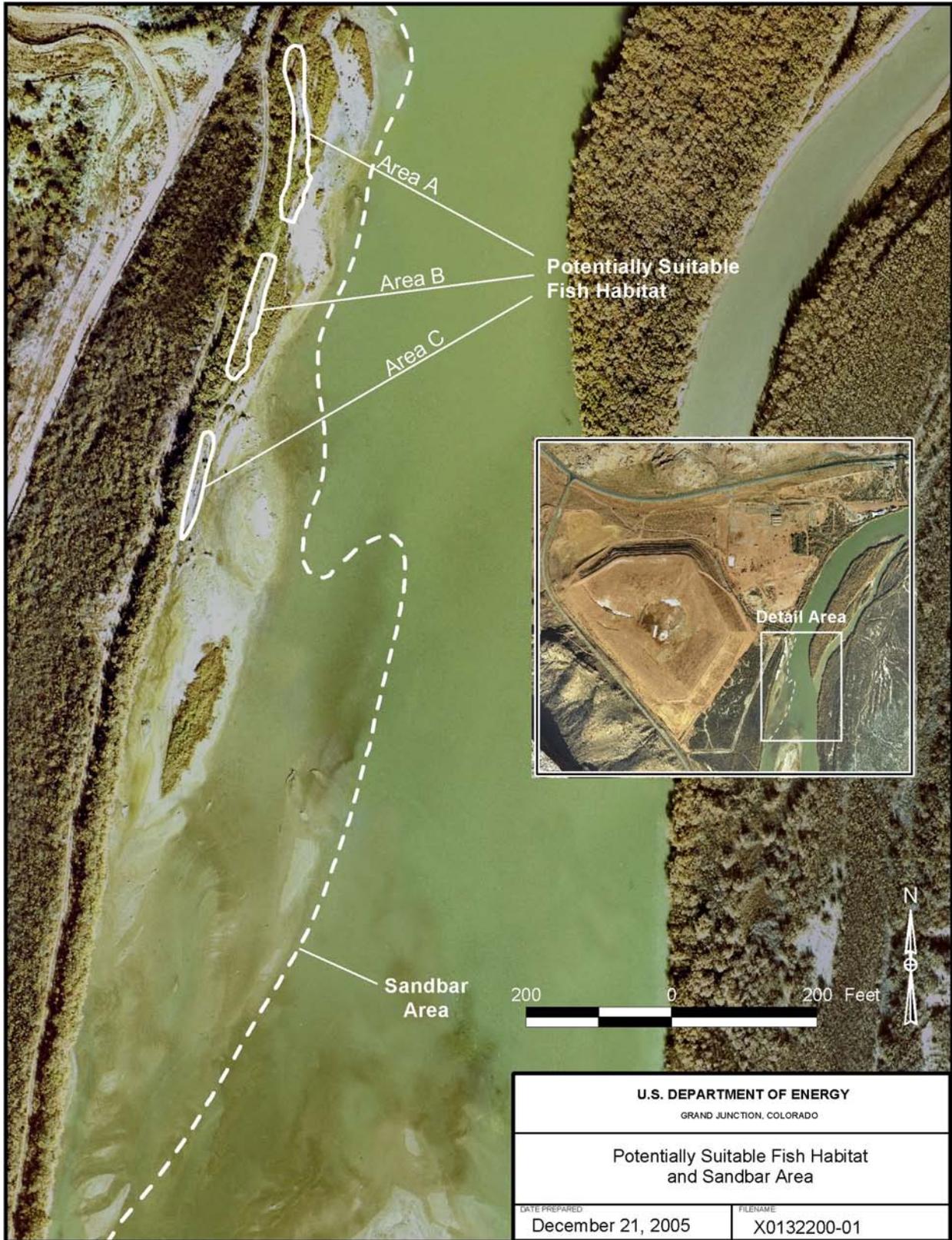


Figure 1. Potentially Suitable Habitat Areas

4.2.1 Collection and Preservation Methods

When dead or dying fish are encountered, the monitoring personnel should collect up to 100 specimens or 10% of the estimated total number, whichever is greater. Dead fish larger than 150 mm need not be preserved if they can be photographed (entire body fills the photographic frame). Dead or nearly dead fish should be placed in a Ziploc bag and covered with a 50:50 solution of isopropyl alcohol (rubbing alcohol available over the counter). Dead or dying fish collection sites should be mapped or located with a GPS and photographs taken. The sample should be labeled with date, time of collections, and closest known existing sample location. The label can consist of either: (a) information written with pencil on paper placed inside the sample; (b) written on the Ziploc bag with a permanent marker; or (c) preferably both. Samples should be stored in a cool place as soon as possible.

4.2.2 Notification and Identification

As soon as possible upon collection of fish samples, the USFWS Ecological Services office should be notified at (801) 975-3330 to make arrangements for fish identification; Tom Chart (x144) or Nathan Darnall (x137).

4.3 Surface Water Sampling Procedures

Surface water samples collected and shipped for laboratory analysis will be analyzed for ammonia, bromide, chloride, sulfate, total dissolved solids (TDS), and uranium.

Water sampling will be performed in accordance with the *Ground Water and Surface Water Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (DOE 2005) and the *Environmental Procedures Catalog* (STO 6). Deviations from these procedures will be noted in a field variance log with an explanation and a description of its possible impacts on data quality. The following specific procedures from the *Environmental Procedures Catalog* will be used for water sampling:

- GT-1(P), “Standard Practice for Field Documentation Processes.”
- GT-2(P), “Standard Practice for Sample Labeling.”
- GT-3(P), “Standard Practice for Chain-of-Sample-Custody and Physical Security of Samples.”
- LQ-4(T), “Standard Test Method for the Field Measurement of pH.”
- LQ-5(T), “Standard Test Method for the Field Measurement of Specific Conductance.”
- LQ-6(T), “Standard Test Method for the Field Measurement of the Oxidation-Reduction Potential (Eh).”
- LQ-7(T), “Standard Test Method for the Field Measurement of Alkalinity.”
- LQ-8(T), “Standard Test Method for the Field Measurement of Temperature.”
- LQ-9(T), “Standard Test Method for the Field Measurement of Dissolved Oxygen.”
- LQ-10(P), “Standard Practice for the Use of a Flow Cell for Field Measurements.”
- LQ-24(T), “Standard Test Method for Turbidity in Water.”
- LQ-11(P), “Standard Practice for the Sampling of Liquids.”

- LQ-12(P), “Standard Practice for the Collection, Filtration, and Preservation of Liquid Samples.”

5.0 Monitoring Requirements

5.1 Personnel and Equipment

Sampling will be conducted according to standard sampling protocols and procedures (see Section 4.3). Standard equipment and methods will be employed. If, at any time during the monitoring period, clarification is needed regarding protocols, collection techniques, or other biota monitoring requirements, the USFWS may be contacted.

5.2 Environmental Compliance

Additional information (from that given in this section) on environmental compliance, waste management, and emergency response is in the Moab Health and Safety Plan (HSP) (DOE 2005b). It is anticipated that the only wastes generated by these survey and sampling activities will be personal protective equipment.

5.3 Health and Safety

Information on health and safety, and emergency response is in the Moab HSP (DOE 2005b). The site-specific HSP has been prepared for the Moab Project in accordance with the requirements of 29 CFR 1910.120. All activities performed in association with the sampling for this task will be performed according to the site-specific health and safety requirements described in the Moab HSP (DOE 2005b).

5.4 Quality Assurance

The objective of sample quality assurance and control measures is to provide systematic control of the tasks so as to maximize accuracy, precision, comparability, and completeness. All procedures will be checked for accuracy through internal laboratory quality control checks such as the analysis of blind duplicates, splits, and known standards. Analytical methods to be used for the water samples are summarized in Table 1. Sample preservation will consist of storing the samples in a cooler with ice during field sampling, sample packaging, and shipping.

Table 1. Analytes and Methods for Ground Water and Surface Water Sample

Analyte	Sample Container	Preservation	EPA Method	Detection Limit	Line Item Code (LIC)
Ammonia- N	125 mL poly	HNO ₃ , pH < 2	350.3	0.1 mg/L	MIS-A-006
Chloride	125 mL poly	Cool, 4° C	300	0.5 mg/L	MIS -A-011
Bromide			300	0.5 mg/L	MIS -A-038
Sulfate			300	5 mg/L	MIS -A-036
TDS			125 mL poly	Cool, 4° C	160.1
Uranium	125 mL poly	HNO ₃ , pH < 2	GJO-1	0.1 µg/L	GJO-1
Field parameters include: dissolved oxygen, redox potential, pH, specific conductance, turbidity, temperature					

TDS = total dissolved solids; mL = milliliters; mg/L = milligrams per liter; µg/L = micrograms per liter.

To maintain evidence of authenticity, the samples collected must be properly identified and easily discernible from other like samples. A label will be attached to the sample container specifying the sample identification number, location, date collected, time collected, and the sampler's name.

Water samples will be kept under custody from the time of collection to the time of analysis. Chain-of-custody records will be used to list all transfers in the possession of the samples. The chain-of-custody form will show that the sample was in constant custody between collection and analysis. While the samples are in shipment to the analytical laboratory, custody seals will be placed over the cooler opening to ensure that the integrity of the samples have not been compromised. The receiving laboratory must examine the seals on arrival and document that the seals are intact. Upon opening the container, the receiving laboratory will note the condition of the sample container (e.g. broken bottles, leaking bottles, etc.).

All sample shipments will be made in compliance with Department of Transportation regulations (49 CFR 171-179) governing shipment of hazardous materials and substances. These regulations govern the packaging, documentation, and shipping of hazardous material, substances, and waste. Special care will be taken to ensure the integrity of the sample through proper packaging and shipping.

All personnel that will conduct sampling for this task at the Moab site are required to read and understand this plan and sign a copy of the "Statement of Understanding" (Appendix B), of this plan.

6.0 Reporting

All fish kills should be immediately reported to the USFWS at (801) 975-3330; Tom Chart (x144) or Nathan Darnall (x137). A copy of the July survey log and any accompanying photographs will be submitted to the USFWS at the beginning of August for their review and suggestions for refinement of the survey process.

A written report will be prepared upon completion of that year's monitoring period. The report will indicate total numbers of dead fish observed and results of the identification process. River conditions for each survey period will be described along with reported river flows (based on Cisco gaging station). Field forms and survey logs will be included in the reports and well as results of any surface water analyses.

7.0 References

DOE 2003. Site Observational Work Plan for the Moab, Utah, Site, GJO-2003-424-TAC, December.

DOE 2005a. Remediation of the Moab Uranium Mill Tailings, Grand County, Utah, Final Environmental Impact Statement, DOE/EIS-0335, prepared by the U.S. Department of Energy Grand Junction Office, July.

DOE 2005b. Moab Project Site Health and Safety Plan, DOE-EM/GJ1038-2005, prepared by the U.S. Department of Energy, Grand Junction, Colorado, December.

Appendix A

Field Reporting Form

Location ID: _____ Sampler: _____ Date: _____ Time: _____

Water Depth	Surface Area (estimate length, width)	Flow Velocity	Turbidity			Temperature at Bottom (plus main channel if this is a backwater)	River Flow (cfs) (at Cisco Gaging Station)
			Clear	Very Cloudy	In Between		
Notes						Comments	
Relationship to Main River Channel (i.e., if backwater, orientation of mouth; Figure 1)							
Extent of "fish kill" (one, few, numerous; amount dead versus "stressed")							
Any Cover? If yes, describe, estimate percent.							
Any Other Notable Characteristics? (e.g., algal growth, discoloration or sheen)							
For fish kills notify:							
USFWS (801) 975-3330							
Tom Chart Ext. 144							
Nathan Darnell Ext. 137							

Attach photographs from Site visit.

Appendix B

Statement of Understanding

I, the undersigned have received, read, and understand the Biota Monitoring Plan for the Moab Project Site.

	Name (Please Print)	Signature	Date	Position
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
7.	_____	_____	_____	_____
8.	_____	_____	_____	_____
9.	_____	_____	_____	_____
10.	_____	_____	_____	_____
11.	_____	_____	_____	_____
12.	_____	_____	_____	_____
13.	_____	_____	_____	_____
14.	_____	_____	_____	_____
15.	_____	_____	_____	_____
16.	_____	_____	_____	_____
17.	_____	_____	_____	_____
18.	_____	_____	_____	_____
19.	_____	_____	_____	_____
20.	_____	_____	_____	_____

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