

Environmental Management - Grand Junction Office



Moab Initial Action Report 2007 Calendar Year

March 2008



U.S. Department
of Energy

Office of Environmental Management

*Work Performed by the Technical Assistance Contractor Under DOE Contract No. DE-AC30-07CC60012
for the U.S. Department of Energy Office of Environmental Management, Grand Junction, Colorado.*

2007 Initial Action Final Report

**Department of Energy
Office of Environmental Management
Grand Junction, Colorado**

Moab UMTRA Project

March 2008

Table of Contents

Section	Page
1.0 Introduction.....	1
2.0 2007 Initial Action Operations.....	2
3.0 Monitoring Results.....	5
4.0 Conclusions and Recommendations.....	6
5.0 References.....	6

Tables

Table 1. Chronology of the 2007 Initial Action.....	4
Table 2. Parameters Collected in the Initial Action Areas and Comparison to Acute and Chronic Standards.....	5

Figures

Figure 1. Surface Water Locations	3
Figure 2. Colorado River Hydrograph (Cisco Gaging Station)	7

Appendix

Appendix A. May 2007 Water Sampling Validation Data Package for Initial Action Surface Water Sampling.....	8
---------------------------------------------------------------------------------------------------------------	---

1.0 Introduction

The Moab Uranium Mill Tailings Remedial Action (UMTRA) Project site (Moab site) is a former uranium-ore processing facility located approximately three miles northwest of the city of Moab in Grand County, Utah (DOE 2005). 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 tons 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-ground surface, 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 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 Moab site were transferred to the U.S. Department of Energy (DOE).

Results of a number of investigations, including one completed by 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. DOE and stakeholders have expressed concern about risk to sensitive aquatic species that may inhabit the slow-moving water at the edge of the river where ammonia is discharging.

DOE, in consultation with stakeholders, designed an initial short-term action to reduce the potential for site-contributed ammonia to adversely affect endangered fish species, specifically the Colorado pikeminnow (DOE 2002). The Initial Action system is implemented in compliance with the *Work Plan for Implementation of the Initial Action in the Sandbar Area Adjacent to the Moab Project Site* (DOE 2002). The Initial Action consists of introducing fresh upstream river water into the mixing zones along the bank of the Colorado River to dilute concentrations of ammonia where suitable habitat may exist. The Initial Action was first implemented during the summer of 2005, and continued in the summers of 2006 and 2007. This report provides the results of that most recent Initial Action implementation.

2.0 2007 Initial Action Operations

During completion of the *Site Observational Work Plan for the Moab, Utah, Site* (DOE 2003), the best potentially suitable habitat for endangered fish was identified in the area immediately downgradient of the Moab Wash (Areas A, B, and C on Figure 1). These areas are dry in Figure 1 because river flows at the time the photo was taken were below levels required to inundate those areas (between 12,500 and 8,750 cubic feet per second) (DOE 2003). During appropriate river flows, backwaters had the potential to develop in these areas, and they were the focus of the Initial Action. During high-river stages, these potential habitat areas are part of the main river channel. After peak runoff in 2007, small backwater areas developed in Areas B and C, and the Initial Action was implemented in these areas. A chronology of the Initial Action is included in Table 1. Photographs of these areas are included in the trip report in Appendix A.

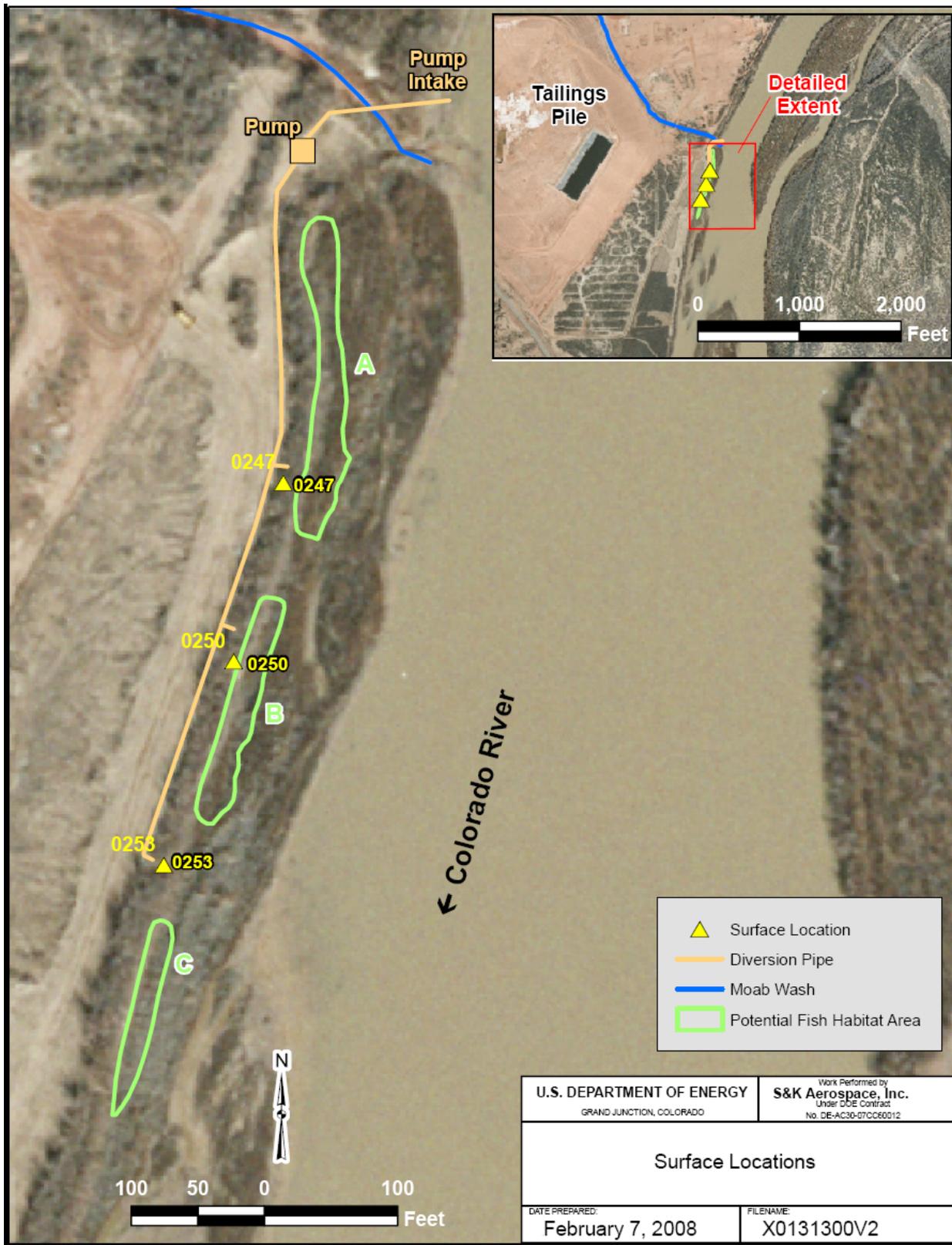


Figure 1. Surface Water Locations

Table 1. Chronology of the 2007 Initial Action

Date	Mean Daily Flow (cfs)	Comments
05/16/07	13,700	At 0800, Area C contained about 3 inches of water and Areas A and B were dry (~ 13,600 cfs). By 1700, Area B contained about 3 inches of water and Area C contained about 5 inches of water (~ 13,900 cfs). Area A was dry.
05/17/07	14,900	At 1700, about 10 inches of standing water was in observed in Area C and about 5 inches in Area B. Areas B and C were connected. Area A was dry. Baseline ammonia samples and parameters were collected from Areas B (0250) and C (0253). The peak spring runoff at the Cisco Gaging Station was observed on this date.
05/22/07	13,700	At 0900, about 5 to 6 inches of standing water in Area C and about 2 to 3 inches of water in Area B was observed. Area A was dry. The Initial Action backwater area was isolated from the main river channel. At 1030, baseline ammonia samples and parameters were collected from Areas B (0250) and C (0253). At 1400, the Initial Action system was activated in Areas B and C.
05/23/07	13,900	Areas B and C were inundated with diverted Initial Action water. Area A was dry. Ammonia samples and parameters were collected from Areas B (0250) and C (0253) while the Initial Action was running.
05/24/07	13,100	The Initial Action samples were shipped overnight to Paragon Analytics, Inc.
05/25/07	11,200	The Initial Action system was ceased due to a drop in river flow below 10,000 cfs.
05/30/07	9,970	All of the Initial Action areas (A, B, and C) were dry up to the river's edge.

Baseline samples were collected at locations 0250 and 0253 before system startup (Table 2). The system was operated as described in Table 1 and depicted in the photographs in the trip report (Appendix A). Figure 2 shows a plot of the Colorado River flow before, during, and after the Initial Action system was in operation.

3.0 Monitoring Results

Baseline sampling results (taken prior to system initiation on 5/17/07) are presented in Table 2 along with corresponding ambient water-quality criteria (AWQC) for ammonia. The AWQC are pH and/or temperature dependent, so they vary with conditions at each location. Table 2 presents results of sampling conducted during operation of the Initial Action. The Validation Data Package for the Initial Action that includes the trip report is attached as Appendix A.

Table 2. Parameters Collected in the Initial Action Areas and Comparison to Acute and Chronic Standards

Location	Date	Temp.	Cond.	pH	DO	ORP	Comments
0250	05/17/07	20.73	491	7.66	5.48	-132	Measured five days before the start-up of the Initial Action System
0253	05/17/07	20.43	554	7.56	6.84	-84	
0250	05/22/07	16.59	922	8.07	6.65	-48	
0253	05/22/07	16.47	469	8.38	7.87	-62	Measured just prior to start-up of Initial Action System
0250	05/23/07	16.45	780	8.14	8.14	-215	Measured after the Initial Action system had been running for one day
0253	05/23/07	17.77	451	8.17	7.90	-240	

Location	Area Represented	Date Sampled	Ammonia (mg/L as N)	Federal/State Chronic Standard (mg/L as N)	Federal/State Acute Standard (mg/L as N)
0250	B	05/17/2007	0.1	3.6	14.7
		05/22/2007	0.1		
		05/23/2007	0.1		
0253	C	05/17/2007	0.1	2.3	8.3
		05/22/2007	0.1		
		05/23/2007	0.1		

Temp.= temperature (°Celsius), Cond.= conductivity (umohs/centimeter), pH (S.U.), DO= dissolved oxygen in milligrams per Liter (mg/L), ORP= oxidation reduction potential (miliVolts)

4.0 Conclusions and Recommendations

Before and after startup of the Initial Action system, the ammonia concentrations in Areas B and C were below the detection limit of 0.1 milligrams per liter (mg/L). As shown in Table 2, the ammonia concentrations were below federal and state chronic and acute ammonia standards at both sample locations. Therefore, discharge of ground water to the Colorado River did not result in unacceptable ammonia concentrations before startup of the Initial Action system.

Baseline sampling results in the Initial Action area for 2006 (DOE 2007) and 2007 indicate that no unacceptable ammonia concentrations were present in that area. It may be that the ground water interim actions are serving their intended purpose of preventing degradation of river water quality. In addition, significant sediment deposition has occurred in the backwater channels along the Moab site, prohibiting the formation of habitat areas. If adjustments to the Initial Action protocols are required or other adjustments to the Initial Action system are deemed necessary, these will be performed by DOE in consultation with the U.S. Fish and Wildlife Service.

5.0 References

DOE (U.S. Department of Energy) 2002. *Work Plan for the Implementation of the Initial Action in the Sandbar Area Adjacent to the Moab Project Site*, GJO-2002-299-TAR, March.

DOE (U.S. Department of Energy) 2003. *Site Observational Work Plan for the Moab, Utah, Site*, GJO-2003-424-TAC, December.

DOE (U.S. Department of Energy) 2005. *Remediation of the Moab Uranium Mill Tailings, Grand and San Juan Counties, Utah, Final Environmental Impact Statement*, DOE/EIS-0355, July.

DOE (U.S. Department of Energy) 2007. *Moab Initial Action Report, 2006 Calendar Year*, DOE-EM/GJ1080-2006, January.

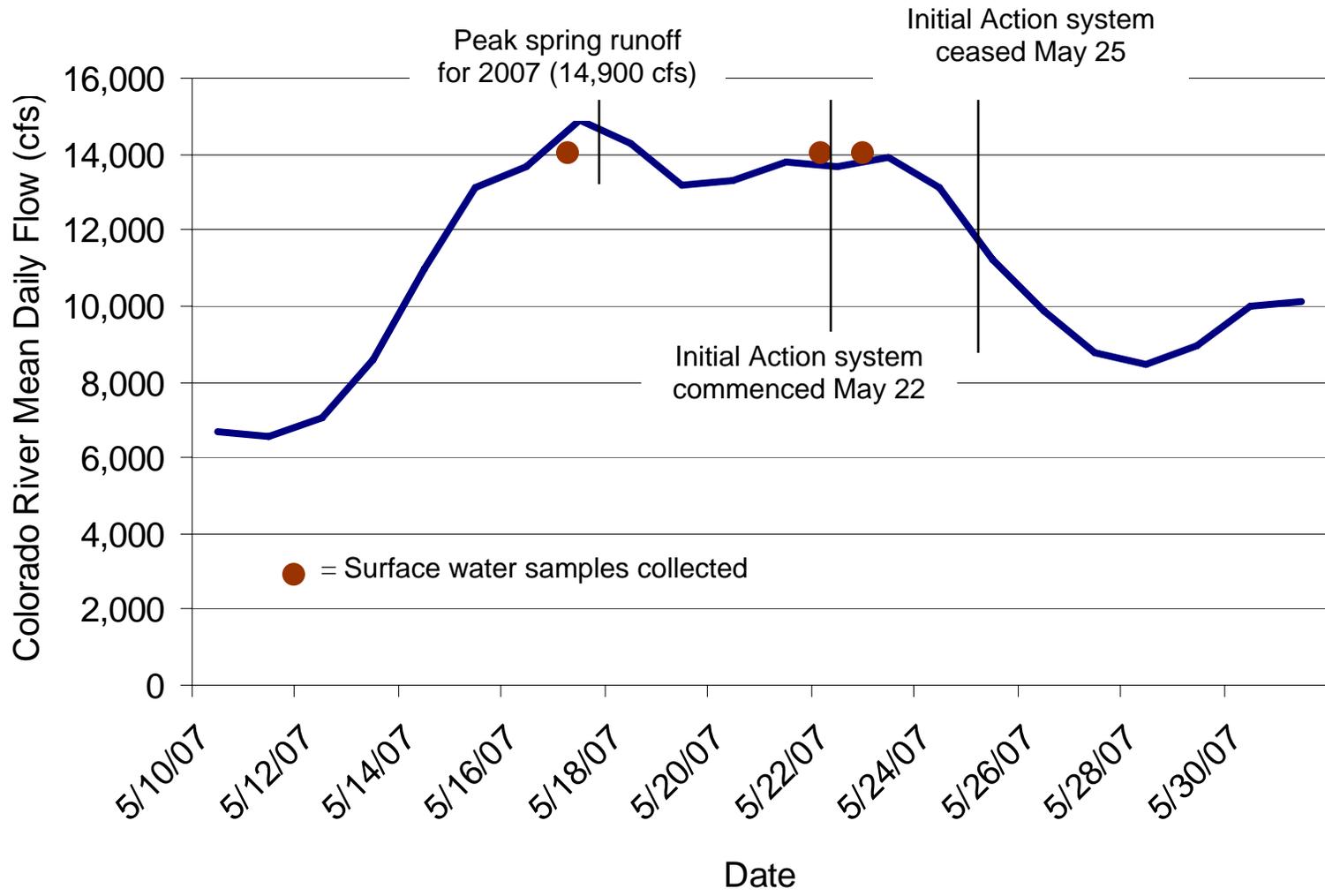


Figure 2. Colorado River Hydrograph (Cisco Gaging Station)

Appendix A

May 2007 Water Sampling Validation Data Package for Initial Action Surface Water Sampling

Environmental Management - Grand Junction Office



May 2007 Water Sampling
Validation Data Package
For Initial Action
Surface Water Sampling

Moab UMTRA Project

January 2008



U.S. Department
of Energy

Office of Environmental Management

*Work Performed by the Technical Assistance Contractor Under DOE Contract No. DE-AC30-07CC60012
for the U.S. Department of Energy Office of Environmental Management, Grand Junction, Colorado.*

May 2007 Water Sampling

**Validation Data Package (VDP)
For Initial Action
Surface Water Sampling
Moab, Utah**

January 2008

May 2007 Initial Action Surface Water Sampling Event Moab, Utah

Table of Contents

	Page
Sampling Event Summary	3
Executive Summary	4
Sampling and Analysis	4
Sample Location Map.....	5
Data Assessment Summary.....	6
Water Sampling Field Activities Verification Checklist	7
Laboratory Performance Assessment	9
Field Analyses/Activities	12
Certification	13
Attachment 1, Data Presentation.....	14
Minimums and Maximums Report	15
Water Quality Data	16
Attachment 2, Trip Report.....	20
Acronyms.....	31

Sampling Event Summary

Site: Moab, Utah

Sampling Period: May 17 – 23, 2007

The purpose of this sampling event was to collect data that can be used to evaluate the performance of the Initial Action system.

SUMMARY CRITERIA

- 1. As a result of this sampling event, is there any indication of anomalous data that may be related to well field pump rate changes, river flow, or other known causes?**

The sampling results indicate there are no anomalous data associated with this surface-water sampling event. All ammonia as nitrogen results were below the detection limit of 0.1 milligram per liter (mg/L). This suggests the initial action system accomplished the goal of distributing diverted Colorado River fresh water to habitat Areas B and C during the post-runoff peak flows (Area A was dry throughout this time period).

- 2. Were all Interim Action well field pumps operating within the planned parameters?**

Yes. As planned, the well field was operating at the time of this event.

- 3. Was the evaporation pond functioning properly?**

Not Applicable

- 4. Were all proposed well (ground water) and surface water locations sampled during this event?**

No. Location 0247, which is associated with habitat Area A, was not sampled during this event because it was dry due to the low Colorado River stage.

- 5. Were there any site activities that have impacted or may impact the Interim Action system?**

Not Applicable

Executive Summary

Similar to previous initial action related sampling events, ammonia concentrations in surface-water samples collected from riparian habitat Areas B and C were below detection limits. Surface-water samples were not collected from Area A because the Colorado River stage was too low to naturally flow into this area. The results of this sampling confirms the Initial Action fresh water diversion system was successful in supplying ammonia-free water into riparian habitat Areas B and C, and assisted in diluting any naturally discharging ground water in these backwater areas.

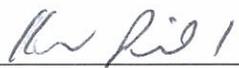
Sampling and Analysis

Sampling and analysis were conducted in accordance with the *Operations, Maintenance, and Performance Monitoring Plan for the Interim Action Ground Water Treatment System*, (February 2007). A description of the initial action system is contained in the *Work Plan for the Implementation of the Initial Action in the Sandbar Area Adjacent to the Moab Project Site* (March 2002). Please refer to the attached trip report for specific sampled locations and an explanation of why some locations were not sampled, such as dry conditions at specific surface water locations.

The data validation indicates that the data meet the quality-control criteria specified for this project. No significant discrepancies were noted regarding sample shipping and receiving, preservation and holding times, instrument calibration, method blanks, or matrix spikes, etc., except as qualified or noted in the Laboratory Performance Assessment.

There were no anomalous data points, as each result was below the detection limit of 0.1 mg/L for ammonia. The majority of the historical results have also been below the detection limit.

According to the U.S. Geological Survey (USGS) Cisco Gaging Station (Station Number 09180500), the mean daily Colorado River flow rates varied between 8,790 and 14,900 cubic feet per second (cfs) during this sampling period. These flows are well below the station average (based on 88 years of data), which range from 16,000 to 20,000 cfs during this same time period.



Ken Pill
Ground Water Lead

11/17/08

Date

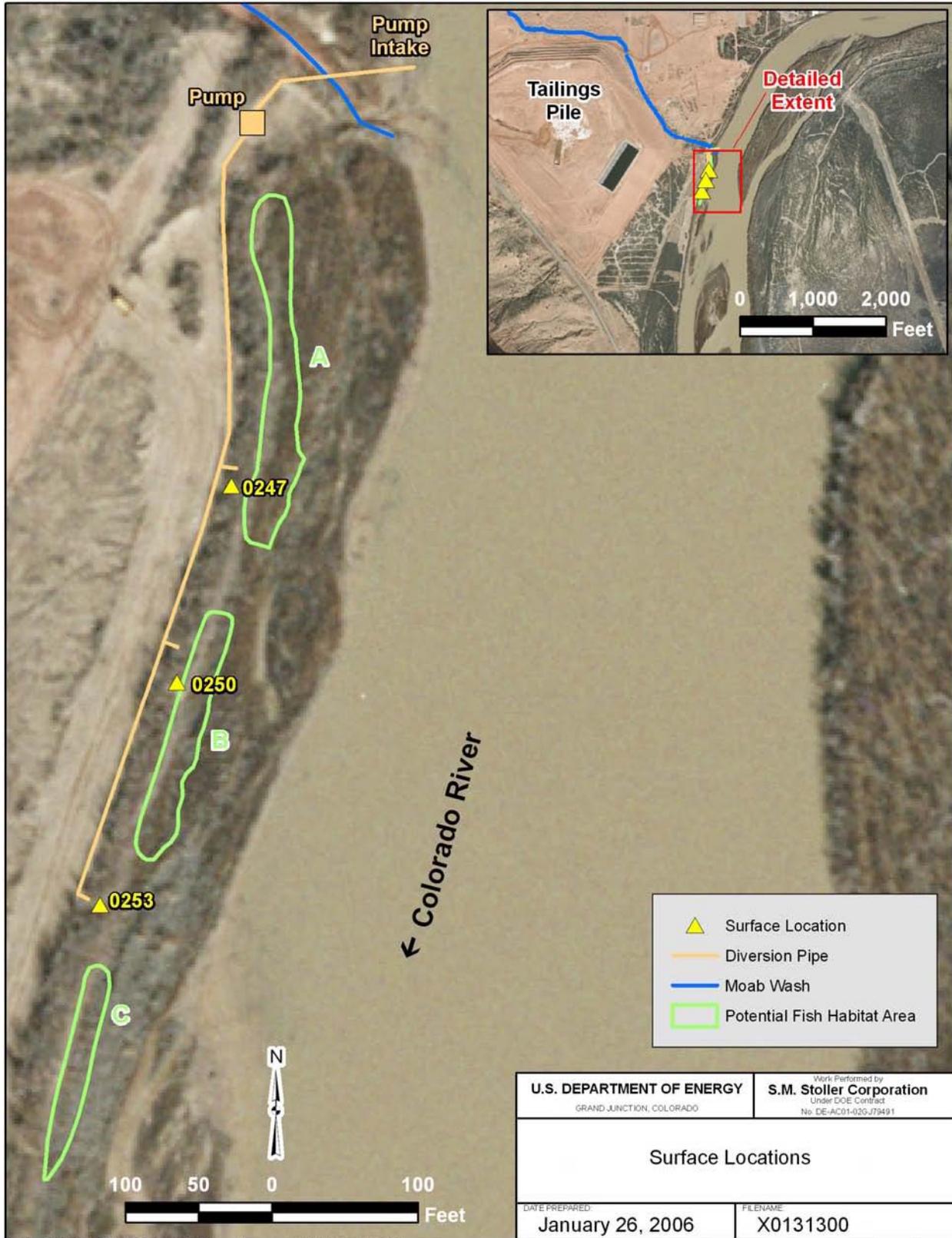


Figure 1. Sample Locations for the Initial Action Sampling

Data Assessment Summary

Water Sampling Field Activities Verification Checklist

Sampling Event / RIN	<u>Initial Action / 07050911</u>	Date(s) of Water Sampling	<u>May 17, 22, and 23, 2007</u>
Date(s) of Verification	<u>December 12, 2007</u>	Name of Verifier	<u>Ken Pill</u>
		Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?		<u>Yes</u>	
List other documents, standard operating procedures, instructions.		<u>NA</u>	
2. Were the sampling locations specified in the planning documents sampled?		<u>Yes</u>	<u>See trip report for explanation.</u>
3. Was a pre-trip calibration conducted as specified in the aforementioned documents?		<u>Yes</u>	
4. Was an operational check of the field equipment conducted twice daily?		<u>Yes</u>	
Did the operational checks meet criteria?		<u>Yes</u>	
5. Were the number and types (alkalinity, temperature, electrical conductivity, pH, turbidity, dissolved oxygen, oxidation reduction potential) of field measurements taken as specified?		<u>Yes</u>	
6. Was the category of the well documented?		<u>NA</u>	<u>All samples collected were from surface water locations</u>
7. Were the following conditions met when purging a Category I well:			
Was one pump/tubing volume purged prior to sampling?		<u>NA</u>	<u>All samples collected were from surface water locations</u>
Did the water level stabilize prior to sampling?		<u>NA</u>	<u>All samples collected were from surface water locations</u>
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?		<u>Yes</u>	
Was the flow rate less than 500 milliliters per minute (mL/min)?		<u>NA</u>	<u>All samples collected were from surface water locations</u>
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?		<u>NA</u>	

Water Sampling Field Activities Verification Checklist

8. Were the following conditions met when purging a Category II well:

Was the flow rate less than 500 mL/min? NA All samples collected were from surface water locations

Was one pump/tubing volume removed prior to sampling? NA All samples collected were from surface water locations

9. Were duplicates taken at a frequency of one per 20 samples? Yes

10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment? Yes

11. Were trip blanks prepared and included with each shipment of volatile organic compound samples? NA

12. Were Quality Control samples assigned a fictitious site identification number? Yes

Was the true identity of the samples recorded on the Quality Assurance Sample Log? Yes

13. Were samples collected in the containers specified? Yes

14. Were samples filtered and preserved as specified? Yes

15. Were the number and types of samples collected as specified? Yes

16. Were chain-of-custody (COC) records completed, and was sample custody maintained? Yes

17. Are field data sheets signed and dated by both team members? Yes

18. Was all other pertinent information documented on the field data sheets? Yes

19. Was the presence or absence of ice in the cooler documented at every sample location? Yes

20. Were water levels measured at the locations specified in the planning documents? NA

Laboratory Performance Assessment

General Information

Requisition No. (RIN): 07050911
Sample Event: May 17-23, 2007
Site(s): Moab, Utah; Initial Action
Laboratory: Paragon Analytics, Fort Collins, Colorado
Work Order No.: 0705192
Analysis: Ammonia as Nitrogen
Validator: Gretchen Baer
Review Date: June 26, 2007

This validation was performed according to the *Environmental Procedures Catalog* (STO 6), "Standard Practice for Validation of Laboratory Data," GT-9(P) (2006). The procedure was applied at Level 2, Data Deliverables Verification. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N, NH ₃ -N	WCH-A-005	MCAWW 350.1	MCAWW 350.1

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
All	All	Ammonia as N	J	No matrix spike performed

Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received eight samples on May 25, 2007, under Airbill number 7916 9409 0046, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC form and the sample tickets, had no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures within the cooler of 0.8 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods.

Method MCAWW 350.1, Ammonia as N

Initial calibrations for ammonia as N were performed using six calibration standards on June 4, 2007, resulting in calibration curves with correlation coefficient values greater than 0.995 and intercepts less than three times the minimum detection limit (MDL). Initial and continuing calibration verification (ICV and CCV) checks were made at the required frequency resulting in 11 CCVs. All calibration check results were within the acceptance criteria.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All initial and continuing calibration blank (ICB and CCB) results were below the practical quantitation limit (PQL) and below the instrument detection limit.

Matrix Spike Analysis

Matrix spike sample analysis is performed as a measure of the ability to recover analytes in a particular matrix. Matrix spike and matrix spike duplicate samples (MS/MSD) were not analyzed with these samples. The ammonia as nitrogen results are qualified as “J” (estimated) because the effects of the sample matrix are not known.

Laboratory Control Sample

A laboratory control sample (LCS) was analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The results were acceptable.

Detection Limits/Dilutions

No dilutions were required for sample analysis. The required detection limit (RDL) was achieved.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Electronic Data Deliverable File

The Electronic Data Deliverable (EDD) file arrived on June 14, 2007. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Field Duplicate Analysis

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. Duplicate samples were collected from location 0250 on May 23, 2007. The duplicate results met the U.S. Environmental Protection Agency (EPA) recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than five times the PQL, indicating acceptable overall precision.

Equipment Blank

An equipment blank was collected after completion of decontamination and prior to collection of environmental samples. This blank is useful in documenting adequate decontamination of sampling equipment. Ammonia as nitrogen was not detected in the equipment blank.

Report Prepared By: _____

Gretchen Baer
Gretchen Baer, Data Validator

Field Analyses/Activities

The following information summarizes the field analyses and activities for this sampling event period.

Field Activities

All surface water samples were collected following the procedures contained within the Sampling and Analysis Plan. One equipment blank was collected and analyzed for the same constituents as the environmental samples. Analyte concentrations measured in the equipment blanks were below or equivalent to their respective RDLs and were considered acceptable. One duplicate sample was also collected. There are no established regulatory criteria for the evaluation of field duplicate samples; therefore, EPA guidance for laboratory duplicates (which is conservative for field duplicates) was used to assess the precision of the field duplicates. All results met the criteria of ± 20 relative percent difference (RPD) and are considered acceptable.

Attachment 1

Data Presentation

Minimums and Maximums Report

The Minimums and Maximums Report is generated by a data validation application contained in the sample management system (SMS) used to query the SEEPro database. The application compares the new data set with historical data and lists all new data that fall outside the historical data range. Values listed in the report are further screened, and the results are not considered anomalous if: (1) identified low concentrations are the result of low detection limits; (2) the concentration detected is within 50 percent of historical minimum or maximum values; or (3) there were fewer than five historical samples for comparison.

For this sampling effort, none of the samples were outside of the historical minimum and maximum result for ammonia as nitrogen. Both locations 0250 and 0253 have been sampled six times since July 2005 (the first time these surface water locations were sampled). According to the SEEPro database, ammonia as nitrogen concentrations have historically ranged from 0.1 (which is the detection limit) to 0.13 mg/L for location 0250 and from 0.1 to 0.37 mg/L for location 0253.

Similar to a number of the samples previously collected from these locations, ammonia as nitrogen concentrations were below the detection limit of 0.1 mg/L. As a result, it was not necessary to generate a Minimums and Maximums Report or an Anomalous Data Review Check Sheet for this VDP.

Water Quality Data

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 12/19/2007 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY
				DATE	ID			LAB	DATA	QA		
Ammonia Total as N	mg/L	0250	SL, RIV	05/17/2007	0001	0.33 - 0.33	0.1	U	J	#	0.1	-
	mg/L	0250	SL, RIV	05/22/2007	0001	0.25 - 0.25	0.1	U	J	#	0.1	-
	mg/L	0250	SL, RIV	05/23/2007	0001	0.42 - 0.42	0.1	U	J	#	0.1	-
	mg/L	0250	SL, RIV	05/23/2007	0002	0.42 - 0.42	0.1	U	J	#	0.1	-
	mg/L	0253	SL, RIV	05/17/2007	0001	0.83 - 0.83	0.1	U	J	#	0.1	-
	mg/L	0253	SL, RIV	05/22/2007	0001	0.25 - 0.25	0.1	U	J	#	0.1	-
	mg/L	0253	SL, RIV	05/23/2007	0001	0.63 - 0.63	0.1	U	J	#	0.1	-
	mg/L	0253	SL, RIV	05/23/2007	0002	0.63 - 0.63	0.1	U	J	#	0.1	-
Dissolved Oxygen	mg/L	0250	SL, RIV	05/17/2007	N001	0.33 - 0.33	5.48		J	#	-	-
	mg/L	0250	SL, RIV	05/22/2007	N001	0.25 - 0.25	6.65		J	#	-	-
	mg/L	0250	SL, RIV	05/23/2007	N001	0.42 - 0.42	8.14		J	#	-	-
	mg/L	0253	SL, RIV	05/17/2007	N001	0.83 - 0.83	6.84		J	#	-	-
	mg/L	0253	SL, RIV	05/22/2007	N001	0.25 - 0.25	7.87		J	#	-	-
	mg/L	0253	SL, RIV	05/23/2007	N001	0.63 - 0.63	7.90		J	#	-	-
Oxidation Reduction Potent	mV	0250	SL, RIV	05/17/2007	N001	0.33 - 0.33	-132		J	#	-	-
	mV	0250	SL, RIV	05/22/2007	N001	0.25 - 0.25	-48		J	#	-	-
	mV	0250	SL, RIV	05/23/2007	N001	0.42 - 0.42	-215		J	#	-	-
	mV	0253	SL, RIV	05/17/2007	N001	0.83 - 0.83	-84		J	#	-	-
	mV	0253	SL, RIV	05/22/2007	N001	0.25 - 0.25	-62		J	#	-	-
	mV	0253	SL, RIV	05/23/2007	N001	0.63 - 0.63	-240		J	#	-	-
pH	s.u.	0250	SL, RIV	05/17/2007	N001	0.33 - 0.33	7.66		J	#	-	-
	s.u.	0250	SL, RIV	05/22/2007	N001	0.25 - 0.25	8.07		J	#	-	-
	s.u.	0250	SL, RIV	05/23/2007	N001	0.42 - 0.42	8.14		J	#	-	-
	s.u.	0253	SL, RIV	05/17/2007	N001	0.83 - 0.83	7.56		J	#	-	-
	s.u.	0253	SL, RIV	05/22/2007	N001	0.25 - 0.25	8.38		J	#	-	-
	s.u.	0253	SL, RIV	05/23/2007	N001	0.63 - 0.63	8.17		J	#	-	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 12/19/2007 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	SAMPLE: ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Specific Conductance	umhos/cm	0250	SL, RIV	05/17/2007	N001	0.33 - 0.33	491	J #	-	-
	umhos/cm	0250	SL, RIV	05/22/2007	N001	0.25 - 0.25	922	J #	-	-
	umhos/cm	0250	SL, RIV	05/23/2007	N001	0.42 - 0.42	780	J #	-	-
	umhos/cm	0253	SL, RIV	05/17/2007	N001	0.83 - 0.83	554	J #	-	-
	umhos/cm	0253	SL, RIV	05/22/2007	N001	0.25 - 0.25	469	J #	-	-
	umhos/cm	0253	SL, RIV	05/23/2007	N001	0.63 - 0.63	451	J #	-	-
Temperature	C	0250	SL, RIV	05/17/2007	N001	0.33 - 0.33	20.73	J #	-	-
	C	0250	SL, RIV	05/22/2007	N001	0.25 - 0.25	16.59	J #	-	-
	C	0250	SL, RIV	05/23/2007	N001	0.42 - 0.42	16.45	J #	-	-
	C	0253	SL, RIV	05/17/2007	N001	0.83 - 0.83	20.43	J #	-	-
	C	0253	SL, RIV	05/22/2007	N001	0.25 - 0.25	16.47	J #	-	-
	C	0253	SL, RIV	05/23/2007	N001	0.63 - 0.63	17.77	J #	-	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 12/19/2007 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
-----------	-------	-------------	-------------------	--------------	----	----------------------	--------	-------------------------	-----------------	--------------

RECORDS: SELECTED FROM USEE200 WHERE site_code='MOA01' AND location_code in('0250','0251','0252','0253') AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%N%' AND data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND DATE_SAMPLED between #5/17/2007# and #5/23/2007#

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LOCATION TYPES: SL SURFACE LOCATION

LOCATION SUBTYPES: RIV River

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

- | | | |
|------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------|
| F Low flow sampling method used. | G Possible grout contamination, pH > 9. | J Estimated value. |
| L Less than 3 bore volumes purged prior to sampling. | N Presumptive evidence that analyte is present. The analyte is "tentatively identified". | Q Qualitative result due to sampling technique |
| R Unusable result. | U Parameter analyzed for but was not detected. | X Location is undefined. |

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

Attachment 2

Trip Report



DATE: December 11, 2007
TO: K. Pill
FROM: E. M. Glowiak
SUBJECT: Trip Report
Site: Moab – Initial Action Surface Water Sampling – May 2007
Date of Sampling Event: May 17-May 23, 2007
Team Members: Elizabeth Glowiak
RIN Number Assigned: All of the samples were assigned to RIN 07050911

Sampling Event Background: As the Colorado River level peaks with the spring snowmelt runoff, the backwater areas along the river bank become inundated with water. After the river retreats, these backwater habitat areas become isolated from the main channel. This year, the Colorado River peaked on May 17 at 14,900 cfs. The initial action was initiated on May 22, 2007, as the Colorado River level began to recede. Normally, fresh river water is diverted into Initial Action Areas A, B, and C; however, the 2007 spring run-off peak was below average and backwater areas persisted only in Areas B and C. Area A remained dry throughout the month of May 2007. Parameters and ammonia samples were collected from Areas B and C on May 17, 22, and 23, 2007.

Field Variance: None.

Sample Shipment: The samples were shipped in coolers overnight to Paragon Analytics, Inc. from Moab, Utah. The tracking number for the shipment is 791694090046.

Quality Control Sample Cross Reference: Following are the false identifications assigned to the quality control samples:

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2506	0250	Duplicate of surface water	Surface Water	NFB 923
2505	NA	Equipment Blank	DI Water	NFB 924

Location Specific Information: The surface water was collected using stainless-steel weighted polytubing and a peristaltic pump. Area B was assigned the sample location number 0250 and Area C was assigned the sample location number 0253.

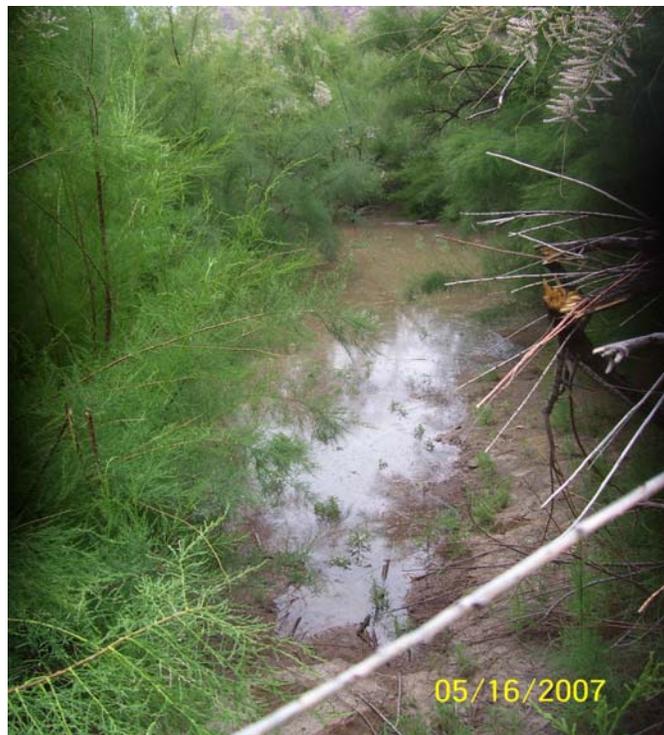
Site No.	Date	Time	Approx Water Depth	Field Parameters				
				Temp (°C)	Spec Cond (µS/cm)	D.O. (mg/L)	pH	ORP
0250	05/17/2007	16:42	4"	20.73	491	5.48	7.66	-132
0253	05/17/2007	16:31	10"	20.43	554	6.84	7.56	-84
0250	05/22/2007	10:15	3"	16.59	922	6.65	8.07	-48
0253	05/22/2007	10:28	3"	16.47	469	7.87	8.38	-62
0250	05/23/2007	15:18	5"	16.45	780	8.14	8.14	-215
0253	05/23/2007	16:00	7.5"	17.77	451	7.90	8.17	-240

Documentation: The following photographs were taken of the Initial Action area prior, during, and after the peak seasonal Colorado River flow.

Photographs from May 16, 2007



On May 16, 2007, Area A was dry.



Around 1700 on May 16, 2007, Area B contained about 3 inches of water when the river flow was at 13,900 cfs.



At 0800 on May 16, 2007, Area C contained about 5 inches of water when the river flow was at 13,600 cfs.

Photographs from May 17, 2007



On May 17, 2007, Area A was dry.



On May 17, 2007, Area B contained about 4 inches of water and was connected to Area C.



On May 17, 2007, Area C contained about 10 inches of water.

Photographs from May 22, 2007



Area A was dry on May 22, 2007.



Area B contained about 2-3 inches of water and was barely connected to Area C. This photograph was taken prior to the launch of the initial action on May 22, 2007, at 1400.



Area C contained approximately 5-6 inches of water and was isolated from the river. This photograph was taken prior to the launch of the initial action on May 22, 2007, at 1400.

Photographs from May 23, 2007



Area B flooded with diverted fresh river water on May 23, 2007.



Area C flooded with diverted fresh river water on May 23, 2007.

Photographs from May 30, 2007



Area B completely dry on May 30, 2007.



Area C completely dry to the river edge on May 30, 2007.

Site Issues: According to the USGS Cisco Gaging Station (Station No. 09180500), the mean daily Colorado River flows during this sampling event are provided below:

Date	Daily Mean Flow (cfs)
05/16/2007	13,700
05/17/2007	14,900
05/18/2007	14,300
05/19/2007	13,200
05/20/2007	13,300
05/21/2007	13,800
05/22/2007	13,700
05/23/2007	13,900
05/24/2007	13,100
05/25/2007	11,200
05/26/2007	9,850
05/27/2007	8,790

Equipment Issues: None.

Corrective Action Required/Taken: None.

Acronyms

CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
cfs	Cubic Feet per Second
COC	Chain of Custody
DO	Dissolved Oxygen
EDD	Electronic Data Deliverable
EPA	Environment Protection Agency
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Samples
MDL	Minimum Detection Limit
mg/L	Milligram per Liter
mL/m	Milliliter per Minute
MS	Matrix Spike
MSD	Matrix Spike Duplicate
μs/cm	Micro Siemens per Centimeter
mV	Millivolt
ORP	Oxygen Reduction Potential
PQL	Practical Quantitation Limit
RDL	Required Detection Limit
RPD	Relative Percent Difference
SMS	Sample Management System
SU	Standard Unit
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey
VDP	Validation Data Package