DOE-EM/GJ1640

Moab UMTRA Project
Flood and Drought Mitigation Plan

Revision 12

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Moab UMTRA Project Flood and Drought Mitigation Plan

Revision 12

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Revision History

Revision	Date	Reason for Revision
0	May 2008	Initial issue.
1	May 2011	Annual update.
2	May 2013	Annual update.
3	May 2014	Annual update includes incorporation of new groundwater and surface water data.
4	July 2015	Annual update.
5	April 2016	Revision includes clarification of specific actions in Sections 3.1 and 3.2.
6	May 2017	Annual update and revision to include specific actions with the CF5 Klein tank extraction operations.
7	December 2018	Update to include specific actions associated with drought.
8	December 2019	Annual update.
9	January 2021	Annual update.
10	April 2021	Update to include information pertaining to flow events in Moab Wash.
11	January 2022	Annual Update
12	December 2022	Annual Update to include moving scope of work exclusively to the RAC.

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Acronyms and Abbreviations

CA	Contamination Area
CBRFC	Colorado Basin River Forecast Center
CF	Configuration
cfs	cubic feet per second
DOE	U.S. Department of Energy
ft	feet or foot
IA	interim action
msl	mean sea level
NEPA	National Environmental Policy Act
NIDIS	National Integrated Drought Information System
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
POD	Plan of the Day
RAC	Remedial Action Contractor
SME	subject matter expert
TAC	Technical Assistance Contractor
TLD	thermoluminescent dosimeter
UMTRA	Uranium Mill Tailings Remedial Action
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFD	variable frequency drive

1.0 Introduction

The U.S. Department of Energy (DOE) Moab Uranium Mill Tailings Remedial Action (UMTRA) Project site (Moab site) is a former uranium ore-processing facility located about three miles northwest of the city of Moab in Grand County, Utah, and lies on the western bank of the Colorado River at the confluence with the Moab Wash.

Several features of the Moab site are shown in Figure 1. The site is transected by the Moab Wash, which flows during significant storm events. North of the Wash is a freshwater intake structure that supplies a pond used for irrigation, dust control, decontamination, rinsing containers, and injection water as part of groundwater interim action (IA) remediation. Low stage of the Colorado River associated with drought conditions can result in insufficient water flowing into the Project's freshwater intake structure. The IA well field is located between the toe of the tailings pile and the river south of the Moab Wash. The site is susceptible to flooding because about 160 acres of the nearly 480 acres of the property are within the 100-year floodplain of either the Colorado River or the Moab Wash.

A berm located along the Colorado River north of the Moab Wash and several off-pile areas of the site have been remediated. A 20-acre area north of the Moab Wash (northern off-pile area) was remediated in the winter of 2010/2011 by excavating and removing the contaminated soil. As part of this remediation, the berm that was previously installed along the riverbank was removed. In addition, more than 158,000 cubic yards of contaminated soil were removed from this area during the remediation, creating areas of lower elevation. As was anticipated, this northern off-pile area is now more susceptible to flooding at lower river stages.

Section 2.0 of this Plan provides information about river stage and flood predictions, Section 3.0 presents the trigger points that mandate specific actions, Section 4.0 provides guidance on specific steps in flood preparation, and Section 5.0 provides guidance to steps that should be taken after flood water has receded. In addition, drought conditions in the Colorado River Basin have the potential to impact site operations. Several crucial Remedial Action Contractor (RAC) functions are dependent on freshwater usage.

Section 6.0 provides information on monitoring for drought, Section 7.0 describes freshwater usage at the site, and Section 8.0 contains protective actions that should take place on-site to prepare for a drought. Section 9.0 provides steps that should be taken once the drought has ended.

1.1 Purpose and Scope

This Plan is applicable to flooding and river drought conditions that may occur at or near the Moab site and outlines the planning and actions to be taken to prepare for these scenarios. It is intended to proactively guard against potential operational risks and maintain compliance during flooding and drought conditions. In the event of flooding, the *Moab UMTRA Project Emergency/Incident Response Plan* (DOE-EM/GJ1520) will be utilized, which contains a Flood Action Plan checklist that includes actions to be taken (e.g., notifications, evaluations) when the Operations/Site Manager calls a Flood Alert.

1.2 Background

Stream flow on the Colorado River has been collected by the U. S. Geological Survey (USGS) at gaging station 09180500 near Cisco, Utah, since 1914. This station, located approximately 35 miles upstream of the site, is the closest station to Moab and provides the most complete data set representing river flow passing the site. There are no significant tributaries between the gaging station and the Moab site. In 2009, the Project installed a standard USGS-style river staff gage at the freshwater intake structure, just west of the freshwater pond at the eastern (upstream) end of the site. The elevation of the Colorado River surface is recorded from the gage on a routine basis.

On average, the river annually reaches a maximum flow between late May and early June, with an average annual instantaneous peak runoff at the Cisco gage of 27,500 cubic feet (ft) per second (cfs). Above-average runoff is attributed to a combination of above-average snowpack in the Upper Colorado River Basin, late spring precipitation events, and above-average temperatures. Peak flows within the last 50 years have equaled or exceeded more than 40,000 cfs 12 times, with the two highest peak flows occurring in 1983 and 1984 (61,900 and 70,300 cfs, respectively).

During spring of 1983 and 1984, the Moab site was reportedly flooded up to the toe of the tailings pile. The most significant recent site flooding event occurred in 2019 (Figure 2), when the peak runoff reached 40,000 cfs, which is equivalent to a river surface elevation of 3,967.2 ft mean sea level (msl) on June 10, and the river flow was above the average annual peak flow from early June through late August. The impacts of this flooding event are well documented in the *Moab UMTRA Project 2019 Flood Response Summary* (DOE-EM/GJTAC3035).

Below-average river flow conditions also impact the Moab Site. A river intake structure, pump, and associated freshwater pond are located in the northern portion of the site. The water is used for various site operational activities. The elevation of the Colorado River can impact the ability to withdraw freshwater. In 2007 and 2018, the river elevation dropped lower than the intake, and a secondary pump had to be installed so that operations could continue.

1.3 Site Condition

Figure 3 represents a rating curve generated using the 2011 flows for the site based on the river flows measured at the Cisco gaging station and the corresponding river surface elevation measured at the site river intake structure. Ground surface elevation shows a low point on the riverbank south of the freshwater pond with an elevation of 3,957 ft msl (Figure 2). Using the rating curve, the associated river surface elevation for flows above 10,750 cfs will exceed the land surface elevation at this location, allowing river water to begin to migrate into the area.

Once flows exceed approximately 33,000 cfs, the low point on the berm along the Moab Wash will be topped, and river water is expected to flow to the south within the constructed channel that runs through Configuration (CF) 5 from the Moab Wash. At a flow near 35,000 cfs, Colorado River water will enter the well field from the south in the drainage channel noted on Figure 2.

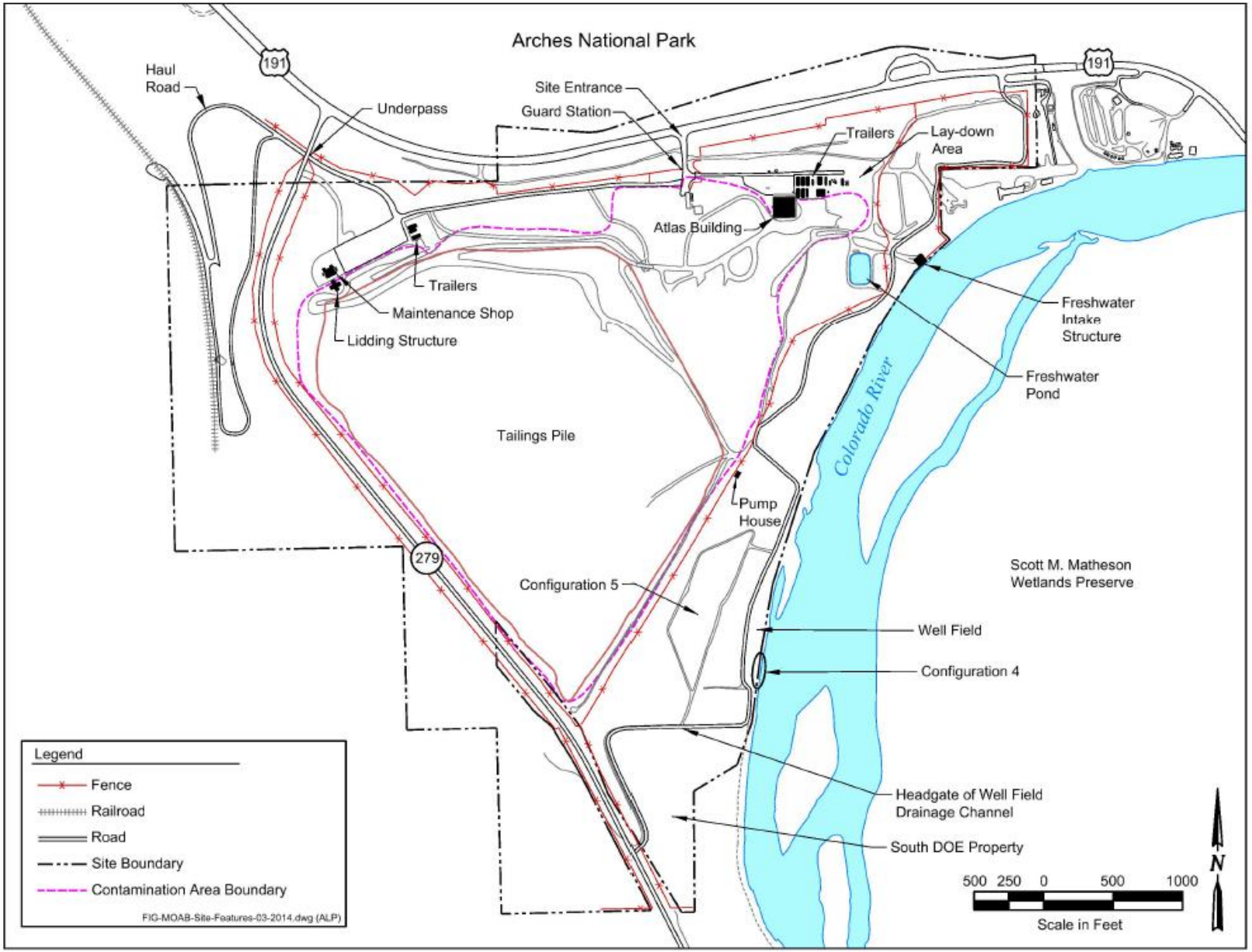

Figure 1. Moab Site Features

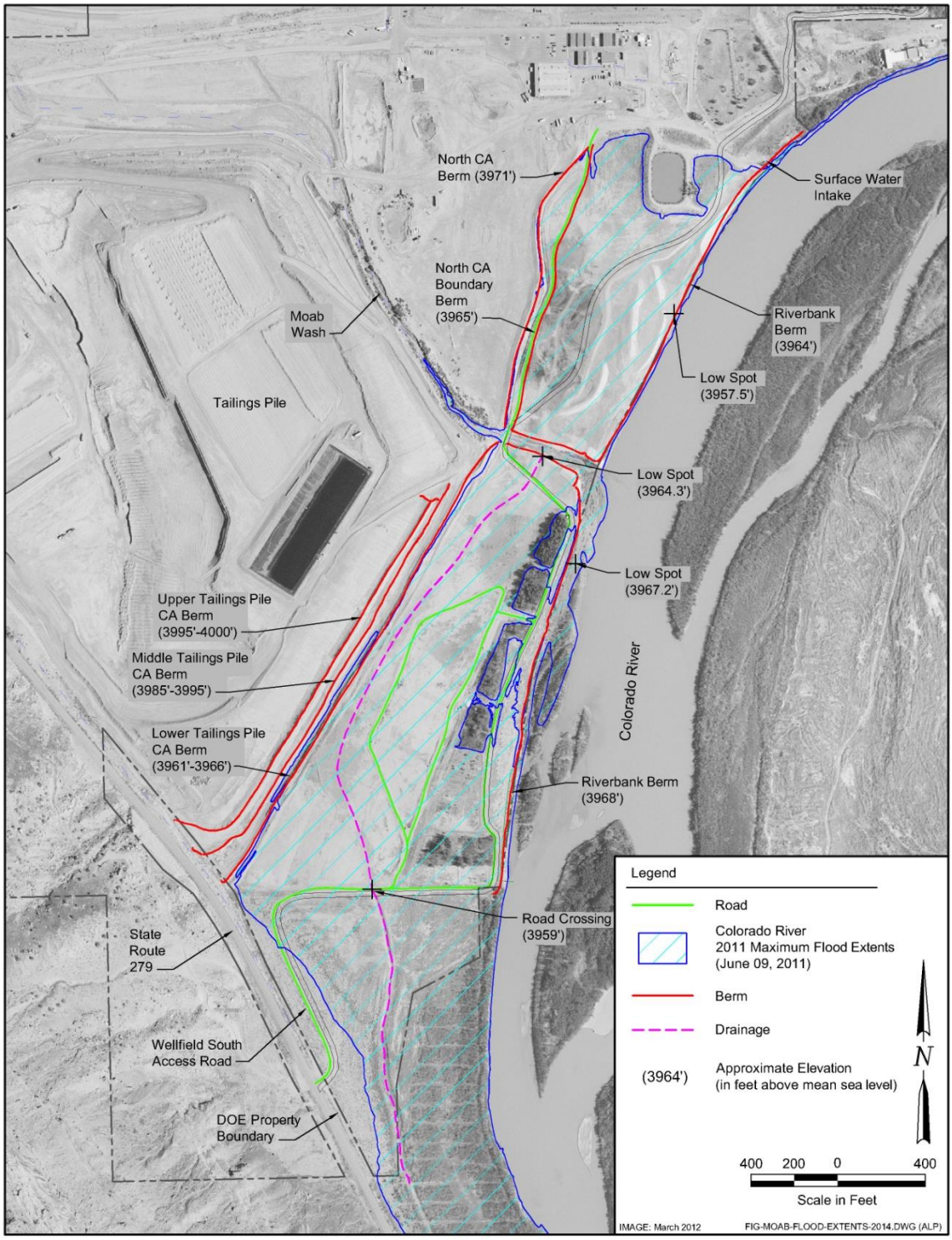

Figure 2. Moab Site Features, Colorado River Elevations, 2011 Flood Extent, and CA Berms and Elevations

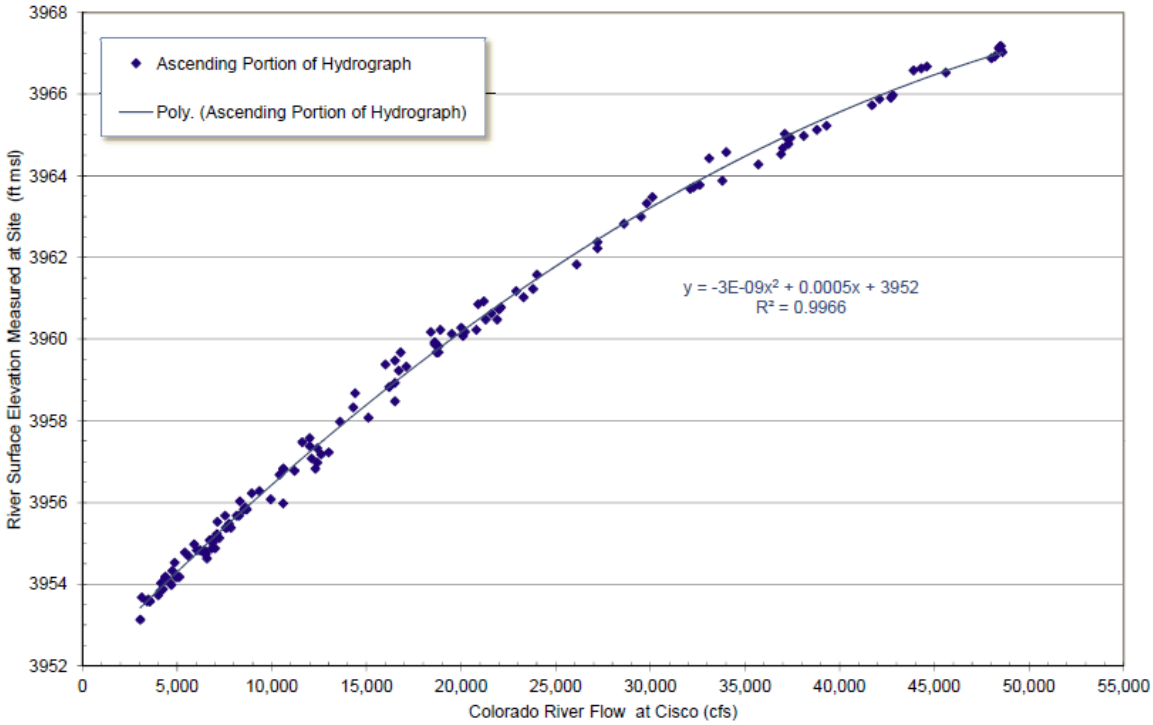

Figure 3. Cisco River Gage vs. Site Elevation Gage

The bank along the river from the Moab Wash to the southern end of CF4 has elevations that generally range from 3,968 to 3,969 ft msl; however, the survey identified a low spot on the berm adjacent to the area between the infiltration trench and the baseline area, where the elevation is 3,967.2 ft msl. River flows above 48,000 cfs would allow the river to flow into the well field.

Due to the wide girth of the river at Moab, even if inundated, there is insufficient energy in the river to adversely impact the tailings pile, so protection of the tailings pile from flooding is limited to maintaining the berms during lower river stages. Additional information is available in:

- Federal Emergency Management Agency, "Flood Insurance Study, Grand County, Utah," 2006.
- U.S. Geological Survey Scientific Investigations Report 2005-2025, "Initial Phase Investigation of Multi-Dimensional Streamflow Simulations in the Colorado River, Moab Valley, Grand County, Utah," 2004.

The river intake structure for the freshwater pump contains a concrete inlet from the river to the wet well. The inlet is typically covered in silt from the river at varying depths, and the sediment occasionally has to be removed. It was noted in 2018 that the river elevation starts to approach the bottom of the inlet at a river flow of near 2,000 cfs at the Cisco Gaging Station.

2.0 Monitoring Colorado River Stage for Potential Flooding

When the river flow rate at the Cisco gage is expected to exceed 15,000 cfs, personnel in the Groundwater Department will monitor the current and forecast river stage daily and reports the status in the Plan of the Day (POD) Meeting.

2.1 Flood Designations

The National Weather Service (NWS) has a flood warning notification system that includes several flood designations applicable to the Moab site, including flash flood warning, flood warning, and river flood warning (http://www.nws.noaa.gov/floodsafety/index). The NWS reports forecast the river stage for 2 weeks. Flood designations are described as follows:

Flash flood warning – Issued to inform the public, emergency management, and other cooperating agencies that flash flooding is in progress, imminent, or highly likely.

Flood warning – In hydrologic terms, a release by NWS to inform the public of flooding along larger streams that pose a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts.

River flood warning – This warning is issued by the local NWS when the forecast points at specific communities that have formal gaging sites and established flood stages or areas along rivers where flooding has been forecast, is imminent, or is in progress. Flooding is defined as the inundation of normally dry areas as a result of increased water levels in an established water course. The flood warning normally specifies crest information. It usually occurs 6 hours or later after the causative event, and it is usually associated with widespread heavy rain and/or snowmelt or ice jams.

The warning will contain the forecast point covered, the current stage (if it is available), and the established flood stage. From the forecast crest, the NWS determines which areas will be affected by the river flooding. This information is included in the warning that is issued as a site/event-specific call-to-action.

Groundwater personnel will monitor the NWS website and report any warnings to the Operations/Site Manager if an immediate threat occurs.

2.2 River Stage Reporting

Estimated Colorado River flow rates for the Cisco, Utah, gaging station (based on upstream flow rates and weather systems impacting the Colorado River basin) can be monitored on the National Oceanic and Atmospheric Administration (NOAA) website at *http://www.cbrfc.noaa.gov/river/station/flowplot/flowplot.cgi?CLRU1*. Figure 4 shows an example hydrograph from the Cisco gage.

The homepage to the Colorado Basin River Forecast Center (CBRFC) is located at *www.cbrfc.noaa.gov* and the website provides NOAA western water supply forecasts.

3.0 Decision-making for Mitigating Potential Flood Damage

Table 1 provides a summary of the critical flows, the river surface elevation, and the areas of the site that will be impacted by flood waters as discussed in Section 1.3.

To avoid unnecessary efforts and associated costs with flood preparation, specific actions are triggered by observed river flow rates and stage forecasts for the Cisco gage. Taking the historical data into account, this Plan establishes conservative trigger points for action at 15,000 cfs, 25,000 cfs, and 35,000 cfs or greater.

These trigger points account for increases in flow rate that may occur over the weekend, when site support is reduced. Figures A-1 through A-4 in Appendix A show the ground elevation, the elevation of specific river flows, and how the site may be impacted.

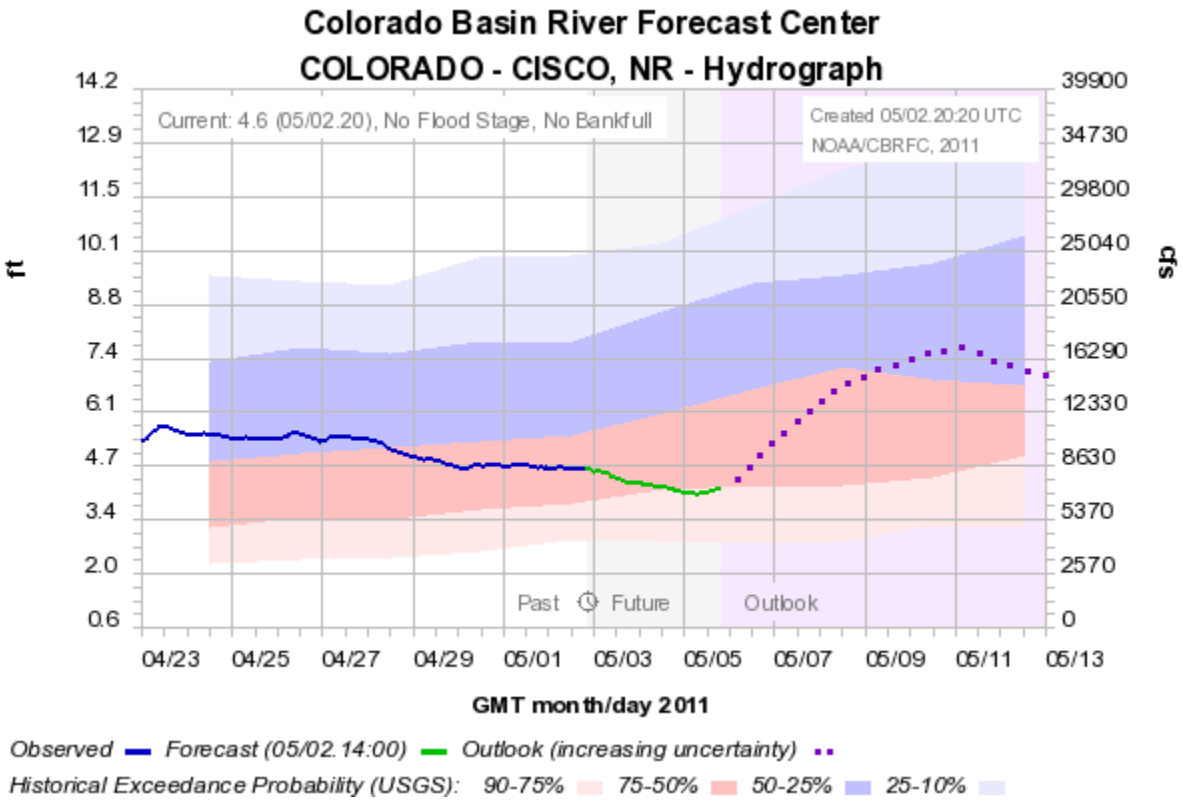

Figure 4. Example Hydrograph from Cisco, Utah, Gaging Station

Table 1. Key River Flows, River Surface Elevations, and Associated Areas Impacted

River Flow (cfs)	Elevation (ft msl)	Area Impacted
11,000	3,957	Surface water enters the surface depression just north of Moab Wash.
14,500	3,958.7	Surface water enters the northern off-pile area.
17,000	3,959.3	Groundwater begins to daylight in the northern off-pile area. Surface water begins to back up into Moab Wash.
22,600	3,960.7	Northern off-pile access road is inaccessible.
28,000	3,962.4	Lower Moab Wash is impassable.
34,000*	3,964.5	Surface water may enter the well field drainage via the southern DOE property.
34,000-37,000*	3,964.5	Surface water may enter the Contamination Area boundary fence adjacent to CF5.
37,500	3,964.7	Surface water will breach the southern berm of Moab Wash.
48,000	3,967.2	Surface water expected to breach the riverbank along the well field.

*In 2014, surface water did not enter the drainage until 37,200 cfs. It continued to flow in until the river dropped to 34,500 cfs. It is likely that debris had blocked the channel from the river.

3.1 Specific Actions at 15,000 cfs

The RAC will take the following actions once the Cisco gage flows are predicted to reach approximately 15,000 cfs:

- Conduct a walkdown of areas to identify potentially vulnerable assets and establish corrective actions. Visually inspect berms, determine if site boundary signs in the northern off-pile should be removed, and repair or enhance as needed.
- Determine if the head gate located off the State Route 279 well field access road should be closed.
- Shut down all freshwater injection into the well field when the river flow reaches 15,000 cfs.
- Verify all riverbed well point and observation well caps have been installed.
- Determine if any equipment in the northern off-pile needs to be relocated. Notify the Moab Operations/Site Manager (or RAC On-call Manager during non-working hours), who will then notify the DOE Site Engineer, the Federal Cleanup Director, and Project Public Affairs.
- Suspend irrigation activities in the northern off-pile area (as necessary) and remove irrigation equipment that may be damaged or transported out of the area by flood waters.
- Inform site security and site personnel during daily safety briefing of flood-prone areas at the site where operations will be restricted for that day.

3.2 Specific Actions at 25,000 to 30,000 cfs

At flows of just above 25,000 cfs, well field access will be impacted by surface water backing up into the Moab Wash and onto the lower Wash crossing. Once the Colorado River flows are predicted to reach 25,000 cfs at the Cisco gage, RAC personnel will perform the following tasks:

- Complete berm inspections for erosion and signs of breaching (see Attachment 1).
- Secure the content of the groundwater sand filter shed, the CF5 pump house, and associated items.
- Remove any equipment that can be damaged by rising water and relocate to higher ground.
- Check the power poles near the Moab Wash to determine if additional support is needed.
- Suspend irrigation activities in the well field area (as necessary) and remove irrigation equipment that may be damaged or transported out of the area by flood waters.

- Shut down the well field access road across the Moab Wash when deemed unsafe (historically occurs at flows greater than 25,000 cfs). The well field southern access road is typically not accessible at flows greater than 30,000 cfs due to flood water coming from downstream of the site.
- Contact electrical Subcontractor regarding potential removal of electrical equipment from the well field.
- Contact Subcontractor regarding potential transport of pump house to higher ground (near Hwy 279 gate).

If the flow is expected to exceed 30,000 cfs at the Cisco gage, RAC personnel will perform the following tasks. Completion of these action items will be determined at the time of the river forecast observation.

- Shut down all power to the well field and secure power following the *Moab UMTRA Project Lockout/Tagout and Out of Service Procedures* (DOE-EM/GJ1552) to prevent inadvertent energization to the well field.
- Have an electrician remove the CF4 and CF5 power centers from the well field, as well as the CF5 variable frequency drives (VFDs), electrical panels, and electrical disconnects. In addition, the heaters in the CF4 well vaults need to be removed.
- Record all individual extraction/injection well flow meter values. Label and remove each well head flow meter display plate.
- If deemed necessary, move the pump house in the southern off-pile from the well field to a non-flood prone location (e.g., near the southern gate off of Hwy 279)
- Measure water levels at each monitoring well equipped with a data logger/pressure transducer. Label, download, and remove each data logger/pressure transducer.
- Open the head gate at the State Route 279 well field access road.
- Consider whether any air monitoring sampling equipment will be impacted by flood water. The air particulate sampling equipment may have to be removed from location 0114 (CF5, off well 0815), as well as the radon cups and thermoluminescent dosimeters (TLDs) from locations 0105, 0106, 0107, 0114, 0126, and 0128. In addition, personnel may lose access to the Matheson air monitoring locations. Remove all equipment stored in low-lying areas and transport it to areas of the site that will not be impacted by higher flow rates.
- Remove the Radiological Control air sampling station near Moab Wash (at the discretion of Radiological Control).
- Radiological Control will conduct a visual survey of the Moab Wash lower crossing to determine if radiological sampling should be performed in areas where the rising waters can come into contact with RRM at the Contamination Area (CA) boundary or within the channel of Moab Wash.
- Remove air monitoring equipment from the well field and other areas of the site at a level flow of approximately 30,000 cfs.

3.3 Specific Actions at 35,000 cfs or Greater

For flows that are predicted to reach 35,000 cfs or greater, the RAC will perform the following tasks:

- Hold weekly (or more frequently as needed) meetings to discuss site actions and predicted river flow forecasts.

- Contact Williams Northwest Pipeline at 435-220-0139 to inform them that we are expecting a flow of greater than 35,000 cfs, so they will have time to remove electrical equipment from their equipment located adjacent to the river intake structure.
- Contact Enterprise Gas to inform them that we are expecting a flow of greater than 40,000 cfs and that on-site access to their gas-line may be impacted
- If the river reaches an elevation not encountered before, actions will be taken as warranted by the site conditions.
- Close the river intake pump head gate to avoid sediment accumulation inside the structure.
- Determine if signage is necessary to warn boaters about underwater hazards on the site.

3.4 Specific Actions for Moab Wash during Heavy Precipitation Events

The *Moab Wash Management Plan* (DOE-EM-GJ3051), discusses management and regulatory issues associated with Moab Wash and flow events.

In the event of heavy rainfall events that produce visible flow in the Moab Wash, the RAC will:
- Take photos of the Wash flow (if the storm event occurs during work hours).
- Close off access to lower crossing until flow stops. Radiological Control personnel, if needed, will perform a gamma survey and sample collection of the sediment in the lower crossing. Once the sediment has been analyzed for radium-226 concentration, the crossing will be cleaned with the material placed either into the CA or on the clean areas, outside of the CA, pending sample results. Scanning will be completed in accordance with the *Moab UMTRA Project Radiological Control Response to Moab Wash Flow Procedure* (DOE-EM/GJRAC2053).
- Monitor the flowrate if it is safe to do so. The Groundwater Program has a portable flowmeter that can be used.
- If it is safe to do so, the Groundwater Program will collect a surface water grab sample for analytes determined by DOE Personnel.
- Monitor erosion within the wash post-storm event. A drone may be useful in capturing images.
- Close the upper Wash crossing while the Wash is flowing; employees in the Support Area/Queue will have to enter and exit the site off State Route 279 until deemed safe by Safety, Health, and Quality. A blue light will be used at the Guard Shack to indicate the upper Moab Wash crossing is impassible.

4.0 Specific Actions for Flood Mitigation

Representatives of the RAC management will jointly observe the Colorado Riverbank, lower portion of the Moab Wash, and berms in the CA to identify low points, erosional features, or loose soils that may be subject to further erosion during flooding. Objects that may be disrupted during flooding will be noted to determine if relocation or protection in place is preferred.

The representatives will pay attention to possible hazardous materials (see list with security guards at the site entry kiosk) that may require special actions. The walkdown survey may result in corrective actions; any potential impacts/issues will be discussed with Operations/Site Managers, and appropriate actions will be taken.

5.0 Specific Actions after Flood Water Recedes

Once the well field is accessible, and there is no longer a threat of flooding or danger, the RAC will perform the following tasks:

- Assess any flood damage on the river berm and in the well field. Complete any necessary corrective actions.
- Assess the need to remove ponded water from the well field.
- Contact the electricians to re-install the VFDs on the CF5 wells and the ground-mounted transformer in the well field.
- Return flow meter face plates to all of the wells.
- Return data loggers/pressure transducers to wells.
- Identify areas of standing water and determine whether mosquito abatement is necessary.
- Have Subcontractor move pump house back to original location.
- Return radon cups/TLDs to the well field, if necessary.
- Resume well field extraction.
- Resume well field injection after the river flow drops to less than 15,000 cfs.
- Conduct a post-flood meeting to discuss sediment removal from the Moab Wash lower crossing or other areas of the site and the repair of roads and berms.
- Reinstall signs that were removed along the site boundary/river.
- Monitor irrigation needs and replace irrigation equipment when needed.
- Perform radiological surveys in areas that have been deemed to have the potential for cross contamination due to flooding.
- Return air monitoring stations to the well field.
- If radiological samples were collected before the flooding, recollect samples in those same areas as soon as it is feasible. Compare the pre-flood radiological data against the post-flood collected data to report any loss of contamination and to what extent.

6.0 Monitoring Colorado River Drought Conditions

Regional drought conditions can impact daily operations at the Moab UMTRA site at any point during the year; however, the drought outlook for the year is significantly dependent on winter conditions in the Colorado River Basin.

The freshwater intake structure is located on the bank of the Colorado River and supplies the site freshwater pond with water used for various site functions. The intake structure consists of a flat bottom concrete intake channel fitted with a raised portion separating the channel from the wet well. The intake channel feeds a wet well in which vertical turbine pumps direct water to the freshwater pond.

When the river flow is below the elevation of the of the intake channel, it is not possible to use the system to fill the pond. The elevation of the intake channel is 3,952.21 ft above mean sea level although annual variation of riverbed sediment levels may increase the intake elevation, preventing water flowing to the intake structure.

Several factors are used to determine drought conditions in the Colorado River Basin including, reservoir water storage capacity, soil moisture leading into the winter season, and precipitation/climate. The CBRFC (www.cbrfc.noaa.gov) presents this data on their website and conducts an Early Outlook Webinar in December for the up-coming winter/spring season. Water supply webinars take place monthly from January through April.

The CBRFC also updates an Upper Colorado Situational Awareness webpage with information concerning soil moisture, snow conditions, water year precipitation, and month to date precipitation.

Figure 5 shows the water supply forecast for June 1, 2018, during drought conditions. During 2018 the peak river flow was only 8,470 cfs, approximately one-third of the average, and flows decreased below 2,000 cfs by late-September. In addition, NOAA has a separate program called the National Integrated Drought Information System (NIDIS) (drought.gov), which includes a national drought early warning system.

6.1 Drought Reporting

The RAC will monitor the CBRFC and the NIDIS websites and report drought conditions to personnel at the POD Meeting.

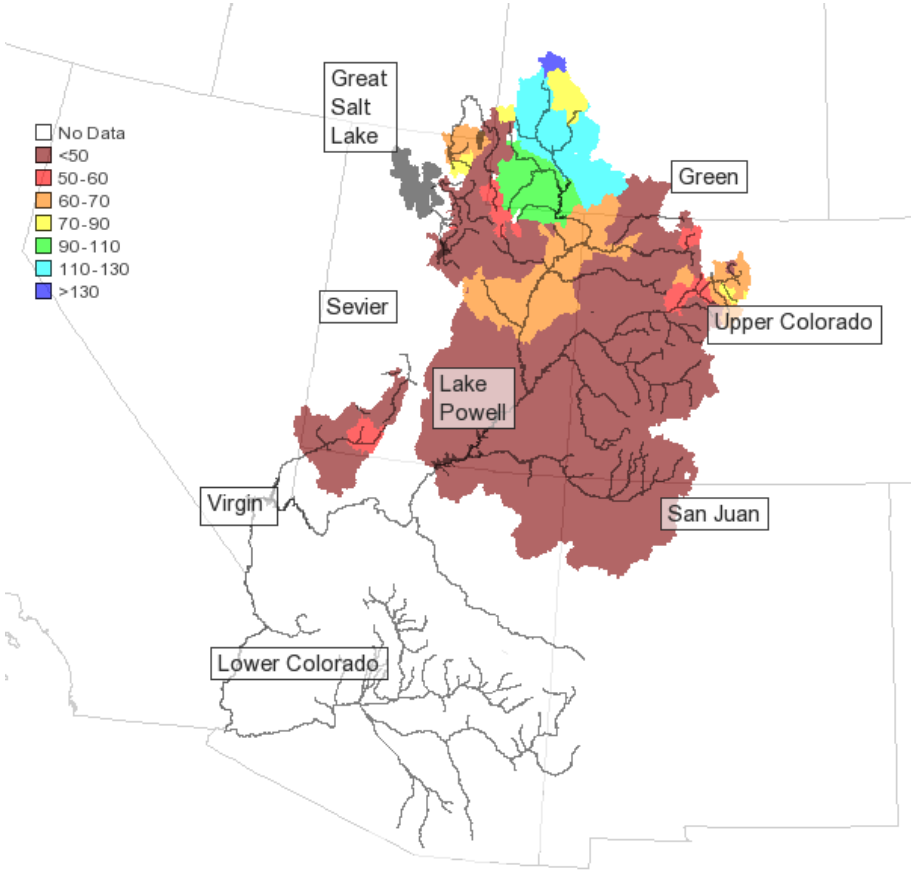

Figure 5. CBRFC Percent Average Water Supply Conditions for June 1, 2018

7.0 Drought Action Items

Drought planning action items have been determined to mitigate risk to project operations. When the CBRFC/NIDIS predicts below average river flow and drought conditions, the RAC will prepare for the listed actions.

- Assess the need for future irrigation water and revegetation activities that may require dust suppression and plan activities accordingly before the pump intake is impacted.
- Consider the possibility of secondary pump placement with the appropriate agencies, including U.S. Fish and Wildlife Services (USFWS) and the Utah Department of Natural Resources, as necessary.
- Assess the need for injection/surface water diversion operations in the well field.
- Meet with DOE personnel to discuss if any program metrics may be impacted (e.g., injection/irrigation).
- Consult with Environmental subject matter experts (SMEs) to evaluate any impacts to the Title 42 United States Code Section 4321, the National Environmental Protection Act (NEPA), or compliance obligations.
- Assess the need for sediment removal from the intake structure for the Colorado River Pump. Remove sediment as needed.
- Discuss the possibility of placing a secondary pump (diesel or electric) off the bank of the Colorado River pump with vendors.
- Assess the need for surfactants or stabilizers to add to the water used for dust suppression in both the contaminated and non-contaminated areas.
- Meet with DOE personnel to discuss if any program metrics may be impacted.
- Consult with Environmental SMEs to evaluate any impacts to NEPA or compliance obligations.

When the CRBFC forecasts a river flow of less than 1,800 cfs (approximate elevation of 3,952.9 ft msl) at the Cisco River Gage, the RAC will prepare for the listed items.

NOTE: If the river flow is expected to drop below 1,800 cfs for a short period or if the operational demand for freshwater is limited (such as in the winter months), the completion of these action items may not be required.

- Prioritize activities that require freshwater usage. Discuss the need for freshwater for site activities with the Operations/Site Manager and determine if the use of a secondary pump will impact the activities.
- Eliminate the use of freshwater for any non-essential activities.
- Continue to monitor the river flow and drought conditions on the CBRFC/NIDIS websites.
- Consult with Environmental SMEs to evaluate any impacts to NEPA or compliance obligations.
- Assess whether potable water should be used for operations (e.g., decontamination, container rinse system).
- Monitor the level of the freshwater pond during operations.
- Consult with Environmental SMEs to evaluate any impacts to NEPA or compliance obligations.
- Place a secondary pump and associated hose/equipment in the vicinity of freshwater pump.

NOTE: Any pump placed in the Colorado River must meet criteria established in the USFWS Biological Opinion: “Final Biological Opinion for Proposed Reclamation of the Atlas Mill Tailings Site in Moab, Utah.”

8.0 Specific Actions Once the Drought Risk Has Diminished

Once there is no longer a threat of drought and low river flow, the RAC will perform the following tasks:

- Resume operations that require freshwater usage.
- Continually monitor the climate conditions and the Colorado River water supply.
- Conduct a post-drought meeting to discuss the need for possible improvements.
- Remove the secondary pump.
- Resume operations that require freshwater usage.
- Participate in a post-drought meeting to discuss the need for possible improvements.

9.0 References

42 USC 4321 (United States Code), National Environmental Protection Act.

DOE (U.S. Department of Energy), *Moab UMTRA Project Emergency/Incident Response Plan* (DOE-EM/GJ1520).

DOE (U.S. Department of Energy), *Moab UMTRA Project Lockout/Tagout and Out of Service Procedures* (DOE-EM/GJ1552).

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Western Water Supply Forecasts (noaa.gov)

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Appendix A.
Surface Water Elevation vs. Site Elevation

Appendix A. Surface Water Elevation vs. Site Elevation

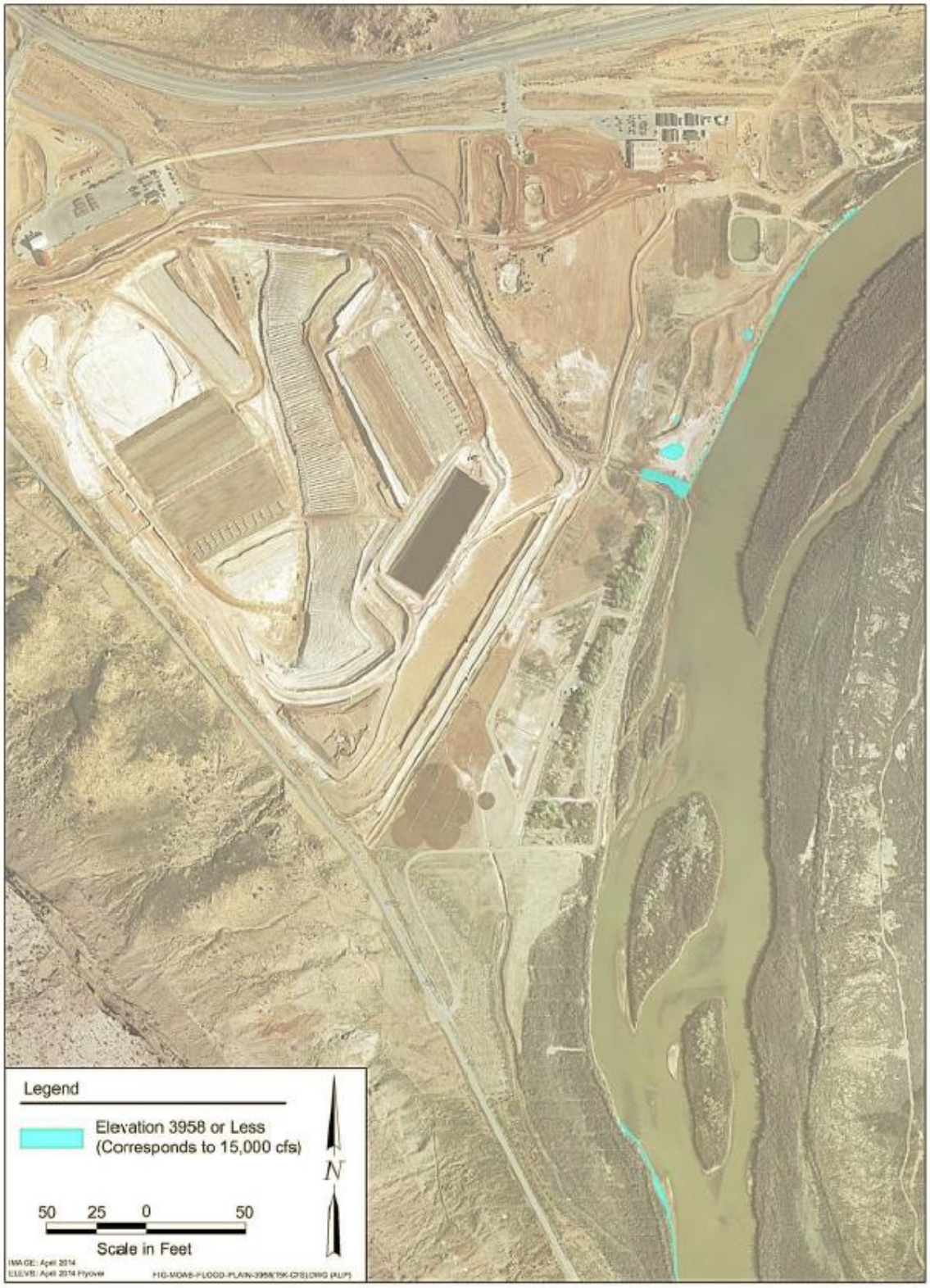

Figure A-1. Potential Impact of 15,000 cfs

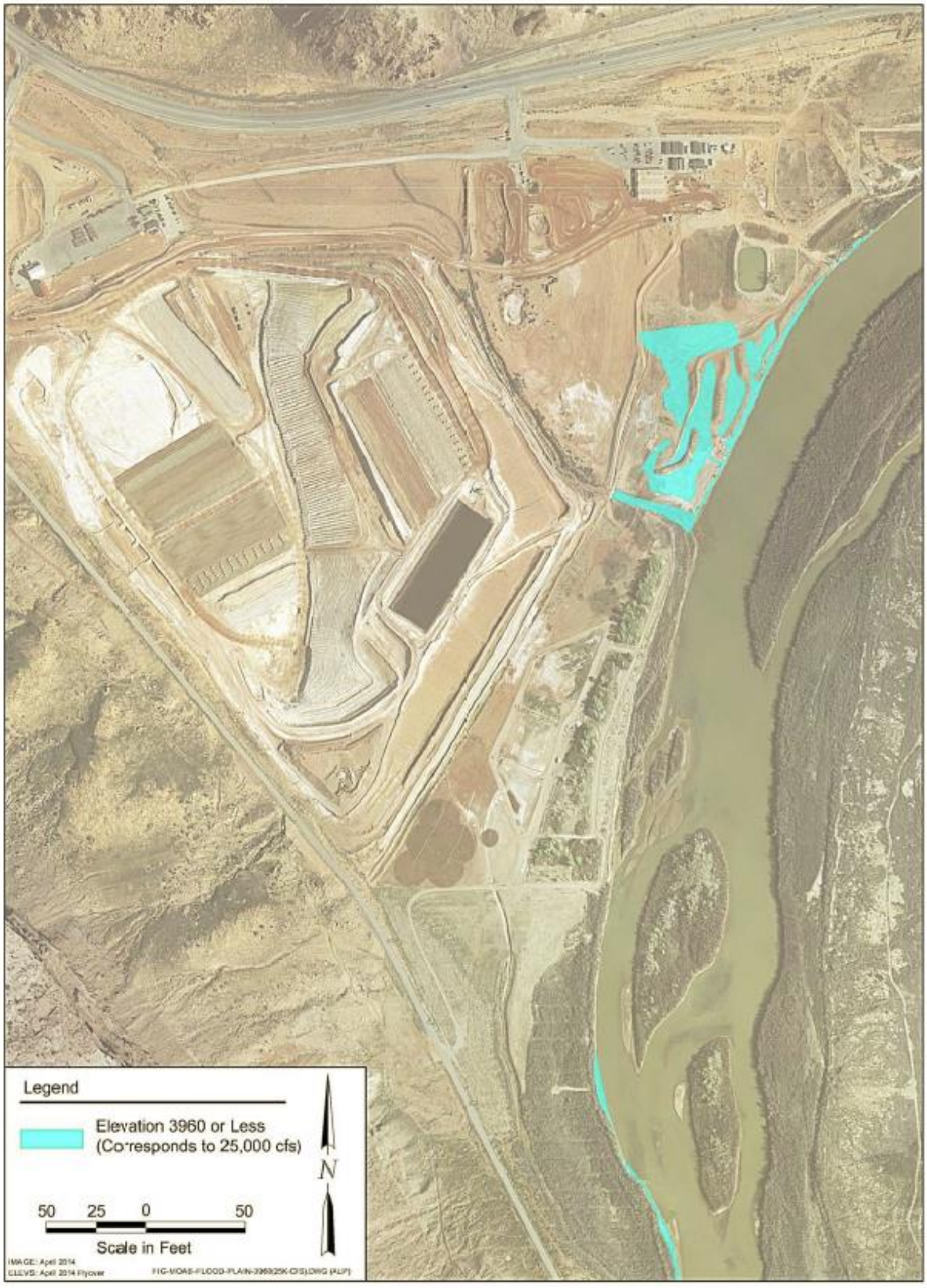

Figure A-2. Potential Impact of 25,000 cfs

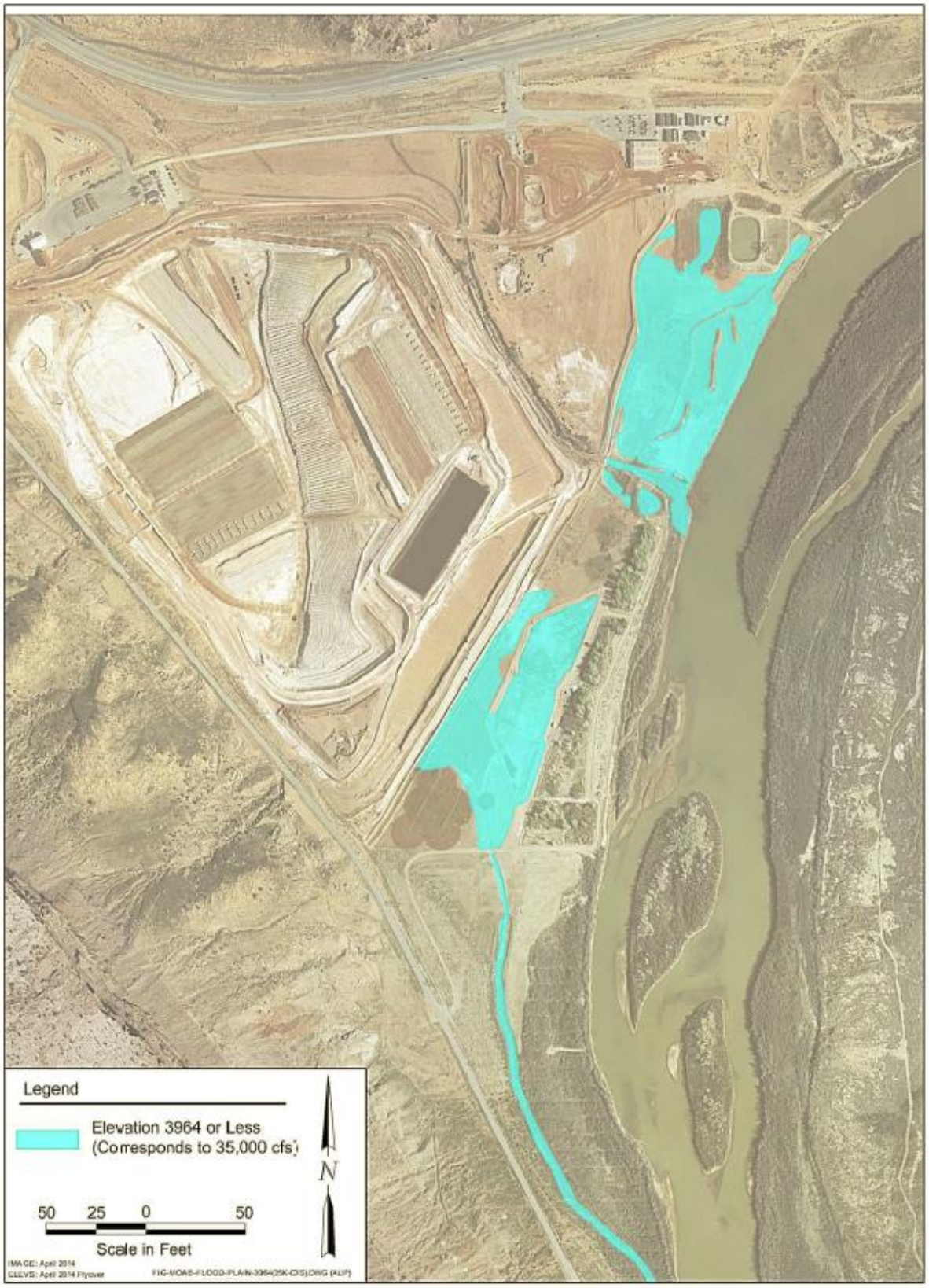

Figure A-3. Potential Impact of 35,000 cfs

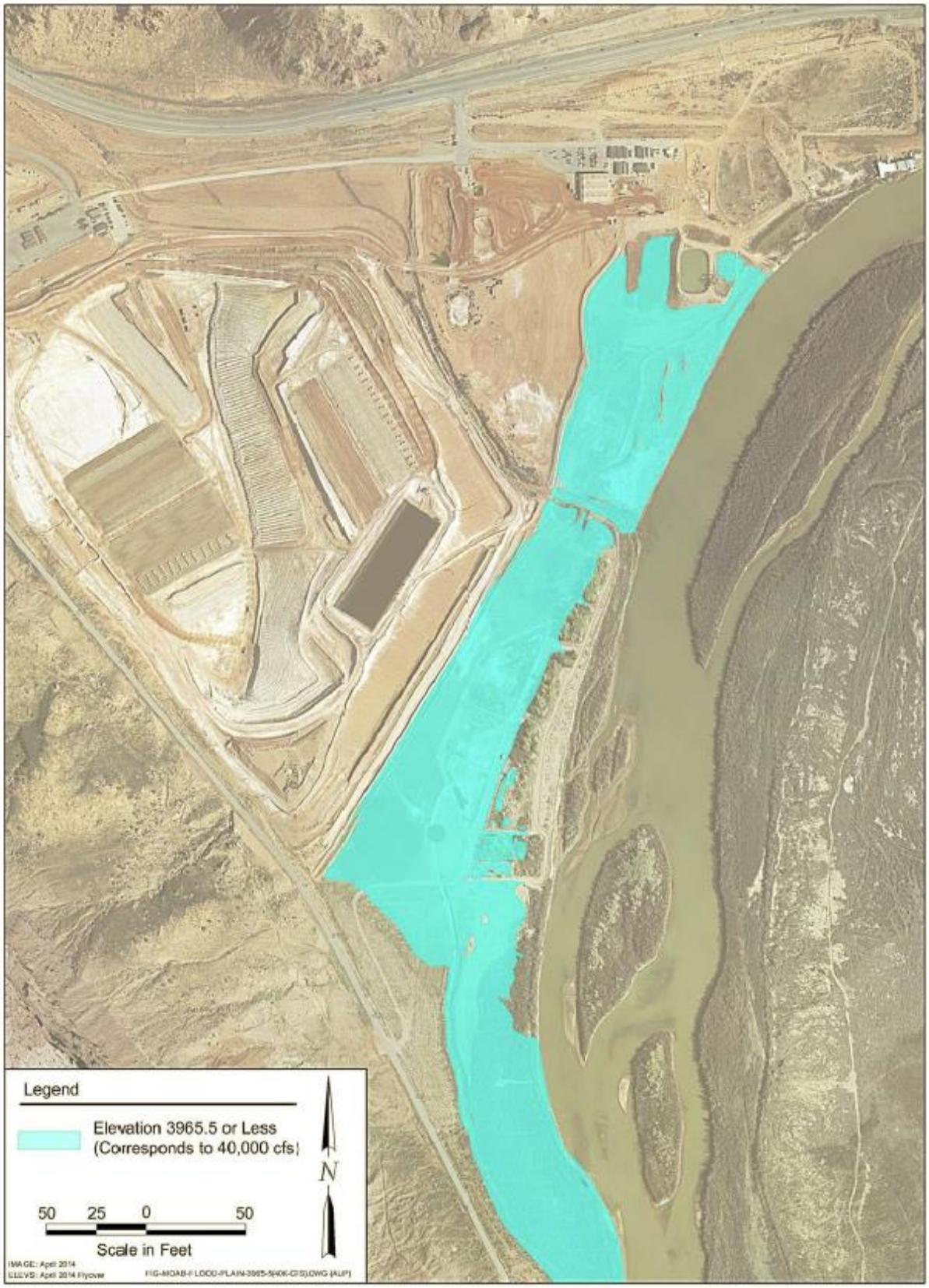

Figure A-4. Potential Impact of 40,000 cfs

Attachment 1.
Berm Inspection Form and Checklist

Attachment 1. Berm Inspection Form and Checklist

Berm Inspection Form and Checklist

INFORMATION:

Inspection Date: _____
Inspection Time: _____
Name of Inspector: _____
Weather Condition: _____
River Flow (cfs): _____

OBSERVATIONS:

☐ **Bank Caving** (*most failure occurs on river-ward slope*)

_____
_____

☐ **Cracking Parallel to Riverbank**

_____
_____

☐ **Slope Slumping/Bulging**

_____
_____

☐ **Soil Erosion**

_____
_____

☐ **Surface Water Seepage** (*wet areas on the berm*)

_____
_____

☐ **Animal Burrows**

_____
_____

WERE PHOTOS TAKEN?

☐ **Yes** ☐ **No**

DEFICIENCIES REPORTED TO:

_____
_____
_____

ADDITIONAL NOTES:

_____
_____
_____

MOAB UMTRA PROJECT CRESCENT JUNCTION

Berm Inspection Form and Checklist (*continued*)