

Office of Environmental Management – Grand Junction



Moab UMTRA Project
Climate Change Vulnerabilities and
Adaptation Plan

Revision 1

September 2016



U.S. Department
of Energy

Office of Environmental Management

**Moab UMTRA Project
Climate Change Vulnerabilities and Adaptation Plan**

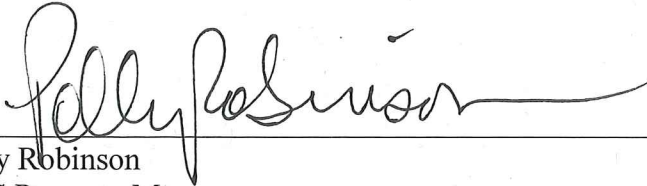
Revision 1

September 2016

**Moab UMTRA Project
Climate Change Vulnerabilities and Adaptation Plan**

Revision 1

Review and Approval



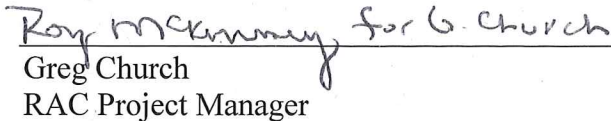
Polly Robinson
TAC Property Manager

9-15-2016
Date



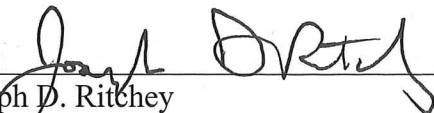
Edward B. Baker
RAC Environmental Compliance Manager

9-19-16
Date



Greg Church
RAC Project Manager

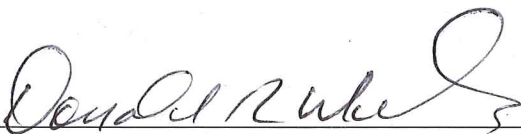
9-16-2016
Date



Joseph D. Ritchey
TAC Senior Program Manager

9/15/16
Date

Reviewed by:



Donald R. Metzler
DOE Moab Federal Project Director

9-20-16
Date

Revision History

Revision Number	Date	Reason for Revision
0	June 2016	Initial issue.
1	September 2016	Document revised from draft version to final HQ-approved document

Contents

Section	Page
1.0 Introduction.....	1
2.0 Location	2
3.0 Facilities and Systems	4
3.1 Facility Operations and Maintenance	4
3.2 Site Facilities.....	5
3.3 Disposal Cell.....	6
3.4 Fleet Management.....	6
3.5 IT Management.....	7
3.6 Production and Process Engineering	7
3.7 Security and Emergency Preparedness	8
3.8 Utility Management	8
3.9 Water Resources	9
3.10 Waste Management.....	9
4.0 References.....	10

Figure

Figure 1. Location of Moab Site and Crescent Junction Disposal Site	3
---	---

Photos

Photo 1. Moab Site Vegetation	3
Photo 2. Crescent Junction Site Vegetation.....	4

Table

Table 1. Facilities and Systems Climate Exposure Vulnerabilities	2
--	---

1.0 Introduction

The Moab Uranium Mill Tailings Remedial Action (UMTRA) Project site is a former uranium ore-processing facility located about 3 miles northwest of Moab in Grand County, Utah. In 2001, the U.S. Department of Energy (DOE) assumed ownership of the Moab site. The DOE Office of Environmental Management's Grand Junction, Colorado, office is responsible for managing the Moab Project.

The scope of the Project is to relocate the 16-million-ton uranium mill tailings pile and associated contaminated materials at the Moab site to a permanent disposal cell constructed near Crescent Junction, Utah. Materials are primarily moved by rail. Construction of the site infrastructure needed to haul and dispose of the mill tailings began in 2008. It was completed in fiscal year (FY) 2009, when the operation phase of the Project began.

The Project utilizes temporary facilities at the Moab and Crescent Junction sites for Project administration and operations, including the tailings container lidding and delidding facility and maintenance structures. Only one permanent building remains, which has approximately 30 percent utilization. Potentially, every structure will be demolished or removed at Project completion, which is currently planned for FY2025.

Pursuant to Executive Order 13653, "Preparing the United States for the Impacts of Climate Change," and Executive Order 13693, "Planning for Federal Sustainability in the Next Decade," DOE has directed its programs to consider and plan for the potential impacts of climate change. Of primary concern to the Moab Project are higher temperatures, drought, and extreme storm events; however, because the possibility of higher temperatures and drought are not forecasted to be appreciably higher until after anticipated Project completion, these risks are not considered very high for the Project.

For example, regional average temperatures are projected to rise by 2.5 to 5.5 °F by 2041 to 2070 and by 5.5 to 9.5 °F by 2070 to 2099, assuming continued growth in global emissions. Reduced snowpack and stream flows (caused by premature melt due to higher temperatures and dust and soot accumulation on the surface of the snowpack transported by winds from lowland regions), of 2 percent are expected to be possible from 2006-2035 and of 9 percent from 2041 to 2070.

The desert climate of Moab and Crescent Junction sites is characterized by hot summers and mild to cold winters. Temperature extremes have ranged from -24 °F in January 1930 to 114 °F in July 1989. The average annual temperature is about 56 °F for a fairly moderate climate. Average annual precipitation is 8.5 to 9 inches. The Moab site is located adjacent to the Colorado River. In recent decades, multiple dams have been constructed upriver, reducing the frequency and severity of flood events; however, in 2011, the site was partially flooded, and some operations were impacted. A river monitoring system was implemented to better anticipate flood events and respond proactively.

In 2014, a rockfall event resulted in a 3-month shipping shutdown. Mitigation actions included the construction of a barrier wall, procurement of a personnel shelter, and installation of a hillside monitoring radar system.

Low-growing desert grass/shrub communities are the predominant vegetation types on the sites, with minor quantities of riparian vegetation along the Colorado River. Low density populations of desert grasses, forbs, and shrubs occur on the upland soils at both sites.

Using climate forecasting data from the National Oceanic and Atmospheric Administration, National Climatic Data Center, a vulnerability assessment matrix was developed based upon the potential risks of most concern to the southwestern region of the United States, where the Project sites are located (see Table 1). Further narrative is provided within this document.

Table 1. Facilities and Systems Climate Exposure Vulnerabilities

Facility/System	High Temperatures	Flooding	Wildfire	Drought	Storms and Winds
Facility Operations & Maintenance	Medium	Medium	Low	Low	Medium
Disposal Cell Operations	Medium	Medium	Low	Medium	Medium
Fleet Management	Low	Low	Low	Low	Low
IT Management	Medium	Low	Low	Low	Medium
Production & Process Engineering	Medium	Medium	Low	Low	Medium
Security & Emergency Preparedness	Low	Low	Low	Low	Low
Utility Management	Medium	Low	Low	Low	Medium
Water Resources	Low	Low	Low	Medium	Low
Waste Management	Low	Medium	Low	Low	Medium

2.0 Location

Figure 1 shows the general location of the sites relative to the city of Moab and other geographical locations. Photos 1 and 2 show the Moab and Crescent Junction site vegetation, respectively.

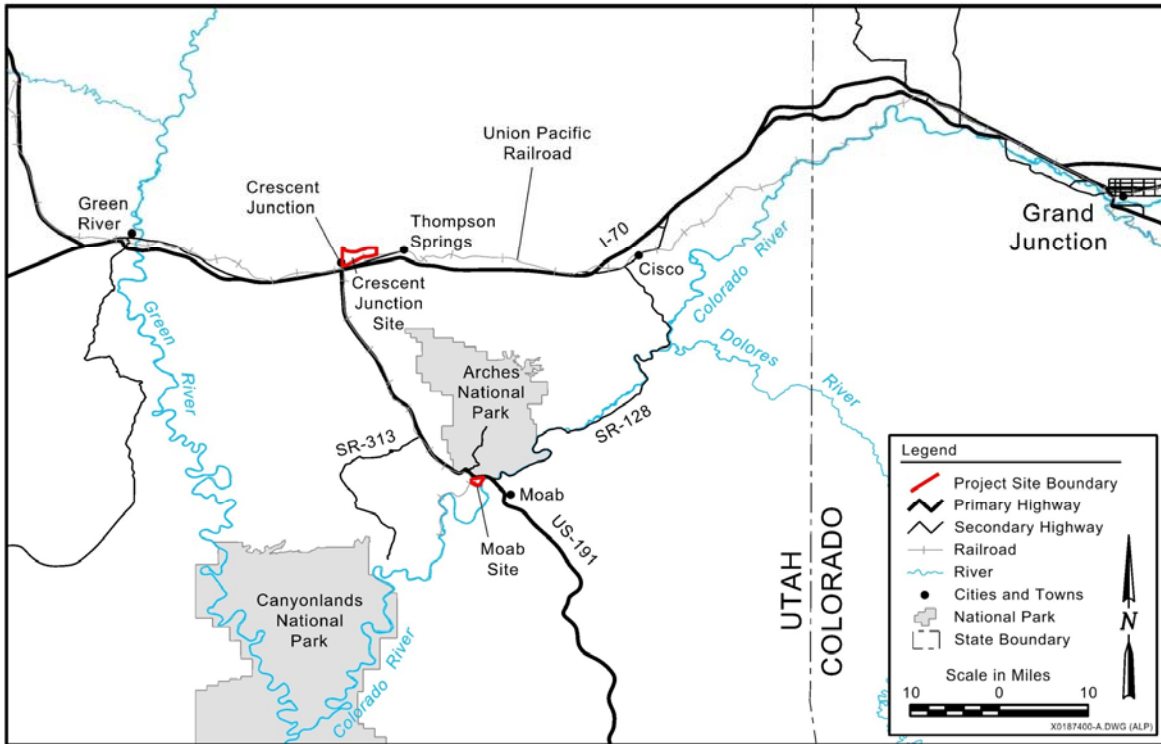


Figure 1. Location of Moab Site and Crescent Junction Disposal Site



Photo 1. Moab Site Vegetation



Photo 2. Crescent Junction Site Vegetation

3.0 Facilities and Systems

3.1 Facility Operations and Maintenance

Facilities infrastructure at the Moab site is comprised of:

- Trailers that provide office space, restrooms, showers, break rooms, radiological access control, security and site access control, and conference areas.
- Two canvas-covered maintenance structures.
- A lidding/delidding structure.
- A constructed warehouse.
- Remediation wells, either for extracting contaminated ground water or injecting freshwater (diverted river water) in addition to various monitoring wells.
- Freshwater settling and storage pond, extraction tanks, pump and pump house, and four associated pumping systems.
- A freshwater intake structure and associated pumps.
- A decontamination pad to clean, survey, and release vehicles and equipment from the contamination area.
- Roads, parking lots, and a rail load-out area.
- Utilities, including electric power line, raw water pump system, septic system, and telephone line.

- Fencing.
- Underpass.
- Information Technology and Telecommunications infrastructure including servers, network equipment, and cabling.

Facilities infrastructure at the Crescent Junction site includes:

- Trailers that provide office space, security and site access control, restrooms, break rooms, and a conference area.
- A canvas-covered maintenance structure.
- CA shade structure.
- Roads, parking lot, and a rail load-out area.
- Storm water retention ponds.
- Construction and domestic waterlines.
- River inlet pumping station, sediment pond, and four booster stations.
- Freshwater storage pond.
- Disposal cell.
- Utilities, including electric power line, raw and domestic water lines, septic system, and telephone line.
- Fencing.
- Information Technology and Telecommunications infrastructure including servers, network equipment, and cabling.

3.2 Site Facilities

High Temperatures

Higher temperatures may require the addition of reflective roofing material on the trailers to reduce interior temperatures and control energy consumption.

Flooding

Additional maintenance and repairs may be needed to better protect the facilities from intense precipitation events and/or high river flows.

Wildfire

Although there may be a low risk (probability and consequence), a wildfire could impact revegetated areas of the site(s).

Drought

Water is required to obtain the proper moisture and density during placement and compaction of the residual radiological material.

Storms and Winds

Additional maintenance and repairs may be needed to better protect the facilities from high winds and lightning strikes. Severe weather may hinder site operations, railroad transportation, and remediation activities.

3.3 Disposal Cell Operations

High Temperatures

Disposal cell operations may be adversely affected by higher temperatures, requiring workforce heat stress monitoring, work stoppages, and schedule delays.

Flooding

Disposal cell operations may be impacted by flooding that could delay placement activities due to frozen ground and mud conditions. The *Moab UMTRA Project Crescent Junction Storm Water Pollution Prevention Plan* (DOE-EM/GJRAC1238) addresses storm water controls.

Wildfire

Some risk of wildfires exists in years of high grass.

Drought

Disposal cell operations may be impacted if water becomes unavailable due to low water levels of the Green River. Water is required to obtain the proper moisture density for placement and compaction of the residual radiological material.

Storms and Winds

Fugitive dust can limit operations during high winds. The Project's *Moab UMTRA Project Crescent Junction Fugitive Dust Control Plan* (DOE-EM/GJRAC1235) addresses this issue, which is mitigated through the application of water and may require a temporary operations shutdown while the dust control measures are implemented.

3.4 Fleet Management

Fleet vehicles are primarily comprised of off-road-capable vehicles. This type of vehicle will continue to be required for unimproved roads and changing weather conditions.

High Temperatures

No significant impact.

Flooding

No significant impact.

Wildfire

No significant impact due to low risk of wildfires.

Drought

No significant impact.

Storms and Winds

Some risk of exterior damage to vehicles resulting from hail and/or high winds could result in higher Project fleet costs.

3.5 IT Management

High Temperatures

Data centers may require more energy to maintain proper operating temperatures. Backup generators or additional power delivery systems may be needed. These issues are addressed in the Project's *System Security Plan for the Contractor General Support System (GSS)* (PL-240-08) (Official Use Only).

Flooding

No significant impact.

Wildfire

No significant impact due to low risk of wildfires.

Drought

No significant impact.

Storms and Winds

Periodic power outages may increase over time, so backup systems must be closely supervised. Data centers may require greater protection from lightning strikes and energy surges. Backup generators or additional power delivery systems may be needed.

Telecommunications are housed in the data centers and could also be affected by any adverse impacts to the data center. External telecommunications infrastructure may be adversely impacted by storm events.

3.6 Production and Process Engineering

High Temperatures

Production and operations may be adversely affected by higher temperatures requiring workforce heat stress monitoring, work stoppages, and schedule delays.

Flooding

More frequent and intense precipitation events may require work stoppages and shutdowns due to heavy equipment mobility issues. In FY2012, the Project worked with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service to gain support for the creation of wetland plant communities in an area particularly prone to flooding. The berm at the toe of the tailings pile may need to be increased in the event of higher river water. The *Moab UMTRA Project Flood Mitigation Plan* (DOE-EM/GJ1640) addresses this issue.

Wildfire

No significant impact due to low risk of wildfires.

Drought

Tailings pile operations may be impacted if water becomes unavailable due to low water levels of the Colorado River.

Storms and Winds

More frequent and larger storm and wind events may also require work stoppages and shutdowns. High winds occur frequently in the spring and can cause power outages and stop gantry crane and other heavy equipment operations.

A previous rockfall event resulted in a 3-month shipping shutdown. Mitigation actions included the construction of a barrier wall, procurement of a personnel shelter, installation of a hillside monitoring radar system, and relocation of some loading activities. The *Moab UMTRA Project Hillside Monitoring Plan* (DOE-EM/GJ2164) addresses these issues

Drought-resistant plants are expected to help stabilize revegetated soils during high wind events.

3.7 Security and Emergency Preparedness

High Temperatures

No significant impact.

Flooding

Security and emergency preparedness may be impacted by flooding if high water blocks access to or egress from the sites. This issue is addressed in the *Moab UMTRA Project Emergency/Incident Response Plan* (DOE-EM/GJ1520) and the *Flood Mitigation Plan*.

Wildfire

No significant impact due to low risk of wildfires.

Drought

No significant impact.

Storms and Winds

An increase in the number and severity of storm events may impose an increase in work stoppages and shutdowns due to lightning and high winds. High winds and lightning are discussed under emergency actions in the *Emergency/Incident Response Plan*.

3.8 Utility Management

Electrical power to the sites is provided by Rocky Mountain Power. The electrical distribution systems at the Moab and Crescent Junction sites include poles, lights, conduit, lines, and junction boxes.

High Temperatures

Utility costs will increase as temperatures rise and more demand is placed upon aging infrastructure.

Flooding

Well field operations cease when a flood event occurs. The *Flood Mitigation Plan* addresses this issue.

Wildfire

No significant impact due to low risk of wildfires.

Drought

No significant impact.

Storms and Winds

More frequent storms and high winds may result in power outages of varying lengths of time.

3.9 Water Resources

The Moab site non-potable water supply system currently consists of river pumps, wells, a storage pond, a freshwater infiltration trench, a sand filter, and a water truck-fill station. The Crescent Junction site construction water system consists of a 21-mile pipeline and associated pumping stations that transport water from the Green River to a retention pond that gravity feeds a water truck-fill station. In addition, when storm water is available in appreciable quantities, it is used for construction purposes.

High Temperatures

More water will be required for dust suppression as higher temperatures become more frequent.

Flooding

Site operations actively control the water levels in the freshwater and retention water ponds, reducing the Project's vulnerability to extreme weather events. Storm water sediment basins have been designed in a very conservative manner to better withstand beyond design basis storms.

Wildfire

There is a low risk of wildfires. However, the Green River pumping station could be damaged if subjected to a burn event and water supply to the Crescent Junction site impacted for a short period of time.

Drought

While the Project owns a large quantity of senior water rights, political pressure could be brought against those rights by downstream communities if an extended period of drought were to occur. Well field operations may be impacted if water becomes unavailable due to low water levels of the Colorado River. Conditioning of tailings, dust control, and irrigation of the revegetation areas may be impacted.

Storms and Winds

More water will be required for dust suppression as higher winds become more frequent.

3.10 Waste Management**High Temperatures**

No significant impact.

Flooding

Contaminated runoff from the Moab site mill tailings pile would be of concern during a flood event. The *Moab UMTRA Project Moab Storm Water Pollution Prevention Plan* (DOE-EM/GJRAC1475) details what procedures are in place to address this concern.

Wildfire

No significant impact due to low risk of wildfires.

Drought

No significant impact.

Storms and Winds

High winds may result in blowing contaminated dust from the Moab site mill tailings pile and the Crescent Junction disposal cell. The *Moab UMTRA Project Moab Fugitive Dust Control Plan* (DOE-EM/GJRAC2072) and *Crescent Junction Fugitive Dust Control Plan* address this issue.

4.0 References

DOE (U.S. Department of Energy), *Moab UMTRA Project Crescent Junction Fugitive Dust Control Plan* (DOE-EM/GJRAC1235).

DOE (U.S. Department of Energy), *Moab UMTRA Project Crescent Junction Storm Water Pollution Prevention Plan* (DOE-EM/GJRAC1238).

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 Flood Mitigation Plan* (DOE-EM/GJ1640).

DOE (U.S. Department of Energy), *Moab UMTRA Project Hillside Monitoring Plan* (DOE-EM/GJ2164).

DOE (U.S. Department of Energy), *Moab UMTRA Project Moab Fugitive Dust Control Plan* (DOE-EM/GJRAC2072).

DOE (U.S. Department of Energy), *Moab UMTRA Project Moab Storm Water Pollution Prevention Plan* (DOE-EM/GJRAC1475).

DOE (U.S. Department of Energy), *Moab UMTRA Project Moab Fugitive Dust Control Plan* (DOE-EM/GJRAC2072).

DOE (U.S. Department of Energy), *Moab UMTRA Project System Security Plan for the Contractor General Support System (GSS)* (PL-240-08) (Official Use Only).

Executive Order 13653, "Preparing the United States for the Impacts of Climate Change."

Executive Order 13693, "Planning for Federal Sustainability in the Next Decade."