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Moab Project

Moab Project Site
Storm Water Pollution Prevention Plan

May 2002

Prepared for
U.S. Department of Energy
Idaho Operations Office
Grand Junction Office

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1.0 Introduction

This *Storm Water Pollution Prevention Plan* (SWP^3) is prepared in accordance with the requirements of the *Utah Pollutant Discharge Elimination System (UPDES), Storm Water General Permit for Construction Activities*. State of Utah regulations require a UPDES storm water discharge permit for "… construction activities including clearing, grading, and excavating…" that result in a land disturbance of five or more acres (U.A.C. R317-8-3.9(6)(d)(10)). The intent of the regulations that apply to construction activities/sites is to control the discharge of sediment from disturbed areas.

A significant portion of the Moab Project Site (Moab site) is currently in a disturbed and unstable condition due to the relatively recent remedial actions and stabilization activities (i.e., construction activities) conducted on-site. Since 1995, it is estimated that approximately 200 acres of the Moab site have been disturbed and are characterized by unstable soils which are susceptible/vulnerable to erosion. Due to past construction activities, and future activities anticipated at the Moab site, a UPDES Storm Water Discharge Permit is required for the Moab site.

Accordingly, this SWP^3 has been prepared to address the activities and operations conducted by the U.S. Department of Energy's Grand Junction Office (DOE–GJO) at the Moab site. Specifically, this plan complies with the State of Utah rules for controlling storm water discharges associated with industrial activity (i.e., construction sites) as defined at U.A.C. R317-8-3.9(6)(d)(10). The primary objective of this plan is to formulate a strategy for controlling, to the greatest extent practicable, storm water discharges, and the off-site release of sediment and contaminants (i.e, uranium mill tailings) from the Moab site. This will be accomplished by identifying specific sources (areas) and activities at the Moab site which have the highest potential for erosion and the discharge of sediment and contaminants. This plan describes the engineering controls and Best Management Practices (BMPs) necessary to minimize and control storm water discharges from those sources and activities.

1.1 Site Location

The Moab site is a former uranium-ore-processing facility located approximately 3 miles northwest of the city of Moab in Grand County, Utah (Figure 1). The Moab site is irregularly shaped; a uranium mill tailings pile occupies much of the western portion of the site. The Moab site is bordered on the north and southwest by steep sandstone cliffs. The Colorado River forms the southeastern boundary of the site. U.S. Highway 191 parallels the northern site boundary, and State Highway 279 parallels the southwestern boundary. Arches National Park is located adjacent to the northern site boundary, and Canyonlands National Park is located approximately 12 miles to the southwest. The Union Pacific Railroad traverses a small section of the site just west of Highway 279, then enters a tunnel and emerges several miles to the southwest. Moab Wash runs in a southeasterly direction through the center of the site and joins with the Colorado River. The wash is an ephemeral stream that flows only after precipitation or during snowmelt. The entire site covers approximately 400 acres of which 130 acres are covered by the tailings pile. Figure 2 shows the major physiographic features of the Moab site.

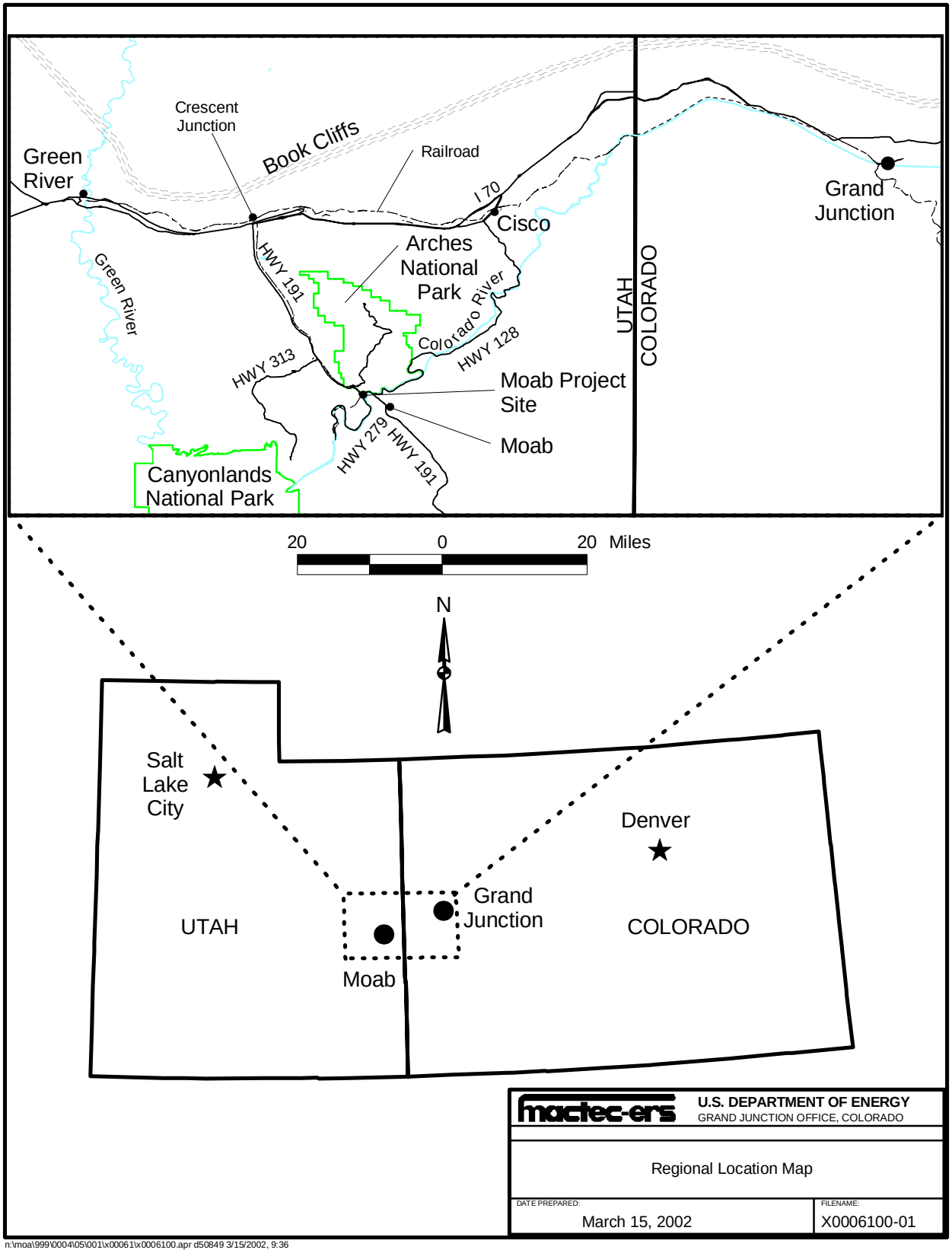

Figure 1. Regional Location Map

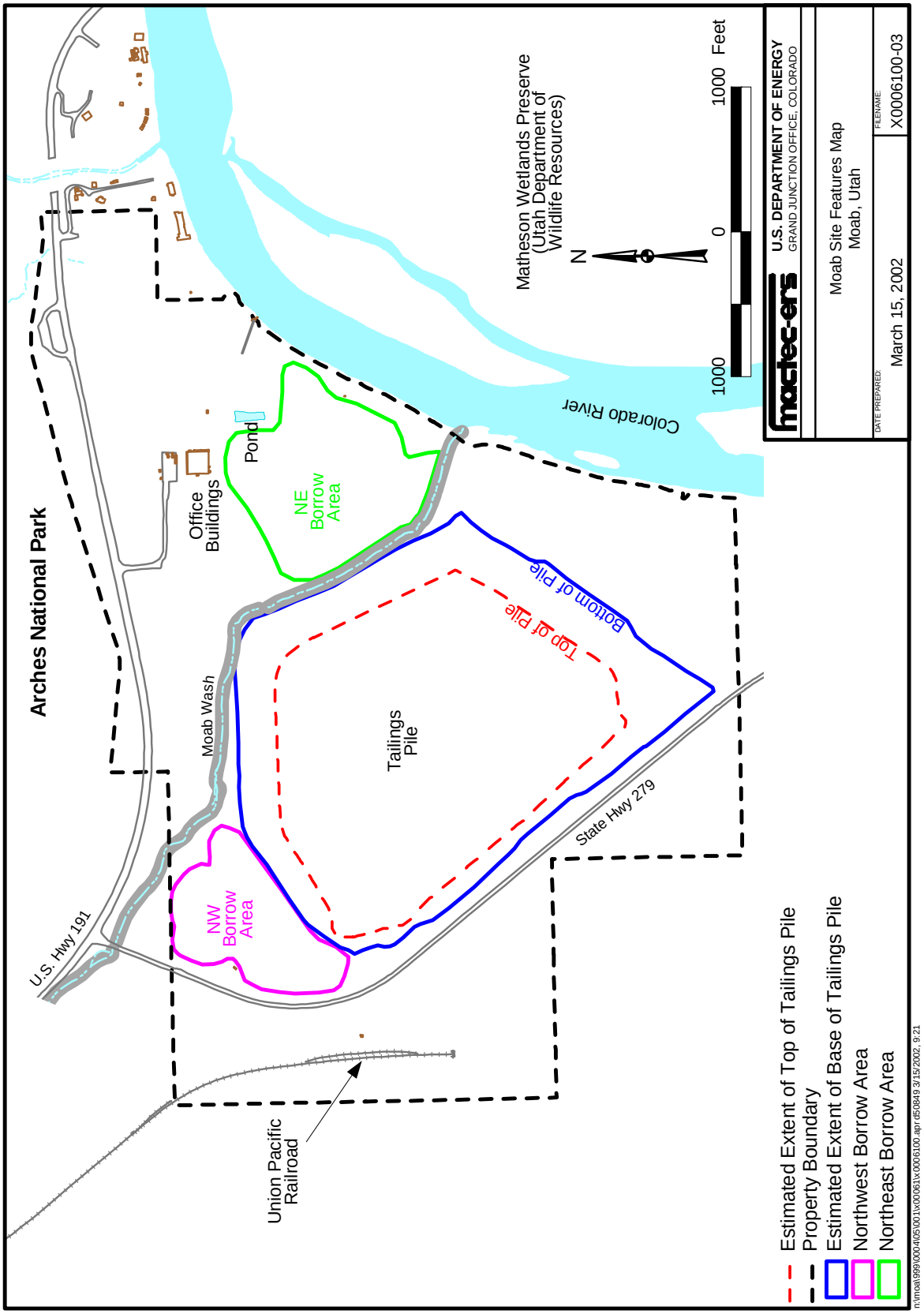

Figure 2. Site Features Map

1.2 Site History

Originally, the property and facility were owned by the Uranium Reduction Company (URC) and were regulated by the Atomic Energy Commission, predecessor agency to DOE. In 1956, URC began operation of the Moab mill. In 1962, the Atlas Minerals Corporation acquired URC and operated the mill until operations ceased in 1984. Between 1956 and 1984, uranium mill tailings were disposed of on site in an unlined impoundment. Decommissioning of the mill began in 1988; between 1989 and 1995, an interim cover was placed on the impoundment. In 1996, Atlas proposed to reclaim the tailings pile for permanent disposal in its current location. However, Atlas declared bankruptcy in 1998, and subsequently, the U.S. Nuclear Regulatory Commission (NRC) appointed Pricewaterhouse Coopers (PwC) as the trustee of the Moab Mill Reclamation Trust and licensee for the site. Ownership and responsibility of the Moab site was transferred from PwC to DOE by passage of the Floyd D. Spence National Defense Authorization Act (H.R. 5408, 2001). This act further designates that the Moab site undergo remediation in accordance with Title I of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA; 42 U.S.C. 7912) as amended. The DOE-GJO took possession of the Moab site on October 25, 2001.

1.3 Climatology

The climate of the Moab region is semiarid. Average annual temperature is approximately 14 degrees Celsius (ºC) (57 degrees Fahrenheit [ºF]). January is the coldest month, averaging –1ºC (30ºF), and July is the warmest month, averaging 28ºC (82ºF). Extreme temperatures have ranged from -28ºC (-18ºF) in January 1963 to 44ºC (111ºF), which has occurred more than once (in July 1953 and on earlier occasions). Temperatures of 32ºC (90ºF) or higher occur about 100 days per year, with about 80 percent of those occurring during June, July, and August. Temperatures below freezing 0ºC (32ºF) occur on the average of 123 days of the year with about 80 percent of those occurring during November through February.

Average annual precipitation at Moab is 20 centimeters (cm) (8 inches), distributed approximately equally among the seasons with slight peaks during the spring and fall. Potential evapotranspiration (about 127 cm [50 inches] per year) greatly exceeds annual precipitation. Mean pan evaporation (about 140 cm [55 inches] per year) and lake evaporation (about 97 cm [38 inches] per year) also greatly exceeds the total annual precipitation.

Low humidity in the region limits fog occurrences (visibility less than 0.5 kilometer [km] [0.3 mi]) to fewer than 10 days per year. Thunderstorms occur about 40 days per year. Hail occurs approximately 3 days per year.

Prevailing winds in the Moab region are to the southeast. Cold air drainage at the Moab site can occur from the northwest under very stable conditions.

1.4 Regulatory Requirements

As required by the State of Utah UPDES *Storm Water General Permit for Construction Activities,* this Storm Water Pollution Prevention Plan (SWP^3) is prepared to control storm water discharges associated with the construction activities occurring at the Moab site. The State of Utah regulations applicable to storm water discharges at this site, and the associated permit requirements are found in Section R317-8-3.9 (U.A.C., September 2001).

In addition to being regulated as a "construction site," the Moab site also meets the regulatory definition of a facility that was previously engaged in the mineral industry as described in the Standard Industrial Classification (SIC) codes 10 through 14 (Metal Mining). This grouping of industries includes both mining and milling facilities. The SIC code 10.94 specifically identifies facilities which mined, milled, or otherwise processed uranium, radium, or vanadium ores. These facilities are specifically regulated at Section R317-8-3.9(6)(d)(3) (U.A.C., September 2001). These regulations stipulate that a storm water discharge permit is required for facilities where storm water may "… come into contact with any overburden, raw materials, intermediate products, finished products, byproducts or waste products located on the site of such operations."

Although significant quantities of uranium mill tailings remain stockpiled on-site, an interim cover over the tailings stockpile has temporarily secured the tailings from erosion and any subsequent transportation by storm water runoff. The off-site discharge of sediment from areas previously disturbed at the Moab site, as well as from future construction activities (i.e., "clearing, grading, and excavation"), is the primary concern with respect to storm water discharges at the Moab site. Consequently, storm water discharges from the Moab site will be addressed under the UPDES *Storm Water General Permit for Construction Activities.*

The UPDES *Storm Water General Permit for Construction Activities* prescribes the content and information to be reported in a site-specific SWP^3. The information provided in this SWP^3 complies with the format and outline required by the UPDES *Storm Water General Permit for Construction Activities.*

In accordance with the terms and conditions of the UPDES *Storm Water General Permit for Construction Activities*, this SWP^3 will be kept on-site, and will be made available to the *Executive Secretary* (or authorized representative) of the Utah Water Quality Board; interested members of the public; and local government officials. There is no requirement to submit this plan to the State for approval.

1.5 Environmental Monitoring

In addition to complying with the State of Utah UPDES storm water discharge requirements, this SWP^3 is consistent with the intent of complying with various DOE Orders. DOE Order 5400.1, *General Environmental Protection Program*, specifies that effluent monitoring and environmental surveillance be conducted to determine the effect of DOE activities upon "…on-site and offsite environmental and natural resources," and to "…verify compliance with applicable Federal, State, and local effluent regulations and DOE Orders." Similarly, DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, requires that DOE control and monitor radiological exposures from its facilities and activities.

The physical form of the radioactive contaminants (i.e., uranium mill tailings) located at the Moab site is best described as a fine-grained, sand-like material, which is highly susceptible to wind and water erosion. Consequently, one of DOE's major objectives at the Moab site is to control and contain the off-site transportation of radiological contaminants resulting from the erosive forces of wind and storm water. This SWP^3 outlines DOE's strategy for controlling the off-site transportation of sediment and uranium mill tailings resulting from storm water runoff at the Moab site.

DOE's strategy for controlling storm water discharges will be to contain and prevent off-site discharge. This will be accomplished using various physical and engineering controls (i.e., sediment/storm water runoff retention basins, revegetating denuded areas, slope reduction, anchored straw bales, silt fencing, diverting off-site water away from site boundaries, chemical-based soil stabilizing agents, etc.).

2.0 Site Source Information

2.1 Site Ownership and Physical Location

As required by the Utah Division of Water Quality, the following site ownership information is provided:

1) **Name of Operation:** Moab Project Site, formerly known as the Atlas Uranium Mill.

2) **Owner/Operator Information:** U.S. Department of Energy, Grand Junction Office. 2597 B3/4 Road, Grand Junction, Colorado 81503. DOE Contact: Joel Berwick (970) 248-6020. On-Site Contact: Irwin Stewart (435) 259- 5131.

3) **Physical Address of Operations:** 1871 N. Highway 191, Moab, Utah 84532.

4) **UTM Coordinates or Longitude/Latitude of Operation (at Main Offices):**

Latitude:	38 degrees, 36 minutes, 17.53329 seconds - North
Longitude:	109 degrees, 35 minutes, 23.47893 seconds - West
Elevation:	3977.6 US feet above MSL

2.2 Description of Potential Storm Water Pollutants

The Moab site consists of approximately 400 acres. Within this area, there is a high degree of variation with respect to factors which can influence the amount of storm water runoff and pollutants that might be expected (e.g., plant growth, terrain, levels of on-going activity, levels of previous disturbance, runoff coefficients, etc.). For the purposes of discussing those areas which have the greatest potential for contributing pollutants during a storm event, the site has been categorized into areas of "high, medium, or low" potential (Figure 3).

2.2.1 High Potential Source Areas

Certain portions of the Moab site are considered to be significant sources of storm water pollutants, and require more active controls than other areas. These areas are characterized by: loose, poorly consolidated sediments, poor vegetative cover, high levels of previous disturbance, high levels of future/anticipated activity or disturbance, or areas with significant residual radioactive contamination remaining. Because both the native soils and uranium mill tailings possess a sand-like texture, these materials are easily eroded. These areas include the entire mill tailings pile (approximately 130 acres), the two major soil borrow areas (approximately 50 acres combined), and the Moab Wash corridor (approximately 10 acres). Consequently, DOE has designated these areas as having the highest priority in their storm water pollution prevention strategy. Cumulatively, these high-potential areas comprise approximately 45 percent of the total site surface area.

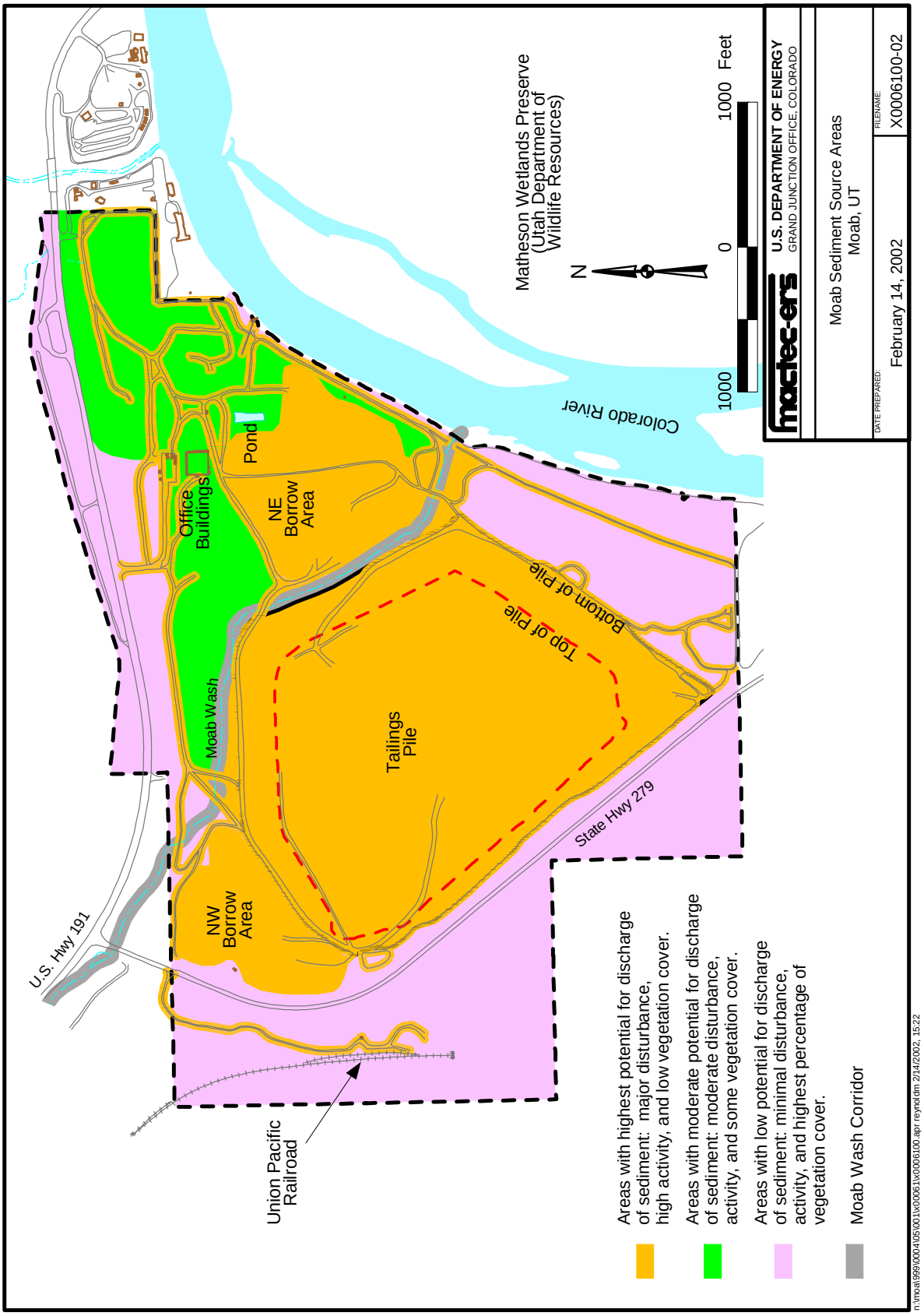

Figure 3. Moab Sediment Source Areas

Tailings Pile and Temporary Cover

Although the former mill is no longer active, a total of approximately 11.8 million tons of uranium mill tailings and surface contaminated soils remain at the Moab site. The majority of the mill tailings are contained within an on-site tailings pile, the footprint of which covers approximately 130 acres. An interim cover of the tailings pile was completed in 1995. Soils from on-site borrow areas were used as the source of material used for the cover. Most of the soils used for the cover are contaminated with low-level radioactive residual contamination resulting from previous milling activities conducted at the site. A portion of the cover was seeded in 1999; however, presently, there is no vegetation established on the cell. The majority of materials on the surface of the tailings pile consist of poorly consolidated soils, and therefore are considered to be a "high-potential" source of storm water pollutants at the Moab site.

Moab Wash Corridor

Moab Wash, a tributary to the Colorado River, is an ephemeral stream, flowing only during or after major storm events. Moab Wash bisects the entire Moab site running from northwest to southeast prior to its discharge into the Colorado River. Although Moab Wash is the major drainage feature for on-site surface runoff, it is also transports and discharges sediment collected from a very large off-site area. During major storm events, it is impractical to control/prevent the discharge of sediment to the Colorado River from Moab Wash, as most of this material is collected off-site and upstream of the Moab site. However, it is DOE's goal to control and prevent storm water runoff and/or sediment originating on the Moab site property from entering Moab Wash. As a result, the only sediment that will be discharged to the Colorado River through Moab Wash, will be sediment and runoff collected from the watershed areas upstream from the Moab site.

On-Site Soil Borrow Areas

Two on-site borrow areas (i.e., the north west and the north east borrow areas) were used to supply material for the interim cover that was placed on the tailings pile. These areas were never reclaimed or stabilized and are essentially void of any plant or vegetation cover. Although the soils are poorly consolidated, and are considered to be major sediment sources during storm events at the Moab site, these areas are now topographical depressions due to the excavation of soils from these areas. Consequently, these structures serve as on-site storm water/sediment retention basins, collecting runoff and sediment from the north and northeastern portions of the site during major storm events.

Combined, the tailings pile, the two borrow areas, and the Moab Wash corridor comprise approximately 45 percent of the total land surface of the Moab site. The remainder of site is not considered to be a significant source of storm water discharges due to: 1) The low level of past disturbances in these areas; 2) The low levels and quantity of contaminated soils identified within these areas; 3) The low levels of anticipated activity occurring in these areas; and 4), A greater percentage of vegetative cover present within these areas.

2.2.2 Moderate Potential Source Areas

Source areas identified as a "moderate-potential" will require a less aggressive approach to storm water control. These areas are characterized by more stable soil conditions, a greater percentage of vegetative cover, lesser quantities of radiologically contaminated materials, and moderate levels of activity. As shown in Figure 3, these areas are found mostly in the northeast and north central portions of the Moab site. Cumulatively, these moderate-potential areas comprise approximately 15 percent of the total site surface area.

2.2.3 Low Potential Source Areas

Most of the "low-potential" areas are found along the site perimeter and consist of steep, rocky terrain (i.e., sandstone slopes and cliffs) in the west, and wetland/river bottom areas along the south and eastern perimeter of the site boundary. Typically, these areas are found along the perimeter of the property boundary and consist of natural, undisturbed terrain and vegetation. There is little to no activity occurring in these areas, nor have these areas been disturbed by past milling activities. The "low-potential" areas comprise approximately 40 percent of the total site area. Consequently, DOE does not anticipate that these areas will be a significant source of storm water discharges from the facility, and no controls are planned for these areas.

3.0 Site/Project Description

3.1 Description of Construction Activities

The DOE is in the process of evaluating remedial alternatives for the mill tailings currently stockpiled at the Moab site. Depending upon which remedial alternative is ultimately selected, DOE's responsibility for monitoring and controlling storm water discharges from this site will range in duration from approximately the next five to eleven years.

Near Term (March 2002 - March 2004) Construction Activities: Construction activities anticipated during this time frame will include the installation of a pipeline for conveying river water to dilute ammonium hotspots/seeps (DOE's "Initial Remedial Action"); construction of a lined evaporation pond for evaporating contaminated ground water (DOE's "Interim Remedial Action"); construction of a lined evaporation pond on top of the tailings pile for evaporating pore water from within the tailings pile; and construction of a heavy equipment/vehicle decontamination facility. Near-term construction activities will likely result in minimal new disturbances (i.e., up to 15 acres).

Long Term (March 2004 - March 2013) Construction Activities: The extent and nature of the long-term construction activities planned for the Moab site will depend on the remedial action alternative (i.e., on-site cap-in-place, off-site disposal, etc.) to be chosen. Which ever alternative is ultimately chosen, a significant portion of the entire Moab site will be disturbed as a result of various construction and remedial activities. Long-term construction activities will likely result in the disturbance of up to 80 percent of the site, or approximately 350 acres.

3.2 Description of On-going Processes and Site Activities

Currently, the activities occurring at the Moab site include: 1) Site characterization (including radiological assessments, surveying, environmental sampling and monitoring, biological surveys, etc.); 2) Site stabilization (securing unsafe conditions, structures, and utilities); 3) Implementing fugitive dust and storm water controls; 4) Waste management activities (cleaning up oil spills, consolidating drums and petroleum products, addressing excess chemical inventory, etc.); 5) Site security (fence installation/repair, postings, barricades, etc.); and 6) Installation of Construction Office and equipment staging area. These on-site activities, and their potential to contribute pollutants to storm water discharges are discussed below:

Site Characterization: DOE is currently in the process of performing various types of environmental characterization activities at the Moab site. These activities include: radiological characterization, surface and ground water monitoring, radon and direct gamma radiation monitoring, environmental air/particulate monitoring, meteorological monitoring, floodplain and wetlands assessment and delineation, threatened and endangered species surveys and critical habitat identification, and various engineering studies and surveys. Most of these types of activities are non-intrusive and result in little to no new land disturbance.

Interim and Initial Groundwater Remedial Actions: DOE will be engaged in various remedial efforts to mitigate immediate threats to the environment. Specifically, the Initial and Interim Groundwater Remedial Actions will be initiated during the summer months of 2002. Activities associated with these remedial actions will necessitate the use of heavy equipment for clearing and grading purposes, and the installation of a lined evaporation pond.

Site Stabilization Activities: DOE will be securing former mill buildings and associated structures (i.e., pump houses, electrical breaker panels, electrical transmission and distribution systems, etc.) that were abandoned by the Atlas Milling Corporation. Many of these structures were left in an unsafe condition and need to be stabilized with the increased level of activity at the site. Although the mill buildings may be eventually demolished, all structures and appurtenances will simply be secured (i.e., buildings will be locked, live utilities will be de-energized, etc.) for the present time. These activities may also include the installation or repair of site fences, installing signs and postings, and setting up various site boundaries and barricades. The stabilization activities planned for the near future will not result in significant new land disturbances or add pollutants to storm water discharges.

Implementation of Fugitive Dust and Storm Water Runoff Controls: DOE recognizes that mill tailings and residual radioactive contaminated soils are especially vulnerable to wind and storm runoff. In an effort to contain these contaminants and prevent their migration off-site, establishing fugitive dust and storm water runoff controls is a priority for DOE. Implementation of these controls will necessitate the use of heavy equipment to construct or strengthen berms, construct sediment retention basins, dig barrow ditches, install culverts, apply dust suppressant materials, etc.; however, new land disturbances associated with these activities are expected to be minimal.

Waste Management Activities: DOE will be performing various housekeeping activities at the site, which will include the consolidation of various waste materials. These activities will consist of consolidating miscellaneous fuels, drums of waste oil and lubricants, and cleaning up miscellaneous spills and leaks that have accumulated near the maintenance shop over the years. For safe storage and to prevent the spread of contaminants into the environment, petroleum contaminated soils will be excavated and placed into a Best Management Practice Area (BMPA) along with other consolidated waste materials. The BMPA is a bermed temporary storage facility that is constructed with a geotextile liner. Waste materials will be temporarily stored at this location until a permanent disposal option has been identified. The construction of this facility and the removal and excavation of various petroleum contaminated soils will involve the use of heavy equipment. These activities may result in the disturbance of up to one acre. Excavating and consolidating petroleum contaminated soils into a safe holding area will eliminate the potential for further migration of these pollutants into the environment.

Establishing Construction Office and Equipment Staging Area: DOE has established a construction office and support trailers, various storage facilities, and an equipment staging area. To complete this task, mobile office buildings will be set-up on-site, security fencing and gates will be installed, and utilities will be extended to the new facilities. This effort will require the use of heavy equipment; however, the staging area will be located in a previously disturbed area and the duration is expected to be very short-term. This activity will have no detrimental effect upon storm water discharges at the Moab site.

3.3 Sequence of Near-Term Construction Activities and Estimated Areas of Disturbance

As required by the UPDES *Storm Water General Permit for Construction Activities*, Table 1 summarizes the sequence and the estimated areas of disturbance associated with the near-term construction activities. Soils found at and near the Moab site are classified as predominantly sands with mixtures of clay, silt, and gravel. The runoff coefficient, *C*, for unimproved, vacant lands for the given soil type is 0.05 (*Urban Storm Drainage Criteria Manual*, *Volume 1*, Urban Drainage and Flood Control District, Denver Regional Council of Governments, September, 1978). The anticipated runoff coefficient after completion of these construction activities will remain essentially the same.

3.4 Receiving Waters

Although DOE's strategy is to contain all on-site storm water runoff within the confines of the Moab site property, any off-site discharge would be to Moab Wash, which is a tributary to the Colorado River. The Colorado River adjoins the Moab site property along the eastern boundary.

Table 1. Sequence of Near-Term Construction Activities and Estimated areas of Disturbance

Near-Term Construction Activity And Sequence	Estimated Duration of Task	Total Area of Disturbance Requiring Storm Water Controls	Post-Construction Run-off Coefficient[1]
1. Construction of evaporation pond on top of tailings pile for wick system	4 weeks.	1.0 acres	0.05
2. Initial Action (installing pipeline, etc.)	3 weeks.	1.0 acres	0.05
3. Construction of on-site decontamination pad.	3 weeks.	1.0 acres	0.05
4. Interim Action (clearing, grading, installing lined evaporation pond)	8 weeks.	7.0 acres	0.05
5. Implementation of fugitive dust and storm water runoff controls	On-going	3.0 acres	0.05
6. Interim waste management activities	On-going	2.0 acres	0.05

[1] *Urban Storm Drainage Criteria Manual (Volume 1)*, Urban Drainage and Flood Control District, Denver Regional Council of Governments (September, 1978).

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4.0 Description of Storm Water Controls

Because the Moab site contains significant quantities of contaminated materials (i.e., uranium mill tailings), and because a large percentage of the site has been previously disturbed and is susceptible to severe erosion, DOE's primary objective is to contain all on-site runoff, to the greatest extent practicable. Figure 4 illustrates the surface drainage patterns and the storm water and erosion controls that will be used at the Moab site. Storm water and erosion controls to be implemented at the Moab site are summarized in Table 2.

4.1 Erosion and Sediment Controls

Tailings Pile Temporary Cover: The temporary cover installed on the mill tailings pile effectively prevents the erosion and subsequent off-site transportation of the stockpiled uranium mill tailings. The cover is generally at least 6 inches thick, and consists mostly of low-level contaminated sandy soils excavated from on-site borrow sources. The cover itself is susceptible to erosion as there has been no plant cover established on the tailings pile. It is anticipated that the cover will require periodic maintenance as cover material is eroded (primarily from the side slopes). Clean soils will be used to "patch" areas on the sideslopes where storm water has eroded through the cover material and exposed the underlying mill tailings.

On-site Dikes and Berms: A series of berms and dikes have been constructed at the Moab site in critical locations to intercept sheet flow and contain storm water runoff from reaching adjacent water ways. An earthen dike/berm has been constructed downgradient of the tailings pile and along the Moab Wash corridor effectively capturing runoff and sediment before it reaches Moab Wash or the Colorado River (Figure 4). Another dike has been built around the north east borrow area and parallels Moab Wash and the Colorado River.

Anchored Straw Bales: As shown in Figure 4, certified weed-free straw bales will be anchored to form a linear sediment barrier along the northern portions of Moab Wash, and along the DOE perimeter fence in the north east corner of the property. As with all sediment and storm water controls, the straw bales will be inspected at regular intervals and replaced as necessary.

Rock Armoring: Use of rock materials for armoring slopes, bank stabilization, check dams, etc., will be used as appropriate. Surfactants ($MgCl_2$ or $CaCl_2$) will be used on designated roads to maintain them in good usable condition, and to prevent rutting and tracking of sediment.

Silt Fencing: A synthetic silt fence fabric will be used whenever additional sediment/erosion controls are needed to augment existing controls, or where the above controls cannot be feasibly implemented.

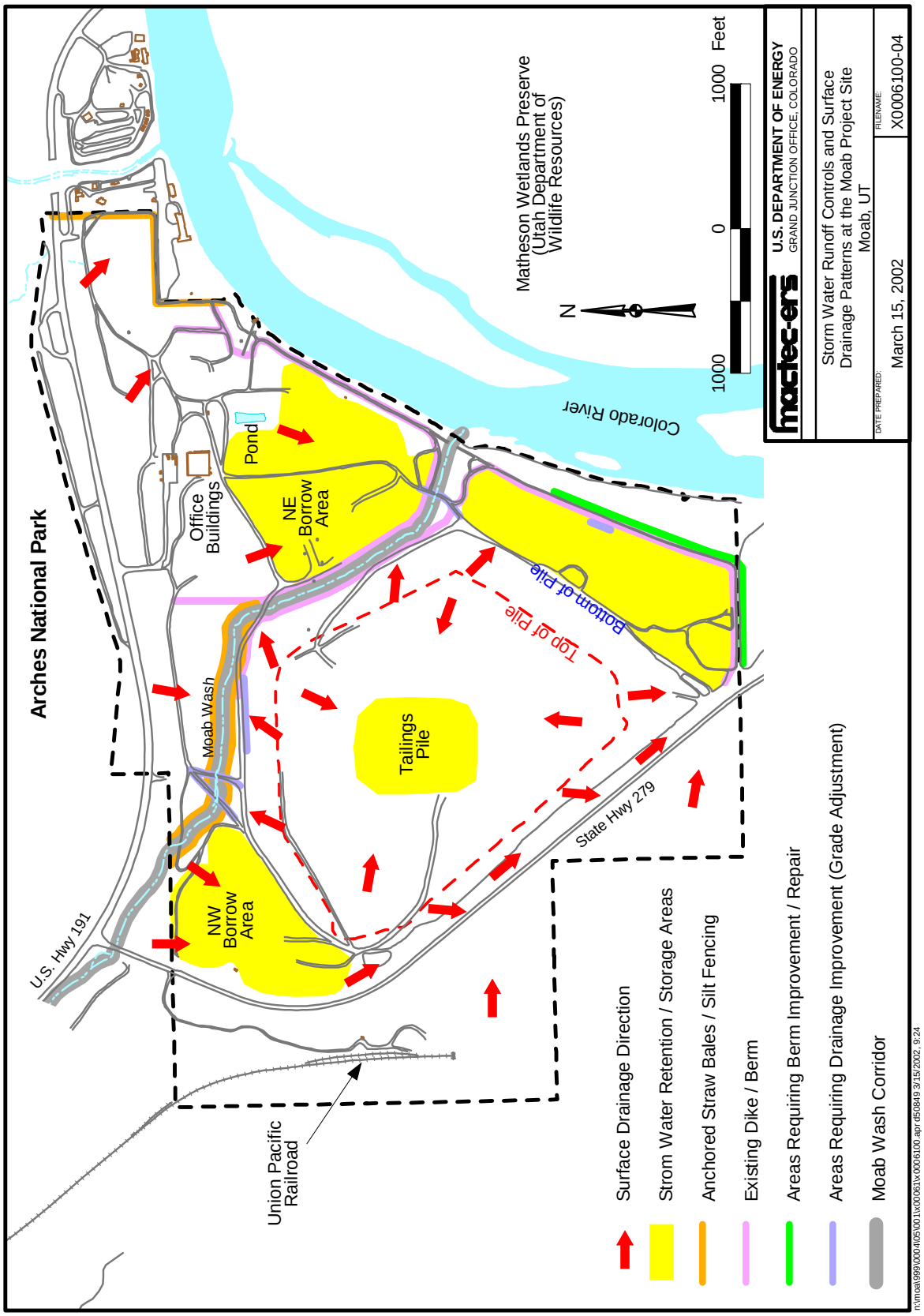

Figure 4. Storm Water Runoff Controls and Surface Drainage Patterns

4.2 Stabilization Practices

Vegetative Buffer Strip: The UPDES *Storm Water General Permit for Construction Activities* specifically identifies the preservation of existing areas of vegetation as valuable storm water buffer and sediment stabilization controls. Almost the entire length of the eastern Moab site boundary is bordered by the Colorado River. This border contains a dense growth of tamarisk, willows, and other wetland and riparian vegetation. This strip of vegetation serves as an efficient filter of storm water and sediment, and is an effective, natural barrier between the disturbed portions of the Moab site and the nearby Colorado River. DOE will make every attempt to preserve and protect the vegetation along the Colorado River to ensure that site sediments, contaminants, and runoff remain on-site.

Soil Stabilizers: Various soil stabilizing agents may be approved for use in areas where sediments are particularly vulnerable to erosion such as the tailings pile cover, side slopes, soil borrow areas, and in areas where significant activity is expected (e.g., site roads). Soil stabilizers/conditioners may include various chemical-based agents and surfactants (i.e., WENDON®), calcium/magnesium chloride, lignum sulfate, and tackifiers.

Non-chemical based soil stabilizing controls that may also be used include fiber mats, mulches, and seeding to establish temporary plant covers in critical locations.

4.3 Structural Controls

Storm Water and Sediment Retention Ponds: As shown in Figure 4, four storm water and sediment retention ponds are in place at the Moab site which capture and contain on-site storm water runoff and sediment: 1) The northwest soil borrow area captures runoff from the north west corner of the site property; 2) The top of the tailings pile itself is inverted and captures runoff that falls directly on top of the pile; 3) The northeast soil borrow area captures runoff from the northern and central portions of the site; and 4) The bermed area immediately south of the tailings pile captures runoff from the western site boundary and from the side slopes of the tailings pile.

Site Drainage and Grading: All drainage features have been evaluated at the Moab site to determine where site drainage patterns require adjustments, improvements and/or repairs. As shown in Figure 4, at various locations along the Moab Wash corridor and around the base of the tailings pile, repairs to the existing dikes/berms are required to improve drainage from these areas. As part of the storm water inspection process, certain areas may require on-going maintenance to ensure that site drainage patterns do not discharge to Moab Wash or to the Colorado River. These maintenance actions will entail grade adjustments, culvert installations and repair, installation and repair of berms and dikes, installation of runoff interception ditches, etc.

4.4 Best Management Practices

The following Best Management Practices (BMPs) will also be followed at the Moab site to help minimize on-site erosion and the off-site discharge of sediment:

Roads: All onsite traffic will be restricted to specific designated roads. Off-road travel will only be authorized on a case-by-case basis (e.g., access to a remote monitoring wells, conduct radiological assessments, etc.). Traffic speed will also be restricted to an appropriate level on all designated roads.

Evaluation of Chemical-Based Soil Stabilizer Use: Use of various chemical soil stabilizers/dust suppressants (e.g., surfactants, salt-based soil conditioners, etc.) shall be done in accordance with the recommended end-uses for those products. Site personnel shall not exceed the manufacturer recommended application rates. Material Safety Data Sheets (MSDSs) for all such materials used at the Moab site shall be reviewed and approved by the Environmental Services organization. Prior to application, site personnel shall determine and evaluate if the use of the soil conditioner could interfere with other site monitoring activities, or cause other harm to the environment (e.g., runoff into critical habitat for threatened or endangered fish).

Decontamination and Tracking Pad: Prior to leaving the Moab site, all heavy equipment and vehicles will be washed and decontaminated at a decontamination pad. This practice will minimize the potential for any off-site tracking of sediment or contaminants.

Covered Loads: Any trucks hauling materials off-site shall be tarped and covered to minimize the loss of materials in-transit or off-site. All loads shall be inspected to ensure that they are properly covered prior to departure.

Spill Response: In the event of a spill or release of contaminated materials off-site, the spilled materials will be immediately contained and cleaned up. Emergency spill response actions are outlined in Section 13.0 of the *Moab site Project Health and Safety Plan* (DOE 2001).

Best Management Practice Areas (BMPA's): BMPA's will be established at the Moab site for the purposes of consolidating various types of waste materials requiring segregation (e.g., petroleum contaminated soils, asbestos wastes, etc.). Isolating and consolidating such wastes into designated material storage areas minimizes the potential that contaminants exposed to storm water runoff will be further dispersed into the environment.

Table 2. Summary of Storm Water and Erosion Controls for the Moab site

Sediment Source		Storm Water Controls								
		Earthen Berms and Dikes	Storage and containment	Vegetative Cover	Chemical -based soil stabilizers	Anchored Straw Bales, Silt Fencing	Rock Armor (riprap, gravel, etc.)	Other (Fiber Mat, Tackifier, Rock Check Dam, etc.)	Drainage Improvements (Grading, ditches Culverts, etc)	No Controls
High Potential Areas	Tailings Pile (Top)		X	X	X					
	Tailings Pile (Side Slopes)			X	X			X		
	Tailings Pile (Base)	X	X						X	
	Northeast Borrow Area	X	X	X	X				X	
	Northwest Borrow Area		X	X	X				X	
	Moab Wash Corridor	X				X	X	X	X	
Moderate Potential Areas	North and east portions of Moab site	X			X	X			X	
	Site Roads				X		X			
Low Potential Areas	River bottom/ wetland areas (south/east)									X
	Sandstone slopes/ cliffs (east/south)									X
	Highway 191 and 279 corridors (east and north)									X

End of current text

5.0 Inspections, Maintenance, and Notifications

As required by the UPDES *Storm Water General Permit for Construction Activities*, site personnel "… shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site at least once every fourteen calendar days (bi-monthly), before anticipated storm events … and within 24 hours of the end of a storm that is 0.5 inches or greater." Precipitation data from an on-site meteorological monitoring station will be used to determine the intensity and duration of storm events.

Site personnel will inspect all storm water controls (as identified in Table 2) for evidence of damage (e.g., replacement of straw bales, additional silt fencing needed, repair of a berm or dike, cleaning a plugged culvert, etc.). Using the *Moab site Storm Water and Erosion Control Checklist* (Appendix A), site personnel will document the condition of the storm water controls and any maintenance actions that may be necessary after each inspection. Any required maintenance actions must be reported to the on-site manager within 24 hours of the inspection. The on-site manager will ensure that the appropriate repairs or maintenance actions are performed in a timely manner.

In the event that a major release of contaminated material were to occur (e.g., breach of a storm water retention basin containing contaminated runoff water, etc.), the inspector(s) shall immediately notify the on-site manager and follow the emergency reporting and notification procedures as outlined in Sections 11.0 and 13.0 of the *Moab site Project Health and Safety Plan* (DOE, 2001).

End of current text

6.0 Records

Project records generated as a result of this plan will be created and managed in accordance with the Moab working file index and plan and include:

- *Storm Water Pollution Prevention Plan for the Moab Project Site* (and subsequent revisions);
- The UPDES *Storm Water General Permit for Construction Activities;*
- Bi-monthly storm water inspection checklists;
- General correspondence related to storm water discharges or permitting

End of current text

7.0 References

Grand Junction Office, 2000. *Moab Site Project Environmental Air Monitoring Sampling and Analysis Plan*, MAC–MOA 1.6-1, Grand Junction, Colorado, February.

———, 2001, *Moab Site Project Health and Safety Plan*, December 2001, MAC–MOA 1.3 (continuously updated), Grand Junction, Colorado.

———, 2002, *Moab, Utah, UMTRA Project Site, Fugitive Dust Control Plan*, GJO–MOA 1.6-3, Grand Junction, Colorado, February.

U.S. Department of Energy (DOE) Order 5400.1, *General Environmental Protection Program.*

———, DOE Order 231.1, *Environment, Safety, and Health Reporting.*

———, DOE Order 5400.5, R*adiation Protection of the Public and the Environment.*

———, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*, DOE/EH–0173T, January 1991.

Utah Administrative Code (U.A.C.), *R317–8-3.9: Utah Pollutant Discharge Elimination System, Storm Water Discharges*, September 2001, Salt Lake City, Utah.

_____, *Utah Pollutant Discharge Elimination System, Storm Water General Permit for Construction Activities*, Permit No. UTR100000, September 2001, Salt Lake City, Utah.

End of current text

APPENDIX A

Storm Water and Erosion Control Inspection Checklist

Appendix B

Material Safety Data Sheets for Soil Stabilizers Used at the Moab, Utah, UMTRA Project Site