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Floodplain and Wetlands Assessment for Additional Interim Actions at the Moab Project Site

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Moab Project

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1.0 Introduction

The Moab uranium mill tailings site (Moab Site) is located 3 miles northwest of Moab, Utah, on the west bank of the Colorado River. Historical processing of uranium ore at the site has resulted in a 130-acre mill tailings pile, areas of windblown soil contamination, and contamination of surface water and ground water. Approximately one-third of the 439-acre site lies within the base floodplain[1] of the Colorado River and Moab Wash, an ephemeral stream that bisects the site. The site also contains approximately 4.7 acres of jurisdictional wetlands along the border of the Colorado River. Figure 1 shows a map of the Moab Site.

Executive Order 11988, *Floodplain Management* (42 FR 26951), and Executive Order 11990, *Protection of Wetlands* (42 FR 26961), requires that all Federal agencies evaluate the potential impacts of actions within floodplains or wetlands, and minimize any adverse effects. This Floodplain/Wetlands Assessment has been prepared in accordance with these executive orders as specified in Title 10 *Code of Federal Regulations* Part 1022.

The U.S. Department of Energy (DOE) is in the process of evaluating alternatives for final remediation at the Moab Site. This process includes release of a Draft Environmental Impact Statement in November 2004 (DOE 2004), which includes a Floodplain/Wetlands Assessment. In 2003, DOE initiated interim actions at the Moab Site, including installation of an interim ground water treatment system to reduce contaminants reaching the Colorado River. A separate Floodplain/Wetlands Assessment was prepared for this initial interim work (DOE 2003a). DOE proposes to conduct additional interim actions before a Record of Decision is issued. Some of the proposed actions will occur in the base floodplain at the Moab Site. The purpose of these actions is to provide a larger buffer zone between surrounding properties and future remedial activities by reducing the size of the contaminated area, to replace invasive, exotic vegetation with more diverse native upland and riparian plant communities, to expand the ground water treatment system, to further investigate the role of phytoremediation in reducing ground water contaminants, and to rehabilitate an existing pumping station.

Pursuant to the National Environmental Policy Act of 1969, DOE published a Notice of Floodplain and Wetlands Involvement for Remediation of the Moab Site (67 FR 77969, December 20, 2002). This notice requested comments from the public regarding potential impacts on floodplains and wetlands associated with proposed activities. Because the activities evaluated in this Floodplain/Wetlands Assessment are included in the previous notice, an additional posting is not necessary.

[1]Only the base floodplain is considered in this assessment. The critical action floodplain (at minimum, the 500-year floodplain) is not included because no critical actions (actions for which even a slight chance of flooding would be too great) are proposed.

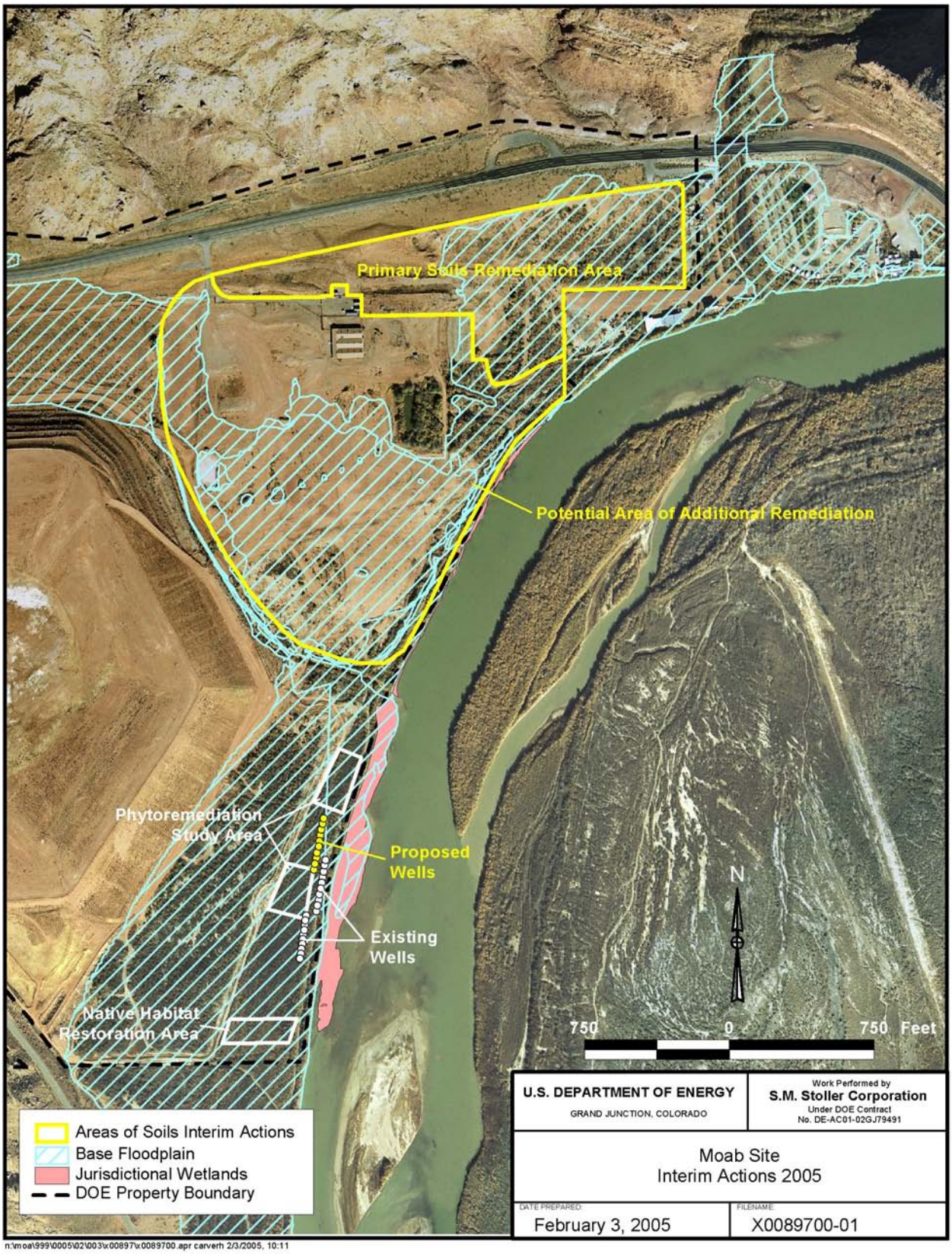

Figure 1. Moab Site Interim Actions 2005

2.0 Project Description

Proposed interim activities are planned across the Moab Site. Activities outside the base floodplain may include building upgrades, installation of a sewage system, modification of the evaporation system and/or potential plantings on top of the tailings pile, and expansion/improvement of an irrigation pond. The irrigation pond and proposed expansion areas are bermed and lie outside the base floodplain. Although the pond area contains wetland and riparian vegetation, it is not jurisdictional wetland because all the water is artificially pumped from the Colorado River.

Proposed activities within the base floodplain at the Moab Site include soil remediation, native habitat restoration, phytoremediation studies, the addition of new injection and extraction wells, and rehabilitation of an existing pump station. No high hazard areas exist within the proposed work area.

Soil remediation is required in order to decrease the size of the contaminated area and provide a larger buffer zone between adjacent landowners and future activities. Large equipment will be used to remove contaminated soils to a soil stockpile, then to the tailings pile. The staging area and soil stockpile lie outside the base floodplain. Portions of the haul road will cross the base floodplain of Moab Wash. Six to twelve inches of soil will be removed throughout most of the soils remediation area, and small areas of deeper excavations will also be done. Following excavation, soils will be rough graded. Contaminated soils will not be replaced, with the exception of the existing dikes that parallel the river. These dikes will be replaced with clean material and reconstructed to their previous height and thickness. In contaminated areas, vegetation, mainly tamarisk, will be cleared, grubbed, and disposed of. Desirable riparian trees, chiefly Fremont cottonwood (*Populus fremontii*) will be preserved. During soils remediation, dust will be suppressed with water and/or calcium chloride (or a similar suitable dust retardant). A small relic dike containing contaminated soils may be removed during remediation. This low dike lies within the base floodplain, is not connected to functional dikes, and does not affect the boundary of the floodplain. Existing wells, utilities, fences, and other structures will not be disturbed. After remediation, the new boundary of the contaminated area will be fenced. The primary soils remediation area is shown in Figure 1. Boundaries of an additional area, with potential to be remediated if funding permits, is also included.

Native habitat restoration is proposed in areas disturbed by remediation, to increase species diversity and habitat value. Portions of the disturbed areas will be seeded with a native upland mix of shrubs, grasses and forbs. Live shrubs will be planted in areas adjacent to neighboring landowners, and noxious weeds (Russian knapweed, or *Centaurea repens*) will be controlled with herbicides. An irrigated native cottonwood hedgerow, a portion of which lies in the floodplain, will also be constructed in the upland zone parallel to Highway 191. Remaining portions of the disturbed areas will be seeded with a native riparian mix of shrubs, grasses and forbs. Live plantings of cottonwood and willow will also occur in these riparian areas. The riparian areas will be bermed and flood irrigated.

Native habitat restoration is also proposed on the uncontaminated bench between the tailings pile and the Colorado River (see Figure 1). This area contains elevated levels of ammonia in the ground water, and test plots are required to develop effective revegetation techniques in these areas. Activities include tamarisk removal, seeding of native shrubs, grasses and forbs,

construction of earthen berms, and flood irrigating. Phytoremediation studies will also be conducted on the bench with the purpose of accelerating ground water remediation prior to planting native communities. Phytoremediation studies will involve cutting approximately two acres of tamarisk to temporarily stimulate growth, and flood irrigating.

A system of ground water monitoring, extraction, and injection wells exist on the uncontaminated bench between the tailings pile and the Colorado River (see Figure 1). Additional wells are needed to expand the ground water treatment system currently in place. Approximately ten wells will be installed in disturbed areas near the existing wells. Limited tamarisk removal (up to one acre) may be required.

Because of increased water needs for dust suppression and revegetation, an existing pump station requires rehabilitation. The proposed work does not include new construction, but only repair and maintenance of the existing structure. The building lies within the base floodplain, but the intake mechanism is located in the channel of the Colorado River in close proximity to wetlands.

3.0 Floodplain and Wetlands Descriptions

3.1 Floodplain

A base floodplain, also called a 100-year floodplain, comprises the area adjacent to a waterway with a 1.0 percent chance of flooding in any given year (10 CFR 1022.4). The extent of the base floodplain at the Moab Site was determined using the U.S. Army Corps of Engineers HEC-2 model (COE 1995) for floodplains of the Colorado River and Moab Wash. The combined base floodplain is approximately 140 acres in size (see Figure 1).

The Colorado River floodplain alluvium consists of shallow sandy sediments and deeper gravelly sediments. Thickness of the shallow alluvium ranges from 8 to 30 ft. Coarse sand and gravel with occasional silt and clay pockets make up the deeper alluvium layer. The water table is within 5 to 15 feet of the surface in the floodplain through most of the year (SMI 2001, DOE 2003b).

Base flow for the Colorado River ranges from 3,000 to 4,000 cubic feet per second (cfs)[2]; the average peak between April and July is 22,000 cfs. The river stage increases by approximately 7 feet during average peak flow. Currently, the river reaches the floodplain at the Moab Site at 48,900 cfs. In 1984, the flow reached 70,300 cfs, when the water rose approximately 4 ft above the toe of the tailings pile (NRC 1999). During a 100-year flood, flow would be approximately 99,500 cfs (NRC 1997). The U.S. Nuclear Regulatory Commission (NRC) calculated a 300,000-cfs discharge during a probable maximum flood event, at which time the water would rise 29 ft above the toe of the tailings pile (Mussetter and Harvey 1994).

[2]Flows are based on data from the Cisco gaging station, 35 miles upstream from Moab, from 1914 to 1999. The Cisco station is representative of flows at the Moab Site because there are no significant tributaries between the gage and the site.

The floodplain of the Colorado River is dominated by tamarisk (*Tamarix ramosissima*), an exotic, invasive shrub that has largely displaced desirable riparian species at the Moab Site. Russian olive (*Eleagnus angustifolia*) is also prevalent in places. The annual weed, summer cypress (*Kochia scoparia*) is the dominant herbaceous species. A small number of Fremont cottonwoods (*Populus fremontii*), willows (*Salix gooddingii* and *Salix exigua*), and desirable grasses and herbaceous plants persist in pockets within the floodplain.

Moab Wash, an ephemeral stream, runs through the middle of the site to the Colorado River. It is dry except during flood events, and its original configuration was altered during milling operations. The 100-year flow for Moab Wash is 9,480 cfs (USACE 1995). Its flow is estimated at 16,000 cfs during a probable maximum flood event (NRC 1997). Vegetation in the Moab Wash floodplain is sparse and dominated by upland species including greasewood (*Sarcobatus vermiculatus*), rabbitbrush (*Chrysothamnus nauseosus*), four wing saltbush (*Atriplex canescens*), and few grasses and forbs.

3.2 Wetlands

Approximately 4.7 acres of wetlands exist at the Moab Site along the Colorado River. Although no actions are proposed within wetlands, they are included in order to evaluate adverse impacts resulting from actions within the floodplain. Wetlands were formally delineated in December 2004 according to procedures outlined in the U.S. Army Corps of Engineers Wetlands Delineation Manual (COE 1987).

Most of the wetlands at the Moab Site are classified[3] as palustrine. Below the tamarisk-dominated bench that borders the Colorado River, temporarily and seasonally flooded palustrine scrub-scrub wetlands exist. Within these areas, dominant vegetation includes tamarisk (*Tamarix ramosissima*), and summer cypress (*Kochia scoparia*). Most of the scrub-scrub wetlands are characterized by elevated levels of ammonia in the ground water and by salty soils. In the highest ammonia areas, where wetland soils and hydrology clearly exist, unusually large amounts of summer cypress, an ammonia-tolerant upland species, occur. As ammonia levels drop, wetland species such as redroot flatsedge (*Cyperus erythrorhizos*) and cocklebur (*Xanthium strumarium*) appear.

Between the scrub-scrub wetlands and the deepwater habitats of the Colorado River, seasonally flooded palustrine emergent wetlands exist. These wetlands contain redroot flatsedge, alkali sacaton (*Sporobolus airoides*), tamarisk, oakleaf goosefoot (*Chenopodium glaucum*), and summer cypress. In areas with high ammonia, redroot flatsedge and summer cypress dominate. As ammonia levels drop, species diversity increases sharply to include desirable wetland species such as Goodding willow (*Salix gooddingii*), alkali bulrush (*Scirpus maritimus*), inland salt grass (*Distichlis spicata*), Baltic rush (*Juncus balticus*), creeping spikerush (*Eleocharis palustris*), softstem bulrush (*Scirpus validus*), Fremont cottonwood (*Populus frem*ontii), coyote willow (*Salix exigua*), and broadleaf cattail (*Typha latifolia*). Among the emergent wetlands are small areas of unconsolidated shore riverine wetlands, sparsely vegetated with redroot flatsedge and reed canarygrass (*Phalaris arundinacea*).

[3]Using U.S. Fish and Wildlife classification for wetlands and deepwater habitats (Cowardin et al 1979).

4.0 Floodplain and Wetlands Effects

4.1 Floodplain

The beneficial value of the floodplain would be expected to increase as a result of the proposed actions. The living values and aesthetic value would be expected to improve with increased plant diversity, decreased noxious and non-noxious weeds, and the establishment of native habitats. The remediated area, currently inaccessible, would serve as a buffer zone between adjacent landowners and future remedial activities.

No effects to lives or property would result from the proposed activities.

Potential positive effects from the proposed activities within the floodplain include[4]:

- Removal of contaminated soils from portions of the floodplain (D, L)
- Slightly increasing the capacity of the floodplain as a result of soil removal (D, L)
- Reducing the occurrence of undesirable tamarisk and Russian knapweed at the site (D, S, L)
- Improving species diversity and habitat value by establishing native plant communities (D, L)
- Removing portions of the floodplain from the contaminated area (D, L)
- Obtaining phytoremediation and habitat restoration data to be used in future activities (I, S)
- Further reducing the amount of contaminants, chiefly ammonia, in ground water (D, L)
- Improving the pumping station (D, S)

Potential negative effects include:

- Generating dust during construction (D, S). Minimized by required dust suppression measures.
- Destruction of upland vegetation in remediated areas and along haul road (D, S)
- Increased risk of erosion in areas where vegetation is removed (D, S). Minimized by implementing storm water management measures (DOE 2002) including temporary sediment ponds, straw bales, and silt fences, as required. Over long term, mitigated by revegetation.
- Removal of effects of phytoremediation by tamarisk in one-acre test plot to be revegetated (I, S)

4.2 Wetlands

No activities are planned within wetlands at the Moab Site. However, soil remediation may occur in the bank above the wetlands. Because of storm water management measures no effects due to runoff or sedimentation are anticipated. If large-scale modifications to the intake mechanism of the pump station are required during rehabilitation, disturbance to vegetation in nearby wetlands may occur. These effects would be minor, direct, and temporary, and a Nationwide 404 permit would be obtained for any disturbance.

[4]Direct (D), indirect (I), short-term (S), and long-term (L) effects are indicated after the description of each effect.

5.0 Alternatives

No alternative sites exist for the proposed remedial activities because soil contamination exists within the base floodplain at the Moab Site, and soils cannot be remediated without disturbance to vegetation. DOE has evaluated measures to mitigate adverse effects of soil removal and has planned these measures into the proposed actions. Upgrades to the pump station must take place on site, and ground water extraction and injection wells must be placed within the ammonia plume. The only possible alternative to the proposed actions is the No Action Alternative. Under this alternative, soils would remain contaminated, no buffer zone would exist between adjacent landowners and future remedial activities, existing vegetation, including noxious weeds, would remain in place, functioning of the existing ground water treatment system would not be enhanced, and the existing pump station would not be rehabilitated; resulting in probable clogging and unavailability of water for dust control.

Phytoremediation and revegetation studies could be conducted in other areas of the floodplain. However, DOE has evaluated possible locations and has chosen a strategy that is most protective of the environment. Under the No Action Alternative, no phytoremediation or revegetation studies would be conducted, and valuable data to be used in future ground water treatment and revegetation efforts would not be collected.

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