

The Little Engine That Could: No Project is too Small for Sustainable Remediation Moab Uranium Mill Tailings Removal Project – 16427

Donald Metzler* and Polly Robinson**

*U.S. Department of Energy

**S&K Aerospace, LLC

ABSTRACT

Executive Order 13693, "Planning for Federal Sustainability in the Next Decade," mandates the reduction of energy use and cost and greenhouse gas emissions, and the search for renewable or alternative energy solutions. DOE EM manages the Moab Uranium Mill Tailings Remedial Action Project in Utah that involves relocating a 16-million-ton uranium mill tailings pile and associated contaminated materials at the former Atlas millsite to a permanent disposal cell constructed near Crescent Junction, Utah, predominantly by rail. Project personnel strive to support the Executive Order in making preparations for the impacts of climate change. Meeting the goals of the Executive Order in light of the remote location and limited resources of the Project sites often requires an innovative approach and perseverance.

The Moab Project is a "Small Site" within EM and has a comparatively short-term completion date. As a result, large-scale sustainability projects, such as retrofits or remodels, do not offer a cost benefit over this period. Instead, less dramatic process changes are achievable. The Project purchases renewable wind energy through the local power provider to reduce Scope 2 (purchased electricity) greenhouse gas emissions. Toward its ambitious goal of achieving zero landfill waste, the Project has diverted over 50 percent of its nonhazardous solid waste from the local landfill through composting and recycling efforts. In particular, electronics must meet various sustainable criteria prior to purchase, and be recycled through donations and certified recyclers, diverting it from the waste stream. The Project has received multiple Green Buy Awards from DOE by reaching leadership goals for purchasing energy-efficient, water-efficient, bio-based, and recycled-content products.

In fiscal year 2014, in response to President Obama's June 2014 memorandum, "Sustainable Practices for Designed Landscapes and Supporting Pollinators on Federal Landscapes," the Project decided to take a proactive approach and work with a local pollinator group, hosting two beehives in a revegetation area on the Moab site. An increase in plant growth and blossoming plants in the revegetation area has been observed and is believed to be related to the added pollinators.

The Project has previously seeded disturbed areas mainly with native drought-resistant species to reduce water usage. Storm water collected in sediment basins at the Crescent Junction site is used for dust control and compaction of mill tailings in the disposal cell. The Project worked with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service to gain support for recontouring a remediated

area adjacent to the Colorado River, which borders the Moab site on the east, to allow the area to flood at a lower river stage. This recontouring promotes more varied vegetation growth and river water that tops the west bank brings soil nutrients to inundated areas of the site. Ponded floodwater has been pumped into revegetation plots for irrigation, reducing freshwater usage.

Innovation in sustainable practices comes in many different fashions. The Moab Project demonstrates that no project is too small to implement sustainable practices.

INTRODUCTION

The Moab Project site is a former uranium ore-processing facility located about 3 miles northwest of Moab in Grand County, Utah. In 2001, DOE assumed ownership of the former Atlas millsite; the DOE EM office in Grand Junction, Colorado, is responsible for managing the Moab Project. The scope of the Moab Project is to relocate the uranium mill tailings and associated contaminated materials at the Moab site and vicinity properties to a permanent disposal cell constructed near Crescent Junction, Utah, predominantly by rail. The scope also includes active ground water remediation at the Moab site. Construction of the site infrastructure needed to haul and dispose of the mill tailings began in 2008. Mill tailings shipments began in April 2009.

The Project utilizes relocatable 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 with about 30-percent utilization. Potentially every structure will be demolished or removed at Project completion, which is currently planned for fiscal year (FY) 2025.

METHODOLOGY

The Project reports on its sustainability performance annually through a Site Sustainability Plan (SSP). [1] The SSP identifies site actions and contributions towards the goals of Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*, [2] and DOE Order 436.1, *Departmental Sustainability*. [3]

The SSP consists of a narrative portion informed by the Consolidated Energy Data Report where various sustainability data are collected and measured against DOE Headquarters' metrics. These metrics consist of the following: Scopes 1, 2, and 3 greenhouse gas emissions, utilities, clean and renewable energy, water use efficiency and management, fleet alternative fuel consumption and fuel reduction, sustainable acquisition, pollution prevention and waste reduction, sustainable remediation, and electronic stewardship. In addition, the SSP provides plans for future years. Some elements have been determined as not applicable to the Moab Project, such as high performance sustainable buildings requirements, because the Project does not maintain permanent structures. The most current approved SSP may be found on the Moab Project website at http://www.gjem.energy.gov/moab/project_docs/pro_docs.htm.

SUSTAINABLE PRACTICES

Efficient Water Use

In 2008, the Project installed a 21-mile long, 6-inch buried waterline from the Green River to the Crescent Junction site to provide construction water, thus reducing total potable water usage by 93 percent. A 9-million-gallon storage pond was constructed adjacent to the southwest corner of the disposal cell. Water from the pond is gravity-fed to water trucks (see Fig. 1) for use in dust control and compaction of the mill tailings in the cell. To manage the water usage flow, meters were installed on the potable waterline and the construction waterline at Crescent Junction. In addition, when storm water runoff is available in appreciable quantities, it is utilized for operations.

The Project has previously seeded disturbed areas at the both sites mainly with native drought-resistant species to reduce water usage.



Fig. 1. Water Truck at Crescent Junction Fill Station.

Recycling and Waste Diversion

Day-to-day site work and operations are routinely evaluated, especially by employees in the field, to identify pollution prevention and waste minimization opportunities. Site staff accurately measure and document waste generation, pollution prevention, and waste minimization activities. All work locations provide employees with both local and centralized recycling stations, and employees are encouraged to utilize them for appropriate materials. Toward its ambitious goal of achieving zero landfill waste, the Project has diverted over 50 percent of its nonhazardous solid waste from the local landfill through composting and recycling efforts reducing Scope 3 greenhouse gas emissions.

Electronics must meet various sustainable criteria prior to purchase, and be recycled through donations to the Computers for Learning program and certified recyclers, diverting them from the waste stream. In addition to recycling activities, to date approximately \$200,000 worth of supplies and equipment, excess to the Project, have been sold through the General Services Administration (GSA) or reutilized by another agency, keeping them out of the waste stream.

The Moab site was able to eliminate the procurement of magnesium chloride and calcium chloride used for dust suppression on the mill tailings pile by using contaminated water extracted through wells installed as part of the ground water interim action remediation system. The well water is high in total dissolved solids (salt) similar to the dust suppression chemicals used previously and has been effective in stabilizing road surfaces and reducing dust. The extracted water was pumped to a 4-acre evaporation pond on top of the tailings pile and eliminated through evaporation or fed to a storage tank for filling water trucks used for dust suppression. The evaporation pond will be decommissioned in FY2016 to facilitate removal of tailings near that portion of the pile and beginning next spring, extracted water will be fed directly to a storage tank to be located off pile.

At the Moab site, the Project installed seven waterless urinals (see Fig. 2) between 2013 and 2014, which reduced water usage and wastewater production. A wastewater management cost avoidance of \$6,125 annually was realized and the wastewater volume was reduced by 31,500 gallons annually through use of these urinals. Approximately 100,000 gallons of potable water have been saved at a cost savings of \$2,000 annually. The Project has already realized the payback period of 12-18 months.



Fig. 2. Waterless Urinals.

Sustainable Procurement

The Project has received two Gold Green Buy awards and one Silver Green Buy award for achieving excellence in Sustainable Acquisition. In addition, 100 percent of procurements by the Project contained the necessary provisions and clauses for eligible procurements. Project procurement goals include energy-efficient, water-efficient, bio-based, and recycled-content products. Equipment and supplies, excess to other federal agencies, are procured whenever possible in place of purchasing new items. Due to these efforts, a cost avoidance of almost \$500,000 has been realized by the Project, and these materials were potentially removed from the waste stream. Examples of excess items obtained include Personal protective clothing, vehicles, electronics, and health and safety equipment.

Alternate Fueled Vehicle Acquisition

The Project primarily utilizes GSA-leased passenger vehicles. All GSA-leased vehicles acquired are flex-fueled (E-85) or hybrid vehicles. GSA-leased vehicles located in Grand Junction, CO are fueled with E85.

Renewable Energy

The Project purchases renewable wind energy through the local power provider to reduce Scope 2 (purchased electricity) greenhouse gas emissions. The Project currently participates in the Blue Sky Renewable Energy Program by buying 12-percent renewable energy. With this participation level, the Project has received Blue Sky Champion Partner and U.S. Environmental Protection Agency Green Power Partner designations. The Project plans to continue its commitment to participate in the Blue Sky Renewable Energy Program by buying up to 30-percent renewable energy incrementally over subsequent years to meet the newly mandated DOE goal of 30-percent of annual electricity consumption from renewable sources by FY2025. In addition, the sites have four meteorological stations (one off site), a sand filter system, and a disposal cell operations monitoring system all powered by solar panels.

Climate Change Resilience

In FY2014, in response to President Obama's June 2014 memorandum, "Sustainable Practices for Designed Landscapes and Supporting Pollinators on Federal Landscapes," [4] the Project decided to take a proactive approach and work with a local pollinator group, hosting two beehives in a revegetation area on the Moab site. An increase in plant growth and blossoming plants in the revegetation area has been observed and is believed to be related to the added pollinators.

In the winter of 2011, contaminated soils were removed from an off-pile area at the Moab site adjacent to the Colorado River, which borders the site on the east. The extensive remediation resulted in a lower overall elevation of that area, allowing flooding to occur at a lower river stage. That spring, record flooding occurred at the

Moab site. 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 by recontouring the remediated area (see Fig. 3). This recontouring promotes more varied vegetation growth and river water that tops the west bank brings soil nutrients to inundated areas of the site. Pondered floodwater has been pumped into revegetation plots for irrigation, reducing freshwater usage.

Site operations actively control the water levels in the freshwater and retention water ponds, reducing the Project's vulnerability during droughts. Waste storage areas have been designed in a very conservative manner to better withstand beyond-design-basis storms.



Fig. 3. Off-pile Remediation Area During Flood Conditions (Colorado River in Left Center).

RESULTS

The Project has taken a graded approach in its planning strategies for achieving sustainability goals as required under Executive Order 13693 and DOE Order 436.1. The Project has been aggressive about meeting the goals of prior executive orders and was reasonably successful. However, future gains are much more difficult to attain as the Project has already optimized its ability to achieve many of the goals. Wherever sustainable practices can be implemented at a reasonable effort and cost, as determined by cost benefit analyses, they are the preferred choice. Examples of

these successes have been summarized above. More detailed information may be found in the Project SSP.

CONCLUSION

Meeting the goals of Executive Order 13693 in light of the remote location and limited resources of projects like the Moab Project often requires an innovative approach and perseverance. The Moab Project is a "Small Site" within EM and has a comparatively short-term completion date. As a result, large-scale sustainability projects, such as retrofits or remodels, do not offer a cost benefit over this period. Instead, less dramatic process changes are achievable and make a real difference. The efforts by the Moab Project demonstrate that the project is like "the little engine that could," and no project is too small to implement sustainable practices.

REFERENCES

1. U.S. Department of Energy, "Moab UMTRA Project 2015 Site Sustainability Plan," Revision 0 (DOE-EM/GJ2188), 2014.
2. Executive Order 13693, "Planning for Federal Sustainability in the Next Decade," March 2015.
3. DOE Order 436.1, "Departmental Sustainability," May 2011.
4. Presidential memorandum, "Sustainable Practices for Designed Landscapes and Supporting Pollinators on Federal Landscapes," June 2014.