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# Environment Restoration Operations Summary of the Mixed Waste Landfill Borrow Pit Reclamation May - August 2013

Sandia National Laboratories/NM

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DEC 0 9 2013

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. David Cobrain  
Manager  
Permits Management Program  
Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, NM 87505

Subject: Department of Energy/National Nuclear Security Administration, Sandia National Laboratories  
Environmental Restoration Operations, Reclamation of the Mixed Waste Landfill Borrow Pit

Dear Mr. David Cobrain:

The Department of Energy/National Nuclear Security Administration and Sandia Corporation are submitting a brief summary describing the reclamation work performed at the Mixed Waste Landfill (MWL) Borrow Pit from May through August 2013. This reclamation effort addresses the only remaining MWL Corrective Measures Implementation (CMI) Plan requirement, Condition 1.g., of the New Mexico Environment Department/Hazardous Waste Bureau (NMED/HWB) Conditional Approval, Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005 (Bearzi December 2008). Condition 1.g. states:

*“The Permittees must implement the change to the CMI Plan under comment response 10 of Comment Response Set #1 concerning the seeding of borrow pits that are no longer needed.”*

Response 10 of MWL CMI Plan Comment Response Set #1 states the following:

*“Once the MWL cover has been constructed and the TA-3 borrow pits are no longer required ... they will be seeded and reclaimed as described in Appendix A, Construction Specifications, Section 02930, Reclamation Seeding and Mulching.”*

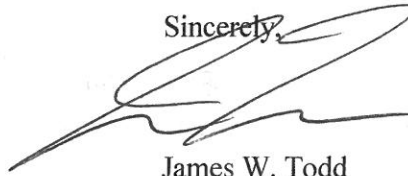
This wording was incorporated into the CMI Plan (Appendix A Construction Specifications, Section 02930 Reclamation Seeding and Mulching, Part 3.2.2, page 02930-4) through replacement pages that were submitted to the NMED/HWB on February 12, 2009.

Although several borrow sites were identified in Technical Area 3 to support MWL evapotranspirative cover construction, use of only one site was necessary. Reclamation work on this borrow site was completed from May 8 through August 2, 2013 and is summarized in the enclosure.

See Page 2

If you should have questions, please contact me at (505) 845-5398 or John Weckerle of my staff at (505) 845-6026.

Sincerely,



James W. Todd  
Assistant Manager

Enclosure

cc w/enclosure (**Certified Mail**):

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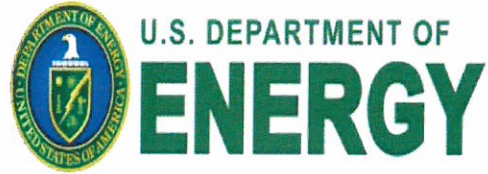
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14-126-550682

SAND 2013-10637P



**Enclosure**

**Summary of Mixed Waste Landfill Borrow Pit Reclamation  
May – August 2013**

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## **Summary of Mixed Waste Landfill Borrow Pit Reclamation** **May – August 2013**

### **Background**

The Mixed Waste Landfill (MWL) Borrow Pit was created as a source of soil material for the construction of an evapotranspirative (ET) cover over the MWL in Technical Area 3 (TA-3) at Sandia National Laboratories/New Mexico (SNL/NM). Although several borrow sites were identified in TA-3, use of only one site was necessary. Beginning in 2006, soils at the Borrow Pit were excavated, screened, and transported to the MWL until the ET cover was completed in 2009. Planned construction activities at the Borrow Pit were to be covered under the Construction General Permit and addressed in a Storm Water Pollution Prevention Plan (SWPPP). In May 2006, prior to the commencement of construction activities, a SWPPP was submitted to the U.S. Environmental Protection Agency (EPA). When construction activities were completed in 2009, the Borrow Pit had been excavated to a depth of approximately three feet across nine acres, down to a caliche/alkali salt-rich horizon. In preparation for termination of construction activities, SNL/NM personnel began evaluating strategies for restoration of the site in 2011. This planning began after a determination that the Borrow Pit was not necessary for future use.

Based on experience in establishing native vegetation on ET covers at the Chemical Waste Landfill, the Corrective Action Management Unit (CAMU), and the MWL, project staff realized that the traditional seeding and mulching approach specified in the MWL Corrective Measure Implementation (CMI) Plan would likely fail at the Borrow Pit due to site conditions as summarized below.

- The site is characterized by surface soils that are highly alkaline with very low organic content;
- The site is large (i.e., nine acres), making supplemental watering infeasible; and,
- The climate is arid, with unpredictable precipitation.

To address these challenges, project personnel developed a reclamation approach involving native plant species that are best suited for the existing site conditions. Key to the overall revegetation strategy was amending the soil to offset its high alkalinity/low organic content, grading and ripping the Borrow Pit floor to maximize storm water infiltration, and timing the restoration activities to coincide with the monsoonal rains. This approach was developed incorporating over 10 years of ET Cover experience and is intended to achieve final stabilization criteria of the Construction General Permit. Final stabilization is considered to be complete when the groundcover of the disturbed areas is a minimum of 70 percent of the original native vegetation density, and dispersed in a manner that does not result in large barren areas.

The Borrow Pit reclamation field work was completed from May 8 through August 2, 2013. The integrated reclamation approach utilized current site conditions and incorporated best management practices (BMPs) to facilitate long-term restoration. The restoration efforts are intended to achieve conditions that meet EPA Construction General Permit final stabilization criteria.

### **Restoration Activities**

Borrow Pit restoration included three main activities. 1) Grading, including ripping and contouring the site to maximize local infiltration of storm water to facilitate revegetation efforts and create a gradual transition between the Borrow Pit and the surrounding undisturbed areas. 2) Adding soil amendments to facilitate revegetation. 3) Seeding of carefully-selected, alkali-tolerant, native grass and shrub species. Each of these activities is described in more detail below.

#### *Grading, Ripping, and Contouring of the Site*

A soil balance approach to grading the site was used that was designed to enhance storm water infiltration across the site without requiring any imported soil fill. As part of this approach, four distinct shallow depressions less than 2.5 feet deep were established across the Borrow Pit floor (i.e., Basins 1, 2, 3, and 4)

to collect storm water that does not immediately infiltrate into the surface soils. The term “basin” is used to describe these four shallow depressions; it is not intended to denote a specific regulated storm water feature. The areas between and surrounding the basins have a very gentle slope and were ripped to create windrows perpendicular to the main wind direction for the capture of soil and seed. Grading work involved improvements to the perimeter BMP (i.e., soil berm) that minimize the boundary slopes to create a gradual, stabilized transition between the surrounding undisturbed areas and the Borrow Pit. Grading operations were guided by topographic surveys that included an initial survey with placement of grade stakes to establish the desired topography, and a final survey to verify the achieved grade.

*Soil Amendments*

Once the grading and ripping operations were completed, the soils were amended before seeding to maximize the native vegetative cover. Different soil amendments were tailored for the basin areas versus non-basin area. Because of increased soil moisture anticipated in the four basin areas, the soil amendment approach was more aggressive in these areas and included the application of ferrous sulfate, compost, and humates. These amendments help to reduce and buffer soil pH, improve the organic content of the soil, and to provide needed nutrients for seed germination and plant growth. In the non-basin area humates and a Helena Chemical Company 5-0-5 fertilizer were applied to the surface of the Borrow Pit floor. Key 5-0-5 ingredients include 5% ammoniacal nitrogen, 5% soluble potash, 7% sulfur, 14% iron, and 17% humic acid. The application of the 5-0-5 fertilizer in addition to the humic substances provides added benefit to the revegetation effort. Materials applied to the basins and non-basin areas are summarized in the table below.

<b>Area Designation</b>	<b>Total Area (acres)</b>	<b>Ferrous Sulfate (lbs)</b>	<b>Compost (cy)</b>	<b>Humates (lbs)</b>	<b>Seed Mix (lbs, PLS)</b>	<b>Gravel Mulch (cy)</b>	<b>5-0-5 Amendment (lbs)</b>	<b>Hydro Mulch (lbs)</b>
Basin 1	0.82	3300	174	520	31	90	0	0
Basin 2	0.27	1100	105	165	9	30	0	0
Basin 3	0.27	1100	72	165	9	30	0	0
Basin 4	0.18	750	48	120	6	21	0	0
Non-Basin	7.42	0	0	0	119	0	3235	0
Perimeter BMP and Side Slopes	1.13	0	0	0	19	0	0	1500

*Seeding*

The restoration effort is completely dependent on natural precipitation for moisture and was planned to coincide with the 2013 monsoon rains. The basin and non-basin areas were seeded with native grass species specifically selected for their tolerance to alkali soil. In the basins three native grass species were selected that can tolerate temporary standing water. In the non-basin and perimeter slope areas a grass and shrub species were selected that can tolerate dryer conditions. Seed application was accomplished using a drill seeder that created small furrows and ensured shallow burial of the seed in the surface soil. For the perimeter BMP and side slopes seeding was accomplished using a hydroseeding approach. The seed-mulch-water mixture included straw fiber mulch with a high strength polymer binder and a tackifier that was prepared in a trailer-mounted tank and applied via a pump and

hose. Quantities of seed and other materials were measured and then applied to a specific area of the site to ensure that the desired application rate was achieved. The seed mixes and application rates used are summarized in the table below.

Seed Variety (Common Name)	Pure Live Seed (Pounds per Acre)
<b>Basin Areas</b>	
"Viva" Galleta grass	12
"Hatchita" Blue grama	17
Alkali sacaton	4
<b>Total</b>	<b>33</b>
<b>Areas of Borrow Pit Floor Outside Basins</b>	
Four-wing (de-winged seeds) saltbush	8
"Paloma" Indian rice grass	8
<b>Total</b>	<b>16</b>
<b>Perimeter BMP</b>	
Four-wing (de-winged seeds) saltbush	8
"Paloma" Indian rice grass	8
<b>Total</b>	<b>16</b>

Gravel mulch was applied to the surface area of the basins after seeding to promote establishment of the native grasses. The gravel mulch helps retain soil moisture and moderate extreme summertime temperatures.

**Conclusion**

Reclamation field activities started on May 8 and were completed on August 2, 2013. During this period there were nine rain events recorded using a rain gauge at the site, totaling approximately four inches. All but 0.5 inches of this monsoonal precipitation fell after seeding was completed in both the basin and non-basin areas. Grass growth was established in the basin areas by the end of August. Pre- and Post-Restoration photographs of the Borrow Pit are provided on the next page. These photographs show the transformation of the site and the current conditions. The final as-built topographic map of the site is provided after the photographs.

The restoration effort went beyond the requirements of the CMI Plan (Appendix A *Construction Specifications*, Section 02930 *Reclamation Seeding and Mulching*) and demonstrate a commitment to restore the site despite challenging conditions not anticipated when the CMI Plan was written (i.e., excavation across the entire nine acre site down to the pervasive caliche, alkali-rich soil horizon). Site grading, application of soil amendments, site-specific native seed mix, and the application of gravel mulch in the basin areas were not required per the CMI Plan reclamation specifications but recommended actions based upon past experience and lessons learned from similar sites and ET covers.

The SNL/NM Storm Water Program will continue routine SWPPP inspections and maintenance of the site until final stabilization criteria are met. While many factors will affect the rate at which this occurs, SNL/NM personnel have incorporated relevant past experience to increase the potential for success in the least amount of time.



Borrow Pit in May 2013 at the start of the reclamation effort. View from northwest corner to southeast.



Borrow Pit in August after completion of the reclamation effort. View from northwest corner to southeast.





SCALE  
 1" = 40'  
 0' 30' 60'

GENERAL NOTES

**LEGEND**

- 5386.00 MINOR CONTOUR
- 5385.00 MAJOR CONTOUR
- SHALLOW DEPRESSION (i.e., BASINS 1-4)
- BORROW PIT FLOOR (i.e., NON-BASIN AREA)
- PERMETER BMP
- WIND ROWS (APPROX. 2 FT ON CENTER)

1. ENTIRE SITE WAS GRADED PER FIGURE 3-1. PERMETER BMP WAS CONTOURED AS SHOWN IN FIGURE 2-2.

2. BORROW PIT FLOOR INCLUDES 4 SHALLOW DEPRESSIONS LESS THAN 2.5 FEET DEEP (i.e., BASINS 1-4) AND THE NON-BASIN AREA. ONLY THE NON-BASIN AREA HAS WINDROWS.

3. APPROXIMATED TOTAL AREA OF BASIN AREAS IS 1.6 ACRES.

4. THE NON-BASIN AREA IS APPROXIMATELY 7.4 ACRES.

5. FERROUS SULFATE, HUMATES, COMPOST, GRAVEL MULCH, AND SEED APPLIED TO BASIN AREAS PER TABLE 2-1.

6. HUMATE 5-0-5 AND SEED APPLIED TO NON-BASIN AREA PER TABLE 2-1.

7. HYDROMULCH AND SEED APPLIED TO PERMETER BMP PER TABLE 2-1.

SANDIA NATIONAL LABORATORIES/ NEW MEXICO  
 amec  
 SITE PREPARATION DETAILS  
 MIXED WASTE  
 LANDFILL BORROW AREA

DATE ESTIMATED: 2/10  
 PROJECT NO.: 20102019.03  
 DRAWING NO.:  
 SCALE: 2:1

Final As-Built Topographic Map of the MWL Borrow Pit – Post Reclamation