

Plant Survey Report
For
Southwest Resources, Inc.
Section 11/12 Mine
McKinley County, New Mexico

November 19, 2015

Prepared By:

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Introduction

This report discusses the results of two botanical surveys of Southwest Resource's Section 11/12 Mine, a 0.50 mile buffer zone around the mine's headframe, and an area around an associated escape/air vent to the west of the mine's headframe in Section 11 known as the "SE air vent/shaft" (Figure 1 at end of this report). The purpose of the July and November 2015 surveys was to identify plants throughout the mine area and to inspect for the presence/absence of two federal and state-listed species including Zuni fleabane (*Erigeron rhizomatus*) and Parish's alkali grass (*Puccinellia parishii*) that are known to occur in McKinley County and may occur within the project area. Information collected from the surveys also will be used to update the mine's permit application and address agency comments with more current information on plant species composition, relative cover, and production in the mine area.

Project Description

The Section 11/12 Mine is an inactive, underground uranium mine located in the southwest quarter of Section 12, T. 14 N., R. 10 W. (Ambrosia Lake, NM USGS quadrangle), approximately 25 miles north of Milan, and 2 miles west of New Mexico Highway 509. The mine is located on the east bank of Ambrosia Lake, a shallow playa-like area that accumulates surface runoff during the summer monsoon season. Don Andres Hill, which is a northeast-southwest trending outcrop of Dakota sandstone is located west-southwest of the mine's headframe and lake.

The vegetation within the project area is classified as a Great Basin Desert Scrub community (Dick-Peddie 1993). Vegetation throughout the mine area has been extensively grazed and is patchy and discontinuous. Dominant species in the project area include four-wing saltbush (*Atriplex canescens*), rabbitbrush (*Ericamera nauseosus* and *Chrysothamnus Greenei*), sand dropseed (*Sporobolus cryptandrus*), alkali sacaton (*S. airoides*), and blue grama (*Bouteloua gracilis*).

The majority of soils (62%) within the mine area are comprised of the Sparank-San Mateo-Zia complex, 0 to 3 percent slopes. Sparank soils are found in flood plains on valley floors and valley sides. These soils are derived from calcareous sandstone stream alluvium. A typical Sparank soil profile consists of silty clay loam (0 to 2 inches), clay (2 to 25 inches), and clay (25 to 65 inches). The capacity of the most limiting layer to transmit water (Ksat) is moderately low (0.01 to 0.06 in/hr) and the depth to restrictive features is more than 80 inches as is the depth to water table. These are well drained soils with high runoff potential resulting in frequent flooding. Available water storage in the soil profile, however, is high (about 10.1 inches).

San Mateo soils are also found on flood plains on valley floors and valley sides and are derived from calcareous sandstone stream alluvium. A typical profile of San Mateo soil consists of clay loam (0 to 2 inches), clay loam (2 to 15 inches), sandy clay loam (15 to 30 inches), clay loam (30 to 39 inches), sandy loam (39 to 45 inches) and clay loam 45 to 65 inches). and clay (25 to 65 inches). The capacity of the most limiting layer to transmit water (Ksat) is moderately high high (0.20 to 0.57 in/hr) and the depth to restrictive features is more than 80 inches as is the depth to water table. These are well drained soils with medium runoff potential resulting in frequent flooding. Available water storage in the soil profile is also high (about 10.7 inches).

Zia soils are found on stream terraces on valley floors and alluvial fans valley sides. These soils are derived from calcareous sandstone stream alluvium. A typical profile consists of fine sandy loam (0 to 20 inches), sandy loam clay loam (20 to 28 inches), and fine sandy loam (28 to 70 inches). The capacity of the most limiting layer to transmit water (Ksat) is high (1.98 to 5.95 in/hr) and the depth to restrictive features and the water is more than 80 inches. These somewhat excessively drained soils have low runoff potential and rarely flood. Available water storage in the soil profile is moderate (about 8.1 inches).

Soils in approximately 12% of the area surrounding Ambrosia Lake consist of the Penistaja-Tintero soil complex, 1 to 10 percent slopes (see soil map and report in Appendix A). Penistaja soils are typically found on the side slopes, treads, of cuestas, mesas, and valley sides. These soils are derived from eolian deposits and sandstone/shale slope alluvium. A typical profile of Penistaja soil consists of sandy loam (0 to 3 inches), sandy clay loam (3 to 19 inches), and sandy loam (19 to 65 inches). Depth to restrictive features is more than 80 inches as is the depth to water table. These are well drained soils with low runoff potential.

Tintero soils are similarly found on the side slopes of valleys, mesas, and cuestas and are also derived from eolian deposits and sandstone slope alluvium. A typical Tintero soil profile consists of fine sandy loam throughout the soil column to 48 inches and loamy fine sand to depth (48 to 65 inches). These are moderately well drained soils with low runoff potential.

The elevation of the project area ranges from approximately 7060 feet at the base of the head frame, 7070 feet at the north end of the mine's facilities area and 7030 feet at the fence line along the south end of the mine. Most of areas surrounding the mine's buildings and headframe have been disturbed or compacted by vehicle traffic, blading, scraping, and livestock grazing and consequently, vegetation is patchy, weedy, and discontinuous throughout this part of the permit area.

Portions of the mine area which located immediately adjacent to Ambrosia Lake are classified as Bottomland (R035XA118NM) and Clayey Bottomland (R035XA119NM) Ecological Sites (NRCS 2015). These areas appear to be transitioning to a less productive dry grassland state (Appendix A).

METHODOLOGY

The purpose of the July and November 2015 surveys was to identify common plants throughout the mine area and to inspect for the presence/absence of plant species of concern. Information collected from the surveys will be used to update the mine's permit application and address agency comments with more current information on plant species composition, relative cover, and production in the mine area.

The potential presence/absence for Zuni fleabane (*Erigeron rhizomatous*) listed as Threatened by the U.S. Fish and Wildlife Service (USFWS, IPaC 2015) and Parish's alkali grass (*Puccinellia parishii*), a State Endangered species, and a USFWS species of concern were also evaluated in this survey.

The Section 11/12 mine was surveyed on July 23, 2015 and again on November 6, 2015, by botanist Robyn Tierney. Prior to completing both surveys, the U.S. Fish and Wildlife Service’s *Information for Planning and Conservation* (IPaC 2015) website was reviewed for plant species of concern (endangered, threatened, and sensitive species) that are known to occur, or may occur within McKinley County.

All plants observed in the project area were identified and a list of plant species observed was compiled. This list was also compared with Tables 2.3 and C.1.1.1 of the U.S. Department of Energy’s (DoE) 1987 Environmental Assessment titled “*Remedial Action at the Amboisia Lake Uranium Mill Tailings Site Ambrosia Lake, New Mexico*” (DOE/EA 0322, June 1987) and a table containing a compilation of both current observed species and the previously identified species from the DoE Environmental Assessment is presented at the end of this report.

Weather during the July 23, 2015 survey was sunny, with high temperatures in the low 90’s F. Weather during the November 6, 2015 survey was also sunny, with temperatures in the upper 50s F. Both surveys were conducted as pedestrian surveys of the Section 11/12 mine facilities area and the area surrounding the SE air vent/escape shaft in Section 11. Photographs of the project area from the two surveys are contained in Appendix B.

SURVEY RESULTS

Plant Species of Concern to the U.S. Fish and Wildlife Service (USFWS): Two species of concern that may occur within McKinley County were identified from the USFWS IPaC (2015) and the New Mexico Rare Plants (NMRPTC 1999, revised 2015) databases (Table 1). Neither species was observed during the July and November 2015 surveys.

Table 1. Species of concern, status, habitat and potential to occur in the project area

SPECIES STATUS	HABITAT	POTENTIAL TO OCCUR IN THE PROJECT AREA*
<i>Erigeron rhizomatus</i> Zuni fleabane USFWS Threatened	Species is found on nearly barren detrital clay hillsides with soils derived from shales of the Chinle or Baca formations (often seleniferous); most often found on north or east-facing slopes in open piñon-juniper woodlands at 7,300-8,000 ft. (NMRPTC 1999, Sivinski and Lightfoot Sivinski and Tonne 1991, Sivinski and Tonne 2004, USFWS 2007, Knight 1988, Christie 2004).	No appropriate habitat: Project area is nearly 1,000 feet lower in elevation and there are no barren detrital clay hillsides with soils derived from Chinle or Baca shale formations within the project area. (NP)

SPECIES STATUS	HABITAT	POTENTIAL TO OCCUR IN THE PROJECT AREA*
<i>Puccinellia parishii</i> Parish’s alkali grass New Mexico State Endangered	The species requires continuously damp soils during its late winter to spring growing period and is found near white-crusts alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes at 2,600-7,200 ft. range-wide (NMRPTC 1999).	Habitat suitable: there are no white-crusts alkaline springs, or seeps, in the project area, and while Ambrosia Lake may contain water from surface runoff generated during summer rains, it generally does not remain wet during the late winter to spring growing period. (NS)

Status USFWS – U.S Fish and Wildlife Service (ECOS, 2014)

Endangered – An animal or plant species in danger of extinction throughout all or a significant portion of its range.

Threatened – An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Potential to Occur

K – Known, documented observation within project area.

S – Habitat suitable and species suspected to occur within the project area.

NS – Habitat suitable but species is not suspected to occur within the project area.

NP – Habitat not present and species unlikely to occur within the project area

The project area was also evaluated during both surveys for the white alkaline crusts and wetland conditions favored by Parish’s alkali grass. Such alkaline and crustal conditions were not observed during the July survey when the lake contained water or during the November survey when the lake was nearly dry.

Plant species that were observed during the surveys are listed in Table 2. Identification of unknown plants was based on keys from Ivey (2008), Heil et al, (2013), and Weber and Wittman (2012).

Taxonomic nomenclature was standardized to meet USDA Plants Database (2015) standards.

Table 2. Plants observed in the vicinity of the Section 11/12 Mine during July 23 and November 5, 2015 surveys. Asterisk (*) indicates presence in previously submitted Table C.1.1, from Environmental Assessment titled “Remedial Action at the Amboisia Lake Uranium Mill Tailings Site Ambrosia Lake, New Mexico” (DOE/EA 0322, June 1987)

Shrubs and Subshrubs

Artemesia frigida

Fringed sagewort

Atriplex canescens

Fourwing saltbush*

Chrysothamnus greenei

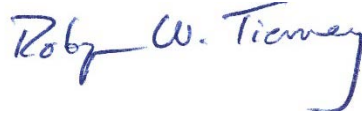
Greene’s rabbitbrush*

<i>Ephedra torreyana</i>	Torrey's joint fir*
<i>Ericameria nauseosa</i> var. <i>bigelovii</i>	Bigelow's rabbitbrush*
<i>Gutierrezia sarothrae</i>	Broom snakeweed*
<i>Krascheninnikovia lanata</i>	Winterfat*
<i>Lycium pallidum</i>	Pale wolfberry*
<i>Sarcobatus vermiculatus</i>	Greasewood*
Cacti	
<i>Opuntia polyacantha</i>	Starvation pricklypear
Grasses and Grass-like Plants	
<i>Achnatherum hymenoides</i>	Indian ricegrass*
<i>Aristida purpurea</i> var. <i>nealleyi</i> , <i>longiseta</i>	Purple threeawn*
<i>Bouteloua gracilis</i>	Blue grama*
<i>Dasyochloa pulchella</i>	Fluff grass*
<i>Elymus elymoides</i>	Bottlebrush squirreltail*
<i>Elymus trachycaulum</i>	Slender wheatgrass
<i>Hesperostipa comata</i>	Needle and thread grass*
<i>Hordeum jubatum</i>	Foxtail barley
<i>Munroa squarrosa</i>	False buffalograss
<i>Pascopyrum smithii</i>	Pubescent wheatgrass*
<i>Pleuraphis jamesii</i>	Galleta*
<i>Poa fendleriana</i>	Muttongrass
<i>Sporobolus airoides</i>	Alkali sacaton*
<i>Sporobolus cryptandrus</i>	Sand dropseed*
<i>Sporobolus flexuosus</i>	Mesa dropseed
Forbs	
<i>Ambrosia acanthicarpa</i>	Bur ragweed
<i>Asclepias subverticillata</i>	Horsetail milkweed

<i>Astragalus</i> spp. (2)	Milkvetch species
<i>Bassia scoparia</i>	Burningbush
<i>Chamaesyce micromeris</i>	Desert spurge
<i>Cryptantha</i> spp. (2)	Catseyes, <i>Cryptantha</i>
<i>Dimorphocarpa wislizeni</i>	Spectacle-pod
<i>Erigeron</i> sp.	Daisy fleabane
<i>Erodium cicutarium</i>	Filaree
<i>Grindelia squarosa</i>	Curlycup gumweed*
<i>Helianthus annuus</i>	Common sunflower*
<i>Heterotheca villosa</i>	Hairy goldenaster
<i>Lactuca serriola</i>	Prickly lettuce*
<i>Machaeranthera bigelovii</i>	Bigelow's tansyaster*
<i>Mentzelia multiflora</i>	Desert blazingstar*
<i>Oenothera albicaulis</i>	Whitestem evening primrose*
<i>Penstemon</i> sp.	Beardtongue species*
<i>Phacelia</i> sp.	Scorpionweed species*
<i>Portulaca oleracea</i>	Common purslane
<i>Rumex crispus</i>	Curly dock*
<i>Salsola tragus</i>	Russian-thistle
<i>Selaginella</i> sp.	Clubmoss
<i>Sphaeralcea coccinea</i>	Scarlet globemallow*
<i>Sphaeralcea incana</i>	Grey globemallow*
<i>Verbisina enceliodes</i>	Golden crownbeard*
<i>Xanthisma spinulosum</i>	Spiny goldenweed
<i>Xanthium strumarium</i>	Common cocklebur

DISCUSSION

No plant species of concern to the U.S. Fish and Wildlife Service or the State of New Mexico will be impacted by the permitting, reclamation, or operation of the Section 11/12 Mine.



Signature of Author: _____
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November 19, 2015

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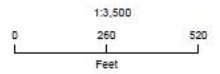
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Southwest Resources

**Section 12 Mine
Facility Map**

Sections 12, T.14N, R.10W
McKinley County, New Mexico

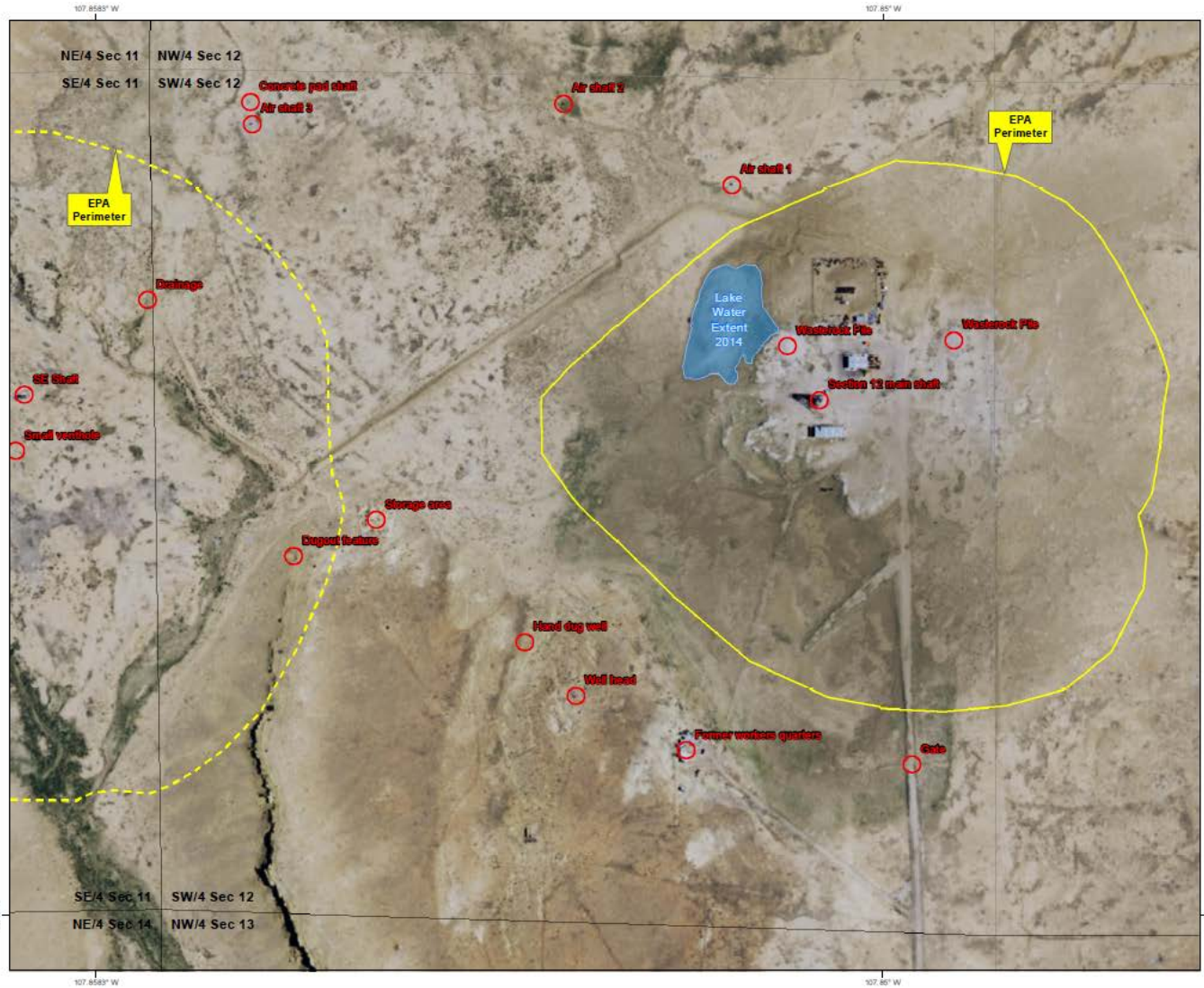
- EPA Perimeter
- Abrosia Lake Water (Intermittent)



NAD 1983 New Mexico State Plane West
FIPS 3003 Meters



Prepared by Permits West, Inc., November 12, 2015
for Southwest Resources Inc.



**Appendix A
Custom Soil Resource Report for
McKinley County Area, New
Mexico, McKinley County
and Parts of Cibola and San
Juan Counties**

Section 11/12 Mine, T 14N., R 10W.