September 1, 2020

Via Federal Express

Mr. Bill Childress
District Manager, Las Cruces District Office
Bureau of Land Management
1800 Marquess Street
Las Cruces, NM 88005

Mr. Holland Shepherd
Program Manager, Mining Act Reclamation Program
New Mexico Energy, Minerals and Natural Resources Department
Mining and Minerals Division
1220 South St. Francis Drive
Santa Fe, NM 87505

RE: **Permit Tracking No. LU035MN**
Submittal of American Magnesium, LLC's
Plan of Operations, Foothill Dolomite Mine (Revision 5)

Dear Messrs. Childress and Shepherd:

I am writing regarding American Magnesium, LLC's (AmMg's) Minimal Impact New Mine Permit Application, permit tracking number LU035MN.

Enclosed please find two (2) copies of AmMg's Plan of Operations (PoO), Revision 5, for the AmMg Foothill Dolomite Mine. The revised PoO provides information and actions to address comments received during the preparation of the Environmental Assessment, which was finalized on July 31, 2020, as well as those received from the Mining and Minerals Division (MMD) in a May 3, 2019 letter. The previous version (Version 4) is dated April 9, 2019. Also included is a compact disk with a portable data file (pdf) version of the document.

As you know, magnesium has been identified as a critical mineral under Presidential Executive Order 13817 signed December 20, 2017, and the Final List of Critical Minerals issued by the U.S. Geological Survey on May 18, 2018. The AmMg Foothill Dolomite Mine will provide the nation with a reliable source of this critical mineral. AmMg looks forward to working with BLM and MMD to obtain the required permits to operate a new minimal impact dolomite mine near Deming, New Mexico.

Should you have any questions, please contact AmMg's permitting lead, Mr. John Ayarbe, PG, with Daniel B. Stephens & Associates, Inc. at 505-353-9137 or by e-mail at jayarbe@geo-logic.com.

Regards,

American Magnesium, LLC

Carol Ness Brewka, Managing Member

Plan of Operations

Foothill Dolomite Mine

Deming, New Mexico

Prepared for **Bureau of Land Management**

Las Cruces, New Mexico

August 27, 2020
(Revision 5)

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

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Acronyms and Abbreviations

ALS	ALS Environmental
AMEC	AMEC Foster Wheeler Environment & Infrastructure, Inc.
AmMg	American Magnesium, LLC
ASU	Arizona State University
ATF	Bureau of Alcohol, Tobacco, and Firearms
BCR	bird conservation region
bgs	below ground surface
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	best management practice
$CaCO_3$	calcium carbonate
CaO	calcium oxide
Census	U.S. Census Bureau
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CFR	Code of Federal Regulations
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
DBS&A	Daniel B. Stephens & Associates, Inc.
Dos Rios	Dos Rios Consultants, Inc.
EMNRD	New Mexico Energy, Minerals and Natural Resources Department
EnviroSystems	EnviroSystems Management, Inc.
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GBBDC	game birds below desired condition
GIS	geographic information system
IO	isolated occurrence
KOP	key observation point
LOI	loss on ignition
MARP	New Mexico Mining Act Reclamation Program
mg/L	milligram(s) per liter
MgO	magnesium oxide

Acronyms and Abbreviations (Continued)

MMD	New Mexico Mining and Minerals Division
mph	miles per hour
MSHA	Mining Safety and Health Administration
NDEP	Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NIAF	NMCRIS Investigation Abstract Form
NMAC	New Mexico Administrative Code
NMMA	New Mexico Mining Act
NMMC	New Mexico Mining Claim
NMPM	New Mexico Principal Meridian
NMCRIS	New Mexico Cultural Resource Information System
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service (formerly the SCS)
NvMA	Nevada Mining Association
NWIS	National Water Information System
OSE	New Mexico Office of the State Engineer
PFYC	potential fossil yield classification
PMLU	post-mine land uses
PoO	plan of operations
RC	reverse circulation
ROI	region of influence
SCS	Soil Conservation Service
SDS	safety data sheet
SMIO	State Mine Inspector's Office
SPCC	spill prevention, control and countermeasures

Acronyms and Abbreviations (Continued)

SPLP	Synthetic Precipitation Leaching Procedure
SRCE	Standardized Reclamation Cost Estimator
SWPPP	storm water pollution prevention plan
TDS	total dissolved solids
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRCS	waste rock characterization study
WSA	Wilderness Study Area
XRF	x-ray fluorescence

Executive Summary

This Plan of Operations (PoO) is submitted to the Bureau of Land Management, Las Cruces Office (BLM), and the New Mexico Energy, Minerals and Natural Resources Department Mining and Minerals Division (MMD) by American Magnesium, LLC (AmMg) for the proposed Foothill Dolomite Mine Project (the Project) located near Deming, New Mexico. The Project is administered by AmMg, a New Mexico limited liability company. As outlined in Section 1.1 of this PoO, AmMg will be the Operator. This PoO is submitted in accordance with BLM Surface Management Regulations in 43 Code of Federal Regulations (CFR) 3809, as amended, and New Mexico Mining Act Reclamation Program regulations in 19.10.3 New Mexico Administrative Code (NMAC). This PoO is intended both to address the BLM's requirements for a plan of operations and to supplement and support AmMg's corresponding application to MMD for a Subpart 3 Minimal Impact New Mining Operations Permit for mining development and reclamation.

The Project area and access road are located on public lands administered by the BLM in parts of Sections 26, 27, and 28, Township 25 South, Range 8 West, New Mexico Principal Meridian, in the Little Florida Mountains Mining District, Luna County, New Mexico (the Project Area). The Project Area includes approximately 30.04 acres and will be developed in the following manner (all acreages are approximate). Initially, a 2-acre laydown yard for a mobile office, equipment storage, sanitation facilities, and stockpile areas for waste rock and topdressing will be constructed for the Project. Once the laydown yard is constructed, resource verification will occur in Phase 1 and 2 mining areas in the Project Area followed by dolomite mining, which will occur in three phases sequentially. The Phase 1 mining area consists of 10.2 acres, Phase 2 consists of 6.8 acres, and Phase 3 consists of 5.5 acres.

The Project Area is located approximately 12 miles south of Deming, New Mexico. Mined material will be transported by truck from the mine site to a processing site in Deming by a new access road to be constructed from the mine site north to an existing unimproved BLM road. The haul route will follow the unimproved BLM road northwest to County Road Bo16 (identified as Camino Doce west of McCan Road and Mahoney Park Road east of McCan Road). The haul route from the intersection of County Road Bo16 and McCan Road has not been finalized.

Conceptually, haul trucks will travel west on County Road Bo16 for 6 miles, then north on Highway 331 (Palomino Road) for 9 miles, and then northeast on Highway 418 for about 4 miles to Highway 497 in west Deming. Trucks will travel east on Highway 497 (West Pine Street) for about 0.7 mile, turn north on to North Gold Avenue and travel north about 2.2 miles to the Peru Industrial Park on Arrowhead Drive NW. Improvements to the haul route will be limited to the unimproved BLM road and the new access road into the mine site. No access road improvements to County Road Bo16 will be required for the 4 miles from NM 11 to its intersection with the unimproved BLM road because this road is wide enough (over 20 feet and paved in the westernmost portion) to accommodate passing haul trucks. For the approximately 2 miles of access along the existing unimproved BLM road from the intersection of County Road Bo16, improvements will include widening to 16 feet from its current 10-foot width, development of several 8-foot-wide by 75-foot-long pullouts on the south side of the road for passing haul trucks (located every 0.5 mile or less depending upon topography), and all associated cut and fill. Pullouts will be developed at existing locations created by current road users. All improvements to the BLM road will result in a total of 4.04 acres of new disturbance. The new proposed access road from the existing BLM road to the mine site will be 16 feet wide by approximately 1,334 feet long, for an additional 1.5 acres of new disturbance (including all cut and fill). Both roads will be surfaced with aggregate base course material.

AmMg proposes to create, over the life of the Project, a total of approximately 30.04 acres of new surface disturbance to BLM managed lands under this PoO. The planned mining activities covered under this PoO consist of the following: resource verification drilling for mine planning, dolomite mining activities, blasting operations, geologic and geophysical mapping, construction of resource verification roads, drill sites, maintenance/improvement of the existing BLM road to the Project Area, construction of a new access road mostly within the Project Area, and reclamation of Project-related surface disturbance.

Mining activities will be conducted in a phased approach based on the success of previously completed resource verification activities. Resource verification and mining activities will begin in Phase 1 and continue into Phase 2; Phase 3 will be mined last (no resource verification will occur in Phase 3). As mining takes place, a series of 20-foot-high interim walls and 5-foot-wide benches with slopes of approximately 2H:1V (horizontal to vertical) will be developed within the

central portion of the mine area. When the outer perimeter of the mine permit area is reached, the 20-foot-high perimeter walls will be sloped in toward the center of the mine at approximately 3H:1V. As Phase 2 mining progresses, the steep walls in the central portion of the mine will be removed as part of the mining. At the end of mining operations (Year 20), the mine will be a relatively flat-bottomed bowl that is open on the southwest. The bottom of the bowl will be sloped slightly to the southwest to maintain positive drainage. The approximately 20-foot-high perimeter walls and benches will vary somewhat in elevation, but the sides will slope toward the center as described above.

This PoO addresses all required items listed under 43 CFR 3809, as amended, to demonstrate AmMg's intention to comply with this and any other federal and/or state laws and regulations as required by the BLM and/or the State of New Mexico. It is understood that studies and documentation with an acceptable level of analysis and detail may be identified and required as the process moves forward.

1. Applicant Information [43 CFR 3809.401(b)(1)]

1.1 Operator Information

Operator Name: American Magnesium, LLC (AmMg)

Mailing Address: PO Box 1013
Elephant Butte, NM 87935

Phone Number: (505) 699-8807

Tax Payer Identification Number: EIN #46-2831543

Point of Contact: Carol N. Brewka, Managing Member
PO Box 1013
Elephant Butte, NM 87935
Phone: (505) 699-8807

Emergency Contact: Carol N. Brewka, Managing Member
PO Box 1013
Elephant Butte, NM 87935
Phone: (505) 699-8807

1.2 Claims Information

Owner(s): American Magnesium, LLC (AmMg)

Address: PO Box 1013
Elephant Butte, NM 87935

Primary Commodity: Magnesium

Claim Name(s) and BLM Serial Number: MAG 21 (NMMC197579)
MAG 22 (NMMC197580)

Claim Type(s): Lode

Table 1. Claim Descriptions

¼	Section	Township	Range	Meridian
MAG 21 Lode Claim (NMMC197579)				
Southeast	27	25 South	8 West	NMPM
Northeast	34	25 South	8 West	NMPM
MAG 22 Lode Claim (NMMC197580)				
Southeast	27	25 South	8 West	NMPM
Northeast	34	25 South	8 West	NMPM

NMMC = New Mexico Mining Claim

1.3 Individual Completing Application

This Plan of Operations (PoO) application was initiated by AMEC Foster Wheeler Environment & Infrastructure, Inc. (AMEC), updated by EnviroSystems Management, Inc. (EnviroSystems), and completed by Daniel B. Stephens & Associates, Inc. (DBS&A) on behalf of AmMg. Entities contributing to this application are summarized in Section 8. All the information contained in the application has been reviewed and verified by AmMg.

1.4 Business Information

AmMg is a New Mexico limited-liability company that was formed on April 30, 2013 for the business of owning mining interests and developing, mining, processing, and selling certain minerals and related substances. Its duration is perpetual.

AmMg and American Magnesium, LLP were formed in order to facilitate the management of the initial phases of the research and development of the Project. In June 2015, American Magnesium, LLP was terminated. In January 2016, American Mineral Management, LLC (the

Manager) was formed to act as manager for AmMg and to continue the research and development of the Foothill Dolomite Mine Project (the Project). The Manager will provide technical expertise, project management, community and government relations, and financial reporting and accountability to the Project. The Manager will also facilitate the recruitment of investors for the Project.

1.5 Corporation Information

The principal executive offices of AmMg are located at 104 Rinconada, PO Box 1013, Elephant Butte, New Mexico 87935. The primary business telephone number is (505) 699-8807. E-mail correspondence should be directed to cnbrewka@msn.com.

1.6 Partnership Information

American Mineral Management, LLC was organized in 2016 as a New Mexico limited liability company for the purpose of managing mining development and mining, including additional mineral resource verification, mine planning, and other mining development and mining projects. Its members and principals have experience in minerals resource verification, development, operation, and disposition.

1.7 Permits and Approvals

In addition to approval by the State under the New Mexico Mining Act (NMMA), AmMg will be required to obtain a number of other state and federal permits and approvals, as listed in Table 2. AmMg will seek other permits and approvals, as necessary, before operations begin.

Table 2. Major Permits and Approvals Required

Permit/Approval	Granting Agency
Federal	
Approval of Plan of Operations	U.S. Bureau of Land Management (BLM)
National Dredge and Fill Permit (Section 404)	U.S. Army Corps of Engineers (USACE)
MSHA Registration	Mine Safety and Health Administration (MSHA)
National Pollution Discharge Elimination System (NPDES), including Storm water Discharge	U.S. Environmental Protection Agency (EPA)
Endangered Species Surveys	U.S. Fish and Wildlife Service
State	
Mining Permit	New Mexico Energy, Mineral and Natural Resources Department (EMNRD)- Mining Act Reclamation Bureau
Mine Registration	EMNRD – Mine Registration Reporting, and Safeguarding Program – Mine Registration
Air Quality Permit	New Mexico Environment Department Air Quality Bureau
Cultural Resources Clearance Surveys	New Mexico Department of Cultural Affairs - Historic Preservation Division
Endangered Plant Species Surveys	Natural Heritage New Mexico
Endangered Wildlife Species Surveys	New Mexico Department of Game and Fish

2. Description of Operations - Proposed Action [43 CFR 3809.401(b)(2)]

Magnesium has been identified as a critical mineral under Presidential Executive Order 13817 signed December 20, 2017 (Trump, 2017), and the Final List of Critical Minerals issued by the Department of Interior on May 18, 2018 (USDOI, 2018). The AmMg Foothill Dolomite Mine will provide the nation with a reliable source of magnesium.

2.1 Legal Description

The Project mine site and access road are located on public lands administered by the Bureau of Land Management, Las Cruces Office (BLM) in parts of Sections 26, 27, and 28, Township 25 South (T25S), Range 8 West (R8W), New Mexico Principal Meridian (NMPM), in the Little Florida Mountains Mining District, Luna County, New Mexico (the Project Area). The actual mine site is located in the southeast quarter of the southeast quarter-section of Section 27. The Project location is shown in Figure 1.

2.2 Project Access

The Project Area is located approximately 12 miles south of Deming, New Mexico. The Foothill Mine Site, including the mining claims, land ownership, the area to be mined, the proposed laydown yard, and the proposed access road into the mine area are shown in Figure 2. The conceptual route to transport mined material from the mine to Deming is shown in Figure 3. Mined material will leave the mine site by a new access road to be constructed from the mine site north to an existing unimproved BLM road. The haul route will follow the unimproved BLM road northwest to County Road Bo16 (identified as Camino Doce west of McCan Road and Mahoney Park Road east of McCan Road). The haul route from the intersection of County Road Bo16 and McCan Road has not been finalized. Conceptually, haul trucks will travel west on County Road Bo16 for 8 miles, then north on Highway 331 (Palomino Road) for 9 miles, and then northeast on Highway 418 for about 4 miles to Highway 497 in west Deming. Trucks will then travel east on Highway 497 (West Pine Street) for about 0.7 mile, turn north on to North

Gold Avenue and travel north about 2.2 miles to the Peru Industrial Park on Arrowhead Drive NW. The location of the processing facility has not been finalized.

2.3 Site Ownership (Acres) and Land Status within Proposed Project Area

The Project Area and access road are situated on approximately 30.04 acres of BLM-administered land. The target dolomite deposit is encompassed within the boundaries of unpatented lode mining claims (named MAG 21 and MAG 22) perfected and maintained under the General Mining Law of 1872. Because AmMg owns those claims, subject only to the paramount title of the United States and surface management requirements of the BLM, it has a real property interest sufficient to conduct development and mining activities thereon, including resource verification, mine development, and mining-related work. The claim boundaries are shown in Figure 2.

2.4 Description of Proposed Action and Site Conceptual Design

The anticipated total surface disturbance for the Project will be 30.04 acres, which includes the following:

- Improvements to the existing unimproved BLM road
- Construction of a new mine site access road
- Development of a laydown yard with temporary structures
- Construction of drill sites and resource verification drilling
- Excavation and removal of dolomite resources
- Reclamation activities

The surface disturbance will occur in phases and the final mine plan will be subject to refinement based on the results of the additional resource verification activities, which will be conducted as the initial activity of mine development.

2.4.1 Improvements to the Existing BLM Road

No improvements to County Road Bo16 will be required for the approximately 8 miles from NM 331 to its intersection with the existing unimproved BLM road because this road is mostly paved west of McCan Road and is wide enough (over 20 feet) to accommodate passing haul trucks. The approximately 2 miles of the existing unimproved BLM road from County Road Bo16 to the mine site turnoff will be improved. Improvements will include widening to 16 feet from its current 10-foot width, development of several 8-foot-wide by 75-foot-long pullouts on the south side of the road for passing trucks (located every 0.5 mile or less depending upon topography), all associated cut and fill, and placement of aggregate base course. To limit new disturbance, AmMg will develop existing pullouts that have been created over time by public use of the BLM road. Drawings for the proposed improvements to the BLM road are provided in Appendix A1.

AmMg intends to follow the current road alignment and to develop previously disturbed areas along the road as pullouts. As needed, the widened road surface will be sloped slightly (2 to 4 degrees) to the south to promote drainage. Other features that may be employed to promote drainage may include water bars and grade dips. Water turnouts will be constructed as needed. A cattle guard will be installed at the swing gate currently located in the upper portion of the BLM road. The existing gate will be reinstalled on the south side of the cattle guard.

The northern edge of the BLM road marks the boundary of the Florida Mountains Wilderness Study Area; therefore, the proposed upgrades, including water turnouts, will be performed on or south of the current alignment. Based on a preliminary survey of current conditions and topography, there are no significant low-water crossings and no locations where culverts will need to be installed. However, if necessary, concrete slab fords (low-water crossings) may be installed (see Section 2.4.2 for details). The improved road will be surfaced with aggregate base course to improve road stability, minimize maintenance, and control dust. Roadwork will likely be accomplished with a bulldozer, a road grader, and haul trucks. Roadwork will follow requirements and procedures in The Gold Book (BLM, 2007a).

Excess material from the road improvement suitable for use as topdressing (defined in 19.10.1.7.T(1) New Mexico Administrative Code [NMAC] as "geological material and other amendments capable of supporting vegetation") will be collected, transported to the laydown yard, and stockpiled for future use during reclamation activities (see Section 2.4.4).

2.4.2 Construction of New Mine Site Access Road

The new proposed access road from the existing BLM road to the mine site will be 16 feet wide by approximately 1,334 feet long and will require cut-and-fill in a number of locations. The cut-and-fill balance method results in level surfaces that are essential for movement of the relatively top-heavy mine equipment. The access road route will first be cleared of topsoil and other material suitable for use as topdressing. Surface vegetation and large rocks will also be removed. Salvageable topdressing will be transported to the laydown yard area and stockpiled for future use during reclamation activities (see Section 2.4.4).

The new road will be approximately 16 feet wide and sloped slightly to the west to promote drainage. Water turnouts will be constructed as needed. The proposed alignment will require the installation of single culverts to cross two or three narrow, steep-sided gullies. A concrete slab ford (low-water crossing) will be constructed at grade to cross a section of ephemeral wash that is about 70 feet wide and located to the north of the proposed mine site (between the BLM road and the mine site). The reinforced concrete slab will be 6 to 8 inches thick, with upstream and downstream cutoff walls several feet deep for scour protection. The slab surface will have a shallow downstream cross slope. Figure 4 shows a typical cross section of a concrete slab ford that is proposed for the new access road to the laydown yard and potentially along the existing unimproved BLM road. Slab fords are considered ideal for semiarid and desert environments, where flow fluctuations are extreme and floods may carry large amounts of debris (USDA, 2006). The road will be surfaced with aggregate base course to improve road stability, minimize maintenance, and control dust. Roadwork will likely be accomplished with a bulldozer, a road grader, and an excavator. Roadwork will follow requirements and procedures in The Gold Book (BLM, 2007a).

The new road from the BLM road to the mine site will be closed to public access to protect public health and safety, and to inhibit unauthorized access. Possible closure solutions may include a locked gate, appropriate signage, and a three-strand barbed wire fence around the mine perimeter. AmMg will discuss options for site security with BLM before any measures are implemented. Drawings for the construction of the mine access road are provided in Appendix A1.

2.4.3 Development of a Laydown Yard

A laydown yard for mining equipment, an office trailer, portable sanitation facilities, and a water tank will be developed adjacent to the footprint of the mining operations (Figure 5). The laydown yard will be developed by blading the area to remove surface vegetation and large rocks, and to segregate topsoil and other material suitable for use as topdressing. Portions of the laydown yard will be used to stockpile topdressing material from disturbed areas and waste rock from mining operations. The proposed laydown area is relatively flat with a low slope to the west-southwest, and will require minimal recontouring. Chain-link fencing topped with three-strand barbed wire may be installed around the laydown yard area to secure equipment within the laydown yard. An existing shallow drainage on the south side of the laydown yard area will be maintained, minimizing the amount of run-on to the laydown yard area and thereby preventing excessive erosion. If excessive erosion is noted, additional measures, such as silt fencing and/or hay bales, will be used to reduce run-on and erosion. The laydown area (2 acres) is included within AmMg's disturbance calculations.

2.4.4 Handling of Salvageable Topdressing

During each operation that results in the creation of a disturbed area, salvageable topsoil and other material capable of supporting vegetation, herein referred to as topdressing, will be collected and transported to the topdressing stockpile area in the laydown yard. Given the configuration of the foothill, it is likely that most salvageable topdressing will be obtained from widening of the existing BLM road, construction of the mine access road and laydown area, and mine construction, particularly on the lower slopes of the foothill. It is likely that the upper slopes of the foothill, where most of the mining will occur, will be too steep to salvage

topdressing, but every effort will be made to do so. Except for the road construction and laydown yard area, topdressing material will come from one of the mining phase areas.

AmMg estimates that perhaps as much as 23,000 cubic yards of topdressing material may be available from the various areas to be disturbed, as summarized in Table 3. This preliminary estimate is based on the acreage to be disturbed and assumed thicknesses of recoverable topdressing. Due to the steepness of the foothill and exposure of dolomite at the surface, it is likely that the foothill will provide little salvageable topdressing and none is expected from the Phase 3 area. If additional topdressing material is required for reclamation, suitable material will be imported from an off-site source. The estimate of salvageable topdressing will be revised after completion of the verification drilling program.

Table 3. Preliminary Estimate of Salvageable Topdressing

Disturbed Area	Area		Salvageable Topdressing Thickness (feet)	Available Topdressing (ft^3)	Available Topdressing (yd^3)
	acres	ft^2			
Road improvements	4.04	175,982	1.0	175,982	6,518
New access road	1.5	65,340	1.0	65,340	2,420
Laydown yard	2.0	87,120	1.0	87,120	3,227
Mine Phase 1	10.2	444,312	0.5	222,156	8,228
Mine Phase 2	6.8	296,208	0.5	74,052	2,743
Mine Phase 3	5.5	239,580	0.0	0.0	0.0
Total	30.04				23,135

Note: A better estimate of available topdressing will be made when resource verification drilling is completed.
ft^2 = Square feet
ft^3 = Cubic feet
yd^3 = Cubic yards

Efforts will be made to salvage the existing vegetation on the areas that are newly disturbed by the Project. Prior to and during soil salvage, woody plants and vegetation will be removed. The vegetation will be stored with the topdressing to increase the organic matter content of the topdressing.

AmMg expects that the topdressing will be collected using a combination of bulldozer and excavator. Salvaged materials will be transported by dump truck to the laydown yard. Once the topdressing is stockpiled in the laydown yard, it will be contoured to minimize erosion and seeded with the reclamation seed mix approved by BLM and the New Mexico Energy, Minerals and Natural Resources Department (EMNRD) Mining and Minerals Division (MMD) (see Section 3.3). The stockpile will be reseeded when new material (e.g., from Phase 2) is added or as necessary to prevent erosion and material loss.

Samples of salvaged topdressing will be analyzed to identify nutrient deficiencies, such as nitrogen, phosphorus, and potassium levels, and the results will subsequently be used to determine requirements for fertilizers and amendments. Organic amendments that could be added to topdressing prior to placement on recontoured areas might include cotton husks, feedlot cattle waste, and aerobically digested sanitized sewer sludge. Any natural soil amendments used would be certified free of invasive and noxious weeds.

Once disturbed areas have been recontoured, cover materials will be hauled from the topdressing stockpile and a minimum of 12 inches of topdressing will be placed on the top surface and slopes. Hauling and placement of topdressing will be accomplished using a variety of equipment, including haul trucks, scrapers, and excavators. Bulldozers and motor graders will be used to smooth the surfaces and facilitate access for cover placement and revegetation activities. Fertilizers would be incorporated into the top 4 to 6 inches of the surface by disking.

2.4.5 Resource Verification

Drilling is proposed to verify the resource and confirm the mine PoO. Resource verification drilling activities are used to confirm geologic materials observed at the surface and conceptual geologic models. Resource verification drilling will occur in Phase 1 and 2 mining areas (Figure 6). Topography in the Phase 3 mining area is too steep and rugged for drill equipment access. AmMg's proposed resource verification activities will verify the thickness and magnesium content of the dolomite, as well as the thickness of overburden (topdressing) present at the site.

Drill holes will not exceed 100 feet in depth from the current surface. During the resource verification operation, salvageable topdressing will be collected and transported to the stockpile area in the laydown yard. Following resource verification activities, the location of each drill hole will be surveyed. Each drill hole will be permanently sealed from bottom to top with a neat cement slurry grout in accordance with 19.10.3.302.L. NMAC.

Limited resource verification will be conducted using diamond-bit drill rigs (designed for drilling to depths up to 100 feet) or dual-tube, reverse-circulation (RC) air-rotary rigs (designed for drilling depths up to 2,000 feet). The RC rigs will be used in the event that the diamond-bit rig cannot achieve the 100-foot depth, but are not anticipated to be necessary. Each type of drill has its advantages and disadvantages depending upon the nature of the material being drilled, the depth of the target, and the information sought. In most drilling programs, more than one drill rig and often more than one type of drill is used. For some holes, both methods may be used sequentially to complete the resource verification boring. Following are characteristics of each type of drilling method:

- Diamond-bit drilling rigs are used where conditions prevent the use of other rigs and/or where solid samples of rock core are needed for geological, geotechnical, or metallurgical studies. The rig proposed to be used will be a hydraulic, self-propelled, self-contained, crawler-based surface drilling rig equipped with a cabin and rod handling system (e.g., Sandvik Ranger DX800, Atlas Copco Epiroc T40). These rigs can be used in rough terrain and are equipped with dust collection systems.

- The RC air rig may be used in the event that the diamond-bit core drill cannot achieve a depth of 100 feet—the maximum depth proposed. At these shallow depths, dry air is the working fluid, with water mist injected for dust suppression. Typical RC drills are truck mounted with optional auxiliary booster compressors to enable deeper penetration.

As noted above, the drill rigs most likely to be used for resource verification will be track mounted and can be used in rough terrain. In areas with reasonably level terrain, construction of roads for the drill rigs and associated equipment would be avoided, and drilling equipment would be driven overland to the drill locations, but only within the mine site area (Figure 6). For drilling locations on steeper terrain, a bulldozer will be used to blade a road for the drill rig. A

limited amount of blasting may be necessary to provide equipment access to drill locations. Berms will be constructed as safety precautions, where necessary.

The proposed locations of the 86 exploratory boreholes in the Phase 1 and 2 mining areas are shown in Figure 7. The map also shows the locations of roads that will be constructed to provide access to the exploratory boreholes. The width of the self-contained, track-mounted drill rigs proposed for use averages approximately 8 feet. Therefore, the access roads will be approximately 12 feet wide. It is anticipated that the exploratory boreholes will be drilled in the centers of the access roads and that individual drill pads will fit within the access roads and not require additional disturbance.

It is anticipated that some exploratory borehole locations will be accessed without constructing a road; however, the assumption made in preparing Figure 7 is that each location will require an access road. Based on this assumption, a total of 10,626 linear feet of access road will be constructed. Assuming an average width of 12 feet, the estimated area that will be disturbed is 127,512 square feet (2.93 acres).

AmMg plans to initiate mining operations once construction of the processing facility begins. If mining operations do not begin within 1 year of the end of verification drilling, AmMg will reclaim the disturbances related to the verification drilling program.

2.4.6 Excavation and Removal of Dolomite Resource

The foothill that will be the focus of mining activity is composed of Fusselman Dolomite that is underlain by the Cutter member of the Montoya formation. The Fusselman Dolomite is a high-magnesium dolomite (a calcium-magnesium carbonate) and is the target of mining (i.e., the ore). The underlying Montoya does not contain high magnesium concentrations. Because of its position beneath the Fusselman and its low magnesium content, the mining process will minimize excavation of the Montoya, thereby minimizing the need to manage excavated Montoya materials as waste rock.

AmMg plans to mine the Fusselman Dolomite in Phase 1 area first, followed by Phase 2, and finally ending in Phase 3 (Figure 2). Dolomite will be mined from the highest elevation of each

phase (one at a time) to the valley floor. Plan view maps and cross sections of the mine area at end of Years 1, 5, and 20 are provided in Appendix A2.

For mining to take place, an access road with a maximum grade of 10 percent will be constructed from the laydown yard area around the west, south, and east sides of the foothill to the top of the foothill, as shown in drawings in Appendix A2. This operation will require some blasting of the dolomite rock. During this operation, salvageable topdressing will be collected and transported to the stockpile area in the laydown yard, as described in Section 2.4.4.

Once access to the top of the foothill is gained, mining in Phase 1 area will begin. Carefully planned blasting with explosives will be used to loosen and break up the dolomite rock. A series of interim 20-foot-high walls with slopes of approximately 2H:1V, separated by 5-foot-wide horizontal benches, will be developed along the east side of Phase 1 (within the central portion of the mine area). During mining, AmMg proposes to reclaim (rip, cover with topdressing, and seed) the horizontal benches as they are created. At 5 feet wide, these benches will be difficult to reclaim post-mining.

As Phase 1 mining proceeds and the outer perimeter of the mine permit area is reached, the perimeter walls will consist of approximately 20-foot-high walls sloped in towards the center of the mine at a slope of approximately 2H:1V, which is consistent with the steep topography of the nearby Florida Mountains. During Phases 2 and 3, the steep interim wall in the central portion of the mine (created in Phases 1 and 2) will be removed (in Phases 2 and 3) as part of the mining. Walls at the final perimeter of the mine will be sloped at approximately 3H:1V. At the end of mining operations (Year 20), the mine will be a relatively flat-bottomed bowl that is open to the southwest. The bottom of the bowl will be sloped slightly to the southwest to maintain positive drainage. The perimeter walls of the bowl will vary in elevation, but the sides will slope toward the center at approximately 3H:1V, as noted above.

All blasting will be conducted under an approved blasting plan (Appendix B). Based on the currently proposed production schedule, blasting during mining operations would occur approximately once per month and a typical blast would use approximately 15,500 pounds of explosives. Each blasting event will consist of advancing boreholes (i.e., drilling), loading the

boreholes with explosives, and detonating the blast. Each event will take approximately one to two weeks to complete. Most of this time will be spent advancing the boreholes. Borehole depths will be approximately 23 feet. After all the boreholes are drilled, they will be loaded with explosives (e.g., ANFO or HANFO) and stemmed with crushed rock to contain the charge for better breakage. Loading of the boreholes with explosives is typically completed the same day of the blast. Blasting is expected to be completed with a single shot per event. Certified blasting personnel with MSHA training will be used to prepare the boreholes and detonate the blasts. Blasting is necessary to loosen and break up the dolomite rock so that it can be mined and loaded into trucks. The blasting plan in Appendix B will be modified as site-specific conditions and requirements are determined.

Once the dolomite is blasted, it will be crushed on-site to achieve proper sizing for handling and hauling, if necessary. The material will be loaded into road haul trucks for off-site transportation. The blast-and-haul operation that is currently planned will be to blast and excavate material starting in Phase 1, moving to Phase 2, and ending in Phase 3.

Based on the production rate, mined material may need to be temporarily staged on-site prior to transport. Blasted material will be staged temporarily at the active excavation area, will be kept to within areas already planned for disturbance and, to the extent possible, will not be double-handled or transported within the site boundary. The maximum amount of ore that will need to be staged at any one time, generally while awaiting the arrival of a haul truck, is estimated to be 15 cubic yards of material.

At full production, AmMg expects to produce approximately 300,000 tons of dolomite (ore) per year. AmMg estimates that a small fleet of haul trucks will make an average total of approximately 50 round trips per day. Assuming that the facility operates 5 days per week and 52 weeks per year, approximately 13,000 round trips would be made each year. Vehicle operating speeds will be consistent with conditions of roadways, grades, clearance, visibility, traffic, and the type of equipment used. Project vehicles will follow posted speed limits on public roadways. Within the project area, but outside the active quarry area, the speed limit will be 25 miles per hour (mph). Within the active quarry area, the speed limit will be 15 mph.

The conceptual transportation route from the mine to the mill site, described in Section 2.2 and shown in Figure 3, is recognized as one possible and feasible alternate route. The final route will be determined collaboratively through negotiations with the City, the County, and federal authorities, including the U.S. Department of Transportation (DOT), taking into account the preferences of all three levels of government and, most likely, the ultimate route determined appropriate for trucks coming north from the U.S.-Mexico border crossing to access Interstate 10.

Phases 1 and 2 will include 24.54 acres of disturbance (including the resource verification drill holes/mining areas, laydown yard, existing BLM road improvements, and construction of new access road to the laydown yard and mine site). Implementation of Phase 3 will result in an additional 5.5 acres of disturbance.

Table 4 presents the total acreage of proposed surface disturbance by type of disturbance. The new disturbances associated with each phase are 17.74 acres for Phase 1, 6.80 acres for Phase 2, and 5.50 acres for Phase 3, for a total of 30.04 acres.

Table 4. Acreage of Proposed Disturbance

Activity	Total New Disturbance (acres)			
	Phase 1	Phase 2	Phase 3	Total
Drill sites (pads)/mining area	10.20	6.80	5.50	22.50
Laydown yard area	2.00	0.00	0.00	2.00
New constructed road (including cut/fill)	1.50	0.00	0.00	1.50
Exiting access road needing improvement (including pullouts and cut/fill)	4.04	0.00	0.00	4.04
Total	17.74	6.80	5.50	30.04

Financial assurance for total surface disturbance acreage will be provided by AmMg, as required by the BLM. The Project will be managed to meet the State of New Mexico's requirements for Minimal Impact New Mining Operations (Subpart 3).

2.5 Proposed Equipment

One diamond-bit drilling rig and one RC air rig (in the event that the 100-foot depth cannot be achieved with the diamond bit rig) will be used in the Project Area for resource verification and mine planning. The drill rigs most likely to be used at the site will be similar to the Sandvik Ranger DX800 or the Atlas Copco Epiroc T40. These track-mounted drill rigs carry drill pipe and an air compressor and can negotiate rough terrain and steep slopes. Each rig will be supported by one 3,000-gallon water truck and one all-terrain vehicle

The Project work force during resource verification activities will include one two-man crew per shift for the diamond-bit drill rig and one three-man crew per shift for each RC rig. One to two geologists will supervise drilling operations. One D7 bulldozer will be required for improving the existing access road and constructing the new access road to the mine site. One tracked excavator hoe will be required to aid in existing road improvement, for new road construction, and for drill pad preparation. Each field vehicle shall be equipped with hand tools, first aid kit, and a fire extinguisher. Water trucks at the Project Area will be used in the event of a fire. All portable equipment, including drill rigs, support vehicles, and drilling supplies, will be removed from the Project Area during extended periods of non-operation.

During mine operations, a comparably-sized work force will be employed to operate the following anticipated equipment, or suitable alternatives, for mining the dolomite rock:

- Approximately 15 haul trucks
- One water truck
- Two all-terrain support vehicles
- Excavator
- Grader
- Backhoe
- Crusher
- Broadcast seeder for reclamation activities

The exact equipment sizes and models are not known at this time, and proposed equipment may change. Table 5 provides a list of potential equipment.

Table 5. Equipment Type (Potential)

Air tool, quarry drill, track-mounted, 6-inch-diameter
Motor grader, self-propelled, 40,000-pound
Smooth drum vibratory roller, 125-horsepower
Water truck, off highway, 10,000-gallon capacity
Dozer, crawler, torque converter, diesel 700-horsepower
Excavator diesel hydraulic crawler mounted 3.5-cubic-yard capacity
Excavator diesel hydraulic crawler mounted 4.5-cubic-yard capacity
Excavator diesel hydraulic crawler mounted 6-cubic-yard capacity
Excavator attachment, hydraulic hammer, 12,000 ft lb
Excavator attachment, grapple
Front end loader, 4WD, articulated frame, diesel, 4.0–4.5 cubic yard, 270-horsepower
Forklift, for rough terrain, 42-foot lift, 35-foot reach, 9,000-pound, 110-horsepower

The equipment used will be based on availability and productions rates. All temporarily stationary equipment will be located within the laydown area, along with mining equipment. The laydown area is included within AmMg's disturbance calculations. Due to the type of equipment used for drilling operations, small drill pads approximately 100 square feet will be constructed and are included in the acreage calculated for the mining phases.

Fossil fuel–fired construction equipment will be maintained in accordance with manufacturers' recommendations to minimize construction-related combustion emissions. Combustion emissions will be further controlled through engine manufacturing requirements for both mobile sources and portable equipment, such as air compressors. Idling time of equipment will be limited, unless idling must be maintained for proper operation (e.g., trenching, hoisting, drilling).

2.6 Operating Practices

AmMg will follow standard drilling procedures and will require a company representative to be on-site or on-call during all drilling activities. The company representative will monitor and coordinate the layout and construction of each drill site, the setup of the drill rig, drilling

progress, demobilization, and cleanup of the drill site. A company geologist will also coordinate drilling activities, log each hole according to the geologic features encountered, determine the maximum depth of each hole (not to exceed 100 feet from the current surface), and advise the drill operator as needed.

Standard drill rig crews will consist of a drill operator and one or two technicians. The technicians will remove and box the recovered core samples, bag the cuttings, mix drilling fluids in the portable mud tank (only if use of RC drill is deemed necessary), operate the water truck, assist with drilling operations, and conduct maintenance as necessary. The crew will be transported to and from the drill site in four-wheel-drive vehicles.

The mining operation will involve the blasting and methodical removal of the existing foothill comprising the dolomite deposit from Phase 1 to Phase 2 to Phase 3, working from the highest elevation of each phase until reaching the valley floor. The dolomite will be blasted in accordance with the approved blasting plan (Appendix B) and loaded into haul trucks for off-site transportation. Based on the currently proposed production schedule, blasting would occur approximately once per month and a typical blast would use approximately 15,500 pounds of explosives. The blasting plan in Appendix B may be modified as site-specific conditions and requirements are determined. The blasted rock will be crushed on-site to achieve proper sizing for handling and hauling, if necessary. Blasting, hauling, and mining operations are planned to be conducted during daylight hours. No nighttime operations or 24-hour operations are planned at this time.

The use of avian exclusion devices to prevent deleterious exposure of birds will not be required, as no toxic chemicals are planned to be used. Water will be needed for dust suppression and site reclamation activities, and may be required for resource verification activities. A water truck and on-site enclosed storage tank will be used to support these activities. No ponds will be constructed, and water will be obtained from off-site.

2.7 Mining Operations and Ancillary Facilities

No construction of permanent structures for mining operations or ancillary facilities will be required, but there will be temporary or mobile types of units. The mining operation does not require support structures or infrastructure to be constructed. AmMg will have a mobile office trailer and portable toilets and sanitation facilities for workers on the site, all of which will be removed following mining. These structures are temporary and mobile.

A laydown yard for mining equipment, trailers, portable sanitation facilities, and a water tank will be developed adjacent to footprint of the mining operations (Figures 2 and 5), as described in Section 2.4.3.

2.8 Site Access and Proposed Constructed Road

Project development will require expanding, improving, and maintaining one BLM road (Section 2.4.1) and constructing and maintaining a very short new road from the BLM road to the mine site (Section 2.4.2) in order to access the proposed mining site and to transport extracted ore to a manufacturing facility. The manufacturing facility, which is not intended to be part of this PoO, is currently planned to be located at the Peru Industrial Park in Deming, New Mexico, though the site of the manufacturing facility has not been finalized.

AmMg, itself or through an affiliate, expects to construct a manufacturing facility within the City of Deming's Peru Industrial Park to produce magnesium and magnesium products from the magnesium-rich dolomite ore that will be mined and transported from the mine operations that are the primary subject of this PoO application. This is preferred over the alternative of shipping the ore to an out-of-state or out-of-country magnesium facility for processing, and will create local jobs and economic development within an already established industrial park that is appropriately zoned and already supplied with useable infrastructure and space needs to accommodate the type of facility that is contemplated for processing the dolomite ore. Based on available information regarding the resource, the estimated duration of mining operations is 20 years.

As mentioned in previous sections of this PoO, one route to the mine site is proposed for year-round use and is as follows: from the intersection of NM 331 and County Road Co34, which becomes Bo16 east of Lucca Road, travel 8 miles east to an unimproved BLM road, then travel 2 miles southeast on the unimproved BLM road to just outside the Project Area, and then south approximately 1,334 feet on new road to be constructed from the existing BLM road into the proposed mine site.

The existing BLM access road proposed for use during this Project will be improved by blading the existing road surface and adding a layer of aggregate base course beginning at the intersection of County Road Bo16 and ending just north of the Project Area. This section of road will also be widened to 16 feet to allow for one-way movement of heavy equipment, and pullouts for two-way passage of haul trucks will be developed about every 0.5 mile (or less depending upon topography) along the south side of the approximately 2-mile-long section of road. To limit new disturbance, AmMg will develop existing pullouts that have been created over time by public use of the BLM road. This will result in 4.04 acres of new disturbance for widening, pullouts, and cut/fill. Improvements to the BLM road are discussed in Section 2.4.1.

Access to the laydown yard and mine site from the existing BLM road will be gained through construction of a new access road that will be approximately 1,334 feet in length and 16 feet wide for a total of 1.5 acres of new disturbance (including cut and fill). Construction of this road will require earth moving using typical construction practices to minimize surface disturbance, erosion, and visual contrast, as well as to facilitate reclamation. Construction of the mine site access road is discussed in Section 2.4.2. A modest amount of overland travel is planned to access certain drill pad locations and to conduct blasting operations, which will be limited and only be conducted when needed, within the Project disturbance area. Road improvements and other construction activities will occur during daylight hours.

Roadwork will follow requirements and procedures in The Gold Book (BLM, 2007a). Road improvements will be made using a bulldozer, backhoe, or equivalent equipment. Road grades will be no steeper than 10 percent, except for short drill spurs within the exploration/mining area. When drainages must be crossed by a road, concrete slab fords or culverts may be placed to

maintain existing drainage patterns. The following best management practices (BMPs) will be employed in order to minimize the surface disturbance and erosion potential:

- Schedule construction activities to avoid heavy seasonal rains.
- Make certain the road surface is adequately drained.
- Restrict machinery to the designated road.
- During clearing operations, do not mix organic debris with fill materials.
- Deposit any surplus soil and other material in designated areas, such as the stockpile portion of the laydown area, where sediment from this material will be managed to protect against undue erosion that might cause materials to leave the area.
- Compact all fill material.
- Revegetate disturbed areas as soon as practicable.
- Inspect newly constructed roads after the first good rain to ensure that all drainage structures and erosion control features are functioning properly.

Balanced cut-and-fill construction will be used to the extent practicable to minimize the exposed cut slopes and the volume of fill material. Because the depth of the cut will be kept to a minimum, topdressing removed during construction will be stockpiled as the fill slope to be used during reclamation. Road construction within drainages will be avoided where possible.

Low-water crossings (e.g., concrete slab fords) may be required in various areas along the existing unimproved BLM road and to cross a main dry arroyo on the new access road (Figure 4). Culverts may be used to cross narrow, deep gullies along the new access road. A road maintenance plan and an evacuation plan will be developed before mining activities commence. It is not anticipated that blasting will be necessary to construct roadbeds. If drilling and blasting of roads should become necessary, the operator will submit a blasting plan to the MMD prior to blasting.

Routine road maintenance may be required and would consist of smoothing ruts, filling holes with fill material, grading, and reestablishing waterbars when necessary. AmMg will use water

and may use a dust control palliative, such as calcium chloride, to control dust on dirt roads. In addition, AmMg will surface the portion of the BLM road to be improved and the new access road to the mine site with aggregate base course to improve road stability, minimize maintenance, and control dust. Water will be obtained from a commercial water source outside the Project Area. Aggregate base course will be obtained from a commercial gravel source outside the Project Area.

2.9 Occupancy

Under 43 Code of Federal Regulations (CFR) 3715.01, occupancy means full- or part-time residence on the public lands. It also means activities that involve (1) residence, (2) the construction, presence, or maintenance of temporary or permanent structures that may be used for such purposes, or (3) the use of a watchman or caretaker for the purpose of monitoring activities. Residence structures include, but are not limited to, barriers to access, fences, tents, motor homes, trailers, cabins, houses, buildings, and storage of equipment or supplies.

2.9.1 Proposed Temporary and Permanent Structures

Intermodal containers may be used to store Project equipment and supplies at the site. In addition, the following temporary facilities are proposed for use on-site during operations:

- A temporary job trailer will be provided for employees to gather for health and safety briefings, store personal belongings during working hours, shelter during inclement weather, and serve as a meeting and break facility.
- A portable generator in the laydown yard area will provide electricity to the office trailer. The generator will be approximately 10,000 watts and powered by gasoline. Gasoline will be stored in and dispensed from fuel delivery systems on light vehicles.
- A portable out-house and sanitation facility will be provided for workers.
- A temporary, 5,000-gallon water tank will be provided for resource verification, dust suppression, and reclamation activities.

2.9.2 Access Restrictions to Mining Site

To ensure public safety and prevent unauthorized access, AmMg will block public use of the proposed 1,334-foot-long mine access road that will be constructed from the BLM road to the mine site. Measures to prevent unauthorized access to the mine site may include a tamper-resistant lockable gate, wire fencing, and appropriate signage.

If necessary, AmMg will erect BLM-approved barbed wire fencing to prevent livestock from entering disturbed areas. In areas where a higher level of security or safety is needed (e.g., in the mobile trailer area and laydown yard), temporary chain-link fence may be erected. Gates or cattle guards will be installed along roadways within the proposed Project Area, as directed by BLM. AmMg will monitor any constructed fences on a regular basis and repairs will be made as needed.

AmMg will take measures to protect the grazing allotment boundary, where the boundaries of the Project Area and the grazing allotment meet. AmMg will also ensure that the gate in the allotment boundary remains closed during operations and/or will be responsible for installing a cattle guard. In the event that livestock enter the proposed area of disturbance via a gate or opening in a fence, the grazing permittee will be contacted immediately. AmMg will assist, as requested, in moving these animals out of the proposed Project Area.

2.9.3 Estimated Duration for Use of On-Site Structures

Temporary structures will be used throughout the duration of resource verification, mining activities, and reclamation. No structures will remain after reclamation activities are complete.

2.10 Hazardous Materials (Hazmat)

Hazardous materials used at the Project Area will primarily consist of petroleum products and explosives. Approximately 500 gallons of diesel fuel will be stored in fuel delivery systems on vehicles and drill rigs, 100 gallons of gasoline will be stored in fuel delivery systems for light vehicles, and 100 pounds of lubricating grease will be stored on the drill rigs or transported by

drill trucks. All containers of hazardous substances will be labeled and handled in accordance with requirements of the New Mexico Department of Transportation (NMDOT) and the Mine Safety and Health Administration (MSHA). In the event that hazardous or regulated materials are spilled, immediate measures will be taken to control and clean up the spill as detailed in the Spill Prevention, Control and Counter-Measures (SPCC) Plan in Appendix C. The BLM, the New Mexico Environment Department (NMED), and the Emergency Response Hotline will be notified. After cleanup, any contaminated material will be removed from the site and disposed of at an approved disposal facility.

No explosive materials will be stored on-site. Explosive materials for blasting will be transported to the site by the licensed blasting contractor on the day blasting operations are to be performed. Any explosive materials remaining after the blasting will be removed by the blasting contractor.

Management of hazardous materials will comply with all applicable federal, state, and local requirements, including the inventory and reporting requirements of Title III of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as the Emergency Planning and Community Right-to-Know Act. All petroleum products, kerosene, and reagents used will be stored in the laydown yard in aboveground tanks with secondary containment capable of holding 110 percent of the volume of the largest vessel in the area.

2.11 Spill Prevention Plan

Over the life of the proposed Project, spills of oils and lubricants may occur during fueling or from equipment. These releases could occur during operations—for example, as a result of a bad connection on an oil supply line, from equipment failure, or from mishandling during transfer operations. Spills of this nature will most likely be small and localized. Equipment will be regularly inspected and properly maintained to limit adverse impacts from any unintentional release. Contamination of surface soils could result from such minor spills. Safety data sheets (SDSs) for hazardous materials on-site will be maintained on-site at all times in accordance with

MSHA's Hazard Communication for the Mining Industry (30 CFR Part 47). SDSs for hazardous materials that might be found on-site are included in Appendix C.

The potential for spills of both hazardous and non-hazardous materials will be further mitigated with the implementation of a spill prevention plan. The SPCC Plan for the Project (Appendix C) describes the reporting requirements and response actions that would take place in the event of a spill, release, or other unexpected condition, as well as procedures for cleanup and disposal. The SPCC Plan will be maintained on-site and made available to all site personnel and will be used as a guide in the training of employees. The plan addresses mitigation of potential spills associated with Project facilities as well as activities of on-site contractors. The plan will be reviewed and updated at a minimum of every three years, and whenever major changes are made in the management of the materials addressed in the plan. Inspection and maintenance schedules and procedures for equipment at the site will be set forth in sections of the plan addressing hazardous materials and petroleum products. In addition, implementation of a health and safety manual and hazard communication program will provide employees with education and awareness of hazardous materials management, thereby further minimizing the potential for spills at the mine area.

2.12 Project-Specific Quality Assurance Plan

A quality assurance plan is not applicable as this is a mine development. However, quality assurance for reclamation will be addressed under the Reclamation Plan (Section 3).

2.13 Water Use and Management

During routine operations, water will be used primarily for dust suppression at the mine site and on unpaved roads from the mine site to McCan Road (Figure 3). A 5,000-gallon tank in the laydown yard will be used to store water to support dust suppression at the mine site.

AmMg estimates that approximately 28,000 gallons of water per day (22 acre-feet per year) will be required for dust suppression on the unpaved section of the proposed transportation route

from the AmMg Foothill Dolomite Mine site to the Peru Mill Industrial Park. The calculation is based on the following values and assumptions:

- Total length of unpaved roads is 4.4 miles with a lane width of 8 feet (total road width of 16 feet).
- Desired penetration depth of applied water is 0.5 inch.
- Assumed porosity of road surface is 20 percent. The actual value is likely less due to compaction; nonetheless, the use of a higher porosity results in the calculation of a greater water requirement and is therefore considered conservative.
- Assumed application frequency is once per day on both sides of the unpaved roads.
- Number of working days, and therefore application days, is 260 days (5 days per week, 52 weeks per year).
- Application efficiency is 80 percent to account for potential water loses such as spilling and overspray.

AmMg plans to acquire water from commercial water sources in the area. No on-site water supply wells will be required. Water will be brought to the site using a water truck, portable water tank, or similar vessel.

2.14 Environmental Protection Measures

AmMg commits to compliance with all applicable environmental laws and regulations regarding protection measures, including but not limited to water and air quality protection, to prevent unnecessary or undue degradation during construction, operation, and reclamation of the Project. The measures are derived from the general requirements established in the BLM's Surface Management Regulations at 43 CFR 3809 and water, air quality, and other environmental protection regulations, including the reclamation requirements applicable to minimal impact new mining operations under the New Mexico Mining Act Reclamation Program (MARP) rules administered by MMD.

2.14.1 Storm Water Management

Surface water from the watershed east (upgradient) of the Foothill Site does not come into contact with the mine site, but is routed around the foothill by existing ephemeral drainages. The existing topography will divert run-on away from the active mining area.

Erosion control in the mine area will be achieved by revegetating disturbed areas as soon as possible and by maintaining naturally vegetated buffers adjacent to the normally dry stream beds, to the extent practicable.

Sediment control in the mine area will be achieved by using berms, silt fences, straw bale dams, diversion ditches with energy dissipaters, and rock check dams at appropriate locations to control discharges of pollutants. Catch benches on walls will be left in place to interrupt surface sheet flow. Sediment control structures will be inspected and maintained on a regular basis.

In addition to using erosion and sediment control BMPs, AmMg will develop a written Storm Water Pollution Prevention Plan (SWPPP) to identify potential sources of pollution in stormwater runoff and to establish control measures that will minimize the discharge of pollutants in runoff from the site. The actual locations and numbers of controls will be determined during final design and, where appropriate, during operations. Sediment removed from the sediment control structures would be placed in the topdressing stockpile or other approved location.

AmMg will identify measures to reduce the volume of stormwater requiring management and to prevent pollution sources from coming into contact with precipitation and stormwater. For example, dikes, curbs, and berms may be used to divert run-on and discharges. Employee training will include good housekeeping practices, such as regular cleanup, collection, and containment of debris in storage areas, procedures for equipment and vehicle fueling and maintenance, spill control, and inspection and maintenance of sediment and stormwater controls.

The mining process will not involve any discharge to surface water courses. Surface runoff (stormwater) from the mine site and laydown yard area will not be collected. As described in

Section 6, the Fusselman Dolomite is widely exposed in the Florida Mountains, including at the Foothill Site. The Fusselman Dolomite does not contain sulfide minerals (e.g., pyrite) that might generate acid. Exposure and mining of the Fusselman Dolomite will not create acid-generating or deleterious materials. Any acid-generating minerals that might be exposed would be buffered by the dolomite rock itself. Except for incidental spills of petroleum products (e.g., diesel fuel, gasoline, hydraulic and lubricating oils), which will be addressed through the SPCC Plan, the mining process and equipment will not create any deleterious substances that cannot be quickly cleaned up. Therefore, it will not be necessary to establish any impoundments to control surface runoff from the mine site.

On August 17, 2017, AmMg filed a Notice of Intent to Discharge with the NMED Ground Water Quality Bureau. On September 19, 2019, following the submittal of rock samples that showed that exposure of the dolomite ore to precipitation would not result in the leaching of metals and does not pose a threat to water quality, NMED determined that the Foothills Dolomite Mine does not require a discharge permit at this time (NMED, 2019).

2.14.2 Water Quality

Based on long-term records (1892-2010) from the Western Regional Climate Center (WRCC, 2019), the Deming area receives approximately 9.3 inches of precipitation annually. The elevation of groundwater beneath the Foothill Site is approximately 4,600 feet above the National Geodetic Vertical Datum (NGVD) of 1929 (NGVD 1929) or more than 250 feet below ground surface (bgs), as discussed in Section 2.15.2. At the end of mining (Year 20), AmMg projects that the floor of the mine will be at 4,865 feet above NGVD 1929. There is no standing surface water in the vicinity of the mine site, and the natural drainage pattern routes infrequent surface water flows around the mine site. The following steps will be taken to protect surface water and groundwater.

- Drill cuttings will be contained on-site. In the unlikely event that the RC drill is used, the fluids will be managed using appropriate control measures.
- Only nontoxic fluids will be used in the drilling process.

- Sediment traps will be used as necessary and filled at the end of the drilling program.

- Following resource verification activities, each drill hole will be permanently sealed from bottom to top with a neat cement slurry grout in accordance with 19.10.3.302.L. NMAC. If groundwater is encountered or the Project is interrupted for greater than 120 days, drill holes will be plugged pursuant to 19.27.4. NMAC. As discussed in Section 2.15.2, there is little chance that groundwater will be encountered during drilling given the proposed 100-foot depth of the drill holes and the projected depth of the water table.

- Stormwater pollution prevention BMPs will be used at the mine and laydown yard sites to minimize erosion from stormwater (see Section 2.14.1). An SWPPP, including a Sediment Control Plan, will be prepared and implemented once final engineering of layout of facilities, the mine site, and road improvements have been confirmed.

- The SPCC Plan (Appendix C) will be followed.

- The Blasting Plan (Appendix B) will be followed.

2.14.3 Air Quality

AmMg has identified several best available control measures (BACMs) that will be followed to reduce airborne dust and protect air quality.

- AmMg will develop and follow a dust control plan.

- AmMg will contour and seed stockpiles of topdressing to protect and preserve the material. Soil stabilizers, such as straw mulch, may also be applied to the stockpiles. To the extent possible, the long axis of the stockpiles will be aligned east-west to parallel the primary wind direction.

- AmMg will revegetate disturbed areas as soon as practical after operations cease in those areas.

- AmMg will take steps to minimize the area of disturbed soil, which are a source of dust.

- Aggregate base course material will be placed on the new mine site access road and existing unimproved BLM road to improve road stability, minimize maintenance, and control dust. Gravel or similar material may also be placed in portions of the laydown yard.

- Water will be applied to unpaved roadways, including the new mine site access road, the existing unimproved BLM road, and County Road Bo16, to suppress dust. Water will also be applied to dust-producing areas within the mine site itself, including around the area to be blasted, to reduce potential for dust. Water applications may be more frequent during high wind events.

- AmMg may also use a dust control palliative, such as calcium chloride, to control dust on dirt roads.

- AmMg will limit vehicle speeds to 15 mph within the mine area and 25 mph on unpaved roads.

- Wet suppression and vacuum controls will be used during drilling.

- Haul trucks carrying the dolomite rock will be covered.

- Fossil-fuel–fired construction equipment will be maintained in accordance with manufacturers' recommendations to minimize construction-related combustion emissions. Combustion emissions will be further controlled through engine manufacturing requirements for both mobile sources and portable equipment, such as air compressors. Idling time of equipment will be limited unless idling must be maintained for proper operation (e.g., trenching, hoisting, drilling).

- No blasting will be conducted during high wind events (over 25 mph).

- AmMg will develop a health and safety plan that includes identification of appropriate personal protective equipment for personnel handling dolomite.

Fugitive dust should remain localized; however, if air quality concerns do arise, the BLM may require that air samplers be placed in appropriate locations outside of mining activities to determine effects to ambient air quality in the region.

Using water to suppress fugitive dust on County Road Bo16 is expected to be effective. However, if air quality concerns do arise on the unpaved portion of County Road Bo16, the BLM may request that base course be used, in addition to water, for fugitive dust suppression.

AmMg has determined that on-site primary crushing may be needed to achieve proper sizing of blasted material for handling and hauling. AmMg will apply for an appropriate air permit and will comply with air quality permitting requirements.

2.15 Site Conditions

2.15.1 Geology

This section summarizes the regional geologic setting of the Florida Mountains and the local geology of the Foothill Site.

2.15.1.1 Regional Geology

The Foothill Site is a small, low hill on the west side of the Florida Mountains, an uplifted and eastward-tilted Basin-and-Range fault block about 15 miles southeast of Deming. The mountains are surrounded by a broad bajada (sloping surface) that slopes gently into the Mimbres Basin. These sediments conceal the range-bounding faults except at the northwest end.

The oldest rocks exposed in the Florida Mountains are Precambrian hornblende and granitic gneisses exposed only north of Capitol Dome. An Upper Cambrian pluton intruded an andesitic to basaltic volcanic sequence producing the hornblende and pyroxene hornfels common in the western and southern parts of the mountains. The alkali-feldspar plutonic rocks are granite at the northern and southern ends of the range and syenite and quartz syenite in the central part. These shallow plutonic rocks and hornfels were unroofed before deposition of a diamictite that,

in turn, was mostly eroded preceding deposition of the Bliss Sandstone in early Ordovician time (approximately 500 million years ago).

Approximately 4,100 feet of Paleozoic rocks that crop out in the southeastern Florida Mountains include in ascending order: Bliss Sandstone, El Paso Formation, Montoya Formation, Fusselman Dolomite, Percha Shale, Rancheria Formation, and Hueco Formation. No Mesozoic rocks are present except possibly the basal beds of the Lobo Formation, the bulk of which was deposited contemporaneously with Laramide deformation during Paleocene and early to middle Eocene times.

Extensive andesitic to rhyolitic volcanism from middle Eocene to early Miocene times accounted for the thick Rubio Peak volcaniclastic section forming Florida Peak, as well as the ash-flow tuff, air-fall tuffs, flow-banded rhyolite, basaltic andesite, and dacite in the Little Florida Mountains. Thick rhyolite fanglomerates in the Little Florida Mountains and alluvial conglomerates forming an apron around the mountains have been deposited as the mountain block was uplifted approximately 7,000 feet since early Miocene time.

The south Florida Mountains fault is the most prominent structural feature in the Florida Mountains. This northwest-trending, high-angle reverse fault is located about 1 mile south of the Project Area and places Upper Cambrian granite against sedimentary rocks as young as basal Lobo Formation (Miocene age). On the northeast side of the south Florida Mountains fault, multiple, small thrust faults displace the Paleozoic rocks, primarily the Ordovician Montoya formation and the Silurian Fusselman Dolomite. Most of these thrust faults exhibit younger-over-older rock relations and produce tectonic elimination of strata. A few show older-over-younger relations.

Hydrothermal alteration and low-grade mineralization are widespread in the Florida and Little Florida Mountains. Relatively limited activity (primarily war-time) has produced manganese, zinc, lead, silver, copper, barite, and fluorite ores. Most production of copper, zinc, lead, and silver ores was from shallow oxidized veins, but small amounts of chalcopyrite accompany fluorite and barite in deeper veins. The metallic mineralization is believed to be late Tertiary (Griswold, 1961).

2.15.1.2 Local Geology

AmMg's primary interest in the area is the high-magnesium content of the Silurian Fusselman Dolomite. The single hill covered by the two AmMg claims is located east of Mahoney Park and is composed primarily of high-magnesium Fusselman Dolomite.

Dolomite is a common rock-forming mineral, calcium magnesium carbonate, with the chemical composition of $CaMg(CO_3)_2$. It is less common than calcite in typical hydrothermal vein deposits; however, the bulk of dolomite is associated with sedimentary carbonate strata of all geologic ages, but primarily with the Precambrian and Paleozoic. Dolomites in these series often form whole blocks or are interbedded with limestones. Pure dolomite has a content of 21.7 percent magnesium oxide (MgO).

The high-magnesium Fusselman Dolomite in the Florida Mountains was described by Kottlowski (1957). According to Kottlowski (1957), the Silurian Fusselman Dolomite is massive bedded and ranges from light gray to dark gray, and weathers to brownish gray. The dolomite is almost pure, and only in a few localities contains appreciable amounts of small-sized insoluble residues, chiefly chert and some quartzose sand. The amount of large-sized chert within the Fusselman Dolomite varies greatly from place to place. In the Florida Mountains, Kelley and Bogart (1952) reported more than 1,350 feet of Fusselman Dolomite, with only the lower 100 to 150 feet containing appreciable amounts of chert. The Fusselman Dolomite consists of six alternating dark gray and light gray dolomite units in the vicinity of the Project Area (Clemons, 1985 and 1998):

1. Lower dark gray member, 160 feet
2. Lower light gray member, 305 feet
3. Middle dark-gray member, 160 feet
4. Middle light-gray member, 610 feet
5. Upper dark-gray member, 165 feet
6. Upper light-gray member, 80 feet

The Foothill Dolomite prospect is an isolated hill of dolomite that has a roughly triangular shape with the broad flatter side to the south and the top of the triangle to the north. Geologic mapping

by Clemons (1998) indicates that the Cutter member of the Montoya Formation (map unit Omc) is exposed on the southwest, south, and southeast portions of the hill (Figure 8, excerpted from Clemons, 1998). The upper Cutter is described by Clemons (1985 and 1998) as primarily dolomite with prominent light gray chert lenses and flattened nodules. On the southwest side of the hill, the Cutter dips approximately 20 degrees to the east-northeast and is in disconformable contact with the lower dark gray member of the Fusselman Dolomite (map unit Sf1). The contact between the lower dark gray member and the lower light gray member of the Fusselman (map unit Sf2) is also present. The dip on the Fusselman ranges from 15 to 41 degrees and is generally to the east-northeast. The lower three members of the Fusselman are exposed on the Foothill Site. The dolomite hill is surrounded by a piedmont slope alluvium (map unit Qpa).

The hill is cut by four normal faults that generally strike northeast or north and dip 68 to 80 degrees to the northwest or west (Figure 8). Three of these faults are downthrown to the northwest or west, but one fault near the southeast end of the hill is downdropped to the east and marks the western edge of a downdropped block of Fusselman that is bordered on the east by Montoya. One normal fault is mapped perpendicular to the other faults and is marked by a prominent ridge near the top of the hill. Displacement on this fault explains the presence of a block of middle dark gray member of the Fusselman (map unit Sf3) near the top of the foothill, as shown in Figure 9.

Geologic cross sections A-A' and B-B' (Figure 10) have been prepared using the geologic mapping of the foothill by Clemons (1998). The cross section indicates that the Cutter member of the Montoya formation has a thickness of at least 100 feet. The lower dark gray member of the Fusselman (Sf1) has a thickness of approximately 140 feet. The lower light gray member (map unit Sf2) has a minimum thickness of at least 160 feet, but the top is truncated by a normal fault. Photographs that illustrate the color features and character of the dolomite are provided in Figure 11.

There is insufficient information to estimate mineral resources for the deposit at this time in accordance with Canadian Institute of Mining, Metallurgy and Petroleum (CIM) *Definition Standards for Mineral Resource and Mineral Reserves* (CIM, 2014). The total thickness of the Fusselman Dolomite deposit in the Project Area (within AmMg's two mining claims) is unknown

at this time. There is no vertical drill hole information for the deposit. All samples are surface chip only (see Section 6.2.1) and cannot be used to verify the vertical and lateral continuity and grade of the dolomite.

2.15.1.3 Groundwater

The primary aquifer in the region is made up of basin fill. Mountain-front recharge and the Mimbres River provide the majority of recharge to the aquifer. Pre-development potentiometric surfaces along the western flank of the Florida Mountains near the Foothill Site were approximately 4,600 feet above NGVD 1929 (Brady et al., 1984; Hanson et al., 1994) or about 250 feet bgs at the base of the mining site. Groundwater elevations in the basin-fill aquifer west of the Foothill Project Area have declined by more than 40 feet between the 1950s and the 2000s (Timmons, Undated, slide 12), and Finch et al. (2008) shows water levels in the Foothill area to be about 4,300 feet above NGVD 1929, or more than 500 feet bgs. Groundwater in the vicinity of the Foothill Site flows west into the basin. Regional groundwater flow in the Mimbres Basin is from north to south (Brady et al., 1984; Hanson et al., 1994; Finch et al., 2008).

The U.S. Geological Survey (USGS) National Water Information System (NWIS) (USGS, 2019) contains water level information for several wells in the Foothill Project area that are consistent with maps by Brady et al. (1984), Hanson et al. (1994), and Finch et al. (2008):

- Well 25S/8W-26.43413 (USGS 320544107381301) is located on private land in Mahoney Park approximately 0.7 mile east of the Foothill Site. The well is located at an elevation of 5,194 feet above NGVD 1929, but the depth of the well is not known. The USGS reports that the water level in this well on March 7, 1972, was 118.95 feet bgs, or an elevation of 5,075 feet above NGVD 1929. The USGS reported no other water level data or any chemistry data from this well.

- Well 25S/9W-25.221 (USGS 320631107431001) is located on private land in the northeast corner of Section 25, T25S, R9W at the intersection of County Road Bo16 and McCan Road, and approximately 4 miles west of the Foothill site. The well is located at an elevation of 4,220 feet above NGVD 1929 and is 319 feet deep. The USGS reports that the water level in this well was 92 feet bgs (about 4,128 feet above NGVD 1929) in February 1972. A total of 6 measurements between 1982 and 2002 indicate that the

water level in this well declined steadily and in January 2002 was at a depth of 147.7 feet bgs (4,072 feet above NGVD 1929). The USGS reported no other water level data or any chemistry data from this well.

- Well 25S/8W-33.33334 (USGS 320447107404901) is located on private land (Crawford Ranch) in the southwest corner of Section 33, T25S, R8W, and approximately 2 miles southwest of the Foothill site. The well is located at an elevation of 4,467 feet above NGVD 1929, but the depth of the well was not determined. The USGS reports that the water level in this well was 261.47 feet bgs (about 4,205 feet NGVD 1929) in October 1955 and 271.28 feet bgs (about 4,195.7 feet above NGVD 1988) in March 1972. The USGS reported no other water level data or any chemistry data from this well.

The New Mexico Office of the State Engineer (OSE) maintains an online database with information related to wells installed throughout New Mexico. A search of the OSE database indicates that there is a well in Section 27, T25S, R8W, with a reported depth to groundwater of 200 feet. The Foothill site is also located in Section 27. The OSE database does not identify any wells in Section 26, where the Mahoney Park well is located.

No groundwater chemistry data have been found for the wells in the immediate vicinity of the Foothill Site (e.g., Mahoney Park or Crawford Ranch), but Thomson et al. (1984) have mapped the distribution of dissolved solids and the dominant chemical type in groundwater in the area. According to Thompson et al. (1984), groundwater in the basin-fill aquifer west of the Florida Mountains, including the Foothill Site, has total dissolved solids (TDS) concentration of less than 500 milligrams per liter (mg/L). The groundwater is generally a sodium- to sodium-and-calcium-bicarbonate-type water.

2.15.2 Hydrology

The proposed mine site lies in the south-central portion of the Mimbres Basin, a closed basin bounded by mountain ranges on all sides, extending from the Continental Divide to the Black Range and Silver City to the north and south, into the Chihuahua province of Mexico. The only perennial stream or large body of surface water in the Mimbres Basin is the Mimbres River, which flows south from the Black Range and then turns east just north of Deming. The river

generally terminates in a closed basin a few miles east of Deming, with no large bodies of surface water.

Surface water in the immediate area of the proposed mine flows via ephemeral stream channels westward, down the slope of the Florida Mountains, and into the alluvial fan to a relatively flat intermontane basin with no large bodies of surface water. Based on aerial photography, such as Google Earth, the ephemeral stream channels around the Foothill Mine site dissipate approximately 3 miles west of the site where the gradient flattens and do not extend to the basin floor (Figure 12). The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory Mapper identifies these and numerous other ephemeral washes that drain the Florida Mountains as intermittent riverine habitats that may be seasonally flooded (USFWS, 2019). The washes near the Foothill Site contain significant vegetation (Figure 13), suggesting that seasonal flooding is relatively infrequent and at this location, generally does not carry sufficient load to remove vegetation from the bottom of the channel. Furthermore, there are no hydrophytes (water-loving plants) and no hydric soils (permanently or seasonally saturated soil resulting in anaerobic conditions) in the Project Area.

2.15.3 Soils

The rocky prominence that is the primary interest at the Project Area is composed entirely of dolomite bedrock, virtually devoid of soil exposures, and is mapped by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) as rough and broken rock land (map unit RU) (Neher and Buchanan, 1980). The alluvial fan from which it rises is mapped as Eba very gravelly clay loam (map unit EG). As described in the soil resource report (Appendix D), the Eba appears on alluvial fans and fan remnants with slopes of 0 to 10 percent. Runoff potential is moderately high when wet, due in part to its clayey matrix. The typical soil profile of this unit is as follows:

- 0 to 2 inches: Very gravelly clay loam
- 2 to 60 inches: Very gravelly clay

Information from the NRCS website indicates that the Eba has “poor” potential as a source of topsoil and as a source of reclamation material. The limiting features are the high clay content and the low organic matter content.

2.15.4 Vegetation

The plant community in the Project Area consists primarily of Madrean Juniper Savanna on the lower slopes of the Foothill Site, Madrean Encinal on the upper northwest, north, and northeast slopes of the foothill, and Chihuahuan Mixed Desert and Thorn Scrub on the bajada slopes off-site to the west and north (USGS, 2015). Vegetation cover in the project area consists of sparse cacti, agave, and grasses, dotted with occasional shrubs or small trees including saltbush, snakeweed, juniper, and honey mesquite. Further information concerning current vegetation conditions and growth parameters will be collected during the National Environmental Policy Act (NEPA) process. Table 6 is a list of all plant species identified in the Project Area during the biological field survey on July 28, 2016. Copies of the biological survey report and the field survey report prepared by EnviroSystems are provided in Appendices E1 and E2, respectively. On October 18, 2018, the New Mexico State Office of the BLM issued revisions to the New Mexico BLM sensitive plant list, which is provided in Appendix E3. No federally listed plant species protected under the Endangered Species Act (ESA) were encountered during surveys.

Table 6. Complete List of Plant Species Observed in Project Area

Common Name	Scientific Name
Trees	
redberry juniper	*Juniperus arizonica*
singleneedle pinyon	*Pinus monophylla*
honey mesquite	*Prosopis glandulosa*
Shrubs and Sub-shrubs	
saltbush	*Atriplex* sp.
snakeweed	*Gutierrezia sarothrae*
yellow trumpetbush	*Tecoma stans*
Forbs	
Cochise scaly cloakfern	*Astrolepis cochisensis*
silverleaf nightshade	*Solanum elaeagnifolium*
Cacti, Agave, and Succulents	
Palmer's century plant	*Agave palmeri*
cholla	*Cylindropuntia* sp.
sotol	*Dasylirion wheeleri*
candy barrelcactus	*Ferocactus wislizeni*
ocotillo	*Fouquieria splendens*
Graham's nipple cactus	*Mammillaria grahamii*
prickly pear cactus	*Opuntia* sp.
soaptree yucca	*Yucca elata*
Grasses	
threeawn	*Aristida* sp.
matted grama	*Bouteloua simplex*

2.15.4.1 Noxious Weeds

Noxious weeds will be controlled through implementation of the following BMPs:

- Concurrent reclamation efforts to the extent feasible
- Operator control of noxious weeds as directed by BLM
- Removal of invasive, nonnative, and noxious weeds on reclaimed areas
- Washing heavy equipment prior to entering the Project Area

- Avoiding areas of known invasive, nonnative, and noxious weeds during periods when the weeds could be spread by vehicles

2.15.5 Visual Resources

The elevation of the Foothill Mine site ranges from about 4,880 to 5,108 feet above NGVD 1929 compared to the floor of the basin to the west at about 4,230 feet and the Florida Mountains in the background, which range from 5,700 feet immediately behind the foothill on the south side of Mahoney Park to 7,100 feet at Gym Peak farther to the east. The physiography of the foothill area from County Road Bo16 and the BLM road is illustrated by Figure 14.

Slopes on the foothill average about 35 percent (35 feet vertical to 100 feet horizontal), but some slopes, such as the northeast and northwest sides, are much steeper (as much as 43 to 56 percent, respectively) and there are short sections of outcropping dolomite that are vertical. In the background mountains, larger blocks of dolomite as much as 500 feet higher than the foothill have equally steep slopes and sheer vertical faces, as shown in Figure 15.

In response to comments from BLM, AmMg has evaluated the visual resources of the Foothill Project Area. Based on a geographic information system (GIS) shapefile downloaded from the BLM Las Cruces District Office website, BLM has assigned the project area a Visual Resource Management (VRM) rating of Class III. The BLM's management objectives for Class III visual resources are, as follows (BLM, 2019):

> To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Appendix F includes a figure showing BLM's visual resource classes in the project area. Contrast rating forms prepared by DBS&A on behalf of AmMg in Revision 4 to this PoO have been replaced with forms prepared by BLM during the environmental assessment (BLM, 2020). BLM identified six key observation points (KOPs) from which to analyze the impacts of the Proposed Action on visual and scenic values:

- Highway 11 KOP (Highway 11 south of Camino Doce)
- McCan Road KOP (McCan Road north of Mahoney Park Road)
- Mahoney Park Road KOP (Mahoney Park Road east of the existing unimproved BLM road)
- County Road Bo16 KOP (Unimproved BLM road southeast of Mahoney Park Road)
- WSA Boundary KOP (Unimproved BLM road at WSA Boundary)
- Foreground KOP (Unimproved BLM road at the mine site access road turnoff)

BLM staff completed the Visual Contrast Rating Worksheets for each KOP, except the Highway 11 and McCan Road KOPs, during two time frames: (1) at the 5-year mining operation interval and (2) after project completion and final reclamation. The two time frames represent the evolution of the viewshed impacts through the life of the project. For the Highway 11 and McCan Road KOPs, which are farthest from the Project Area, the BLM only completed the worksheets for the 5-year time frame, concluding that "[l]ong-term [post-reclamation] impacts to the viewshed from this location were not simulated or evaluated on a visual contrast rating worksheet because the short-term project would create weak to no contrasts in the landscape" (BLM, 2020, p.27). Table 7 summarizes the BLM findings presented in the contrast rating forms provided in Appendix F.

BLM's analysis for each KOP concluded that the project design will meet BLM's visual resource management objectives and that no mitigating measures are warranted. As a result of AmMg's owns analysis, AmMg has identified the following steps that will be taken to reduce the visual impacts:

- The existing unimproved BLM road follows the lay of the land; the BLM road will be widened rather than creating a new road. Existing vehicle pullouts created by users of the BLM road will be developed to provide pullouts for haul trucks.
- The proposed mine access road will leave the BLM road at a bend and follow the shortest route from the BLM road to the mine site without taking a straight path. The

Table 7. Conclusions from BLM's Visual Contrast Rating Worksheets

Key Observation Point	Distance from Project Area	Five-Year Phase			Post-Reclamation Phase		
		Visual Effects of Landscape Modifications Compared to Adjacent Undisturbed Areas	Meets VR Objectives	Mitigation Measures Required	Visual Effects of Reclamation Compared to Adjacent Undisturbed Areas	Meets VR Objectives	Mitigation Measures Required
Highway 11	5.78 mi.	**Weak or No Contrast**. The proposed modification may not be visible to the casual viewer and would not attract attention or dominate the view.	Yes	No	No discernible difference from the 5-Year Phase	NA	NA
McCan Road	5.25 mi.	**Weak or No Contrast**. The proposed modification would be indistinct to the casual viewer and would therefore not attract attention or dominate the view.	Yes	No	No discernible difference from the 5-Year Phase	NA	NA
Mahoney Park Rd.	1.25 mi.	**Moderate to Weak Contrasts**. The proposed modifications would be visible to the casual observer, may attract attention, but would not dominate the landscape.	Yes	No	**Weak Contrast**. The proposed project would not dominate the viewshed after reclamation	Yes	No
County Road Bo16	1.06 mi.	**Moderate to Weak Contrasts**. Would attract the attention of the casual observer, but would not dominate the landscape.	Yes	No	**Weak Contrast**. The proposed project would not dominate the viewshed after reclamation.	Yes	No
WSA Boundary	0.31 mi.	**Moderate to Weak Contrasts**. Would attract the attention of the casual observer, but would not dominate the viewshed.	Yes	No	**Weak Contrast**. The proposed project would not dominate the viewshed after reclamation.	Yes	No
Foreground	0.14 mi.	**Moderate to Weak Contrasts**. Would attract the attention of the casual observer, but should not dominate the viewshed.	Yes	No	**Weak Contrast**. The proposed project may attract the viewer's attention, but would not dominate the view after reclamation.	Yes	No

Source: BLM, 2020, Appendix B
Note: Landscape modifications would include access road construction, ground disturbance, active mining, and vegetation removal. Reclamation would include vegetation and topsoil replacement that would mimic adjacent undisturbed areas.
NA = Not analyzed

- road will follow the lay of the land to limit the need to install culverts. A concrete slab ford will be constructed at grade across the dry arroyo.
- The laydown yard will be placed on a raised bench to minimize surface disturbance.
- The road to access the mine itself will be constructed to follow the contour of the hillside.
- Unnecessary disturbance will be reduced by working within previously disturbed areas when possible. Disturbed areas will be kept as small as possible while still meeting the operational needs.
- The Project Area will be kept clean. Unused equipment and materials that may or may not be needed in the future will be removed.
- Disturbed areas that are not needed for future operations will be reclaimed; interim reclamation (e.g., using half the amount of approved seed mix) will be performed in areas that receive intermittent use.
- The water tank and the office trailer will be painted in colors that will blend with the background landscape to reduce visual contrast. To the extent possible, topdressing and waste rock stockpiles will be located to screen the office trailer, water tank, and staged equipment from the BLM road.
- Disturbed areas will be recontoured to a natural looking contour that blends with the surrounding topography. While areas to be drill seeded must have a somewhat smoother texture, recontouring to a rough texture helps trap broadcast seed and moisture, deters off-road travel, and helps to match the “texture” of the surrounding landscape.

2.15.6 Cultural and Paleontological Resources

Dos Rios Consultants, Inc. (Dos Rios) performed a Class III archaeological survey of the proposed mining site from August 5 through 8, 2016. A total of 17 isolated occurrences (IOs) were found within the survey area. An IO is a single or scatter of artifacts or a feature (or

features) that are not extensive enough to meet the criteria of being an archaeological site. The IOs within the survey area ranged from isolated mine shafts to fragments of ceramics, metal cans, and fragments of rock from the working of stone tools. From January 30 through February 1, 2019, Dos Rios performed a Class III archaeological survey along the existing unimproved BLM road, including potential vehicle pullouts, and along the proposed mine site access route. A total of 24 IOs were found within the survey area, including metal cans, bullet shell casings, metal scraps, and fragments of rock from the working of stone tools. Dos Rios also surveyed a known cultural resource site south of the BLM road to ensure that it would not be impacted by the proposed widening of the BLM road. No archaeological sites, determined eligible for inclusion to the National Register of Historic Places by the BLM, were discovered during the surveys. Dos Rios submitted their reports directly to the Las Cruces District Office of the BLM. Due to the sensitive nature of the information contained in the reports, copies are not included in this PoO, but are on file at the Las Cruces District Office of the BLM.

Geologic literature pertaining to fossil fauna in the locality and stratigraphic intervals present at the proposed mining site has been extensively reviewed. Based on this review, the Project Site should be given a fossil yield classification of Class 2 (i.e., low, under the BLM potential fossil yield classification [PFYC] system) (BLM, 2007b). A PFYC rating of Class 2 means that the gross potential fossil yield for the rock units present is low and refers to sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils. Scientifically significant fossils are generally defined as all vertebrate fossils and their tracks or traces, and some invertebrate or plant fossils identified as rare or important by the scientific community. Typical geological and paleontological conditions for a Class 2 classification include the following:

- Vertebrate or significant invertebrate or plant fossils not present or very rare
- Units that are generally younger than 10,000 years before present
- Recent aeolian deposits
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration)

The fossils found in the Fusselman and Montoya Formations are primarily shallow marine invertebrates (e.g., horn corals, echinoderms, brachiopods and gastropods). Both formations have undergone significant chemical diagenesis from dolomitization, which destroys structural detail in carbonate fossils through recrystallization. Some of the corals in the Fusselman are preserved by silica replacement. However, the carbonate platform in which the formations present at the site formed is very extensive, and both the Fusselman and Montoya Formations have many outcrops across the southern portion of the State of New Mexico and Texas.

The following measures will be taken if previously undiscovered cultural or paleontological resources are discovered during operations:

- Pursuant to 43 CFR 10.4(g), AmMg will notify the BLM, by telephone and with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further, pursuant to 43 CFR 10.4(c) and (d), the operator will immediately stop all activities in the vicinity of the discovery and not commence again for 30 days or when notified to proceed by the BLM.

- AmMg will immediately notify the BLM of any paleontological resources discovered as a result of mining operations. The operator will suspend all activities in the vicinity of such discovery until notified to proceed by BLM, and shall protect the discovery from damage or looting. The operator may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The BLM will evaluate, or will have evaluated, such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by BLM after consulting with the operator. Within 10 days, the operator will be allowed to continue construction through the site, or will be given the choice of either (1) following the BLM instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource or (2) following the BLM instructions for mitigating impacts to the fossil resource prior to continuing activities in the project area.

- Any cultural resource discovered by the permit holder, or by any person working on their behalf, during the course of activities on federal land will be reported, as required by applicable cultural resources laws applicable to the site, to BLM by telephone with written confirmation. The permit holder will suspend all operations in the immediate area of such discovery and protect it until an evaluation of the discovery can be made by the BLM. This evaluation will determine the significance of the discovery and what mitigation measures or documentation requirements are necessary to allow activities to proceed. The holder is responsible for the cost of evaluation and mitigation. In instances where applicable cultural resource laws require the immediate cessation of operations, operations will resume only upon written authorization to proceed from appropriate officials vested with such authorization authority under applicable laws.

2.15.7 Wildlife

The Project Area provides habitat for a variety of mammals, reptiles, and birds. Table 8 lists all wildlife species identified during the biological field survey conducted by Envirosystems on July 28, 2016 (Appendices E1 and E2). On October 18, 2018, the New Mexico State Office of the BLM issued revisions to the New Mexico BLM sensitive animal list, which is provided in Appendix E3. No federally listed wildlife species protected by the ESA were observed during surveys.

Table 8. Complete List of Wildlife Species Observed in the Project Area

Common Name	Scientific Name
Birds	
black-chinned sparrow	*Spizella atrogularis*
bushtit	*Psaltriparus minimus*
cactus wren	*Campylorhynchus brunneicapillus*
Gambel's quail	*Callipepla gambelii*
greater roadrunner	*Geococcyx californianus*
northern mockingbird	*Mimus polyglottos*
thrasher	*Toxostoma* sp.
Reptiles	
whiptail lizard	*Aspidoscelis* sp.

A species search for the occurrence of golden eagles in Luna County was conducted using the Biota Information System of New Mexico (BISON-M), which is maintained by the New Mexico Department of Game and Fish (NMDGF, 2019). The results indicate the presence (extant, possible, or accidental) of golden eagles in Luna County, but no occurrences were identified in the Florida Mountains. The result of this records search is provided in Appendix E3.

A species search for the occurrence of bats in Luna County was conducted using BISON-M. Searches were made for the following species: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), cave myotis (*Myotis velifer*), fringed myotis (*Myotis thysanodes*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). The search results indicate the presence (extant, possible, or accidental) in Luna County of all of these species other than cave myotis, but none were identified in the Florida Mountains.

Caves and inactive mines in the project area could provide habitat for bats. During the NEPA process, the biological survey will be expanded to determine whether bats are present within the project area.

AmMg is committed to wildlife protection through implementation of the following BMPs:

- Access to the proposed mine site will be fenced to prevent wildlife from entering the mine area.
- Reclamation will be conducted to achieve a stable configuration and self-sustaining ecosystem for wildlife.
- Wildlife signage will be placed along the unnamed BLM road and proposed new access road to be used to avoid vehicle collisions with wildlife as directed by BLM.

2.15.8 Migratory Birds

Some migratory birds were observed in the Project vicinity during the field survey. However, no nesting migratory birds were identified on the Project Site. In its strategic plan for migratory bird

conservation (BLM, 2013), BLM recommended two sources for determining which migratory birds should be considered for analysis in environmental planning documents: the BLM priority migratory birds table (BLM, 2013) and the game birds below desired condition (GBBDC) list (USFWS, 2004). Both of these sources were reviewed during development of the biological evaluation report (Appendices E1 and E2).

The BLM priority migratory birds table is organized by habitat and bird conservation region (BCR). Species that occupy the desert scrub habitat of the project area and BCR 35 (Chihuahuan Desert) were analyzed for potential impacts from the proposed quarry project (refer to Table 7 in Appendix E1). The GBBDC list was also reviewed, and species that could potentially use the project area were identified.

Any ground clearing or other habitat disturbances during the migratory bird (including raptors) nesting season (March 1 – August 31) risks a violation of the Migratory Bird Treaty Act. AmMg will conduct a preconstruction survey for nesting migratory birds if surface disturbing activities are conducted during the nesting season. The survey will be performed by a qualified wildlife biologist. If active nests are found, an appropriately sized no surface disturbance buffer, defined in consultation with BLM, will be placed around the active nest until the nesting attempt has been completed. It is expected that the ongoing disturbance caused by mining activities will deter migratory birds from nesting in the project area.

2.15.9 Public Safety and Site Access

The following measures related to public safety and site access will be implemented:

- Public access to the mine site will be blocked where the mine access road meets the BLM road to minimize public exposure to the mine site, mining equipment, and haul trucks.

- Mine traffic will maintain vehicle speed at or below 15 mph in the pit area and 25 mph on unpaved roads. Haul trucks will adhere to posted speed limits on paved roads.

- Public safety will be maintained throughout the duration of the Project. All equipment and temporary facilities will be maintained in a safe and orderly manner.
- Any survey monuments, witness corners, or reference monuments will be protected to the extent economically and technically feasible.
- All solid wastes will be disposed of in a state, federal, or local designated site.
- Pursuant to 43 CFR 8365.1-1(b)(3), no sewage, petroleum products, or refuse will be dumped from any trailer or vehicle.
- All applicable state and federal fire laws and regulations will be observed, and all reasonable measures will be taken to prevent and suppress fires in the Project Area.

2.15.10 Socioeconomic Conditions of the Proposed Project Area

The analysis of socioeconomic resources identifies aspects of the social and economic environment that are sensitive to changes and that may be affected by the proposal to conduct resource verification activities, mining development, and mining operations. The analysis specifically considers how the proposed actions might affect the individuals, communities, and the larger social and economic systems of Luna County, the surrounding region, and the State of New Mexico.

Businesses, community services, and economic systems in Luna County would likely change the most in response to the implementation of the proposed mining operation. Because potential impacts with the greatest magnitude, duration, extent, and likelihood would occur in Luna County, it is therefore defined as the region of influence (ROI) for the analysis of socioeconomic impacts. Impacts that extend outside of the ROI are discussed where applicable throughout the section.

The data supporting this analysis are collected from standard sources, including the U.S. Census Bureau (Census), Bureau of Labor Statistics (BLS), other federal, state, and local agencies, or other research institutes. Demographic and economic data is presented for Luna County and compared to demographic and economic data for the State of New Mexico.

Demographic data from the Census is also presented for the City of Deming as applicable. The inclusion of demographic data for the City of Deming does not change the ROI, as these are located within Luna County.

2.15.10.1 Population

The 2010 estimated population of Deming is 14,855, a net increase of 739, or 5 percent, from the 2000 estimated population. Luna County grew by 0.32 percent and the State population grew by 13.2 percent from 2000 to 2010 (Table 9).

Table 9. Population Change, 2000-2010

Location	2000	2010	Numeric Change 2000-2010	Percent Change 2000-2010
Deming	14,116	14,855	739	5.2
Luna County	25,016	25,095	79	0.32
New Mexico	1,819,046	2,059,179	240,133	13.2

Source: U.S. Census, 2000 and 2010

In general, the population of Luna County is older than that of the state as a whole. The percentage of children in Luna County (the ROI), including those under 5 years and between 5 and 18 years, is lower than percentages for those same age groups in the state of New Mexico. Population estimates and the percent of children by age group in the City of Deming, Luna County, and New Mexico are shown in Table 10.

Table 10. Population Under 18 Years of Age, 2010

Location	Total Population	Children Under 5 Years	Children 5 to 18 Years	All Children Under 18 Years
Deming	14,855	8.0%	19.6%	27.6%
Luna County	25,095	7.3%	19.2%	26.5%
New Mexico	2,059,179	7.0%	18.1%	25.1%

Source: U.S. Census Bureau, 2010

The distribution of population by age in Luna County, including the City of Deming, and New Mexico is summarized in Table 11. The percent of the population between the ages of 20 and

44 is lower in Luna County than in the state as a whole. The percent of persons 65 and older in Luna County is about double the percent in the state overall.

Table 11. Distribution of Population by Age, 2010

Location	Percent Under 18 Years	Percent 20 to 44 Years	Percent 45 to 64 Years	Percent 65 Years and Older
Deming	27.6	28.9	21.8	21.7
Luna County	26.5	26.8	24.4	22.3
New Mexico	25.1	64.8	26.5	13.2

Source: U.S. Census Bureau, 2010

2.15.10.2 Housing

A housing unit refers to a house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied as separate living quarters, or if vacant, intended for occupancy as separate living quarters. An owner-occupied housing unit indicates that the owner or co-owner lives in the unit even if mortgaged or not fully paid for. The median value(s) of housing units reflects housing units with and without a mortgage. A household includes all the people who occupy a housing unit as their usual place of residence.

Luna County has 10,999 total housing units. About 67.4 percent of homeowners in Luna County occupy their housing unit. The median value of housing in New Mexico is 48 percent higher than in Luna County.

2.16 Proposed Preliminary Schedule of Operations (Concept to Closure)

AmMg plans to initiate resource verification drilling within 6 months of permit approval and for this activity to last approximately 1 to 2 months. This activity will require preliminary construction of the mine site access road and roadwork within the mining operations area. If mining operations do not begin within 1 year of the end of verification drilling, AmMg will reclaim the disturbances related to the verification drilling program. Improvement of the BLM road and final construction of the mine site access road will occur within 6 months of completion of verification drilling. Phase 1 mining would begin as soon as construction of the processing

facility has begun and would occur over a period of approximately 12 years. Phase 2 mining would begin following completion of Phase 1 and is expected to last approximately 3 years. Reclamation of Phase 1 would occur during development of Phase 2. Phase 3 would be initiated after mining activities are complete in Phase 2 and would last approximately 5 years. Reclamation of Phase 2 will be initiated during development of Phase 3. If possible, reclamation activities may be initiated during development of Phase 3. Reclamation of Phase 3 would require approximately 6 months to 1 year to complete. Post-mining monitoring of reclamation would begin as reclamation activities are completed in each phase. The estimated operational life required to recover the minerals has been estimated to last up to 20 years, although this estimate likely will be refined as the Project progresses.

The mining activities are anticipated to take up to 20 years and employ up to 10 on-site personnel during this timeframe. This PoO provides a phased approach that incorporates blasting and excavation techniques that qualify under the MMD program as minimal impact mining given the limitation of the Project's disturbance footprint to under 40 acres. The drilling and blasting plan provided contains the available information on sequencing and blasting of the deposit. For the most part, drilling, with some limited blasting, will occur during the resource verification activities of the Project, and blasting will occur during mining phases of the Project. Based on the currently proposed production schedule, blasting during mine operations would occur approximately once per month and a typical blast would use approximately 15,500 pounds of explosives. The blasting plan in Appendix B may be modified as site-specific conditions and requirements are determined. Blasted material will be crushed on-site to achieve proper sizing for handling and hauling, if necessary. AmMg will evaluate operating hours, and will not blast during evening and early morning hours. At this point in time, more detailed blasting schedules than those provided above cannot be fully developed. AmMg will present a blasting schedule once it can be developed with accuracy beyond the general timeline for blasting during the mining phases that is provided here.

The reclamation workforce will consist of up to 10 employees. Reclamation will occur contemporaneously during operations, to the extent feasible, and will be conducted to ensure that total disturbance remains within the 30.04-acre disturbance footprint estimate and after all mining activities in each phase are complete.

Southwestern New Mexico and Luna County have a history of mining and agriculture, and AmMg will provide employment opportunities to individuals living in the immediate area of the Project. It is likely that personnel from outside the local area will be required in order to meet the full needs of the Project; however, the southwestern United States is capable of providing a large base of experienced personnel.

3. Reclamation Plan [43 CFR 3809.401(b)(3)]

All disturbed areas in the Project Area will undergo reclamation unless the BLM requests that improvements, such as those to the existing BLM road or construction of the new mine access road, be left in place. These areas include the final surface once the deposit is mined to the valley floor, the laydown yard, and new/existing access roads. Drill holes from the Project will be permanently plugged and abandoned in accordance with applicable regulatory requirements. Areas will be restored to a safe and stable condition that blends with the surrounding undisturbed area, and that meets BLM and MMD requirements to achieve a self-sustaining ecosystem appropriate for the surrounding area that is consistent with approved post-mining land uses. The impacted surface area shall be restored to the condition that existed prior to operations by recontouring so that the remaining ground surface approximates the surrounding topography. Stockpiled topdressing will be replaced, and all disturbed surfaces will be revegetated.

Topsoils and subsoils will be replaced and contoured to achieve safe slopes, erosion control, long-term stability, and preservation of surface water flow patterns. The disturbed area shall be reseeded with a certified weed-free native seed mix and mulched with a certified weed-free mulch. A tackifier may be used to enhance stability of the seed bed.

Reclamation will begin no later than immediately following completion of mining activities and, to the extent reasonably practicable, contemporaneously with mining. Disturbed areas that are not needed for future operations will be reclaimed; interim reclamation will be performed in areas that receive intermittent use. Revegetation will occur prior to the initiation of the growing season.

AmMg will conduct reclamation in accordance with the revegetation success standards in §19.10.603.G NMAC, which specifies that revegetated lands under the grazing and wildlife habitat post-mine land uses (PMLUs) will meet the following:

- Total herbaceous cover and productivity shall be equal to 90 percent of the reference area within a 90 percent statistical confidence.

- The diversity of plant life forms (woody plants, grasses, and forbs) shall determine what is reasonable given the physical environment of the reclamation.
- Woody plant species shall be established to an approved density with an 80 percent statistical confidence.
- Other reasonable, attainable standards approved by the Director.

Monitoring parameters, including vegetative cover and plant diversity, will also be used to determine the success of revegetation.

Notification shall be provided to BLM and MMD when reclamation and revegetation are complete. Disturbed areas shall be maintained to control dust and minimize erosion through such time as the site becomes eligible for release of financial assurance.

3.1 Mine Reclamation [43 CFR 3809.401(b)(3)(ii)]

Reclamation will be completed to the standards described in 43 CFR 3809.420(3) and MMD Part 3 requirements. Reclamation will also meet the reclamation objectives as outlined in the U.S. Department of Interior Solid Minerals Reclamation Handbook #H-3042-1 (BLM, 1992), and Surface Management of Mining Operations Handbook H-3809-1 (BLM, 2012). All drill sites, pits, excavation disturbances, the laydown yard, newly constructed road segments, and road improvements will be recontoured and reseeded unless otherwise directed by BLM.

Reclamation will be designed to achieve land uses consistent with the BLM- and MMD-approved PMLUs and any applicable land use management plans for the area. Reclamation is intended to return disturbed land to a level of productivity comparable to pre-resource verification levels. Land use includes wildlife habitat, livestock grazing, hunting, and dispersed recreation. The post-mining land uses are not expected to differ from pre-Project land use.

During Project activities, reclamation will involve management of drilling to contain any drill cuttings and water, monitoring road conditions, and keeping sites clean and safe. Exploration drill holes will be backfilled from bottom to top with neat cement slurry grout in accordance with

19.10.2.302.L NMAC. If mining operations do not begin within 1 year of the end of verification drilling, AmMg will reclaim the disturbances related to the verification drilling program. During seasonal closure of the Project Area and periods of inactivity between drilling phases (if applicable), reclamation would involve cleaning sites and maintaining the overall safety of the Project Area. The BLM and MMD will be notified prior to any periods of inactivity at the mine site greater than 120 days.

After Project activities are completed, reclamation will include regrading disturbed areas related to this Project such that they blend with surrounding topography. The Project Area will then be seeded using the approved reclamation seed mixture and application rates approved by the BLM and MMD. Proposed reclamation at the end of Years 5 and 20 are described in Sections 3.4 and 3.5, respectively, and are illustrated in Figures A2-2c and A2-3c (Appendix A2), respectively. AmMg may further detail and modify the reclamation plans present herein as the Project is undertaken and site-specific mining conditions are evaluated.

3.2 Regrading and Reshaping of Disturbed Area [43 CFR 3809.401(b)(3)(ii)]

As described in Section 2.15.5, the slopes on the foothill average about 35 percent (35 feet vertical to 100 feet horizontal), but some slopes, such as the northeast and northwest sides, are much steeper (as much as 43 to 56 percent, respectively) and there are short sections of outcropping dolomite that are vertical. In the background mountains, larger blocks of dolomite as much as 500 feet higher than the foothill have equally steep slopes and sheer vertical faces, as shown in Figure 15.

At closure, disturbance locations will be reclaimed according to BLM and MMD standards. The slope of the valley floor will be maintained and recontouring will be performed as appropriate to blend disturbed areas with the surrounding topography. Upon completion of mining (Year 20), the mine will be a shallow bowl that will be open to the natural slope on the southwest, as described in Section 2.4.6 and depicted in Figure A2-3a in Appendix A2. The perimeter walls will be sloped at approximately 3H:1V, which is generally consistent with the surrounding topography. Perimeter walls will be 20 feet high with 5-foot-wide benches to minimize runoff and the potential for erosion. Sediment control features may also be placed on the walls and

slopes until revegetation is established. All mine-related roads that were not in existence at the commencement of operations will be reclaimed, and the existing road that was widened may be reclaimed to the previous width, as directed by BLM. Concrete slab fords and any culverts placed during road construction will be removed unless BLM requests that they be left in place.

3.3 Revegetation [43 CFR 3809.401(b)(3)(vii)]

Where salvageable soil exists in areas that are to be newly disturbed, AmMg will salvage and store as much topdressing as can be safely and practically recovered, as discussed in Section 2.4.4. The seed mixture and application rates proposed by AmMg are listed in Table 12.

Once disturbed areas have been recontoured, the seedbed will be prepared. Seedbed preparation will be conducted when surface and subsurface soil moisture conditions are dry in order to avoid soil compaction. The surface will be ripped or scarified to a depth of approximately 8 to 12 inches, and disked to a depth of approximately 6 inches. Cover materials will be hauled from the topdressing stockpile, and a minimum of 6 inches of topdressing and any required soil amendments will be placed on the top surface and slopes. The topdressing and soil amendments will be disked to a depth of approximately 6 inches. Wherever possible, seedbed preparation will be done along contour. Bulldozers and motor graders will be used to smooth the surfaces and facilitate access for cover placement and revegetation activities. Hauling and placement of topdressing will be accomplished using a variety of equipment, including haul trucks, scrapers, and excavators.

A seed mix approved by both BLM and MMD will be used to reestablish vegetation. A proposed seed mix, which includes a number of pollinator plants (Dreesen and Grasswitz, 2015), is offered in Table 12. Wherever possible, seed will be planted along contour using a rangeland drill or similar equipment. When drill seeding cannot be accomplished, broadcast seeding will be employed. For broadcast seeding, the drill seeding rate will be doubled and areas will be raked with a chain- or tire-harrow to lightly cover the seed and achieve good soil-seed contact. Hydroseeding will only be used on steep slopes that cannot be safely seeded using the drill or broadcast seeding methods.

Table 12. Seed List and Seeding Rates for Reclamation

Common Name	Scientific Name	Attributes and Function [a]	PLS/acre [b]
Grasses - Warm Season			
Sideoats grama	*Bouteloua curtipendula*	Drought-resistant sod grass providing ground cover and forage	1.10
Blue grama	*Bouteloua gracilis*	Drought-resistant sod grass providing ground cover and forage	0.25
Cane beardgrass	*Bothriochloa barbinodis*	Bunchgrass providing ground cover and forage	0.20
Galleta	*Pleuraphis jamesii*	Bunchgrass providing erosion control and early spring/late fall forage	1.10
Green sprangletop	*Leptochloa dubia*	Erect bunchgrass; aggressive short-lived nurse plant with forage value	0.20
Plains bristlegrass	*Seteria vulpiseta*	Bunchgrass providing ground cover and forage	0.30
Sand dropseed	*Sporobolus cryptandrus*	Drought-tolerant bunchgrass adapted to sandy sites	0.04
Grasses - Cool Season			
Indian ricegrass	*Achnatherum hymenoides*	Tufted grass providing forage/seed to birds and small mammals	1.30
Plains lovegrass	*Eragrostis intermedia*	Bunchgrass providing ground cover and early spring forage	0.04
NM feathergrass	*Hesperostipa newmexicana*	Persistent bunch grass providing ground cover and forage	0.50
Shrubs			
Four-wing saltbush	*Atriplex canescens*	Slightly evergreen shrub providing cover/forage for wildlife and livestock	1.75
Rubber rabbitbrush	*Ericamerica intermedia* [c]	Mid-height shrub providing cover and erosion control	0.35
Apache plume	*Fallugia paradoxa* [c]	Mid-height shrub providing browse, cover and erosion control	0.10
Winterfat	*Krascheninnikovia lanata*	Low shrub providing nutritious winter browse	0.70
Forbs			
White prairie clover	*Dale candida* [c]	Nitrogen-fixing forb with low water requirements providing forage and ground cover	0.40
Blue flax	*Linum lewisii* [c]	Persistent blue-flowered forb, nutritious seed for ground birds	0.35
Prairie coneflower	*Ratibida colomnifera* [c]	Red and yellow flowered forb attracting pollinators	0.10
Desert globemallow	*Sphaeralcea ambugua* [c]	Persistent mid-height forb providing browse for deer and antelope	0.40
		Total	9.18

[a] All species are native perennials.
[b] Rate is in pounds of pure live seed (PLS) per acre; substitutions may change seeding rates.
[c] Pollinator plant.

Following seeding, certified weed-free mulch will be uniformly spread at a rate of about 2 tons per acre. Mulch may contain a minimum of viable seeds associated with the source (i.e., barley or wheat). Long-stem mulch will be given preference over shorter materials. The mulch will be then be crimped with a straight-disc harrow or similar equipment to fix it in place.

Seeding is typically done once, right before the monsoon season. Yearly visits to the site will be conducted to monitor the success of the revegetation for a period of three years or until revegetation success has been achieved. Reapplication of seed will be conducted in areas where success levels (summarized in Section 3) are not being met.

AmMg proposes to establish a 3-acre reference area to the southwest of the mine area that will be used to measure revegetation success standards (Figure 2). The reference area includes an area of shallow bedrock (soil map unit RU, rough broken and rock land) similar to the area to be mined, but extends into an area of more developed soils (soil map unit EG, Eba very gravelly clay loam), as indicated in the soil survey report (Appendix D). This area will be fenced to ensure that it remains unaffected by mining and associated activities over the life of the mine. The reference area will be used to address the requirement that vegetation in reclaimed areas meet revegetation success standards in 19.10.603.G NMAC. Information regarding current vegetation conditions and growth parameters in the reference area will be determined during the NEPA process and will be submitted to MMD when that process is completed.

3.4 Year 5 Reclamation Plan

At the end of Year 5, AmMg anticipates that the site disturbances will include the 1,334-foot-long mine site access road (including a concrete slab crossing of the dry arroyo), the 2-acre laydown yard, approximately 86 exploratory boreholes, the on-site road to the active mine area, and the mine area itself. At this time, AmMg assumes that the improvements to the BLM road will be left in place. The exploratory boreholes will be backfilled with neat cement grout as described in Section 2.4.5, and will have been plugged after completion. A plan view map and cross sections showing the anticipated configuration of the mine site at the end of Year 5 of mining are provided as Figures A2-2a and A2-2b in Appendix A2. A plan view map showing the Year 5 reclamation plan is provided as Figure A2-2c. The mine area itself is anticipated to

consist of a 10.2-acre area including 20-foot-high walls with 5-foot wide benches, as described in Section 2.4.6. The financial assurance cost estimate for third-party reclamation at the end of Year 5, which includes costs for reclamation of the BLM road, is discussed Section 7. Following are reclamation plans for each of the disturbances at the end of Year 5, assuming cessation of mining operations were to occur at that time.

3.4.1 Laydown Yard Reclamation

The laydown yard will cover approximately 2 acres and will include an office trailer, a portable generator, portable toilets, and security fencing. At closure, these and any other temporary facilities in the laydown yard area will be removed from the site. Any gravel that may have been placed in the laydown yard area will be removed and reused to reinforce the surface of the BLM road. Topdressing stockpiled in the laydown yard will be used during reclamation of the disturbed areas.

The disturbed surface of the laydown yard area will be reclaimed by grading the surface to match the original contour. The seedbed will be prepared, seeded, and mulched, as described in Section 3.3.

3.4.2 Mine Access Road Reclamation

The mine access road extends south from the BLM road to the mine site. At closure, any gravel that may have been placed on the access road will be removed and reused to reinforce the surface of the BLM road. Any culverts placed to cross narrow steep-sided gullies and the concrete slab ford crossing of the dry arroyo will be removed and disposed of off-site. The disturbed surface of the mine access road will be reclaimed by grading the surface to match the original contour. The area of the concrete slab ford crossing within the dry arroyo will be recontoured, but will not be reseeded or mulched. The seedbed along the former roadbed will be prepared, seeded, and mulched as described in Section 3.3.

3.4.3 Mine Reclamation

Through Year 5, the mining operation will continue in the Phase 1 area and cover approximately 27.54 acres (Figure A2-2a in Appendix A2). The mine will consist of a relatively flat working bench with an elevation of approximately 4,915 feet above NGVD 1929. As discussed in Section 2.4.6, the east side of the working bench will consist of an interim wall consisting of 20-foot-high walls sloped at approximately 2H:1V, separated by 5-foot-wide benches (see cross sections provided in Figure A2-2b). The wall along the north and northwest sides of the bench, which will form part of the final mine perimeter, will consist of 20-foot-tall walls sloped at 3H:1V, separated by 5-foot-wide benches. The access road will enter the mine area from the northwest. Other areas to be reclaimed will include the roads created for the resource verification drilling and the road in the Phase 2 and 3 areas that extends around the south and east sides of the original hill to access the initial mine area.

AmMg intends to reclaim the benches separating the walls as the benches are created; at 5-feet wide, the benches will be difficult to reclaim later. Reclamation of the benches will include preparation of the seedbed, seeding, and mulching, as described in Section 3.3.

Reclamation of the mine area at the end of Year 5 will include blasting the interim (eastern) wall to lower the wall and create a 3H:1V slope. As this work progresses, the cutoff road and roads from verification drilling along the south and east sides of the hill will be reclaimed by using an excavator to pull (or a bulldozer to push) the fill back onto the road to reestablish the original slope (about 35 percent). The 3H:1V wall along the north and northwest perimeter of the mine will not be recontoured. At closure, stable 3H:1V walls around the perimeter of the mine will be left in place, and unstable walls will be stabilized by blasting or other safe methods. AmMg expects that the dolomite walls will be competent and stable, and that they will not require recontouring. Once recontouring within the mine and on the south and east sides of the foothill is complete, the seedbed will be prepared, seeded, and mulched as described in Section 3.3. The mine walls will be hydroseeded if they cannot be safely accessed.

The mine area and the mine walls will be appropriately barricaded with physical barriers or fences, and will be posted according to MSHA and New Mexico Mine Inspectors Office

regulations. Access will be limited by a locked gate, and the access road will be blocked with physical barriers (e.g., large rocks).

3.5 Year 20 Reclamation Plan

At the end of Year 20, AmMg anticipates that the site disturbances will include the 1,334-foot-long mine site access road (including a concrete slab crossing of the dry arroyo), the 2-acre laydown yard, the on-site road to the active mine area, and the mine area itself. At this time, AmMg assumes that the improvements to the BLM road will be left in place. A plan view map and cross sections showing the anticipated configuration of the mine site at the end of Year 20 of mining are provided as Figures A2-3a and A2-3b in Appendix A2. A plan view map showing the Year 20 reclamation plan is provided as Figure A2-3c. The mine area itself is anticipated to cover the 22.5-acre permitted mining area including 20-foot-high walls sloped at 3H:1V with 5-foot-wide horizontal benches, as described in Section 2.4.6. A preliminary financial assurance cost estimate for third party reclamation at the end of Year 20, which includes costs for reclamation of the BLM road, is provided in Section 7. Following are reclamation plans for each of the disturbances at the end of Year 20.

3.5.1 Laydown Yard Reclamation

The laydown yard will cover approximately 2 acres and will include an office trailer, a portable generator, portable toilets, and security fencing. At closure, these and any other temporary facilities in the laydown yard area will be removed from the mine site. Any gravel that may have been placed in the laydown yard area will be removed and reused to reinforce the surface of the BLM road. Topdressing stockpiled in the laydown yard will be used during reclamation of the disturbed areas.

The disturbed surface of the laydown yard area will be reclaimed by grading the surface to match the original contour. The seedbed will be prepared, seeded, and mulched, as described in Section 3.3.

3.5.2 Mine Access Road Reclamation

The mine access road extends south approximately 1,350 feet from the BLM road to the mine site. At closure, any gravel that may have been placed on the access road will be removed and reused to reinforce the surface of the BLM road. Any culverts placed to cross narrow steep-sided gullies and the concrete slab ford crossing of the dry arroyo will be removed and disposed of off-site.

The disturbed surface of the mine access road will be reclaimed by grading the surface to match the original contour. The area of the concrete slab ford crossing within the dry arroyo will not require further reclamation. The seedbed will be prepared, seeded, and mulched, as described in Section 3.3.

3.5.3 Mine Reclamation

Upon completion of mining operations (Year 20), the area disturbed by mining operations will cover approximately 22.5 acres (Figures A2-3a and A2-3b in Appendix A2). The mine will be a relatively flat-bottomed bowl that is open to the southwest. The bottom of the bowl will be at an elevation of approximately 4,865 feet above NGVD 1929 and sloped slightly to the southwest to maintain positive drainage. The perimeter of the bowl will vary in elevation. The sides of the bowl will consist of 20-foot-high walls sloped in towards the center of the mine at approximately 3H:1V. The walls will be separated by 5-foot-wide benches (Figure A2-3b). The access road will enter the mine area from the northwest.

At the end of mining (Year 20), the floor of the mine and the access road into the mine will be reclaimed. The floor of the mine will be prepared, seeded, and mulched, as described in Section 3.3. AmMg intends to reclaim the benches separating the walls as the benches are created, as described in Section 2.4.6. The 3H:1V wall around the perimeter of the mine will not be recontoured. At closure, stable 3H:1V walls around the perimeter of the mine will be left in place, and unstable walls will be stabilized by blasting or other safe methods. AmMg expects that the dolomite walls will be competent and stable, and that they will not require recontouring. The mine walls will be hydroseeded if they cannot be safely accessed.

The road into the mine will be recontoured. The road surface will be prepared, seeded, and mulched, as described in Section 3.3. The mine area and the mine walls will be appropriately barricaded with physical barriers or fences and posted according to MSHA and New Mexico Mine Inspectors Office regulations. Access will be limited by a locked gate and the access road blocked with physical barricades (e.g., large rocks).

3.6 Wildlife Rehabilitation [43 CFR 3809.401(b)(3)(v)]

Reclamation of the Project Area will be conducted to achieve a stable configuration and a self-sustaining ecosystem appropriate for the life zones of the surrounding area. Access to the mine site will be restricted for protection of the public and animals.

3.7 Removal of Building and Associated Structures [43 CFR 3809.401(b)(3)(ix)]

All temporary Project structures will be towed away, demobilized, or demolished and removed from the site for appropriate disposition when mining activities are complete.

3.8 Post-Closure Management [43 CFR 3809.401(b)(3)(x)]

Following the completion of reclamation and closure activities, revegetation will be monitored for at least three growing seasons. Revegetation will be considered successful when revegetation success standards in 19.10.603.G NMAC have been met, as well as achieving Part 3 requirements under the NMMA for release of financial assurance. In accordance with 19.10.1.7.S.(2) NMAC, a “self-sustaining ecosystem” will be established for all reclaimed areas impacted by mine development. The reclaimed land will be self-renewing without augmented seeding, amendments, or other assistance which is capable of supporting communities of living organisms and their environment. By MMD definition, a “self-sustaining ecosystem” includes hydrologic and nutrient cycles functioning at level of productivity sufficient to support biological diversity. Additional seeding will occur until a self-sustaining ecosystem is established. No discharges that will impact groundwater are anticipated from the proposed activities; only water

for dust suppression, site reclamation activities, and potentially for resource verification activities is currently anticipated.

3.9 Proposed Productive Post-Mining Land Use

Major land uses occurring in the vicinity of the mine area are mining, grazing, wildlife habitat, watershed, and recreation. Following closure, the mine area would continue to support mineral development, grazing, wildlife habitat, watershed, and recreation. Land use in the Project Area will not change from pre-mining approved purposes and the Project Area will continue to support these approved uses. Reclamation and closure of the disturbed area will result in post-mining land uses that will be sustainable and will be consistent with uses currently approved. Mining, grazing, recreation, and wildlife habitat are the designations consistent with the surrounding land uses of the site and will be appropriate for the site upon reclamation. The Reclamation Plan is designed to reestablish grazing in the area and allow for long-term use of the reclaimed areas by wildlife known to historically use the area without affecting the potential for other uses such as mining and recreation.

4. Monitoring Plan [43 CFR 3809.401(b)(4)]

The proposed mining operation is designed to produce no discharge. However, sediment control will still be an important design feature at the site. The only sedimentation that may be produced will be from surface water runoff from several on-site sources, including the mining phases and any soil or rock stockpiles.

A SWPPP will be developed in accordance with the National Pollutant Discharge Elimination System (NPDES) permit program for non-point source discharge and implemented to control sedimentation from disturbance associated with mine activities. BMPs will be followed to manage stockpile areas and other disturbed surfaces. Direct runoff of water used for dust control will be limited to the extent practicable and will not cause downstream erosion or flooding or cause an exceedance of applicable water quality standards. AmMg will obtain water for dust control and site reclamation activities, and potentially for resource verification activities, from a commercial water source. AmMg will not release pollutants to groundwater, and small localized spills of hazardous materials are not likely to contaminate groundwater.

Sediment control will be achieved through the use of BMPs including regrading, fabric and/or hay bale filter fences, seeding and mulching, siltation or filter berms, silt fences, straw bale dams, diversion ditches with energy dissipaters, rock check dams at appropriate locations during construction and operation, and downgradient drainage channels in order to prevent unnecessary or undue degradation. Diversion structures, including existing natural structures, will divert runoff away from disturbed areas. All sediment control structures will be monitored and maintained on a regular basis. During reclamation, all areas where water could pond will be recontoured and graded, and surfaces will be covered with topdressing and vegetated.

4.1 Monitoring Devices

BMPs will be used to limit erosion and reduce sediment in runoff from the Project's disturbed areas during construction, operations, and reclamation. Structural and operational BMPs will be used to minimize erosion and control sediment. Disturbance will be limited to preserve existing vegetation to the maximum extent possible. Following construction activities, areas such as cut

and fill embankments will be seeded as soon as practicable and safe. Revegetation of disturbed areas will reduce the potential for wind and water erosion. Concurrent reclamation will be used to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures will be inspected periodically, and repairs will be performed as needed. Additional details regarding BMPs will be included in the SWPPP permit required for mine construction and operation.

4.2 Sampling Parameters and Frequency

There are no non-point source discharges anticipated that will require scheduled monitoring. Non-point source discharges on the Project would be in the form of sediment runoff. However, non-point sources will be managed via recommendations contained in the SWPPP to the extent that they may occur during resource verification, mining development, mining, or reclamation with the use of BMPs as necessary, including seeding and mulching of disturbed areas, silt fences, straw bale check dams, diversion ditches with energy dissipaters, and rock check dams. The SWPPP may require total suspended solids (TSS) and TDS sampling of runoff following large rain-producing storm events (typically, following periods of rainfall exceeding 0.25 inch in a 24-hour period), as defined in the SWPPP.

4.3 Analytical Methods

If stormwater runoff analysis is required per the SWPPP, samples will be collected at the locations designated and will be sent to a certified laboratory for analysis using U.S. Environmental Protection Agency (EPA) approved methods.

4.4 Reporting Procedures

Reports generated by certified laboratories conducting water quality analyses shall be submitted to the BLM for review.

5. Interim Management Plan [43 CFR 3809.401(b)(5)]

5.1 Schedule of Anticipated Periods of Temporary Closure [43 CFR 3809.401(b)(5)(vi)]

No temporary closures (defined as greater than 120 days) are anticipated during the execution of the Project. If a temporary closure is required due to mechanical, operational, or weather requirements, the following measures will be taken:

- Excavations and workings will be stabilized.
- Toxic or deleterious materials will be removed from the site.
- Equipment, supplies, and structures will be stored or removed.
- The Project Area will be monitored to maintain a safe and clean condition.
- Site conditions will be inspected every 14 days or following periods of rainfall exceeding 0.25 inch in a 24-hour period.

5.2 Plans for Monitoring Site Conditions during Periods of Non-Operation [43 CFR 3809.401(b)(5)(v)]

Site conditions will be inspected every 14 days or following periods of rainfall exceeding 0.25 inch in a 24-hour period.

5.3 Measures to Stabilize Excavations and Workings [43 CFR 3809.401(b)(5)(i)]

Where possible, final and interim reclamation will be performed concurrently with mining activities in a phased approach. Phase 1 reclamation will be initiated once mining in this area is complete and mining activities have moved to Phase 2, and so on. When recontoured, the disturbed areas will be graded to promote non-erosive runoff and will be vegetated. To the

extent feasible, any remaining disturbed areas will be shaped to blend with the surrounding topography and seeded.

Ongoing reclamation will consist of recontouring/terracing and seeding. Regrading will consist of redistributing fill slopes back onto the cut portion of the road to return the area to near pre-disturbance topography. Regrading would, to the extent practical, reestablish pre-disturbance topography and drainage and provide slopes that would, in conjunction with revegetation, control erosion. Recontoured surfaces will be seeded with an approved certified weed-free, native seed mix at the rate approved by the BLM and MMD (Table 12).

5.4 Measures to Isolate or Control Toxic or Deleterious Materials [43 CFR 3809.401(b)(5)(ii)]

All refuse generated by the Project will be disposed of at an authorized landfill facility off-site, consistent with applicable regulations. No refuse of any kind will be disposed of on-site. Water and/or nontoxic drill hole abandonment materials, including Abantonite, Alcomer 120L, bentonite, EZ-mud, Poly-plus, and Super plug, will be used as necessary during drilling and will be stored at the Project Area.

Hazardous and regulated materials used at the Project Area will include, but are not limited to, diesel fuel, gasoline, and lubricating grease. All containers of hazardous substances will be labeled and handled in accordance with requirements of the NMDOT and MSHA. All hazardous substances will be moved from the site to an appropriately controlled location. In the event that hazardous or regulated materials, such as diesel fuel, are spilled, immediate measures will be taken to control the spill and clean up the spill as detailed in the SPCC plan. After cleanup, the oil, toxic fluids, or chemicals, along with any contaminated material, will be removed from the site and disposed of at an approved disposal facility. Self-contained, portable chemical toilets will be used for human waste. The human waste and toilet chemicals will not be buried on-site.

5.5 Provisions for Storage or Removal of Equipment, Supplies, and Structures [43 CFR 3809.401(b)(5)(iii)]

Equipment and supplies will be removed from the Project Area and secured elsewhere, both for safety and liability reasons and to ensure environmental protection.

5.6 Measures to Maintain the Project Area in a Safe and Clean Condition [43 CFR 3809.401(b)(5)(iv)]

The Project Area will remain trash free and will be left in a safe condition. Routine road maintenance may be required and would consist of smoothing ruts, filling holes with fill material, grading, and reestablishing waterbars when necessary. Periods of non-operation greater that 120 days are not anticipated; however, if temporary closures are required, heavy equipment would be removed from the Project Area. The BLM and MMD will be notified in writing within 90 days after work is suspended at the operation for more than 120 days. The notice will state the nature and the reason for the suspension of work, the anticipated duration of the suspension, and any event that will reasonably be expected to result in either the resumption of activities or the abandonment of the operation.

All trash will be hauled off-site, and there will be no resource verification or mining materials left on-site at the conclusion of operations. All drill sites will be patrolled with hand rake and shovel after Project completion to scatter/cover any cuttings piles and fill ruts, and to perform general cleanup. No core samples would be left on-site after completion of Project activities.

6. Rock Characterization and Handling Plan [43 CFR 3809.401(b)(2)(iv)]

The purpose of a rock characterization and handling study is to determine if the rock contains acid-generating or deleterious materials, and to support development of an effective rock handling strategy to meet performance standards set forth at 43 CFR 3809.420. The geology of the Florida Mountains and the Foothill Site is summarized in Section 2.15.1. This section describes the characteristics of the rocks.

6.1 Rock Characteristics

As discussed in Section 2.4.6, the foothill that will be the focus of mining activity is composed primarily of Silurian Fusselman Dolomite that disconformably overlies the Cutter member of the Ordovician Montoya formation. The Fusselman Dolomite is a high-magnesium dolomite (a calcium-magnesium carbonate) and is the target of mining (i.e., the ore). The underlying Montoya does not contain high magnesium concentrations and is considered waste rock. The mining process will concentrate on the removal of the Fusselman Dolomite, while minimizing excavation of the Montoya.

In the Florida Mountains, the Fusselman Dolomite is massive bedded, ranges from light gray to dark gray, and weathers to brownish gray. The dolomite is almost pure, and only in a few localities contains appreciable amounts of small-sized insoluble residues, chiefly chert and some quartzose sand. The amount of large-sized chert within the Fusselman Dolomite varies greatly from place to place. The Fusselman is composed of six members that alternate dark gray and light gray from bottom to top.

As shown on the geologic map of the Foothill Site (Figure 8), the Cutter member (map unit Omc) is exposed on the southwest, south, and southeast portions of the hill. On the southwest side of the hill, the Cutter dips approximately 20 degrees to the east-northeast and disconformably underlies the Fusselman (map unit Sf). The dip on the Fusselman ranges from 15 to 41 degrees and is generally to the east-northeast. The lower three members of the Fusselman are exposed on the Foothill Site (Clemons, 1998).

6.2 Rock Chemistry

This section summarizes the analytical results of dolomite samples collected by AmMg from the Foothill Site and submitted for chemical analyses.

6.2.1 Whole Rock Analysis

In March 2016, AmMg collected 90 rock chip samples (sample IDs 1 through 90) from the Foothill Site. Unfortunately, no map has been found showing the locations of these samples. The samples were submitted to ALS Environmental (ALS) in Reno, Nevada for laboratory analysis. ALS crushed each sample and performed whole rock analysis using fusion/x-ray fluorescence (XRF) and loss on ignition (LOI). Fusion/XRF is used to determine major element oxides of a rock sample. LOI is used to account for the material that the XRF cannot detect (below sodium). The laboratory report for the whole rock analysis is provided in Appendix G1. Three populations are identified from the percentage of magnesium oxide (MgO) and calcium oxide (CaO) in each sample:

- Group 1: MgO in 82 of the 90 samples ranges from 18.1 to 22.3 percent and averages 21.1 percent. CaO in these samples ranges from 29 to 33.5 percent and averages 30.9 percent. Kottlowski (1957) provided the percent of MgO and CaO of 9 samples of Fusselman Dolomite collected from a large exposure south of the Foothill Site. The average percentages of MgO and CaO in Fusselman samples collected by Kottlowski (1957)—21.7 and 30.3 percent, respectively—are very similar to those obtained from this group of Foothill samples.

- Group 2: MgO in 7 of 90 samples ranges from 3.6 to 7.4 percent, while CaO in these samples ranges from 45 to 50.6 percent. It is possible that these samples are from the Cutter member of the Montoya formation (currently we have no sample location map).

- Group 3: A single sample contained 6.5 percent MgO and 10.8 percent CaO. This sample also contained 48.04 percent silica oxide (SiO_2) compared to an average of 1.17 percent in the other 89 samples.

6.2.2 2017 SPLP Metals Analysis

On August 28, 2017, AMEC submitted one sample (sample ID 78) from the Foothill Site to ALS for laboratory analysis. Although this sample is identified as being a soil, it is likely that this sample was a split from the sample that was crushed by ALS in Reno for the whole rock analysis. ALS analyzed the sample using EPA's Synthetic Precipitation Leaching Procedure (SPLP) (EPA method 1312) to determine whether the material would leach acid or other deleterious substances when exposed to normal rainfall. The leachate was analyzed for total metals using EPA method 6010B, uranium using EPA method 6020A, and mercury using EPA method 7470A. The results of this analysis are summarized in Table 13; the laboratory report is provided in Appendix G2.

The SPLP results show metal concentrations below laboratory reporting limits, except for aluminum (6.6 mg/L), boron (2.4 mg/L), and selenium (0.068 mg/L). Due to the detection of these metals, additional evaluation of the potential for constituents to be leached from the Silurian Fusselman Dolomite was conducted in 2019 (Section 6.2.4).

6.2.3 Neutralization Potential

On February 12, 2018, AMEC submitted a dolomite sample (sample ID 78) from the Project site to ALS for determination of acid neutralization potential. The sample was analyzed using Method 3.2.3 from Sobek et al. (1978). Although no acid runoff or significant leaching is anticipated to result from the Project, the result (1,025 tons of calcium carbonate [$CaCO_3$] equivalent per 1,000 tons of material) indicates an extremely high buffering capacity of the dolomite to neutralize any acid that might occur. The ALS sample result from the dolomite is provided in Appendix G3.

Table 13. 2017 Synthetic Precipitation Leaching Procedure Results

Analyte	Analytical Method	Concentration (mg/L)	
		Groundwater Standard	Sample Result
Aluminum	SW6010B	5.0 [a]	**6.6**
Arsenic	SW6010B	0.01 [b]	<0.1
Barium	SW6010B	2.0 [b]	<1.0
Boron	SW6010B	0.75 [a]	**2.4**
Cadmium	SW6010B	0.005 [b]	<0.05
Chromium	SW6010B	0.05 [b]	<0.1
Cobalt	SW6010B	0.05 [a]	<0.1
Copper	SW6010B	1.0 [c]	<0.1
Iron	SW6010B	1.0 [c]	<1.0
Lead	SW6010B	0.015 [b]	<0.03
Manganese	SW6010B	0.2 [c]	<0.1
Mercury	SW7470A	0.002 [b]	<0.0002
Molybdenum	SW6010B	1.0 [a]	<0.1
Nickel	SW6010B	0.2 [a]	<0.2
Selenium	SW6010B	0.05 [b]	**0.068**
Silver	SW6010B	0.05 [b]	<0.1
Uranium	SW6020A	0.03 [b]	<0.001
Zinc	SW6010B	10 [c]	<0.2

Source: ALS, 2017
Bold indicates that value exceeds the standard.
[a] Irrigation use (20.6.2.3103.C. NMAC)
[b] Human health standard (20.6.2.3103.A. NMAC)
[c] Secondary standard (20.6.2.3103.B. NMAC)
mg/L = Milligrams per liter
< = Not detected at indicated method reporting limit

6.2.4 2019 SPLP Metals Analysis

During a May 13, 2019 conference call, the NMED requested additional evaluation of the potential for constituents to be leached from the Silurian Fusselman Dolomite, the targeted mining material. The request was made because 2017 SPLP data associated with a sample collected at the site showed elevated aluminum, boron, and selenium concentrations (Section 6.2.2). The laboratory report notes issues with the aluminum, boron, and selenium analyses.

A total of 5 samples of dolomite were collected along the west ridge of the foothill, a prominent ridge that extends west from the summit of the foothill to the bajada floor. The samples were submitted to ACZ Laboratories, Inc. (ACZ) in Steamboat Springs, Colorado, for SPLP testing (U.S. Environmental Protection Agency [EPA] method 1312). The SPLP leachate was analyzed for the constituents listed in Table 14. The final report submitted to NMED, including the complete laboratory report, is provided as Appendix G4.

The laboratory results were compared to the regulatory standards for groundwater listed in 20.6.2.3103 NMAC (Table 14). With the exception of pH, the constituents do not exceed regulatory standards. The results for pH do exceed the standard, but this is likely due to the high buffering capacity of the Fusselman Dolomite. Exposure of the Fusselman Dolomite to precipitation, which has been occurring for millennia and will continue during and after mining operations, does not pose a threat to water quality. NMED has determined that the Foothills Dolomite Mine does not require a discharge permit at this time (NMED, 2019).

6.3 Rock Handling

Visual characterization and review of professional literature have failed to indicate that the Fusselman Dolomite at the Foothill Site contains sulfide minerals, such as pyrite, that would generate acid or deleterious materials. The Fusselman crops out over a wide area in the southern Florida Mountains, but there are no visual indications of acid-generating potential, such as visible sulfide minerals (e.g., pyrite). In fact, as expected, the Fusselman Dolomite has a high capacity to neutralize any acid-generating potential present. If the Fusselman Dolomite had the potential to generate acidic or other reactive leachate, the effects (most likely widespread iron staining) would be obvious on outcrop and, because the Fusselman is widely exposed in this area, would not depend on whether or not the Fusselman was being mined.

Table 14. 2019 Synthetic Precipitation Leaching Procedure Results
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Analyte	Laboratory Method	Groundwater Standard (mg/L)	Sample ID and Results (mg/L [a]) [b]				
			19-1	19-2	19-3	19-4	19-5
Human Health Standards [20.6.2.3103(A) NMAC]							
Arsenic	6010D	0.1	<0.04	<0.04	<0.04	<0.04	<0.04
Barium	6010D	1.0	0.011 B	<0.007	<0.007	<0.007	<0.007
Cadmium	6010D	0.01	<0.008	<0.008	<0.008	<0.008	<0.008
Chromium	6010D	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	SM4500F-C	1.6	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	6010D	0.05	<0.03	<0.03	<0.03	<0.03	<0.03
Mercury	7470A	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	6020B	0.05	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silver	6010D	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	6020B	0.03	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Other Standards for Domestic Water Supply [20.6.2.3103(B) NMAC]							
Chloride	SM4500Cl-E	250	2.1	1.1 B	1.8 B	2.7	0.5 B
Copper	M6010D	1.0	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	M6010D	1.0	<0.03	<0.03	<0.03	<0.03	<0.03
Manganese	M6010D	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfate	SM4500 SO4-D	600	<20	<20	<20	<20	<20
Zinc	M6010D	10	0.01 B	<0.01	0.01 B	0.01 B	0.01 B
pH (s.u.)	M9045D/M9040C	6–9	9.9	10.0	10.0	10.0	10.0

Note: Analyses performed by ACZ Laboratories, Inc., Steamboat Springs, Colorado
[a] Unless otherwise noted
[b] Results are for the dissolved portion of the analytes except for mercury, which is measured as total concentration per 20.6.2.3103 NMAC
mg/L = Milligrams per liter
< = Analyte not detected at concentration above the noted method detection limit (MDL)
B = Detected concentration is above the MDL but below the practical quantitation limit (PQL); result is considered an estimate
s.u. = Standard units

Table 14. 2019 Synthetic Precipitation Leaching Procedure Results
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Analyte	Laboratory Method	Groundwater Standard (mg/L)	Sample ID and Results (mg/L [a]) [b]				
			19-1	19-2	19-3	19-4	19-5
Standards for Irrigation Use [20.6.2.3103(C) NMAC]							
Aluminum	M6010D	5.0	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	M6010D	0.75	0.02 B	<0.02	<0.02	<0.02	<0.02
Cobalt	M6010D	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	M6010D	1.0	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	M6010D	0.2	<0.008	<0.008	<0.008	<0.008	<0.008
No New Mexico Groundwater Standard							
Alkalinity (as $CaCO_3$)	SM2320B	None	52.9	49.5	52.4	50.9	56.2
Calcium	6010D	None	5.8	4.0	5.6	5.6	7.4
Magnesium	6010D	None	8.9	8.6	8.2	7.7	8.2
Potassium	6010D	None	0.6 B	0.2 B	0.2 B	0.4 B	<0.02
Sodium	6010D	None	2.3	0.8 B	1.0	1.6	0.4 B

Note: Analyses performed by ACZ Laboratories, Inc., Steamboat Springs, Colorado

[a] Unless otherwise noted

[b] Results are for the dissolved portion of the analytes except for mercury, which is measured as total concentration per 20.6.2.3103 NMAC

mg/L = Milligrams per liter

< = Analyte not detected at concentration above the noted method detection limit (MDL)

B = Detected concentration is above the MDL but below the practical quantitation limit (PQL); result is considered an estimate

s.u. = Standard units

BLM requires that mine operators characterize the rock units to be disturbed to determine the potential for those materials to generate acid or deleterious leachate. If such potential acidic or reactive materials are identified, the operator must develop a plan for managing rock that may require special handling. There is no evidence that the Fusselman Dolomite to be mined at the Foothill Site has the potential to generate acidic or other reactive leachate. Therefore, a waste rock characterization study (WRCS) and rock handling plan are not anticipated to be needed.

7. Reclamation Cost Estimate [43 CFR 3809.401(D)]

At this time, AmMg is providing preliminary cost estimates for reclamation of disturbed areas through Years 5 and 20. As required by 43 CFR 3809.552, a complete reclamation cost estimate will be prepared for the entire mine Project upon completion of the requirements of NEPA and upon BLM and MMD approval of the reclamation plan proposed herein. The planned cost estimating effort will be developed using Standardized Reclamation Cost Estimator (SRCE) software (NDEP et al., 2019) to facilitate accuracy, completeness, and consistency in the calculation of costs for mine site reclamation. The financial assurance will be submitted in the approved amount in order to cover this PoO upon receiving concurrence from the BLM and MMD that the amount is satisfactory.

7.1 Proposed Reclamation Activities

The proposed activities related to reclamation of disturbed areas through Years 5 and 20 are discussed in Sections 3.4 and 3.5, respectively.

7.2 Preliminary Financial Assurance Cost Estimate

AmMg has developed the preliminary financial assurance cost estimates for reclaiming the estimated extent of disturbance through Year 5 and Year 20 of operations (Tables 15a and 15b). The preliminary financial assurance cost estimate was developed using MMD's *Guidance for Estimating 3rd Party Reclamation (Financial Assurance) Costs for Minimal Impact Mining and Exploration Permit Applications*, which was updated in September 2013 (EMNRD MMD, 2013). This document is available on MMD's MARP website.

The estimates include costs for the reclamation of the surface disturbances through Year 5 and Year 20. All exploration boreholes will be plugged prior to or during the early stages of mining and are included in the Year 5 costs. The surface disturbance area includes the phased mining operations areas (10.2 acres for Phase 1, 6.8 acres for Phase 2, and 5.5 acres for Phase 3), plus 2 acres for the laydown yard, 4.04 acres for improvements to the BLM road, and 1.5 acres for the mine site access road. As noted in the MMD guidance document, the per acre cost for

reclaiming and reseeding all surface disturbances includes a 40 percent add-on to cover indirect costs. Also, as required by and described in the guidance, the cost for surface reclamation is to be escalated over the operating period. For the Year 5 estimate (Table 15a), AmMg has considered that the guidance was developed in 2013 and has escalated the costs over an 11-year period (6 years from 2013 to 2019 and 5 years from 2019). For the Year 20 estimate (Table 15b), AmMg escalated the costs over a 26-year period.

Table 15a. Financial Assurance Cost Estimate for Reclamation of Foothill Dolomite Mine Site, Year 5

Reclaim Drill Holes	Number of Holes	Average Depth (feet)	MMD Cost per Foot	Estimated Cost
	86	100	$14	$120,400
Reclaim Surface Disturbance	MMD Cost First Acre	MMD Cost 26.54 Additional Acres ($4,900 per acre)		
27.54 acres	$8,900	$130,046		$138,946
			Subtotal	$259,346
			Escalation Rate: 2.5% per year for 11 years (1.312)	$80,938
			Total	$340,284

Table 15b. Financial Assurance Cost Estimate for Reclamation of Foothill Dolomite Mine Site, End of Mine Life (Year 20)

Reclaim Drill Holes	# Holes	Average Depth (feet)	MMD Cost per Foot	Estimated Cost
	0	100	$14	$0
Reclaim Surface Disturbance	MMD Cost First Acre	MMD Cost 29.04 Additional Acres ($4,900 per acre)		
30.04 acres	$8,900	$142,296		$151,196
			Subtotal	$151,196
			Escalation Rate: 2.5% per year for 26 years (1.900)	$136,121
			Total	$287,317

The preliminary estimated financial assurance cost to reclaim drill holes and surface disturbances through 2024 (Year 5) at AmMg's Foothill Dolomite Mine is $340,284. The Year 5 estimate includes acreage in mining Phases 2 and 3 that will be disturbed during the resource verification drilling program and at the beginning of mining operations, as shown on Figure A2-2a.

The estimated financial assurance cost to reclaim all surface disturbances through 2039 (Year 20) at AmMg's Foothill Dolomite Mine is $287,317. The Year 20 estimate does not include a cost for drill hole reclamation because that work will be completed much earlier. Although AmMg assumes that the improvements to the BLM road will not be reclaimed, both estimates include costs for that work.

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Figures

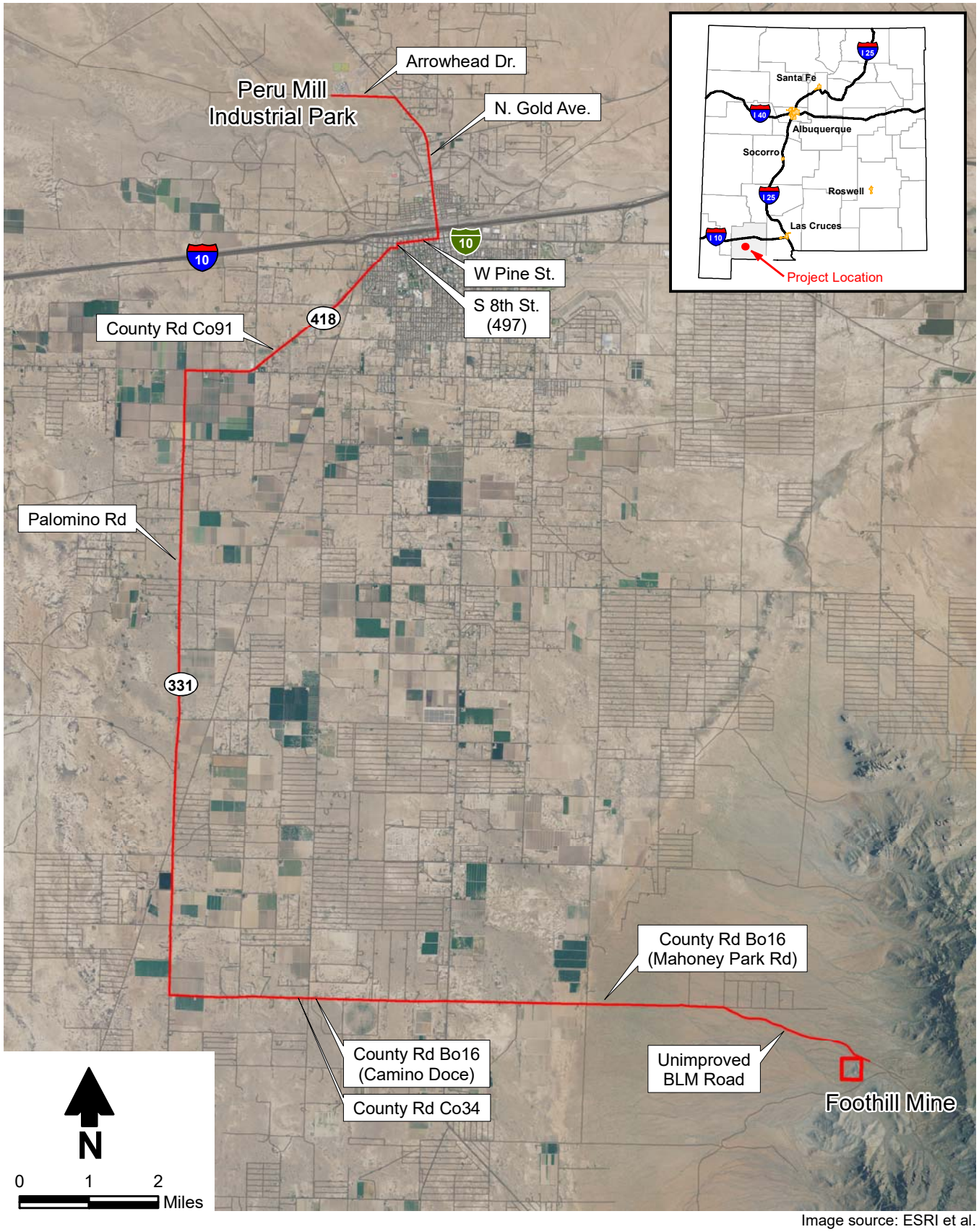

Image source: ESRI et al.

Explanation

Project location

Conceptual route

Road

S:\Projects\DB19.1011_American_Mg\GIS\MXDs\POO_Version 5_Aug2020\F01 Project Location.mxd

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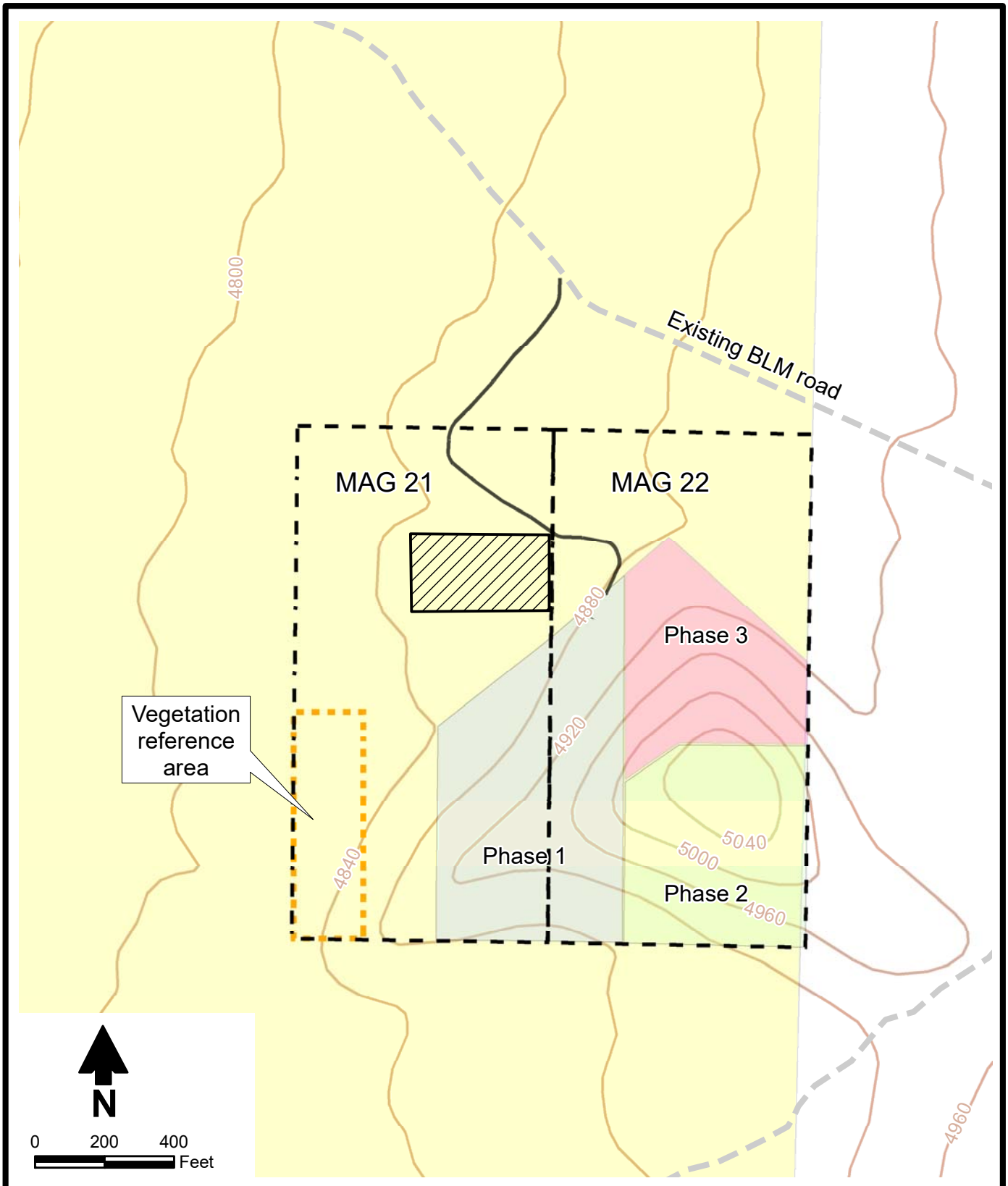
JN DB19.1011

AMERICAN MAGNESIUM

Project Location

Figure 1



Source: USGS 7.5 min, South Peak, NM 2017

Explanation

- Claim area(s) boundary
- Proposed laydown yard
- Proposed access road
- BLM
- Private

AMERICAN MAGNESIUM

Foothill Mine Site Land Ownership

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Figure 2

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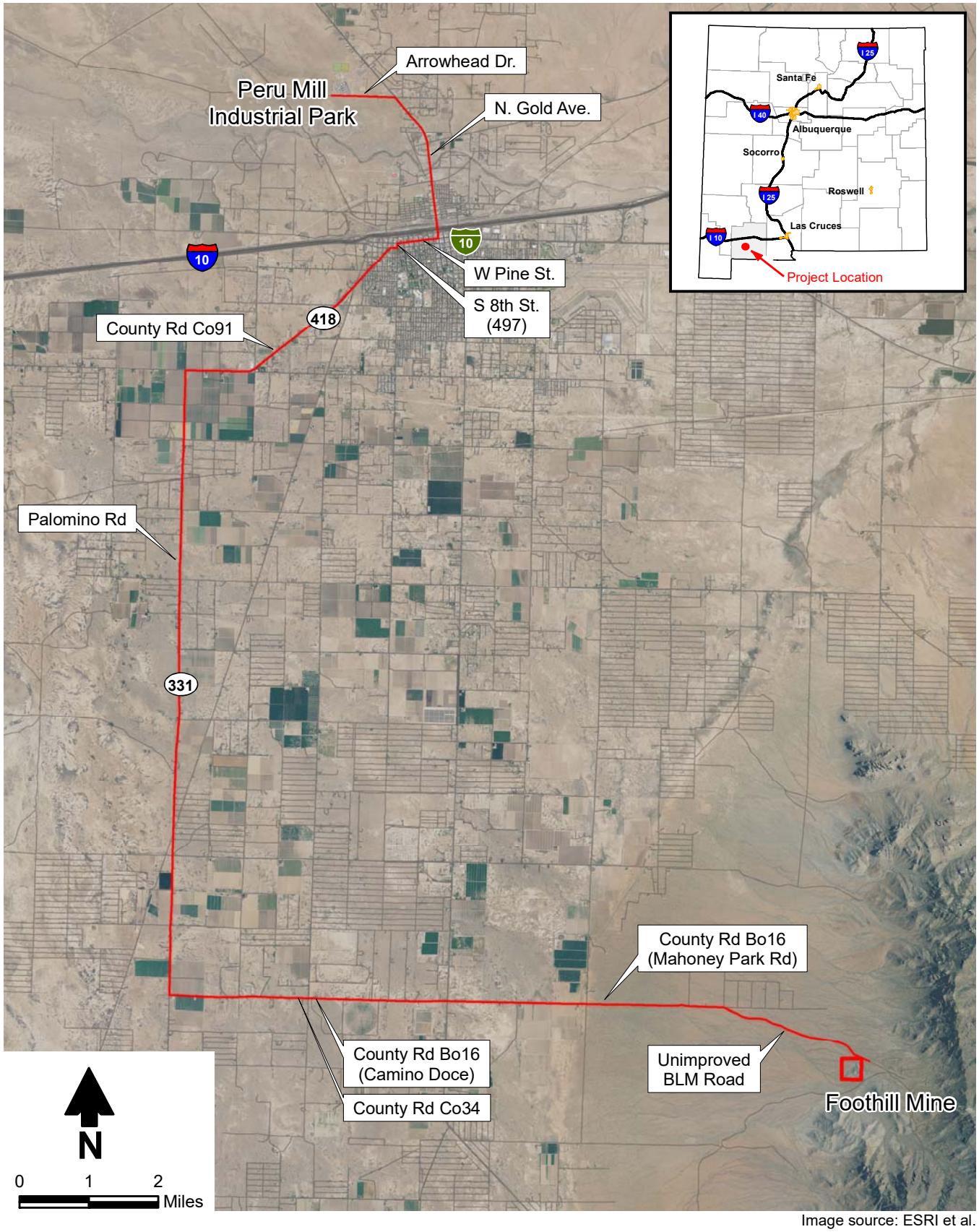

Image source: ESRI et al.

Explanation

Project location

Conceptual route

Road

S:\Projects\DB19.1011_American_Mg\GIS\MXDs\POO_Version 5_Aug2020\F03 Transportation Route.mxd

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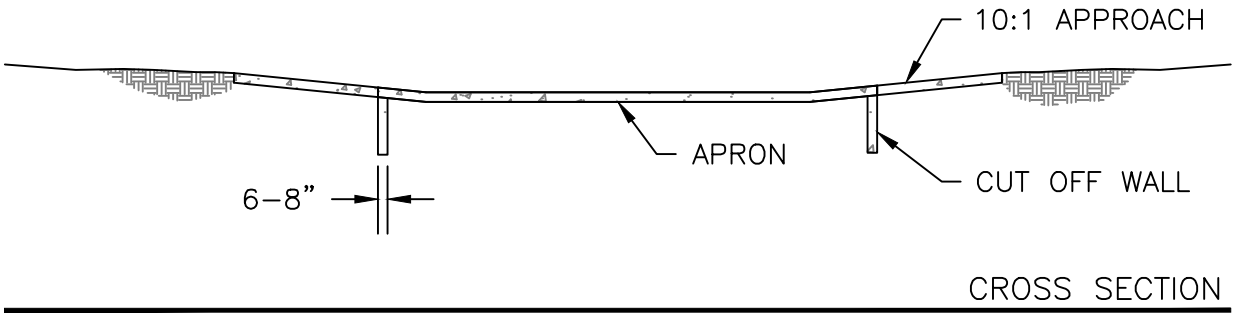
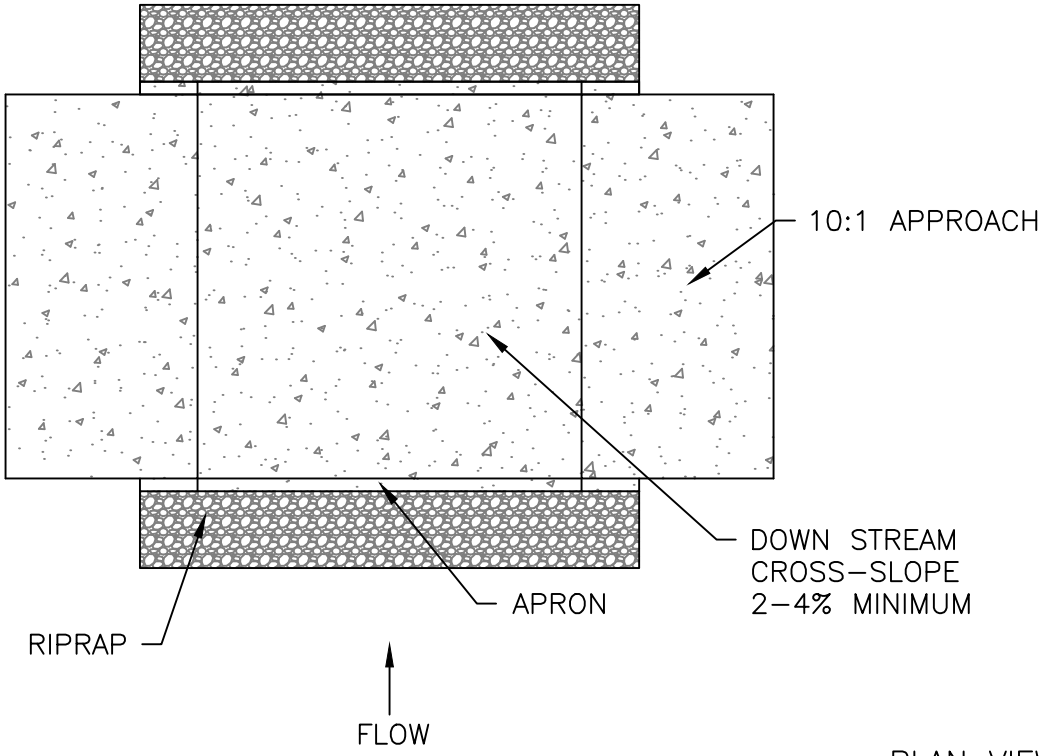
AMERICAN MAGNESIUM

Conceptual Transportation Route

Figure 3



CROSS SECTION



PLAN VIEW

S:\Projects\DB19.1011_American_Mg\CAD\Production\LOW FLOW XING - FIGURE 5.dwg

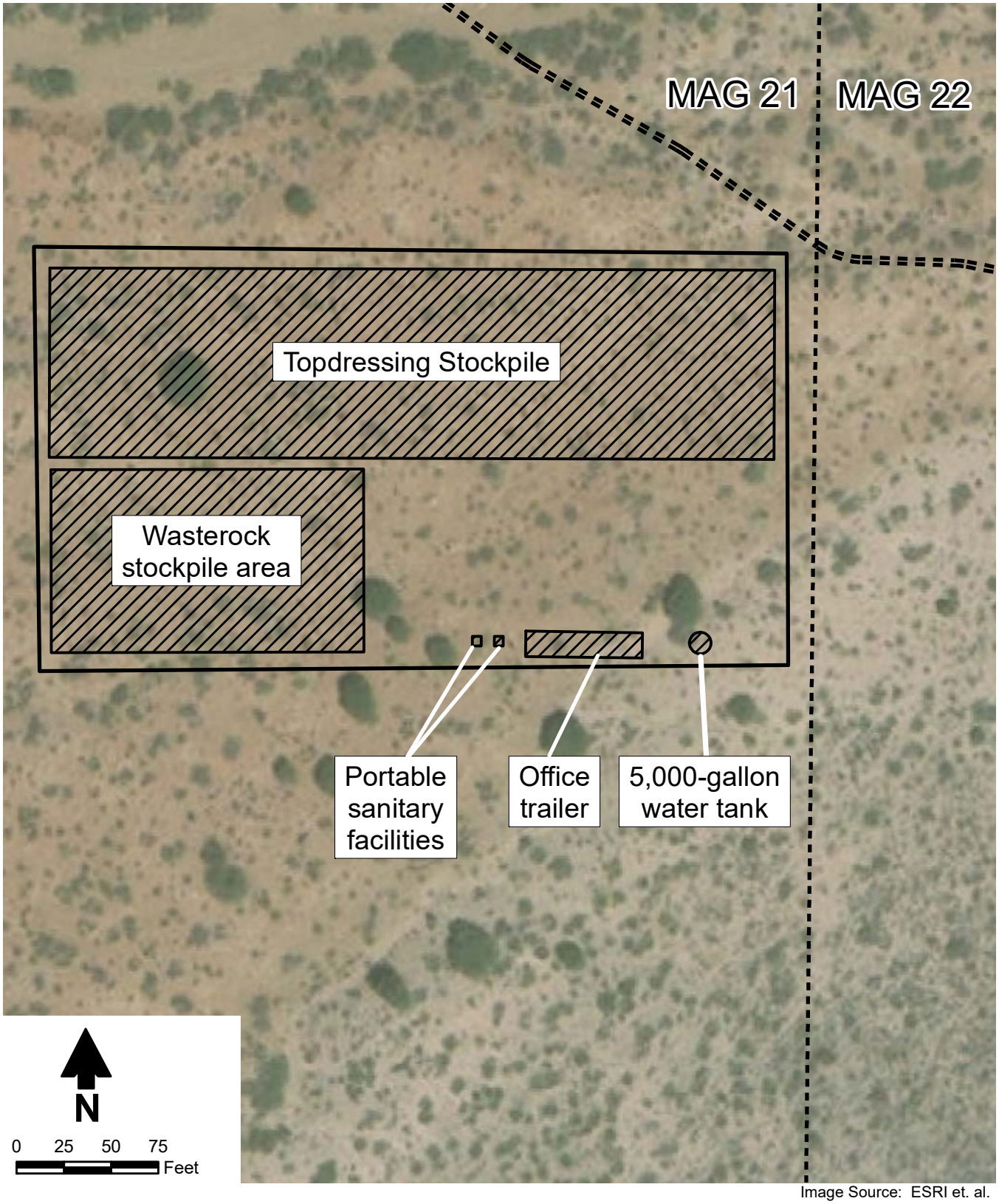


Image Source: ESRI et. al.

Explanation

- Proposed laydown yard
- Laydown yard features
- Claim area(s) boundary
- Proposed access road

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AMERICAN MAGNESIUM
Laydown Yard
Figure 5

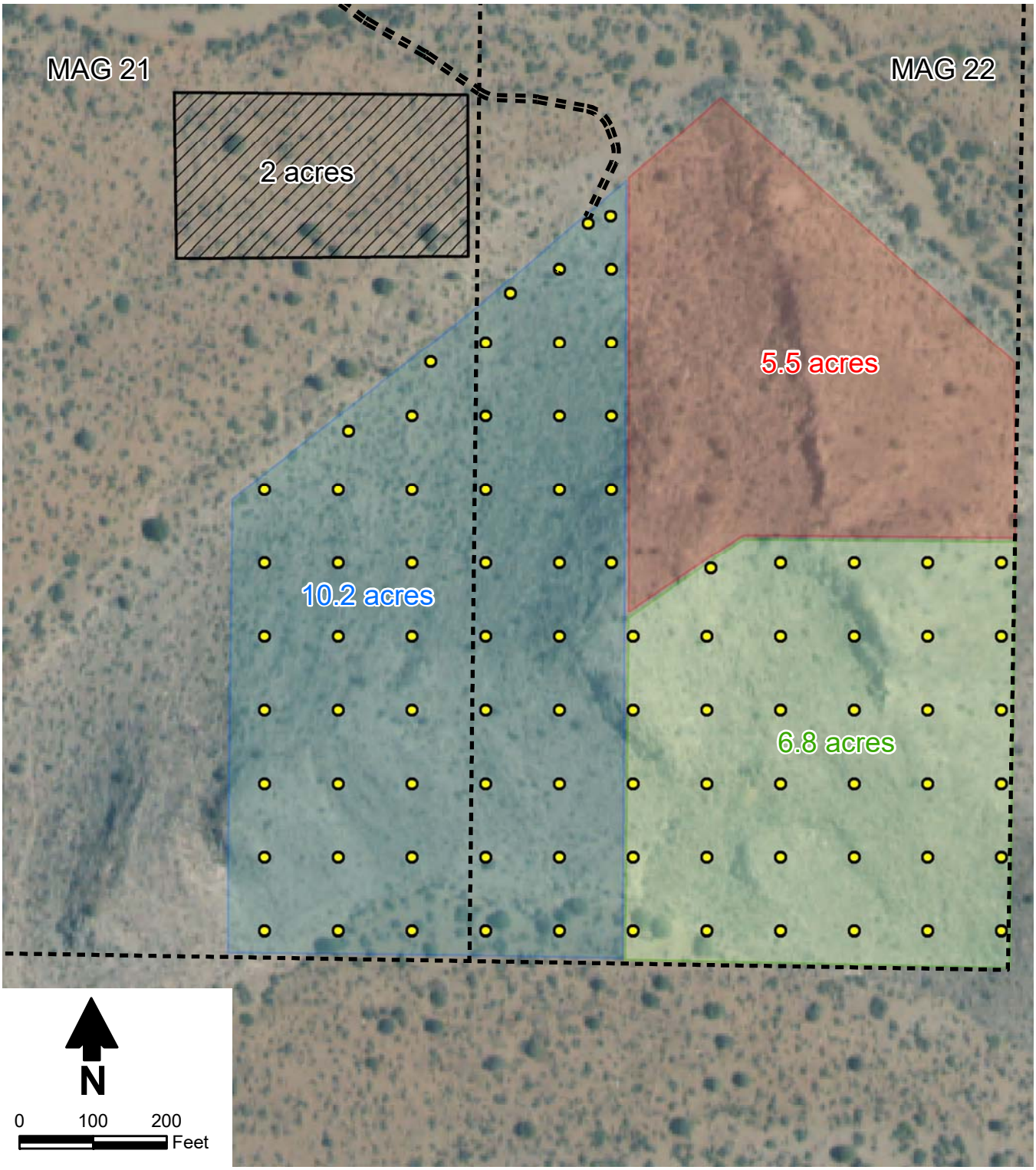

Image Source: ESRI et. al.

Explanation

- Claim area(s) boundary
- Proposed borehole drilling location
- Proposed laydown yard
- Proposed access road
- Phase 1 mining area
- Phase 2 mining area
- Phase 3 mining area

AMERICAN MAGNESIUM

Proposed Mining Phases and Drilling Locations

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JN DB19.1011

Figure 6

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GENERAL NOTES:

1. THE DRAWINGS ARE PRELIMINARY AND SUBJECT TO CHANGE BASED ON RESOURCE VERIFICATION DRILLING.
2. THE TOPOGRAPHY IS BASED ON EXTRAPOLATION OF 40-FOOT CONTOUR INTERVAL FROM THE SOUTH PEAK, NM 7.5-MINUTE TOPOGRAPHIC MAP (USGS, 1996). A TOPOGRAPHIC SURVEY OF THE SITE SHOULD BE MADE FOR ACTUAL MINE DESIGN DRAWINGS.
3. ELEVATIONS ARE RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1929.

LEGEND

1. MINE BOUNDARY
2. CLAIM BOUNDARY
3. EXISTING TOPO
4. PROPOSED ROADS
5. PROPOSED DRILL HOLES

4900
4925
4950
4975
5000
5025
5050
5075
PROPOSED ROADS
Phase 3
Phase 1
Phase 2

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04-5-19 DB19.1011

AMERICAN MAGNESIUM

Resource Verification Access Roads

Figure 7

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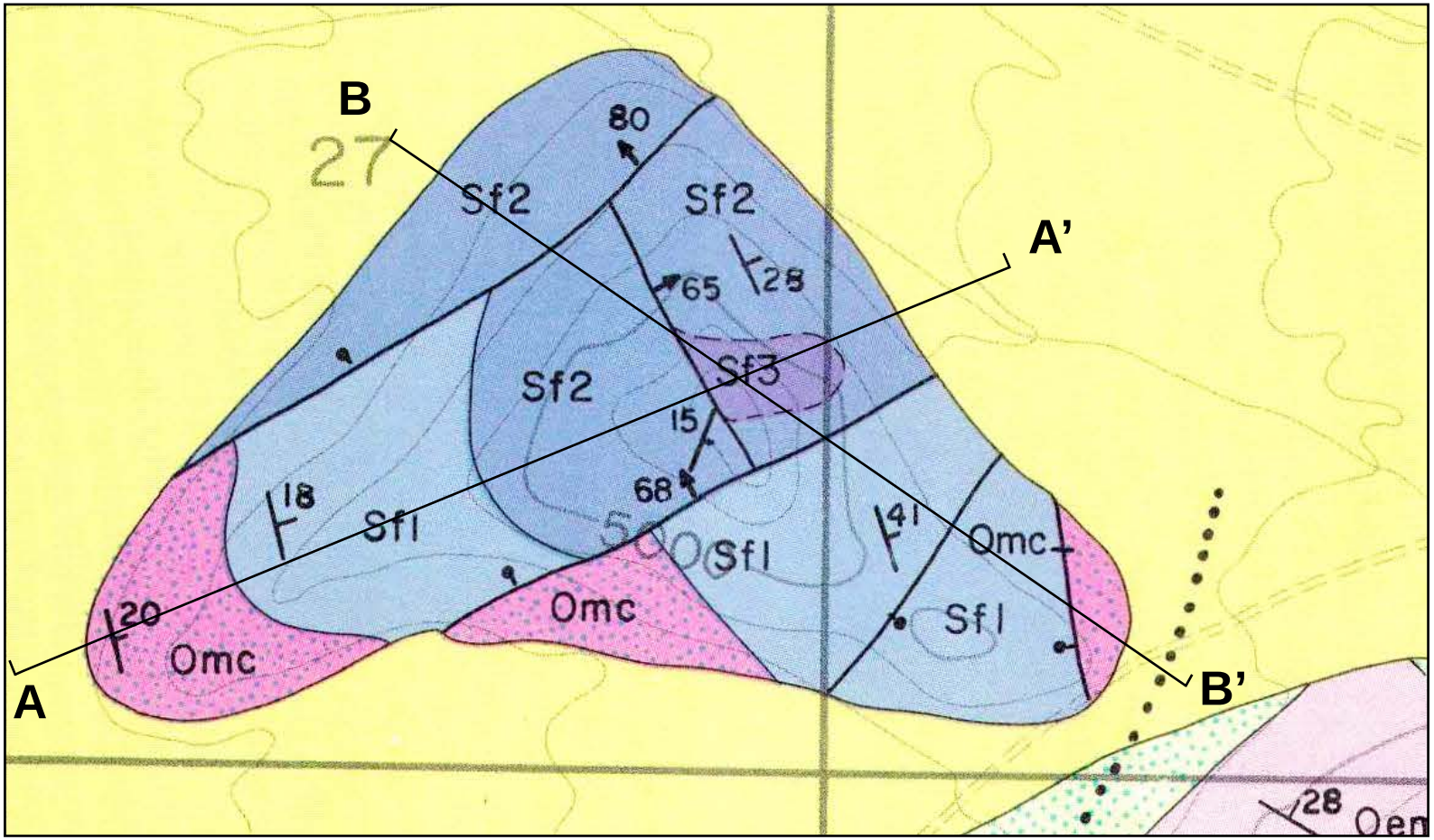

Source: Clemons, 1998

Contour interval = 40 Feet

Explanation

Quaternary

- Qpa — Alluvium
- Qpc — Covered slopes

Fusselman Dolomite

- Sf3 — Middle dark member
- Sf2 — Lower light member
- Sf1 — Lower dark member

Montoya Formation

- Omc — Cutter Member

Figure 8

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03/18/19 JN DB19.1011

AMERICAN MAGNESIUM
Geologic Map

P:_DB19-1011\Plan of Ops.8-20\Figures\Word\Fig09_SouthSide.doc

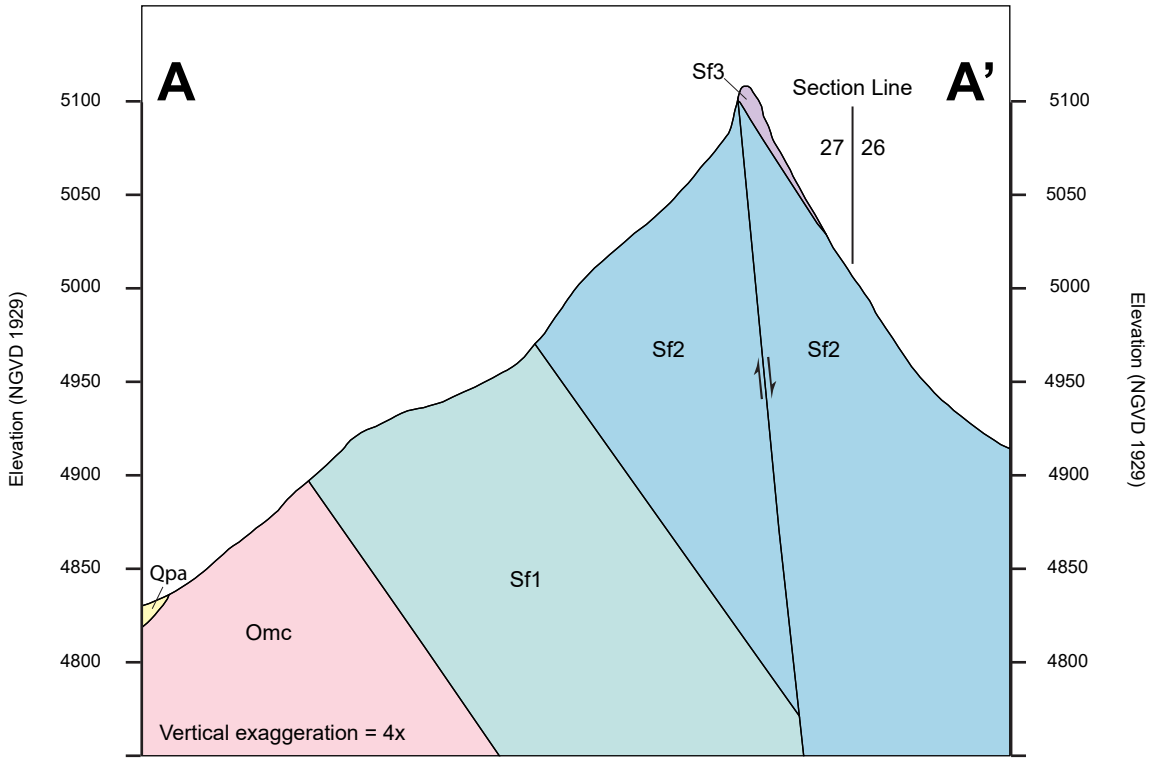
Figure 9

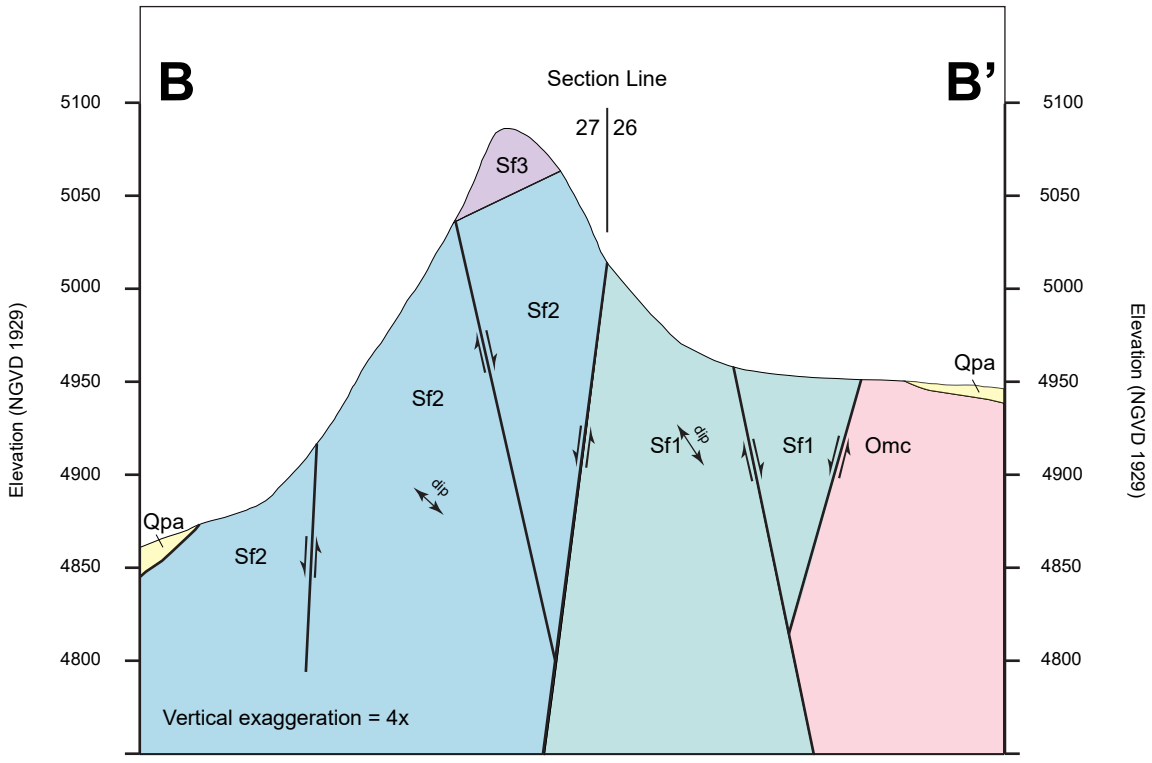
AMERICAN MAGNESIUM

South Side of Foothill Mine Area

Daniel B. Stephens & Associates, Inc.

8/27/20





Explanation

Quaternary
- Qpa — Alluvium

Fusselman Dolomite
- Sf3 — Middle dark member
- Sf2 — Lower light member
- Sf1 — Lower dark member

Montoya Formation
- Omc — Cutter Member

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03-18-19
JN DB19.1011

AMERICAN MAGNESIUM
Geologic Cross Sections

Figure 10

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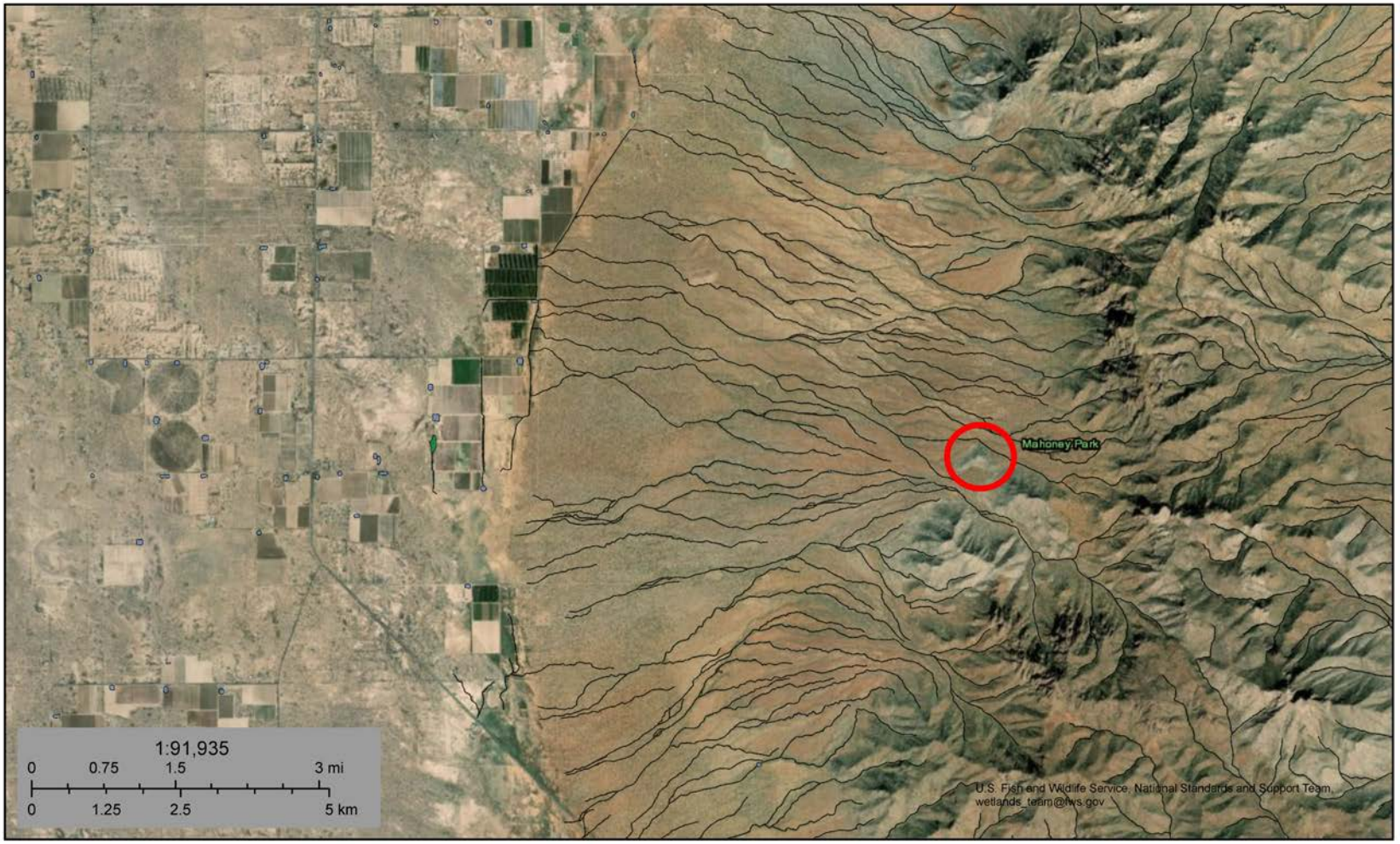
AMERICAN MAGNESIUM

Fusselman Dolomite

Figure 11



February 27, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Source: U.S. Fish and Wildlife Service
National Wetlands Inventory Mapper

Figure 12

AMERICAN MAGNESIUM

Extent of Ephemeral Washes

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Figure 13

AMERICAN MAGNESIUM

View Southeast of Arroyo Low-Water Crossing

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8/27/20

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Figure 14

AMERICAN MAGNESIUM

View East of Foothill Mine Area from County Road Bo16 and BLM Road

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8/27/20

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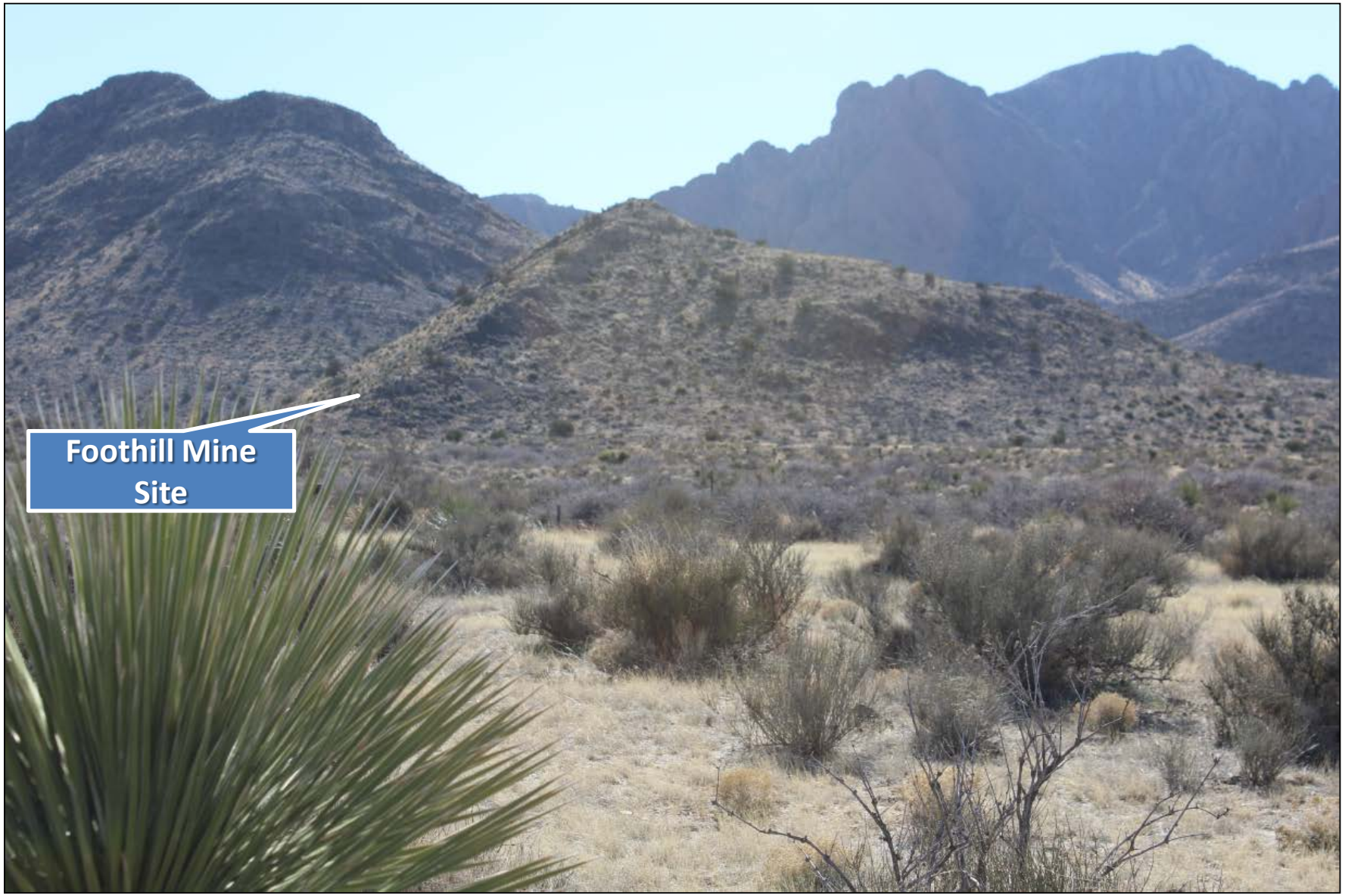

Figure 15

AMERICAN MAGNESIUM

View South of Foothill Mine Area from BLM Road

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8/27/20

Appendix A

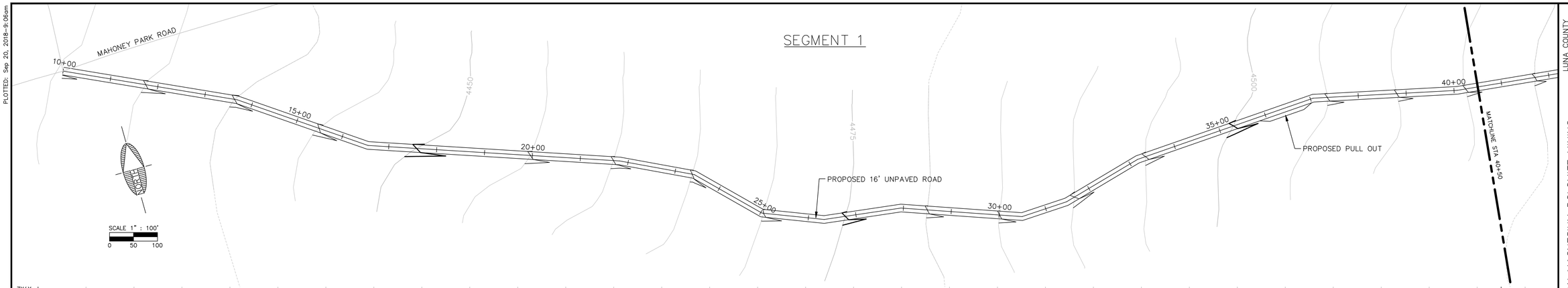
Preliminary Design Drawings

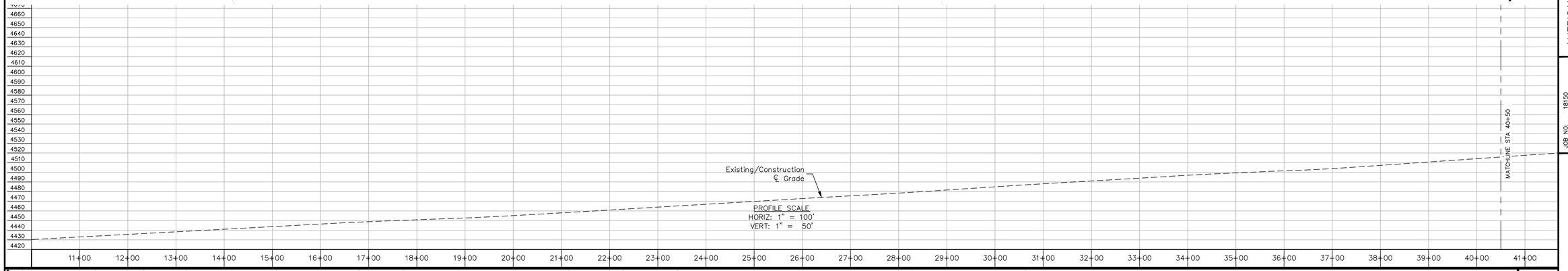
Appendix A1

Roadway Improvements

PLOTTED: Sep 20, 2018–9:06am

SEGMENT 1





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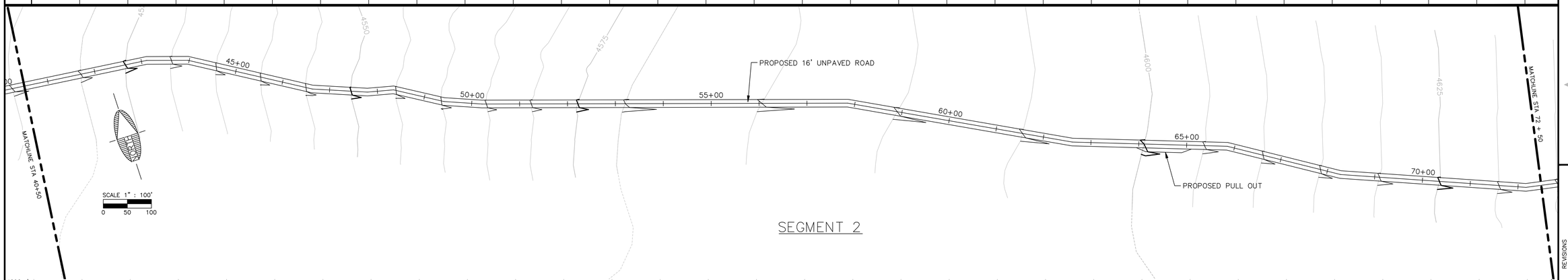

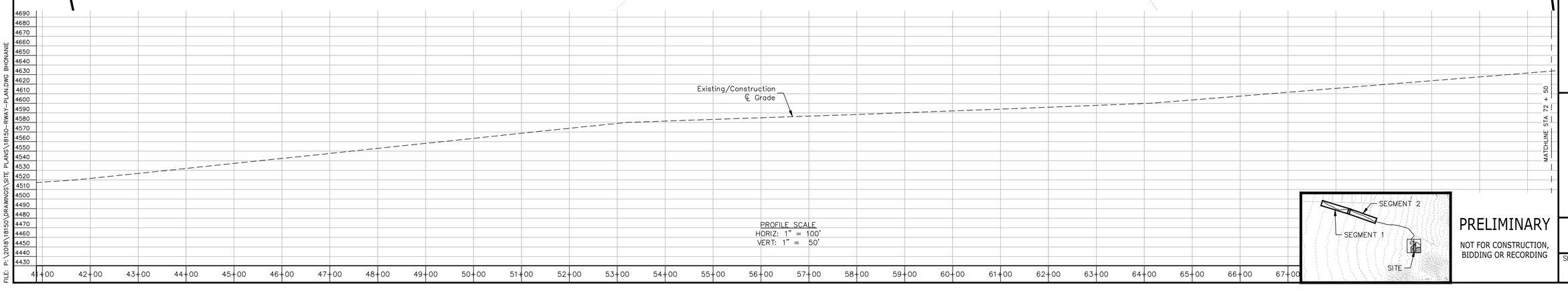

PRELIMINARY

NOT FOR CONSTRUCTION, BIDDING OR RECORDING

LUNA COUNTY
NEW MEXICO

AMERICAN MAGNESIUM DOLOMITE MINING

R□AD□ A□ IM□R□□EMEN□ □□AN

JOB NO:	18150
DATE:	SEP 18
SCALE:	AS SHOWN
DRAWN:	BH
DESIGN:	BH
CHECKED:	GEC

110 W. Dale Avenue
Flagstaff, AZ 86001
928.773.0354
928.774.8934 fax
www.swiaz.com

Shephard ▲ Wesnitzer, Inc.

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

Call at least two full working days before you begin excavation.
ARIZONA811 Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)

DRAWING NO.
I□01

SHT NO.	OF
1	□

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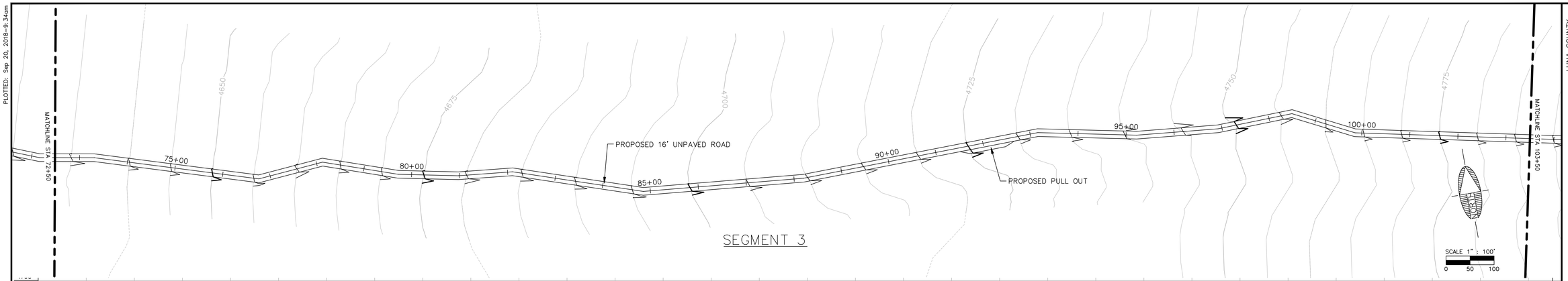
PLOTTED: Sep 20, 2018-9:34am



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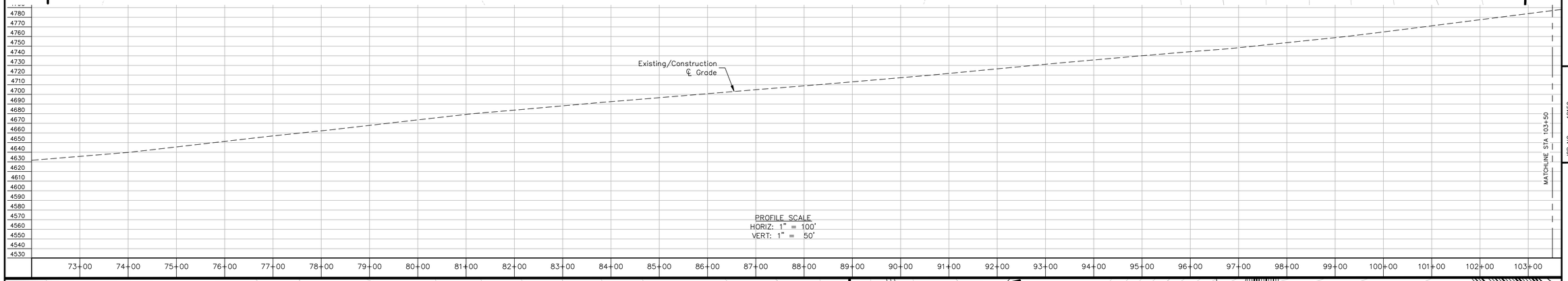

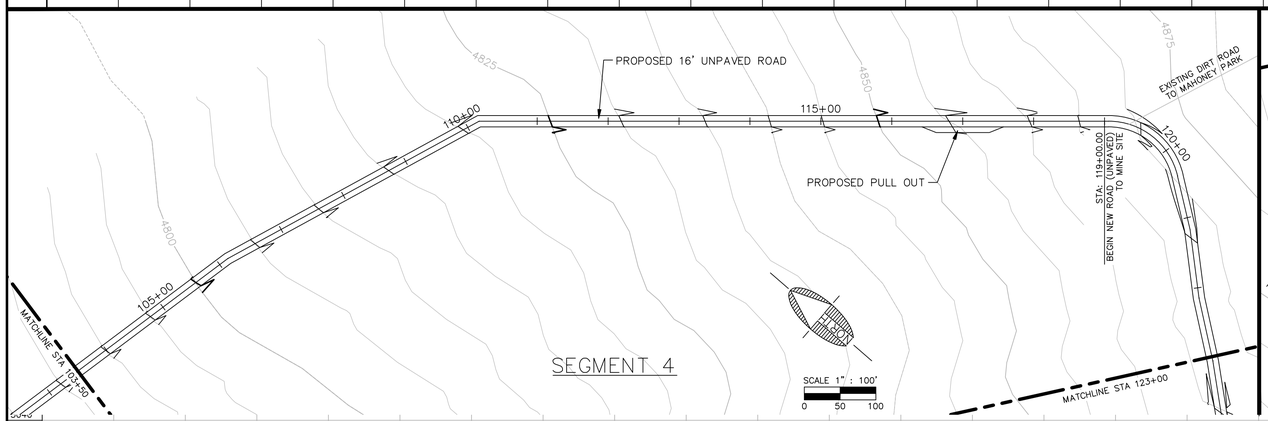

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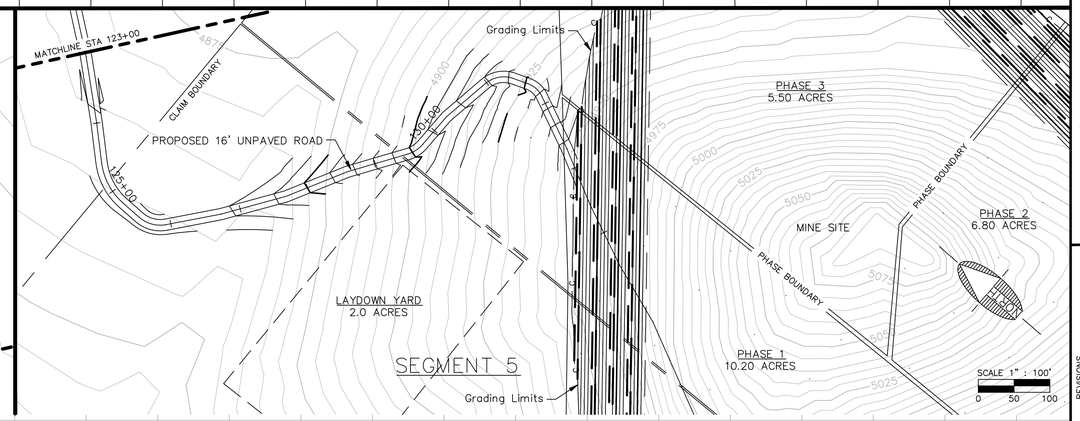

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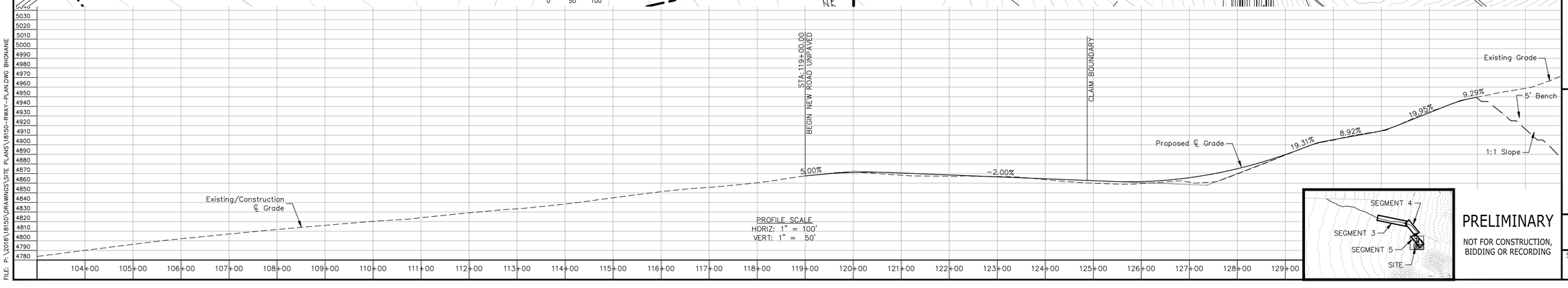

PRELIMINARY

NOT FOR CONSTRUCTION, BIDDING OR RECORDING

DRAWING NO. I-01

SHT NO. 1 OF 1

ROAD IMPROVEMENT PLAN

LUNA COUNTY
NEW MEXICO

AMERICAN MAGNESIUM DOLOMITE MINING

JOB NO:	18150
DATE:	SEP 18
SCALE:	AS SHOWN
DRAWN:	BH
DESIGN:	BH
CHECKED:	GEC

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

Shephard Wesnitzer, Inc.
110 W. Dale Avenue
Flagstaff, AZ 86001
928.773.0334
928.774.8934 fax
www.swiaz.com

FILE: P:\2018\18150\DRAWINGS\SITE PLANS\18150-RWAY-PLAN.DWG BHONANIE

Appendix A2

Mine Plans and Sections
Years 1, 5, and 20

MAG 21

MAG 22

LAYDOWN YARD (2.0 ACRES)

SERVICE RD. 10% MAX GRADE

1:1 CUT

1:1 CUT

4990

5010'

5030'

2:1 FILL

2:1 FILL

A
FIGURE A2-1b

5070'

5050'

5'X20' BENCHES

PHASE 3 (5.50 ACRES)

WORKING AREA ELEV.=4980'

SERVICE RD. 10% MAX GRADE

PHASE 1 (10.20 ACRES)

2:1 FILL

B
FIGURE A2-1b

PHASE 2 (6.80 ACRES)

4900 4925 4950 4975 4980 5000 5025

GENERAL NOTES:

1. THE DRAWINGS ARE PRELIMINARY AND SUBJECT TO CHANGE BASED ON RESOURCE VERIFICATION DRILLING.
2. THE TOPOGRAPHY IS BASED ON EXTRAPOLATION OF 40-FOOT CONTOUR INTERVAL FROM THE SOUTH PEAK, NM 7.5-MINUTE TOPOGRAPHIC MAP (USGS, 1996). A TOPOGRAPHIC SURVEY OF THE SITE SHOULD BE MADE FOR ACTUAL MINE DESIGN DRAWINGS.
3. ELEVATIONS ARE RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1929.

SERVICE RD. VOLUME		
CUT (CU. YD.)	FILL (CU. YD.)	NET (CU. YD.)
4951.67	14420.58	9468.91 (FILL)

LEGEND

1. MINE BOUNDARY
2. CLAIM BOUNDARY
3. EXISTING TOPO
4. DESIGN TOPO

N

60' 0' 30' 60' 120'

SCALE: 1" = 60'

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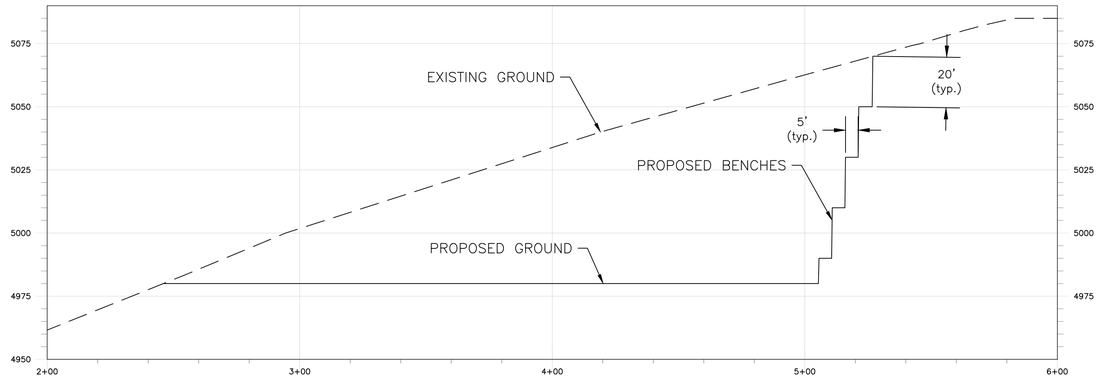
Daniel B. Stephens & Associates, Inc.

04-5-19 DB19.1011

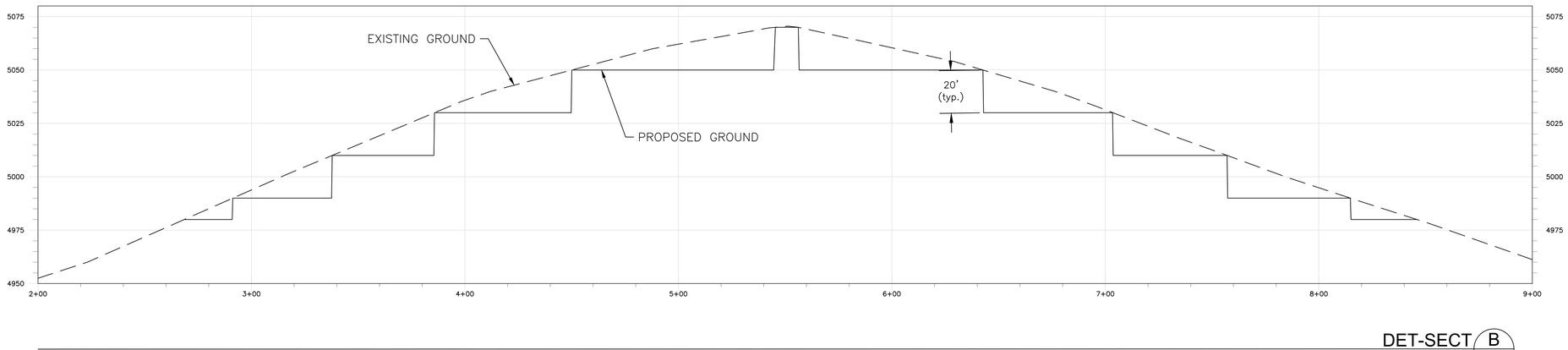
AMERICAN MAGNESIUM

Year 1 Mining Area

Figure A2-1a



DET-SECT A
SCALE:1:40 FIG. A2-1a



DET-SECT B
SCALE:1:40 FIG. A2-1a

30' 0' 15' 30' 60'
SCALE: 1" = 30'

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04-5-19 DB19.1011

AMERICAN MAGNESIUM
Year 1 Mining Area
Figure A2-1b

MAG 21

MAG 22

SERVICE RD. (10% MAX GRADE)

LAYDOWN YARD (2.0 ACRES)

4900

4925

4930

4950

4970

4990

5010'

5050'

5070'

5030'

2:1 FILL

5'X20' BENCHES

PHASE 3 (5.50 ACRES)

C
FIGURE A2-2b

WORKING AREA ELEV.=4915'

4915

4975

5000

5025

SERVICE RD. (10% MAX GRADE)

PHASE 1 (10.20 ACRES)

PHASE 2 (6.80 ACRES)

D
FIGURE A2-2b

GENERAL NOTES:

1. THE DRAWINGS ARE PRELIMINARY AND SUBJECT TO CHANGE BASED ON RESOURCE VERIFICATION DRILLING.
2. THE TOPOGRAPHY IS BASED ON EXTRAPOLATION OF 40-FOOT CONTOUR INTERVAL FROM THE SOUTH PEAK, NM 7.5-MINUTE TOPOGRAPHIC MAP (USGS, 1996). A TOPOGRAPHIC SURVEY OF THE SITE SHOULD BE MADE FOR ACTUAL MINE DESIGN DRAWINGS.
3. ELEVATIONS ARE RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1929.

LEGEND

1. MINE BOUNDARY
2. CLAIM BOUNDARY
3. EXISTING TOPO
4. DESIGN TOPO

N

80' 0' 40' 80' 160'

SCALE: 1" = 80'

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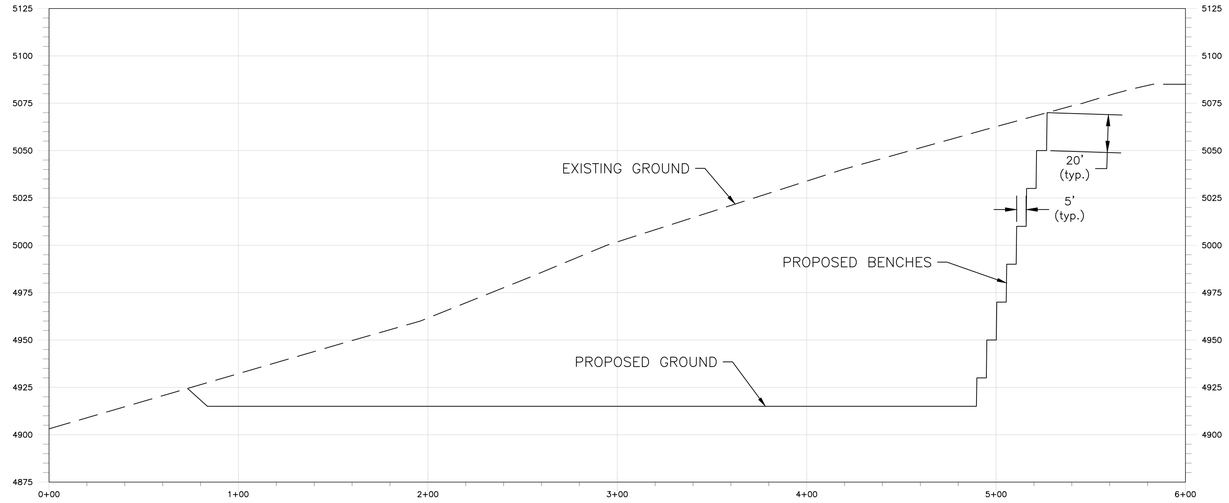
AMERICAN MAGNESIUM

Year 5 Mining Area

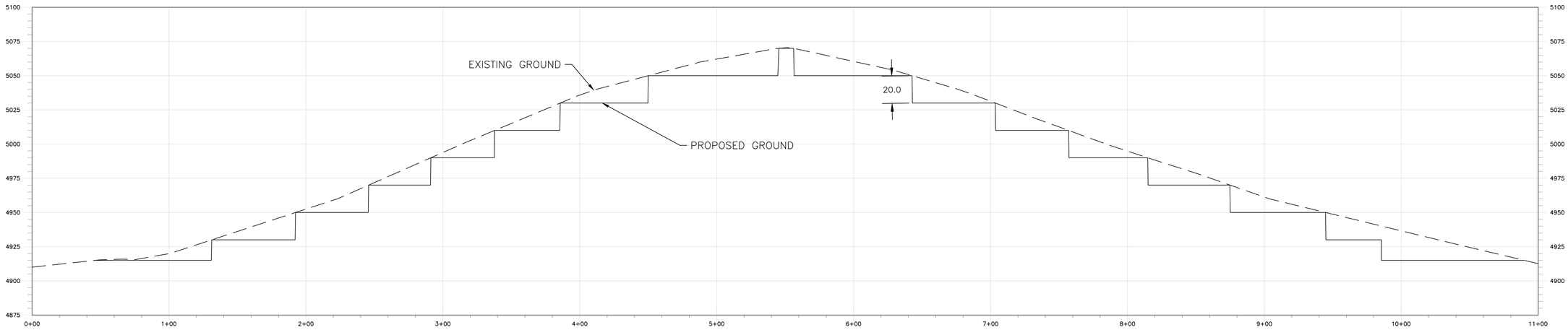
Daniel B. Stephens & Associates, Inc.

04-5-19 DB19.1011

Figure A2-2a



DET-SECT C
SCALE:1:40
FIG. A2-2a



DET-SECT D
SCALE:1:40
FIG. A2-2a

40' 0' 20' 40' 80'
SCALE: 1" = 40'

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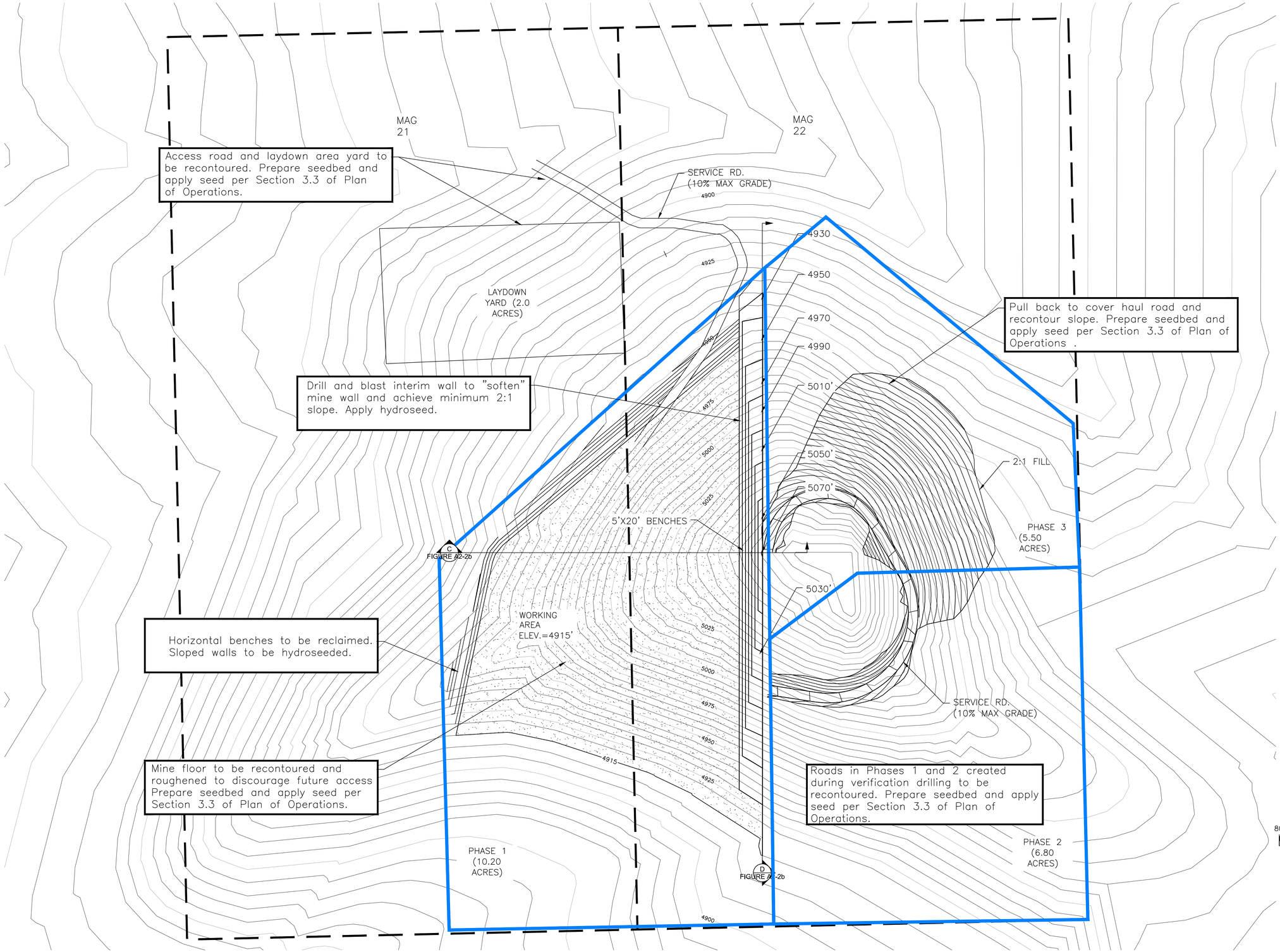
04-5-19 DB19.1011

AMERICAN MAGNESIUM
Year 5 Mining Area
Figure A2-2b



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N

80' 0' 40' 80' 160'

SCALE: 1" = 80'

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AMERICAN MAGNESIUM

Year 5 Reclamation Plan

Figure A2-2c

MAG 21

MAG 22

SERVICE RD.
(10% MAX GRADE)

LAYDOWN
YARD (2.0
ACRES)

4900
4925
4950
4975
5000
5025
5050
5075

5'X20' BENCHES

PHASE 3
(5.50
ACRES)

FINISH GRADE LINE
ELEV. 4865'

FINISH GRADE LINE
ELEV. 4865'

E
FIGURE A2-3a

5'X20' BENCHES

PHASE 1
(10.20 ACRES)

PHASE 2
(6.80
ACRES)

F
FIGURE A2-3b

4885'
4905'
4925'
4945'
4965'
4980'

GENERAL NOTES:

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80' 0' 40' 80' 160'

SCALE: 1" = 80'

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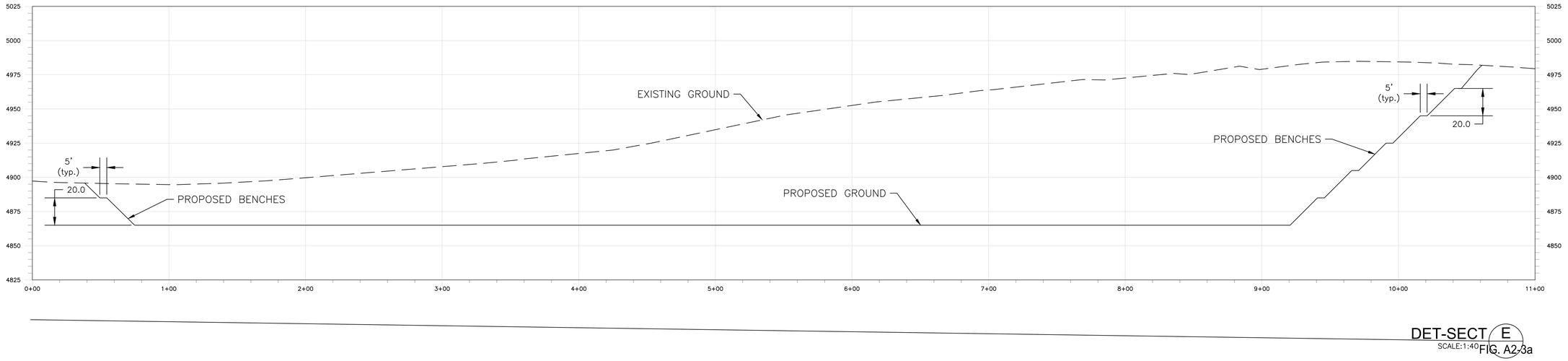
AMERICAN MAGNESIUM

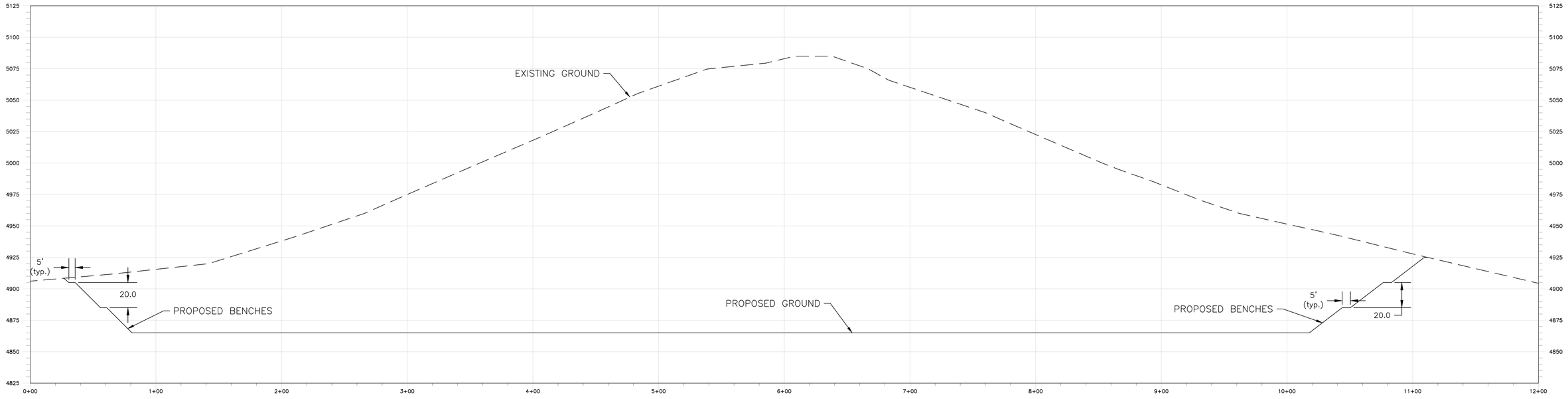
Year 20 Mining Area

Figure A2-3a



DET-SECT E
SCALE:1:40

FIG. A2-3a



DET-SECT F
SCALE:1:40

FIG. A2-3a

40' 0' 20' 40' 80'

SCALE: 1" = 40'

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04-5-19 DB19.1011

AMERICAN MAGNESIUM

Year 20 Mining Area

Figure A2-3b

GENERAL NOTES:

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1. MINE BOUNDARY
2. CLAIM BOUNDARY
3. EXISTING TOPO
4. DESIGN TOPO

MAG 21

MAG 22

Access road and laydown area yard to be recontoured. Prepare seedbed and apply seed per Section 3.3 of Plan of Operations.

SERVICE RD. (10% MAX GRADE)

LAYDOWN YARD (2.0 ACRES)

4900

4925

4950

4975

5000

5025

5050

5075

5'X20' BENCHES

PHASE 3 (5.50 ACRES)

Horizontal benches to be reclaimed. Sloped walls to be hydroseeded.

FINISH GRADE LINE ELEV. 4865'

FINISH GRADE LINE ELEV. 4865'

E FIGURE A2-3a

5'X20' BENCHES

Mine floor to be recontoured and roughened to discourage future access Prepare seedbed and apply seed per Section 3.3 of Plan of Operations.

PHASE 1 (10.20 ACRES)

PHASE 2 (6.80 ACRES)

F FIGURE A2-3b

4885'

4905'

4925'

4945'

4965'

4980'

N

80' 0' 40' 80' 160'

SCALE: 1" = 80'

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Appendix B

Blasting Plan

Blasting Plan for Foothill Dolomite Mine

The following blasting plan applies to the American Magnesium LLC Foothill Dolomite Mine located southeast of Deming, New Mexico. This plan covers the aspects of explosive applications and the concerns that may arise. The following plan presents the procedure for a "typical" blast. Explosive products, initiation systems, site security and vibration issues will all be part of design.

Production Blasting

Blasting is necessary to loosen and break up the dolomite rock so that it can be mined and loaded into trucks. Each blasting event will include the drilling of production shot holes, loading of the shot holes with explosives, and detonation of the blast. Each event will take approximately one to two weeks to complete. Most of this time will be spent drilling the shot holes. Production shots will be drilled with either a 3.5- or 4.5-inch bit in a 9-foot by 9-foot pattern. Shot holes will be approximately 23 feet deep. After all the shot holes are drilled, they will be loaded with explosives. Explosive selection will include the following products: ammonium nitrate-fuel oil (ANFO) or possible a heavy ANFO (HANFO), a light blend of emulsion and ANFO, cast boosters or an ammonium gel dynamite and non-electric (NONEL) detonators as the primer. After the explosives are loaded, the open holes will be backfilled (stemmed) with 8 to 10 feet of crushed rock to contain the charge for better breakage. Loading of the boreholes with explosives is typically completed the same day of the blast.

The above described scenario should yield a powder factor in the 0.90 to 1.28 range depending on depth. The NONEL firing system will assist in controlling vibrations in sensitive areas by limiting the weight of explosives detonating in any particular delay period. The amount of explosives per shot will vary due to depth of the holes and the patterns. A typical shot will have approximately 15,500 pounds of explosives products. Blasting is expected to be completed with a single shot per event. Blasters certified by the Department of the Interior Office of Surface Mining (OSM) with current Mine Safety and Health Administration (MSHA) training will prepare the shot holes and detonate the blast. OSM training for blaster certification addresses the control of flyrock, vibrations, airblast, and fumes by the appropriate use of explosives and hazard recognition in the field.

The plan described above is for a "typical" shot. Geology, pit geometry and vibration concerns will dictate modifications that will have to be made by the blaster-in-charge, as deemed necessary. The need for these changes will be explained on the respective shot report.

Shot Times and Shot Volumes

Because of the magnitude of the project and the accelerated rate at which production is expected, the blasting crew must have flexibility in time of blast, which should be sun up to sun down, unless there are specific issues to the general public's safety. The volume or size of the shots should also not be impeded as long as the vibrations are within the tolerances set out by OSM guidelines.

Blast Area and Blast Site Security

Prior to loading of shot holes, the blaster-in-charge will hold a meeting to review shot design, anticipated weather, and safety procedures, including the placement of road guards. Prior to a blast, a warning signal (audible to residents within ½ mile of the site) will be made to alert site workers and the public of impending blasts. The meaning of the signals and the specific blasting times will be provided in a blasting schedule notice that will be mailed to residents within ½ mile of the blast area. Once the loading of explosive materials commences, the blaster-in-charge will have complete and total control of the blast site and the blasting area.

Appendix C

Spill Prevention, Control and Countermeasures Plan

DRAFT

SPILL PREVENTION, CONTROL, AND COUNTERMEASURE PLAN

For Magnesium Mining

Deming, New Mexico

February 2018

Prepared for:

U.S. Department of the Interior
Bureau of Land Management
Las Cruces Field Office
1800 Marquess Street
Las Cruces, New Mexico 88005

Prepared and Submitted by:

American Magnesium LLC
104 Rinconada
PO Box 684
Elephant Butte, NM 87935

Table of Contents

List of Tables

Appendices

Professional Engineer Certification [40 CFR 112.3(d)]

Certification: I hereby certify that I have examined the facility and, being familiar with the provisions of 40 CFR Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Engineer:	David Tognoni
Registration Number:	XXXXX
State:	New Mexico
Date of Plan Certification:	XXXXX

Dan Kwiecinski, PE

Date

Registered Professional Engineer Seal

SPCC Management Approval [40 CFR 112.7]

I hereby certify that the necessary resources to implement this SPCC have been committed.

David Tognoni, PE;
America Magnesium LLC Managing Partner

Date

List of Acronyms

AmMg	American Magnesium LLC
AST	aboveground storage tank
BLM	Bureau of Land Management, Las Cruces Office
CFR	Code of Federal Regulations
EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
MND	Mining and Minerals Division
MSHA	Mining Safety and Health Administration
NMDOT	New Mexico Department of Transportation
Project	American Magnesium Mining Project near Deming, New Mexico
Project Area	Sections 26 & 27, Township 25 South, Range 8 West, NMB&M, in Little Florida Mountains Mining District, Luna County, New Mexico
RC	dual-tube, reverse-circulation drilling method
SO	Safety Officer
SPCC	Spill Prevention, Control, and Countermeasure Plan
UST	underground storage tank
U.S. EPA	U.S. Environmental Protection Agency

1. Introduction

This Spill Prevention, Control, and Countermeasure Plan (SPCC) is submitted to the Bureau of Land Management, Las Cruces Office (BLM), and the New Mexico Energy, Minerals and Natural Resources Department (EMNRD) Mining and Minerals Division (MMD) by American Magnesium for the Mining Project (Project) located near Deming, New Mexico. The Project is administered by American Magnesium, LLC (AmMg), a New Mexico limited liability company. This SPCC was prepared and will be implemented as required by the U.S. Environmental Protection Agency (U.S. EPA) Regulation contained in Title 40, Code of Federal Regulations, Part 112 (40 CFR 112).

This SPCC describes the reporting requirements and response actions that would take place in the event of a spill, release, or other upset condition, as well as procedures for cleanup and disposal. This SPCC will be posted and distributed to key site personnel and will be used as a guide in the training of employees. This SPCC also addresses mitigation of potential spills associated with project facilities as well as activities of on-site contractors. The SPCC shall be reviewed and updated at a minimum of every 3 years, and whenever major changes are made in the management of the materials addressed in the plan. Inspection and maintenance schedules and procedures for equipment at the Project Area would be set forth in sections of the plan addressing hazardous materials and petroleum products. In addition, the implementation of a health and safety manual and hazard communication program would provide employees with education and awareness of hazardous materials management; thereby further minimizing the potential for spills at the mine area.

This SPCC addresses general requirements for handling spills and discharges of hazardous or controlled materials during activities for the Project. The development, implementation and use of this SPCC are essential to ensure that spills and leaks can be quickly contained and cleaned up. As a general rule, the approach to spill cleanup is to first contain the spill by securing the spill source and deploying spill containment materials, including sorbent pillows, socks, sheets, and granules. Small spills are responded to by the operator involved in the spill. Clean up of residues managed as hazardous or solid waste will be disposed of accordingly.

2. Facility Information [40 CFR 112.7(a)]

Facility Name:	American Magnesium LLC (AmMg)
Mailing Address:	104 Rinconada PO Box 684 Elephant Butte, NM 87935-0684
Street Address:	XXXXX
Owner:	David Tognoni, PE 104 Rinconada PO Box 684 Elephant Butte, NM 87935-0684
Facility Contact:	David Tognoni, PE
Location:	32°5'0.61"N, 107°39'10.90"W (approximated)

2.1 Location

The Project Area is located on public land administered by the BLM in part or all of Sections 26 & 27, Township 25 South, Range 8 West, NMB&M, in Little Florida Mountains Mining District, Luna County, New Mexico. (Project Area). The Project Area includes approximately 43.8 acres. Project disturbance and bonding will occur in phases. There are approximately 8.6 miles of existing road that will be utilized for Project access. A Site map of the Project Area is included as **Appendix A**.

2.2 Project Description and Onsite Equipment

The Project Area will include drill sites, the excavation and removal of dolomite resources, and necessary road improvements. The Project Area will include a total of 44 acres for the purpose of resource verification, mining operations, and reclamation activities.

For the initial phase of the Project, dual-tube, reverse-circulation (RC) air rotary drilling rigs and diamond-bit core rigs will be used for drilling operations and exploration of dolomite resources. One reverse circulation rig and one core drilling rig will be used in the Project Area for mine development. Each rig will include the following support vehicles:

- One pipe truck;
- One booster truck;
- One 3,000-gallon water truck;
- One all-terrain support vehicle; and,
- One auxiliary air compressor.

The Project Area includes primitive road which will be improved with a bulldozer using cut-fill balance methods. One D7 dozer will be used for rehabilitation of the existing access roads and for resource verification road construction. One tracked excavator hoe will be required to assist in the rehabilitation of existing roads, for new road construction, and for drill pad construction.

During mine operations including quarrying the dolomite rock and crushing of the material for transport off-site, operational equipment required for use at the Project Area will expand to include the following.

- Up to 10 haul trucks;
- One 3,000-gallon water truck;
- Two all-terrain support vehicles;
- Storage igloo for blasting storage;

- Excavator;
- Primary crusher, if needed;
- Grader;
- Backhoe; and,
- Broadcast seeder for reclamation activities.

2.3 Contact Information

The American Magnesium Site Supervisor (to be determined), will be responsible for overall spill prevention and response during the Project. All Project personnel will be responsible for following spill prevention procedures and notifying the Supervisor in the event of a spill or discharge. Key contacts with knowledge of the Project spill prevention and response procedures are provided below in **Table 1**.

Table 1. Project Contact Information

Name	Title	Telephone	Email Address
David Tognoni, PE	AmMg Managing Partner	Mobile: 575.741.1527	dqtognoni@gmail.com
David Tognoni, PE	AmMg	Mobile: 575.741.1527	dqtognoni@gmail.com
TBD	AmMg	Work: TBD Mobile: TBD	TBD

2.4 Past Spill Experience

There are no historical or existing spills at the site. If spills occur during the activities in the Project Area **Table 2** below will be updated in a revised SPCC.

Table 2. Past Spill Experience

Date of Occurrence	Description of Spill	Corrective Actions Taken	Plan for Preventing Recurrence
Not Applicable	Not Applicable	Not Applicable	Not Applicable

3. Potential Equipment Failures [40 CFR 112.7(b)]

Hazardous materials are chemicals (such as paints, oils, and fuels), biological agents (such as disease-causing materials), or physical agents (such as radioactive materials) that are dangerous to humans, animals or the environment.

The anticipated total oil storage capacity at the Project Area is 700 gallons. Hazardous materials used at the Project Area will include diesel fuel, gasoline, and lubricating grease. Approximately 500 gallons of diesel fuel will be stored in fuel delivery systems on vehicles and drill rigs. Approximately 100 gallons of gasoline will be stored in fuel delivery systems for light vehicles. Approximately 100 pounds of lubricating grease will be stored on the drill rigs or transported by drill trucks. All containers of hazardous substances will be labeled and handled in accordance with requirements of the New Mexico Department of Transportation (NMDOT) and Mining Safety and Health Administration (MSHA).

The physical and chemical properties for diesel fuel, gasoline, and other petroleum products are included in their respective Safety Data Sheets (SDS) that will be maintained on site at all times in accordance with MSHA's Hazard Communication for the Mining Industry (30 CFR Part 47). The anticipated SDSs required for use at the Project Area are included as **Appendix B** and include the following:

- Marathon Petroleum No. 2 Ultra low Sulfur Diesel (SDS ID No. 0290Mar019);
- Marathon Petroleum Gasoline All Grades (SDS ID No. 0127Mar19);
- Marathon Petroleum Multipower-3 Motor Oil (SDS ID No. 0162Mar019);
- Marathon Petroleum Maratrac Grease (SDS ID No. 0196Mar019); and,
- Prestone Antifreeze/Coolant (SDS ID No. SDS 501).

4. Containment and Diversionary Structures [40 CFR 112.7(c)]

Spill response materials of sufficient quantity to prevent a typical discharge will be maintained onsite. In accordance with 40 CFR 112.7(c)(1)(vii) sorbent materials will provide sufficient containment for this Project Area and anticipated activities. Oil absorbent boom, sorbent materials, and other spill response materials will be maintained onsite and within vicinity to daily work activities. The spill response materials anticipated for use during this project will include the following:

- (quantity) empty 55-gallon drums for potentially contaminated material storage;
- (quantity) oil absorbent socks;
- (quantity) oil absorbent pads;
- (quantity) Oil-Dry® or equivalent absorbent material;
- (quantity) Nitrile gloves;
- (quantity) Neoprene gloves;
- (quantity) Vinyl or PVC overboots;
- (quantity) non-sparking shovels; and,
- (quantity) brooms.

These materials will be stored in the onsite mobile trailer area and accessible by onsite personnel and replaced as needed throughout the duration of the Project. The spill response materials will be checked monthly during the duration of the Project and replenished as needed.

5. Potential Spill Volumes and Rates [40 CFR 112.7(d)]

Fuel spills from diesel and gasoline storage required by onsite equipment fall into two main categories: "minor incidental" and "major incidental" spills. Minor incidental spills result from incidents such as careless operator handling of transfer equipment during fueling, broken hydraulic lines, or engines that leak oil. Examples of a major incidental spill include breech of the fuel storage tank, rupture of a vehicle fuel tanks from collision, or an unattended open valve. **Table 3** and **Table 4**, below, present typical volumes and discharge rates for fuel spills caused by common equipment failures and operator mistakes.

Table 3. Potential Minor Incidental Failures

Major Incidental			
Potential Failure	Spill Direction	Volume Released	Discharge Rate
Operational oil and grease	Spotting	Up to several ounces	Spotting
Refueling of small motors, generators, etc.		Up to several gallons	Instantaneous
Broken hydraulic line on onsite equipment		Up to several gallons	Instantaneous
Leaking engine or onsite vehicle		Up to several gallons	Gradual to Instantaneous
Refueling of onsite vehicles		Up to 50 gallons	Gradual to Instantaneous

Table 4. Potential Major Incidental Failures

Major Incidental			
Potential Failure	Spill Direction	Volume Released	Discharge Rate
Breach of fuel storage tank		Up to 150 gallons	Instantaneous
Vehicle Collision		Up to 100 gallons	Instantaneous
Refueling of large equipment such as drilling rigs, front loaders, excavators, etc.		Up to 100 gallons	Up to 10 gallons per minute

5.1 Demonstration of Practicability

AmMg have determined that the use of additional containment and diversionary structures outside of the procedures described within this SPCC, NMDOT-approved storage containers, and appropriately stocked spill kits would be impractical during this phase of activities at the Project Area.

In accordance with 40 CFR 112.7(d)(2), AmMg commits to providing manpower, equipment, and materials required to expeditiously control and remove any quantity of oil spilled during the implementation of this project.

6. Inspections and Record Keeping [40 CFR 112.7(e)]

6.1 Routine Daily Inspections

Documentation of inspections will be maintained at all times. Daily visual inspections will be conducted for both onsite equipment and the complete project site prior to operation, and will include visual monitoring for the following:

- Signs of fuel or oil leakage from onsite vehicles and equipment;
- Staining and discoloration of site soils;
- Excessive ponding of stormwater; and,
- The presence of visible accumulation of petroleum hydrocarbons.

Daily tailgate inspection forms and daily equipment inspection forms are included as **Appendix C**; whenever possible manufacturer equipment inspection forms will be used.

Equipment safety inspections will be completed prior to the daily use of onsite equipment. The inspections will be completed by the equipment operator and verified by the Site Supervisor or designee. Equipment safety inspection forms will be maintained onsite during the duration of the project.

6.2 Annual Inspections

An inspection of the Project Area will be conducted annually by appropriate responsible personnel to verify that:

- The SPCC is maintained;
- The description of the onsite chemicals and equipment is accurate;
- Applicable SDSs are maintained onsite;
- Site maps are current and reflect accurate onsite conditions; and,
- Controls to reduce the potential for spills identified in this plan are being implemented.

6.3 Record Keeping

This SPCC will be maintained at the Project Area, where personnel will be able to quickly access and use the information to respond to spills. Emergency telephone numbers and any other relevant numbers will be kept readily available to all site personnel. Training records of onsite personnel and documentation of any spills or maintenance conducted at the Project Area will be maintained onsite.

If spills occur at the Project Area, details of the spills will be recorded and maintained onsite. In the event of a potential spill, the following information will be recorded:

- Description of the material spilled (including the quantity and manifest number, if any);
- Exact time and location of spill, including a description of the area involved;
- Containment and cleanup procedures;
- Summary of any communications with government officials, including NMED;
- Reason for spill;
- Corrective action to prevent future spills; and,
- Plan for preventing Recurrence.

7. Personnel Training and Spill Control Procedures [40 CFR 112.7(f)]

7.1 Personnel Training

In addition to the required posted information, all project personnel will be briefed about spill control procedures prior to mobilization to the Project Area, at the initial site briefing, and through daily tailgate safety meetings.

Onsite personnel shall, at a minimum, be trained in the operation and maintenance of onsite equipment in a manner sufficient to prevent discharges, discharge procedure protocols, applicable pollution control laws, rules and regulations, and general contents of this SPCC in accordance with 40 CFR 112.7(f)(1). Personnel responsible for handling spills and potentially hazardous wastes will have received both the initial 40-hour and annual 8-hour refresher training in Hazardous Waste Operations and Emergency Response (HAZWOPER) in accordance with OSHA Standard 29 CFR 1920.120(e). This training is included as part of the initial training received by all field personnel. Training records and certificates will be kept at the mobile trailer area. Foster Wheeler Site Supervisor will be responsible for ensuring the effectiveness of this SPCC and will be accountable for discharge prevention [40 CFR 112.7(f)(2)]. The Site Supervisor will report minor incidental failures to the Project Manager within one day (24 hours) and major incidental failures within one hour.

Upon completion of the annual site inspection and review of the SPCC, any discharges, or recently developed precautionary measures, the revised SPCC will be reviewed with onsite personnel by the Project Manager or Site Supervisor [40 CFR 112.7(f)(3)].

7.2 Spill Control Procedures

Fuels and oils will be stored in containers on support or crew trucks for fueling of equipment. Container storage includes auxiliary fuel tanks (100 gallons or less) and containers (5 gallons or less) on support vehicles. Containers will not be stored where a leak or spill could enter a stormwater conveyance or arroyo. No storage of containers will occur outdoors. This will preclude exposure to precipitation and extremes in temperature. All materials will be stored on support vehicles or within equipment reservoirs.

Site personnel will monitor fuel storage, delivery and construction equipment for leaks. Any leaks will be immediately addressed and repaired. Any leaks and leak repair procedures will be documented according to Section 6.3 of this SPCC.

All spills or leaks, regardless of their quantity, will be reported to New Mexico Environment Department (NMED) at the following numbers:

- For emergencies, call 505-827-9329 twenty-four hours a day.
- For non-emergencies, call 866-428-6535 (voice mail, twenty-four hours a day).
- For non-emergencies, and to reach an on-duty NMED staff member during normal business hours, call 505-476-6000.

During spill cleanup operations, the Site Supervisor will be responsible for all spill containment and cleanup activities. If a spill occurs on-site, AmMg will respond and immediately contain the contaminated material and place it in a secure container, work area, or truck. The cause of any spill will be determined and corrective action will be taken. Complete details of the cause of the spill and how it was responded to will be documented.

Should a spill occur off-site, the delivery driver will immediately contact the Site Supervisor as well as the responsible local and/or state emergency response agencies so that a response may be made to mitigate the spill. Action will be taken immediately to contain and recover the spilled material. The spill will be contained so that removal equipment can clean up the spill. If a spill occurs on soil, the area will be over excavated to clean soil, to verify that all spilled material is removed. If a spill occurs on concrete or

pavement, brooms, sorbent materials or vacuums may be used to ensure that all spilled material is recovered.

AmMg and its subcontractors will oversee the disposal of any recovered product, contaminated soil, contaminated materials and equipment, decontamination solutions, sorbents, and spent chemicals collected during a response to a discharge incident. A licensed transportation/disposal company will be contracted to dispose of waste according to applicable local and state regulatory guidelines.

8. Security [40 CFR 112.7(g)]

AmMg will construct chain-link fences in the proposed laydown area to provide a higher level of security for potential sources of spills and for onsite equipment. These areas will remain locked during non-operational hours. Within this area, a mobile trailer area will be maintained. Spill response materials and small equipment will be stored in this location when not in use.

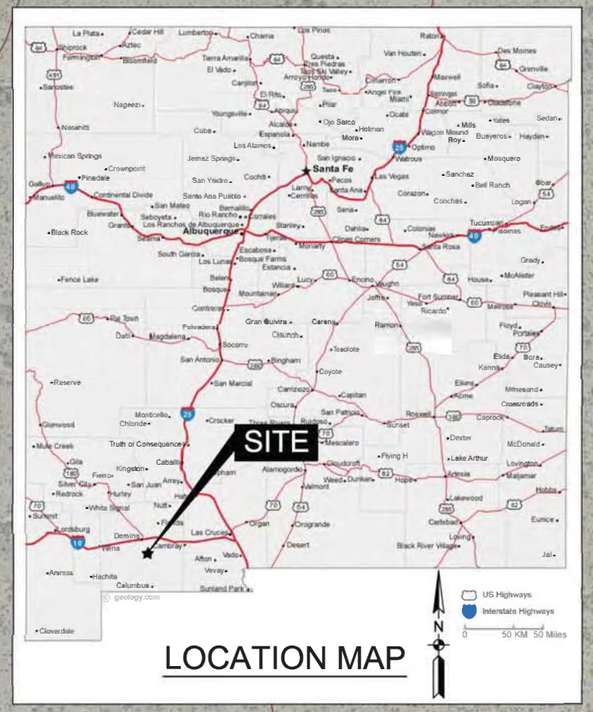
Fuel used during the Project will remain in mobile fuel delivery systems and maintained on light vehicles. Light vehicles will not remain onsite during non-operational hours.

All petroleum products, kerosene, and reagents used for blasting activities will be stored in aboveground tanks within a secondary containment area capable of holding 110 percent of the volume of the largest vessel in the area.

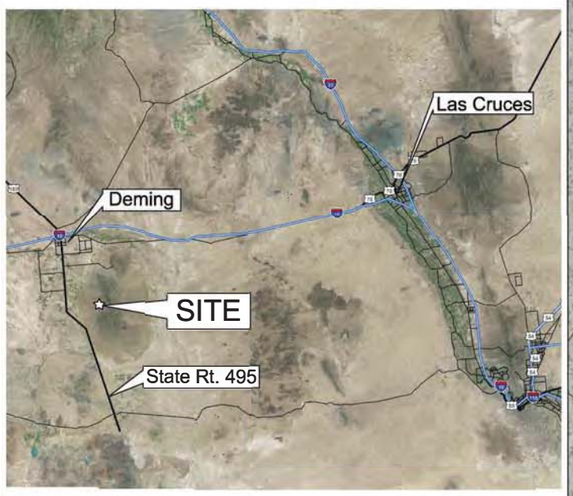
APPENDICES

Appendix A

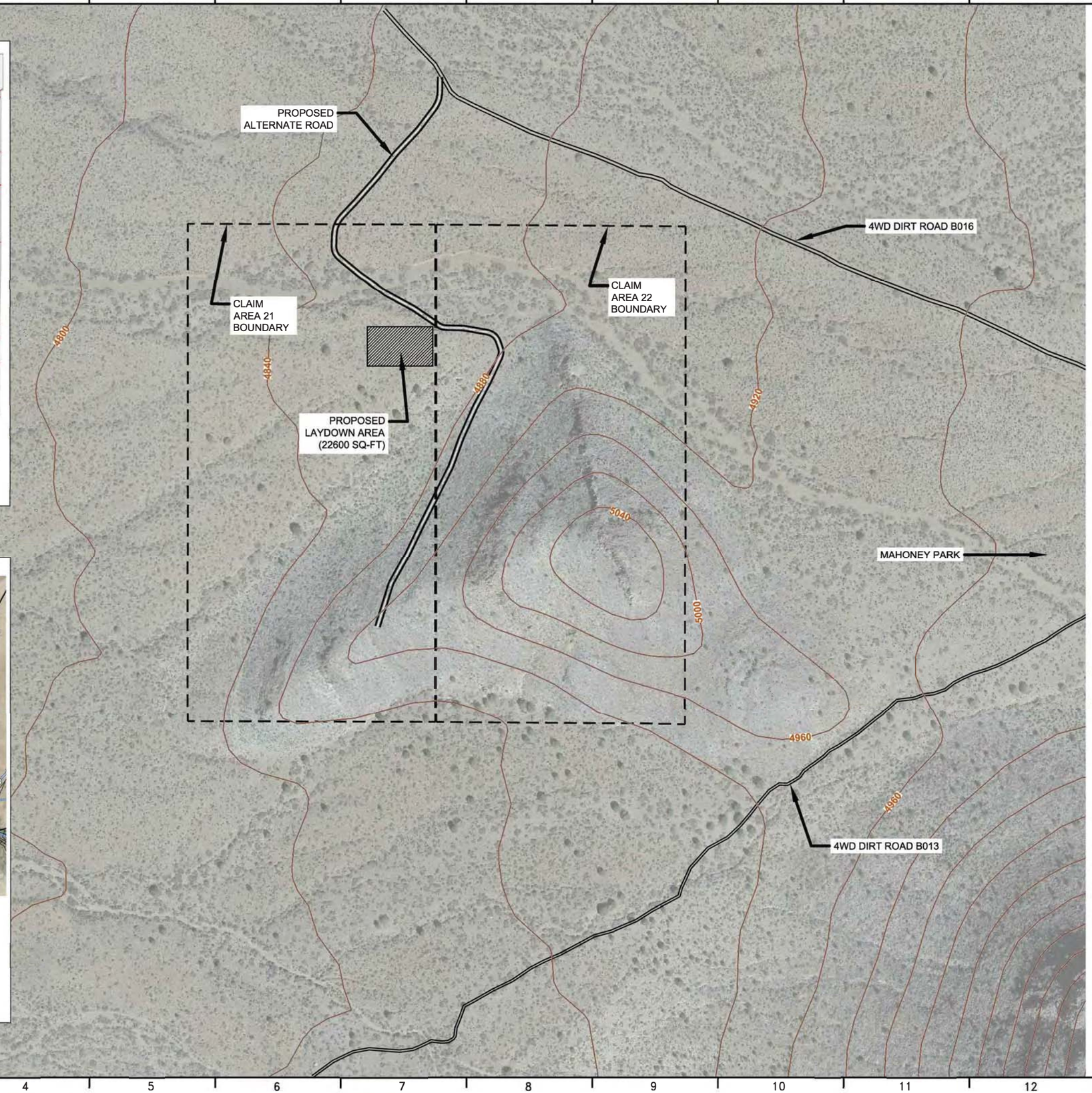
Site Map



LOCATION MAP



VICINITY MAP



LEGEND

- CLAIM BOUNDARY
- ROADWAY
- PROPOSED LAYDOWN AREA

N

0 150 300

SCALE: 1" = 150'
(WHEN PRINTED FULL SIZE 22" X 34")

PROJECT:

AMERICAN MAGNESIUM- SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	
DATE:	

SHEET TITLE:

SITE MAP

SHEET NUMBER:	REV. #
1	
SHEET 1 OF 1 SHEETS	

Appendix B

Safety Data Sheets

SAFETY DATA SHEET

SDS ID NO.: 0290MAR019
Revision Date 06/01/2016

1. IDENTIFICATION

Product Name: Marathon Petroleum No. 2 Ultra Low Sulfur Diesel

Synonym: #2 Diesel; No. 2 Ultra Low Sulfur Diesel 15 ppm Sulfur Max; Ultra Low Sulfur Diesel No. 2 15 ppm Sulfur Max; Ultra Low Sulfur Diesel No. 2 15 ppm Sulfur Max with Polar Plus; No. 2 Diesel, Motor Vehicle Use, Undyed; No. 2 Diesel, Motor Vehicle Use, Undyed, with Polar Plus; ULSD No. 2 Diesel 15 ppm Sulfur Max; ULSD No. 2 Diesel 15 ppm Sulfur Max with Polar Plus; No. 2 MV 15 Diesel; No. 2 MV 15 Diesel with Polar Plus; No. 2 Ultra Low Sulfur Diesel Dyed 15 ppm Sulfur Max; Ultra Low Sulfur Diesel No. 2 Dyed 15 ppm Sulfur Max; Ultra Low Sulfur Diesel No. 2 Dyed 15 ppm Sulfur Max with Polar Plus; No. 2 Diesel, Tax Exempt-Motor Vehicle Use, Dyed; No. 2 Diesel, Tax Exempt-Motor Vehicle Use, Dyed, with Polar Plus; ULSD No. 2 Diesel Dyed 15 ppm Sulfur Max; ULSD No. 2 Diesel Dyed 15 ppm Sulfur Max, with Polar Plus; No. 2 MV 15 Diesel Dyed; #2 MV 15 CFI Diesel; #2 MV 15 CFI Diesel Dyed; No. 2 Low Sulfur Diesel (TxLED); No. 2 MV 15 Diesel Dyed, with Polar Plus; No. 2 NRLM 15 Diesel Dyed; No.2 NRLM Diesel Dyed; No. 2 MV 500 ppm TxLED; No.2 Low Emission Low Sulfur Diesel; No. 2 Low Sulfur Diesel (TxLED) 500 ppm Sulfur Max; No. 2 Heating Oil 5000 NMA Unmarked; NEMA No. 2 Heating Oil; Heating Oil, No. 2 Low Sulfur 5000 ppm; No. 2 Ultra Low Sulfur Diesel Dyed with <6% Renewable Diesel Fuel; Ultra Low Sulfur No. 2 Diesel Dyed with <6% Renewable Diesel Fuel; No. 2 Diesel Dyed with <6% Renewable Diesel Fuel 15 ppm Sulfur Max; No. 2 Ultra Low Sulfur Diesel with <6% Renewable Diesel Fuel; Ultra Low Sulfur No. 2 Diesel with <6% Renewable Diesel Fuel; No. 2 Diesel with <6% Renewable Diesel Fuel 15 ppm Sulfur Max; Garyville Export Diesel; Export Diesel, Garyville; Diesel Fuel, Export Garyville; #2 Motor Vehicle ULSD 15 ppm with 0-5% Renewable Diesel; Marathon No. 2 ULSD with 0-5% Renewable Fuel with R100; Marathon No. 2 ULSD with 0-5% Renewable Fuel with R99; No. 2 Heating Oil 2000 ppm Sulfur Max, Clear (Undyed) Unmarked;Ultra Low Sulfur Heating Oil 15 ppm Sulfur Max, Clear (Undyed) Unmarked; ULS Heating Oil 15 ppm Clear (Undyed) Unmarked; ULS HO 15 ppm CLR; Ultra-Low Sulfur Heating Oil (<= 15ppm, Undyed); No. 2 Heating Oil 2000 ppm Sulfur Max, Dyed Unmarked; No. 2 Heating Oil 2000 ppm Sulfur Max, Dyed Marked; Ultra Low Sulfur Heating Oil 15 ppm Sulfur Max, Dyed Unmarked; Ultra Low Sulfur Heating Oil 15 ppm Sulfur Max, Dyed Marked;15 ppm Sulfur Heating Oil Grade 67; 15 PPM Heating Oil; 15 PPM Dyed Heating Oil; 0291MAR019; 0306MAR019; 0308MAR019; 0334MAR019; 0335MAR019; 0336MAR019; 0337MAR019; 0340MAR019;

Product Code: 0290MAR019
Chemical Family: Complex Hydrocarbon Substance

Recommended Use: Fuel.
Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:

MARATHON CANADA MARKETING, Ltd.
Canadian Address Here

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Acute toxicity - Inhalation (Dusts/Mists)	Category 4
Skin corrosion/irritation	Category 2
Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Specific target organ toxicity (repeated exposure)	Category 2
Aspiration toxicity	Category 1
Acute aquatic toxicity	Category 2
Chronic aquatic toxicity	Category 2

Hazards Not Otherwise Classified (HNOC)
Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

FLAMMABLE LIQUID AND VAPOR
May accumulate electrostatic charge and ignite or explode
May be fatal if swallowed and enters airways
Harmful if inhaled
Causes skin irritation
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of causing cancer
May cause damage to organs (thymus, liver, bone marrow) through prolonged or repeated exposure
Toxic to aquatic life with long lasting effects

Appearance Yellow to Red Liquid **Physical State** Liquid **Odor** Hydrocarbon

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use only non-sparking tools.
Use explosion-proof electrical/ventilating/lighting/equipment
Take precautionary measures against static discharge
Do not breathe mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection

Wash hands and any possibly exposed skin thoroughly after handling
Avoid release to the environment

Precautionary Statements - Response
IF exposed or concerned: Get medical attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
If skin irritation occurs: Get medical attention
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor if you feel unwell
IF SWALLOWED: Immediately call a POISON CENTER or doctor
Do NOT induce vomiting
In case of fire: Use water spray, fog or regular foam for extinction
Collect spillage

Precautionary Statements - Storage
Store in a well-ventilated place. Keep container tightly closed
Keep cool
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container at an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

No. 2 Ultra Low Sulfur Diesel is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbon chain lengths predominantly in the range of eleven to twenty carbons. May contain up to 5% Renewable Diesel. May contain small amounts of dye and other additives (<0.15%) which are not considered hazardous at the concentration(s) used. May contain a trace amount of benzene (<0.01%). Contains a trace amount of sulfur (<0.0015%)

Composition Information:

Name	CAS Number	% Concentration
No. 2 Diesel Fuel	68476-34-6	50-100
Kerosine (petroleum)	8008-20-6	0-50
Alkanes, C10-C20 branched and linear	928771-01-1	0-5
Naphthalene	91-20-3	0.3-2.6

All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

4. FIRST AID MEASURES

First Aid Measures

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).

Inhalation: Remove to fresh air. If not breathing, institute rescue breathing. If breathing is difficult, ensure airway is clear, give oxygen and continue to monitor. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Skin Contact: Immediately wash exposed skin with plenty of soap and water while removing contaminated clothing and shoes. May be absorbed through the skin in harmful amounts. Get medical attention if irritation persists. Any injection injury from high pressure equipment should be evaluated immediately by a physician as potentially serious (See NOTES TO PHYSICIAN).

Place contaminated clothing in closed container until cleaned or discarded. If clothing is to be laundered, inform the person performing the operation of contaminant's hazardous properties. Destroy contaminated, non-chemical resistant footwear.

Eye Contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

Ingestion: Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking. Prolonged or repeated exposure may cause adverse effects to the thymus, liver, and bone marrow.

Indication of any immediate medical attention and special treatment needed

Notes To Physician: INHALATION: This material (or a component) sensitizes the myocardium to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material. Administration of sympathomimetic drugs should be avoided.

SKIN: Leaks or accidents involving high-pressure equipment may inject a stream of material through the skin and initially produce an injury that may not appear serious. Only a small puncture wound may appear on the skin surface but, without proper treatment and depending on the nature, original pressure, volume, and location of the injected material, can compromise blood supply to an affected body part. Prompt surgical debridement of the wound may be necessary to prevent irreversible loss of function and/or the affected body part. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES.

INGESTION: This material represents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media
Do not use straight water streams to avoid spreading fire.

Specific hazards arising from the chemical
This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard and should be handled accordingly. May accumulate electrostatic charge and ignite or explode. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the Emergency Response Guidebook 128.

Hazardous combustion products
Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact No.

Sensitivity to Static Discharge Yes.

Special protective equipment and precautions for firefighters
Firefighters should wear full protective clothing and positive-pressure self-contained breathing apparatus (SCBA) with a full face-piece, as appropriate. Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Additional firefighting tactics
FIRES INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after the fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles: if this is impossible, withdraw from area and let fire burn.

EVACUATION: Consider initial downwind evacuation for at least 1000 feet. If tank, rail car or tank truck is involved in a fire, ISOLATE for 5280 feet (1 mile) in all directions; also, consider initial evacuation of 5280 feet (1 mile) in all directions.

NFPA	Health 1	Flammability 2	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. All contaminated surfaces will be slippery.

Protective equipment: Use personal protection measures as recommended in Section 8.

Emergency procedures: Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.

Environmental precautions: Avoid release to the environment. Avoid subsoil penetration.

Methods and materials for containment: Contain liquid with sand or soil. Prevent spilled material from entering storm drains, sewers, and open waterways.

Methods and materials for cleaning up: Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids. Recover and return free product to proper containers. When recovering free liquids ensure all equipment is grounded and bonded. Use only non-sparking tools.

7. HANDLING AND STORAGE

Safe Handling Precautions: NEVER SIPHON THIS PRODUCT BY MOUTH. Use appropriate grounding and bonding practices. Static accumulating flammable liquid. Bonding and grounding may be insufficient to eliminate the hazard from static electricity. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Vapors may travel along the ground or be moved by ventilation. Flashback may occur along vapor trails. No smoking. Use only non-sparking tools. Avoid breathing fumes, gas, or vapors. Use only with adequate ventilation. Avoid repeated and prolonged skin contact. Use personal protection measures as recommended in Section 8. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists

from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignition of vapors or mists without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

Portable containers should never be filled while in or on a motor vehicle or marine craft. Containers should be placed on the ground. Static electric discharge can ignite fuel vapors when filling non-grounded containers or vehicles on trailers. The nozzle spout must be kept in contact with the container before and during the entire filling operation. Use only approved containers.

A buildup of static electricity can occur upon re-entry into a vehicle during fueling especially in cold or dry climate conditions. The charge is generated by the action of dissimilar fabrics (i.e., clothing and upholstery) rubbing across each other as a person enters/exits the vehicle. A flash fire can result from this discharge if sufficient flammable vapors are present. Therefore, do not get back in your vehicle while refueling.

Cellular phones and other electronic devices may have the potential to emit electrical charges (sparks). Sparks in potentially explosive atmospheres (including fueling areas such as gas stations) could cause an explosion if sufficient flammable vapors are present. Therefore, turn off cellular phones and other electronic devices when working in potentially explosive atmospheres or keep devices inside your vehicle during refueling.

High-pressure injection of any material through the skin is a serious medical emergency even though the small entrance wound at the injection site may not initially appear serious. These injection injuries can occur from high-pressure equipment such as paint spray or grease or guns, fuel injectors, or pinhole leaks in hoses or hydraulic lines and should all be considered serious. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES (See First Aid Section 4).

Storage Conditions: Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area. Do not store near an open flame, heat or other sources of ignition.

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Name	ACGIH TLV	OSHA PELS:	OSHA - Vacated PELs	NIOSH IDLH
No. 2 Diesel Fuel 68476-34-6	100 mg/m³ TWA Skin - potential significant contribution to overall exposure by the cutaneous route	-	-	-
Kerosine (petroleum) 8008-20-6	200 mg/m³ TWA Skin - potential significant contribution to overall exposure by the cutaneous route	-	-	-
Alkanes, C10-C20 branched and linear 928771-01-1	-	-	-	-
Naphthalene 91-20-3	10 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 10 ppm TWA: 50 mg/m³	10 ppm TWA 50 mg/m³ TWA 15 ppm STEL 75 mg/m³ STEL	250 ppm

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation. Use mechanical ventilation equipment that is explosion-proof.

Personal protective equipment

Eye protection:	Use goggles or face-shield if the potential for splashing exists.
Skin and body protection:	Wear neoprene, nitrile or PVA gloves to prevent skin contact. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times.
Respiratory protection:	Use a NIOSH approved organic vapor chemical cartridge or supplied air respirators when there is the potential for airborne exposures to exceed permissible exposure limits or if excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.
Hygiene measures:	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid
Appearance	Yellow to Red Liquid
Color	Yellow to Red
Odor	Hydrocarbon
Odor Threshold	No data available.

Property	**Values (Method)**
Melting Point / Freezing Point	No data available.
Initial Boiling Point / Boiling Range	154-366 °C / 310-691 °F (ASTM D86)
Flash Point	58-76 °C / 136-168 °F (ASTM D93)
Evaporation Rate	No data available.
Flammability (solid, gas)	Not applicable.
Flammability Limit in Air (%):	
Upper Flammability Limit:	No data available.
Lower Flammability Limit:	No data available.
Explosion limits:	No data available.
Vapor Pressure	No data available.
Vapor Density	No data available.
Specific Gravity / Relative Density	0.82-0.86
Water Solubility	No data available.
Solubility in other solvents	No data available.
Partition Coefficient	No data available.
Decomposition temperature	No data available.
pH:	Not applicable
Autoignition Temperature	No data available.
Kinematic Viscosity	1.90-3.32 cSt @ 40°C (ASTM D445)
Dynamic Viscosity	No data available.
Explosive Properties	No data available.
VOC Content (%)	No data available.
Density	No data available.
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

Reactivity	The product is non-reactive under normal conditions.
Chemical stability	The material is stable at 70°F (21°C), 760 mmHg pressure.
Possibility of hazardous reactions	None under normal processing.

Hazardous polymerization Will not occur.

Conditions to avoid Excessive heat, sources of ignition, open flame.

Incompatible Materials Strong oxidizing agents.

Hazardous decomposition products None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation Harmful if inhaled. May cause irritation of respiratory tract. May cause drowsiness or dizziness. Breathing high concentrations of this material in a confined space or by intentional abuse can cause irregular heartbeats which can cause death.

Eye contact Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.

Skin contact Irritating to skin. Effects may become more serious with repeated or prolonged contact. May be absorbed through the skin in harmful amounts.

Ingestion May be fatal if swallowed or vomited and enters airways. May cause irritation of the mouth, throat and gastrointestinal tract.

Acute toxicological data

Name	Oral LD50	Dermal LD50	Inhalation LC50
No. 2 Diesel Fuel 68476-34-6	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	>1 - <5 mg/L (Rat) 4 h
Kerosine (petroleum) 8008-20-6	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.28 mg/L (Rat) 4 h
Alkanes, C10-C20 branched and linear 928771-01-1	-	-	>1 - <5 mg/l (Rat) 4 h
Naphthalene 91-20-3	490 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 340 mg/m^3 (Rat) 1 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

MIDDLE DISTILLATES, PETROLEUM: Long-term repeated (lifetime) skin exposure to similar materials has been reported to result in an increase in skin tumors in laboratory rodents. The relevance of these findings to humans is not clear at this time. Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffer's Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline.

MIDDLE DISTILLATES WITH CRACKED STOCKS: Light cracked distillates have been shown to be carcinogenic in animal tests and have tested positive with in vitro genotoxicity tests. Repeated dermal exposures to high concentrations in test animals resulted in reduced litter size and litter weight, and increased fetal resorptions at maternally toxic doses. Dermal exposure to high concentrations resulted in severe skin irritation with weight loss and some mortality. Inhalation exposure to high concentrations resulted in respiratory tract irritation, lung changes/infiltration/accumulation, and reduction in lung function.

ISOPARAFFINS: Studies in laboratory animals have shown that long-term exposure to similar materials (isoparaffins) can cause kidney damage and kidney cancer in male laboratory rats. However, in-depth research indicates that these findings are unique to the male rat, and that these effects are not relevant to humans.

NAPHTHALENE: Severe jaundice, neurotoxicity (kernicterus) and fatalities have been reported in young children and infants as a result of hemolytic anemia from overexposure to naphthalene. Persons with glucose 6-phosphate dehydrogenase (G6PD) deficiency are more prone to the hemolytic effects of naphthalene. Adverse effects on the kidney have been reported in persons overexposed to naphthalene but these effects are believed to be a consequence of hemolytic anemia, and not a direct effect. Hemolytic anemia has been observed in laboratory animals exposed to naphthalene. Laboratory rodents exposed to naphthalene vapor for 2 years (lifetime studies) developed non-neoplastic and neoplastic tumors and inflammatory lesions of the nasal and respiratory tract. Cataracts and other adverse effects on the eye have been observed in laboratory animals exposed to high levels of naphthalene. Findings from a large number of bacterial and mammalian cell mutation assays have been negative. A few studies have shown chromosomal effects (elevated levels of Sister Chromatid Exchange or chromosomal aberrations) in vitro. Naphthalene has been classified as Possibly Carcinogenic to Humans (2B) by IARC, based on findings from studies in laboratory animals.

DIESEL EXHAUST: The combustion of diesel fuels produces gases including carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur, and hydrocarbons that can be irritating and hazardous with overexposure. Long-term occupational overexposure to diesel exhaust and diesel exhaust particulate matter has been associated with an increased risk of respiratory disease, including lung cancer, and is characterized as a “known human carcinogen” by the International Agency for Research on Cancer (IARC), as “a reasonably anticipated human carcinogen” by the National Toxicology Program, and as “likely to be carcinogenic to humans” by the EPA, based upon animal and occupational exposure studies. However, uncertainty exists with these classifications because of deficiencies in the supporting occupational exposure/epidemiology studies, including reliable exposure estimates. Lifetime animal inhalation studies with pulmonary overloading exposure concentrations of diesel exhaust emissions have produced tumors and other adverse health effects. However, in more recent long-term animal inhalation studies of diesel exhaust emissions, no increase in tumor incidence and in fact a substantial reduction in adverse health effects along with significant reductions in the levels of hazardous material emissions were observed and are associated with fuel composition alterations coupled with new technology diesel engines.

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking. Prolonged or repeated exposure may cause damage to organs.

Skin corrosion/irritation Causes skin irritation.
Serious eye damage/eye irritation None known.
Sensitization None known.

Mutagenic effects None known.

Carcinogenicity Suspected of causing cancer.

Cancer designations are listed in the table below

Name	ACGIH (Class)	IARC (Class)	NTP	OSHA
No. 2 Diesel Fuel 68476-34-6	Confirmed animal carcinogen (A3)	Not Classifiable (3)	Not Listed	Not Listed
Kerosine (petroleum) 8008-20-6	Confirmed animal carcinogen (A3)	Not Classifiable (3)	Not Listed	Not Listed
Alkanes, C10-C20 branched and linear 928771-01-1	Not Listed	Not Listed	Not Listed	Not Listed

Naphthalene 91-20-3	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not Listed

Reproductive toxicity None known.

Specific Target Organ Toxicity (STOT) - single exposure Respiratory system. Central nervous system.

Specific Target Organ Toxicity (STOT) - repeated exposure Thymus. Liver. Bone marrow.

Aspiration hazard May be fatal if swallowed or vomited and enters airways.

12. ECOLOGICAL INFORMATION

Ecotoxicity This product should be considered toxic to aquatic organisms, with the potential to cause long lasting adverse effects in the aquatic environment.

Name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
No. 2 Diesel Fuel 68476-34-6	-	96-hr LC50 = 35 mg/l Fathead minnow (flow-through)	-	48-hr EL50 = 6.4 mg/l Daphnia magna
Kerosine (petroleum) 8008-20-6	72-hr EL50 = 5.0-11 mg/l Algae	96-hr LL50 = 18-25 mg/l Fish	-	48-hr EL50 = 1.4-21 mg/l Invertebrates
Alkanes, C10-C20 branched and linear 928771-01-1	-	-	-	-
Naphthalene 91-20-3	-	96-hr LC50 = 0.91-2.82 mg/l Rainbow trout (static) 96-hr LC50 = 1.99 mg/l Fathead minnow (static)	-	48-hr LC50 = 1.6 mg/l Daphnia magna

Persistence and degradability Expected to be inherently biodegradable.

Bioaccumulation Has the potential to bioaccumulate.

Mobility in soil May partition into air, soil and water.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
This material may be a flammable liquid waste.

Safe Handling of Wastes
Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required. Use appropriate grounding and bonding practices. Use only non-sparking tools. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. No smoking.

Disposal of Wastes / Methods of Disposal
The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal
Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

UN Proper Shipping Name:	Fuel Oil, No. 2
UN/Identification No:	NA 1993
Class:	3
Packing Group:	III

TDG (Canada):

UN Proper Shipping Name:	Diesel Fuel
UN/Identification No:	UN 1202
Transport Hazard Class(es):	3
Packing Group:	III

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product does not contain any component(s) included on EPA's Extremely Hazardous Substance (EHS) List.

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
No. 2 Diesel Fuel	NA
Kerosine (petroleum)	NA
Alkanes, C10-C20 branched and linear	NA
Naphthalene	NA

SARA Section 304: This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	Hazardous Substances RQs
No. 2 Diesel Fuel	NA
Kerosine (petroleum)	NA
Alkanes, C10-C20 branched and linear	NA
Naphthalene	100 lb final RQ 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard
Chronic Health Hazard

SARA Section 313: This product may contain component(s), which if in exceedance of the de minimus threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

Name	CERCLA/SARA 313 Emission reporting:
No. 2 Diesel Fuel	None
Kerosine (petroleum)	None
Alkanes, C10-C20 branched and linear	None
Naphthalene	0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

No. 2 Diesel Fuel

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 2444
Pennsylvania Right-To-Know:	Not Listed
Massachusetts Right-To Know:	Not Listed
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	SN 2444 TPQ: 10000 lb (Under N.J.A.C. 7:1G, environmental hazardous substances in mixtures such as gasoline or new and used petroleum oil may be reported under these categories)
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Kerosine (petroleum)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1091
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	SN 1091 TPQ: 10000 lb (Under N.J.A.C. 7:1G, environmental hazardous substances in mixtures such as gasoline or new and used petroleum oil may be reported under these categories)
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Alkanes, C10-C20 branched and linear

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed
Pennsylvania Right-To-Know:	Not Listed
Massachusetts Right-To Know:	Not Listed
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/19/02

New Jersey Right-To-Know:	SN 1322 SN 3758
Pennsylvania Right-To-Know:	Environmental hazard Present (particulate)
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 1322 TPQ: 500 lb (Reportable at the de minimis quantity of >0.1%)
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	100 lb RQ (air); 1 lb RQ (land/water)

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
No. 2 Diesel Fuel	B3,D2A,D2B	0.1%
Kerosine (petroleum)	B3,D2B	1%
Alkanes, C10-C20 branched and linear	B3,D2A,D2B	0.1%
Naphthalene	B4,D2A	0.1%

Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Issue Date 10/31/2016

Revision Notes

Revision Date 06/01/2016

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is intended as guidance for safe handling, use, processing, storage, transportation, accidental release, clean-up and disposal and is not considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

SDS ID NO.: 0127MAR019
Revision Date 06/01/2016

1. IDENTIFICATION

Product Name: Marathon Petroleum Gasoline - All Grades

Synonym: Gasoline; Regular Unleaded Gasoline; Conventional Regular Unleaded Gasoline; Mid Grade Unleaded Gasoline; Conventional Mid Grade Unleaded Gasoline; Premium Unleaded Gasoline; Conventional Premium Unleaded Gasoline; Sub-Octane Gasoline; Regular RBOB; Super RBOB; Premium RBOB; RBOB; Reformulated Blend Stock For Oxygenated Blending; 84 Octane Gasoline; CBOB; Premium CBOB; Conventional Blend Stock for Oxygenate Blending; Recreational Gasoline; Recreational Gasoline; Recreational Unleaded Gasoline; 89 Recreational Gasoline; Brand 89 Recreational Gasoline; 7.0 Max RVP 89 Recreational Gasoline; BR 7.0 Max RVP 89 Recreational Gasoline; 90 Recreational Gasoline; 90 Marina Gasoline; Brand 91 Recreational Gasoline; 91 Recreational Gasoline; 91 Marina Gasoline; 90 Octane Midgrade Gasoline with No Ethanol; 0125MAR019; 0126MAR019; 0134MAR019; 0313MAR019; 0314MAR019

Product Code: 0127MAR019
Chemical Family: Complex Hydrocarbon Substance

Recommended Use: Fuel.
Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:

MARATHON PETROLEUM COMPANY LP
539 South Main Street
Findlay, OH 45840

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 1
Skin corrosion/irritation	Category 2
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1B
Reproductive toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Aspiration toxicity	Category 1
Acute aquatic toxicity	Category 2
Chronic aquatic toxicity	Category 2

Hazards Not Otherwise Classified (HNOC)
Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

EXTREMELY FLAMMABLE LIQUID AND VAPOR
May accumulate electrostatic charge and ignite or explode
May be fatal if swallowed and enters airways
Causes skin irritation
May cause respiratory irritation
May cause drowsiness or dizziness
May cause genetic defects
May cause cancer
Suspected of damaging fertility or the unborn child
Toxic to aquatic life with long lasting effects

Appearance Clear yellow liquid **Physical State** Liquid **Odor** Hydrocarbon

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools.
Take action to prevent static discharges
Avoid breathing mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Wash hands and any possibly exposed skin thoroughly after handling
Avoid release to the environment

Precautionary Statements - Response
IF exposed or concerned: Get medical attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
If skin irritation occurs: Get medical attention
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor if you feel unwell
IF SWALLOWED: Immediately call a POISON CENTER or doctor
Do NOT induce vomiting
In case of fire: Use water spray, fog or regular foam for extinction
Collect spillage

Precautionary Statements - Storage
Store in a well-ventilated place. Keep container tightly closed
Keep cool
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container at an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Gasoline is a complex combination of hydrocarbons consisting of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons having molecular chains ranging in length from four to ten carbons. May contain small amounts of dye and other additives (>0.02%) which are not considered hazardous at the concentrations used.

Composition Information:

Name	CAS Number	% Concentration
Gasoline	86290-81-5	100
Heptane (mixed isomers)	142-82-5	2.5-26
Butane (mixed isomers)	106-97-8	0.5-19
Pentane (mixed isomers)	78-78-4	6.5-19
Hexane Isomers (other than n-Hexane)	107-83-5	2-12
Toluene	108-88-3	3-9.5
Xylene (mixed isomers)	1330-20-7	3.5-9.5
n-Hexane	110-54-3	0.1-4.5
Cumene	98-82-8	0-4
1,2,4 Trimethylbenzene	95-63-6	1-4
Ethylbenzene	100-41-4	0.5-2.5
Benzene	71-43-2	0.1-1.5
Cyclohexane	110-82-7	0-1.5
Octane	111-65-9	0-1.5
1,2,3-Trimethylbenzene	526-73-8	0-1
Naphthalene	91-20-3	0.1-0.5

All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

4. FIRST AID MEASURES

First Aid Measures

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).

Inhalation: Remove to fresh air. If not breathing, institute rescue breathing. If breathing is difficult, ensure airway is clear, give oxygen and continue to monitor. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). Keep affected person warm and at rest. If symptoms occur get medical attention.

Skin Contact: Immediately wash exposed skin with plenty of soap and water while removing contaminated clothing and shoes. May be absorbed through the skin in harmful amounts. Get medical attention if irritation persists. Any injection injury from high pressure equipment should be evaluated immediately by a physician as potentially serious (See NOTES TO PHYSICIAN).

Place contaminated clothing in closed container until cleaned or discarded. If clothing is to be laundered, inform the person performing the operation of contaminant's hazardous properties. Destroy contaminated, non-chemical resistant footwear.

Eye Contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

Ingestion: Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected

person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Indication of any immediate medical attention and special treatment needed

Notes To Physician: INHALATION: This material (or a component) sensitizes the myocardium to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material. Administration of sympathomimetic drugs should be avoided.

SKIN: Leaks or accidents involving high-pressure equipment may inject a stream of material through the skin and initially produce an injury that may not appear serious. Only a small puncture wound may appear on the skin surface but, without proper treatment and depending on the nature, original pressure, volume, and location of the injected material, can compromise blood supply to an affected body part. Prompt surgical debridement of the wound may be necessary to prevent irreversible loss of function and/or the affected body part. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES.

INGESTION: This material represents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media
Do not use straight water streams to avoid spreading fire.

Specific hazards arising from the chemical
This product has been determined to be an extremely flammable liquid per the OSHA Hazard Communication Standard and should be handled accordingly. May accumulate electrostatic charge and ignite or explode. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the Emergency Response Guidebook 128.

Hazardous combustion products
Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact No.
Sensitivity to Static Discharge Yes.

Special protective equipment and precautions for firefighters
Firefighters should wear full protective clothing and positive-pressure self-contained breathing apparatus (SCBA) with a full face-piece, as appropriate. Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Additional firefighting tactics
FIRES INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or

monitor nozzles. Cool containers with flooding quantities of water until well after the fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles: if this is impossible, withdraw from area and let fire burn.

EVACUATION: Consider initial downwind evacuation for at least 1000 feet. If tank, rail car or tank truck is involved in a fire, ISOLATE for 5280 feet (1 mile) in all directions; also, consider initial evacuation of 5280 feet (1 mile) in all directions.

NFPA	Health 1	Flammability 3	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.

Protective equipment: Use personal protection measures as recommended in Section 8.

Emergency procedures: Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.

Environmental precautions: Avoid release to the environment. Avoid subsoil penetration. Ethanol in gasoline phase seperates in contact with water. Monitor downstream for dissolved ethanol or other appropriate indicators.

Methods and materials for containment: Contain liquid with sand or soil. Prevent spilled material from entering storm drains, sewers, and open waterways.

Methods and materials for cleaning up: Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids. Recover and return free product to proper containers. When recovering free liquids ensure all equipment is grounded and bonded. Use only non-sparking tools.

7. HANDLING AND STORAGE

Safe Handling Precautions: NEVER SIPHON THIS PRODUCT BY MOUTH. Use appropriate grounding and bonding practices. Static accumulating flammable liquid. Bonding and grounding may be insufficient to eliminate the hazard from static electricity. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Vapors may travel along the ground or be moved by ventilation. Flashback may occur along vapor trails. No smoking. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing fumes, gas, or vapors. Use only with adequate ventilation. Avoid repeated and prolonged skin contact. Use personal protection measures as recommended in Section 8. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignition of vapors or mists without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

Portable containers should never be filled while in or on a motor vehicle or marine craft. Containers should be placed on the ground. Static electric discharge can ignite fuel vapors when filling non-grounded containers or vehicles on trailers. The nozzle spout must be kept in contact with the container before and during the entire filling operation. Use only

approved containers.

A buildup of static electricity can occur upon re-entry into a vehicle during fueling especially in cold or dry climate conditions. The charge is generated by the action of dissimilar fabrics (i.e., clothing and upholstery) rubbing across each other as a person enters/exits the vehicle. A flash fire can result from this discharge if sufficient flammable vapors are present. Therefore, do not get back in your vehicle while refueling.

Cellular phones and other electronic devices may have the potential to emit electrical charges (sparks). Sparks in potentially explosive atmospheres (including fueling areas such as gas stations) could cause an explosion if sufficient flammable vapors are present. Therefore, turn off cellular phones and other electronic devices when working in potentially explosive atmospheres or keep devices inside your vehicle during refueling.

High-pressure injection of any material through the skin is a serious medical emergency even though the small entrance wound at the injection site may not initially appear serious. These injection injuries can occur from high-pressure equipment such as paint spray or grease or guns, fuel injectors, or pinhole leaks in hoses or hydraulic lines and should all be considered serious. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES (See First Aid Section 4).

Storage Conditions: Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area. Do not store near an open flame, heat or other sources of ignition.

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Name	ACGIH TLV	OSHA PELS:	OSHA - Vacated PELs	NIOSH IDLH
Gasoline 86290-81-5	300 ppm TWA 500 ppm STEL	-	300 ppm TWA 900 mg/m³ TWA 500 ppm STEL 1500 mg/m³ STEL	-
Heptane (mixed isomers) 142-82-5	400 ppm TWA 500 ppm STEL	TWA: 500 ppm TWA: 2000 mg/m³	400 ppm TWA 1600 mg/m³ TWA 500 ppm STEL 2000 mg/m³ STEL	750 ppm
Butane (mixed isomers) 106-97-8	1000 ppm STEL	-	800 ppm TWA 1900 mg/m³ TWA	-
Pentane (mixed isomers) 78-78-4	1000 ppm TWA	-	-	-
Hexane Isomers (other than n-Hexane) 107-83-5	500 ppm TWA 1000 ppm STEL	-	500 ppm TWA 1800 mg/m³ TWA 1000 ppm STEL 3600 mg/m³ STEL	-
Toluene 108-88-3	20 ppm TWA	TWA: 200 ppm Ceiling: 300 ppm	100 ppm TWA 375 mg/m³ TWA 150 ppm STEL 560 mg/m³ STEL	500 ppm
Xylene (mixed isomers) 1330-20-7	100 ppm TWA 150 ppm STEL	TWA: 100 ppm TWA: 435 mg/m³	100 ppm TWA 435 mg/m³ TWA 150 ppm STEL 655 mg/m³ STEL	900 ppm
n-Hexane 110-54-3	50 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 500 ppm TWA: 1800 mg/m³	50 ppm TWA 180 mg/m³ TWA	1100 ppm
Cumene 98-82-8	50 ppm TWA	TWA: 50 ppm TWA: 245 mg/m³ Skin	50 ppm TWA 245 mg/m³ TWA Limit applies to skin	900 ppm
1,2,4 Trimethylbenzene	25 ppm TWA	-	25 ppm TWA	-

95-63-6			125 mg/m³ TWA	
Ethylbenzene 100-41-4	20 ppm TWA	TWA: 100 ppm TWA: 435 mg/m³	100 ppm TWA 435 mg/m³ TWA 125 ppm STEL 545 mg/m³ STEL	800 ppm
Benzene 71-43-2	0.5 ppm TWA 2.5 ppm STEL Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 10 ppm (applies to industry segments exempt from the benzene standard) TWA: 1 ppm STEL: 5 ppm (see 29 CFR 1910.1028)	25 ppm Ceiling 1 ppm TWA 5 ppm STEL	500 ppm
Cyclohexane 110-82-7	100 ppm TWA	TWA: 300 ppm TWA: 1050 mg/m³	300 ppm TWA 1050 mg/m³ TWA	1300 ppm
Octane 111-65-9	300 ppm TWA	TWA: 500 ppm TWA: 2350 mg/m³	300 ppm TWA 1450 mg/m³ TWA 375 ppm STEL 1800 mg/m³ STEL	1000 ppm
1,2,3-Trimethylbenzene 526-73-8	25 ppm TWA	-	25 ppm TWA 125 mg/m³ TWA	-
Naphthalene 91-20-3	10 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 10 ppm TWA: 50 mg/m³	10 ppm TWA 50 mg/m³ TWA 15 ppm STEL 75 mg/m³ STEL	250 ppm

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation. Use mechanical ventilation equipment that is explosion-proof.

Personal protective equipment

Eye protection: Use goggles or face-shield if the potential for splashing exists.

Skin and body protection: Use nitrile rubber, Viton® or PVA gloves for repeated or prolonged skin exposure. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times.

Respiratory protection: Use a NIOSH approved organic vapor chemical cartridge or supplied air respirators when there is the potential for airborne exposures to exceed permissible exposure limits or if excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid
Appearance	Clear yellow liquid
Color	Yellow
Odor	Hydrocarbon
Odor Threshold	No data available.

Property	**Values (Method)**
Melting Point / Freezing Point	No data available.
Initial Boiling Point / Boiling Range	24-210 °C / 75-410 °F (ASTM D86)

Flash Point	-43 °C / -45 °F
Evaporation Rate	No data available.
Flammability (solid, gas)	Not applicable.
Flammability Limit in Air (%):	
Upper Flammability Limit:	7.6
Lower Flammability Limit:	1.4
Explosion limits:	No data available.
Vapor Pressure	5.5-15 psi (ASTM D4814)
Vapor Density	3-4
Specific Gravity / Relative Density	0.70-0.76
Water Solubility	No data available.
Solubility in other solvents	No data available.
Partition Coefficient	2.13-4.5
Decomposition temperature	No data available.
pH:	Not applicable
Autoignition Temperature	280 °C / 536 °F
Kinematic Viscosity	No data available.
Dynamic Viscosity	No data available.
Explosive Properties	No data available.
VOC Content (%)	100%
Density	No data available.
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

Reactivity The product is non-reactive under normal conditions.

Chemical stability The material is stable at 70°F (21°C), 760 mmHg pressure.

Possibility of hazardous reactions None under normal processing.

Hazardous polymerization Will not occur.

Conditions to avoid Excessive heat, sources of ignition, open flame.

Incompatible Materials Strong oxidizing agents.

Hazardous decomposition products None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation May cause irritation of respiratory tract. May cause drowsiness or dizziness. Breathing high concentrations of this material in a confined space or by intentional abuse can cause irregular heartbeats which can cause death.

Eye contact Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.

Skin contact Irritating to skin. Effects may become more serious with repeated or prolonged contact. May be absorbed through the skin in harmful amounts.

Ingestion May be fatal if swallowed or vomited and enters airways. May cause irritation of the mouth, throat and gastrointestinal tract.

Acute toxicological data

Name	Oral LD50	Dermal LD50	Inhalation LC50
Gasoline	14000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.2 mg/L (Rat) 4 h

86290-81-5			
Heptane (mixed isomers) 142-82-5	-	3000 mg/kg (Rabbit)	103 g/m³ (Rat) 4 h
Butane (mixed isomers) 106-97-8	-	-	658 mg/L (Rat) 4 h
Pentane (mixed isomers) 78-78-4	-	-	450 mg/L (Mouse) 2 h
Hexane Isomers (other than n-Hexane) 107-83-5	> 5000 mg/kg (Rat)	-	-
Toluene 108-88-3	> 2000 mg/kg (Rat)	8390 mg/kg (Rabbit)	12.5 mg/L (Rat) 4 h
Xylene (mixed isomers) 1330-20-7	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.04 mg/L (Rat) 4 h
n-Hexane 110-54-3	15000 mg/kg (Rat)	3000 mg/kg (Rabbit)	48000 ppm (Rat) 4 h
Cumene 98-82-8	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 20 mg/L (Rat) 6 h
1,2,4 Trimethylbenzene 95-63-6	3280 mg/kg (Rat)	> 3160 mg/kg (Rabbit)	18,000 mg/m³ (Rat) 4 h
Ethylbenzene 100-41-4	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Benzene 71-43-2	> 2000 mg/kg (Rat)	> 5000 mg/kg (Rabbit)	> 20 mg/l (Rat) 4 h
Cyclohexane 110-82-7	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	13.9 mg/L (Rat) 4 h
Octane 111-65-9	-	-	118 g/m³ (Rat) 4 h
1,2,3-Trimethylbenzene 526-73-8	-	-	-
Naphthalene 91-20-3	490 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 340 mg/m³ (Rat) 1 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

NAPHTHAS: In a large epidemiological study on over 15,000 employees at several petroleum refineries and amongst residents located near these refineries, no increased risk of kidney cancer was observed in association with gasoline exposures (a similar material). In a similar study, no increased risk of kidney cancer was observed among petroleum refinery workers, but there was a slight trend in the incidence of kidney cancers among service station employees, especially after a 30-year latency period. Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffer's Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline.

ISOPARAFFINS: Studies in laboratory animals have shown that long-term exposure to similar materials (isoparaffins) can cause kidney damage and kidney cancer in male laboratory rats. However, in-depth research indicates that these findings are unique to the male rat, and that these effects are not relevant to humans.

C9 AROMATIC HYDROCARBONS: A developmental inhalation study was conducted in laboratory mice. Increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate were observed at the highest exposure level (1,500 ppm). This exposure level was extremely toxic to pregnant female mice (44% mortality). Reduced fetal body weights were also observed at 500 ppm. A multi-generation reproduction inhalation study was conducted in laboratory rats. Reductions in pup weights, pup weight gain, litter size, and pup survival were observed at 1,500 ppm, an exposure level at which significant maternal toxicity was observed. Reduced pup weight gain was also observed at 500 ppm.

PENTANES: Studies of pentane isomers in laboratory animals indicate exposure to extremely high levels (roughly 10 vol.%) may induce cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

BUTANES: Studies in laboratory animals indicate exposure to extremely high levels of butanes (1-10 or higher vol.% in air) may cause cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

TOLUENE: Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Abuse of toluene at high concentrations (e.g., glue sniffing and solvent abuse) has been associated with adverse effects on the liver, kidney and nervous system, and can cause CNS depression, cardiac arrhythmias, and death. Studies of workers indicate longterm exposure may be related to impaired color vision and hearing. Some studies of workers suggest longterm exposure may be related to neurobehavioral and cognitive changes. Some of these effects have been observed in laboratory animals following repeated exposure to high levels of toluene. Several studies of workers suggest longterm exposure may be related to small increases in spontaneous abortions and changes in some gonadotropic hormones. However, the weight of evidence does not indicate toluene is a reproductive hazard to humans. Studies in laboratory animals indicate some changes in reproductive organs following high levels of exposure, but no significant effects on mating performance or reproduction were observed. Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Findings in laboratory animals have been largely negative. Positive findings include small increases in minor skeletal and visceral malformations and developmental delays following very high levels of maternal exposure. Studies of workers indicate long-term exposure may be related to effects on the liver, kidney and blood, but these appear to be limited to changes in serum enzymes and decreased leukocyte counts. Adverse effects on the liver, kidney, thymus and nervous system were observed in animal studies following very high levels of exposure. The relevance of these findings to humans is not clear at this time.

XYLENES, ALL ISOMERS: Overexposure to xylene may cause upper respiratory tract irritation, headache, cyanosis, blood serum changes, nervous system damage and narcosis. Effects may be increased by the use of alcoholic beverages. Evidence of liver and kidney impairment were reported in workers recovering from a gross overexposure. Effects from Prolonged or Repeated Exposure: Impaired neurological function was reported in workers exposed to solvents including xylene. Studies in laboratory animals have shown evidence of impaired hearing following high levels of exposure. Studies in laboratory animals suggest some changes in reproductive organs following high levels of exposure but no significant effects on reproduction were observed. Studies in laboratory animals indicate skeletal and visceral malformations, developmental delays, and increased fetal resorptions following extremely high levels of maternal exposure with evidence of maternal toxicity. The relevance of these observations to humans is not clear at this time. Adverse effects on the liver, kidney, bone marrow (changes in blood cell parameters) were observed in laboratory animals following high levels of exposure. The relevance of these observations to humans is not clear at this time.

1,2,4-TRIMETHYLBENZENE: The following information pertains to a mixture of C9 aromatic hydrocarbons, over 40% of which was composed of 1,2,4-trimethylbenzene. A developmental inhalation study was conducted in laboratory mice. Increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate were observed at the highest exposure level (1,500 ppm). This exposure level was extremely toxic to pregnant female mice (44% mortality). Reduced fetal body weights were also observed at 500 ppm. A multi-generation reproduction inhalation study was conducted in laboratory rats. Reductions in pup weights, pup weight gain, litter size, and pup survival were observed at 1,500 ppm, an exposure level at which significant maternal toxicity was observed. Reduced pup weight gain was also observed at 500 ppm. Embryotoxicity has been reported in studies of laboratory animals. Adverse effects included increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate.<n><n>

N-HEXANE: Long-term or repeated exposure to n-hexane can cause peripheral nerve damage. Initial symptoms are numbness of the fingers and toes. Also, motor weakness can occur in the digits, but may also involve muscles of the arms, thighs and forearms. The

onset of these symptoms may be delayed for several months to a year after the beginning of exposure. Testicular atrophy and partial to full loss of the germ cell line were observed in sub-chronic high-dose inhalation studies of laboratory rodents. These effects appeared irreversible. Rodent reproduction studies have shown evidence of reduced fetal weight but no frank malformations.

CUMENE: Overexposure to cumene may cause upper respiratory tract irritation and CNS depression. Studies in laboratory animals indicate evidence of respiratory tract hyperplasia, and adverse effects on the liver, kidney and adrenal glands following high level exposure. The relevance of these findings to humans is not clear at this time. Findings from lifetime laboratory rodent inhalation studies were as follows: In F344/N rats: an increased incidence of renal carcinomas and adenomas, respiratory epithelial adenomas, and interstitial cell adenomas of the testes. In B6C3F1 mice: an increased incidence of carcinomas and adenomas of the bronchi and lung, liver neoplasms, hemangiosarcomas of the spleen, and adenomas of the thyroid.

ETHYLBENZENE: Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). The incidence of tumors was also elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as "possibly carcinogenic to humans" (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure with evidence of maternal toxicity. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals have demonstrated evidence of ototoxicity (hearing loss) following exposure levels as low as 300 ppm for 5 days. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

BENZENE: Studies of workers exposed to benzene show clear evidence that overexposure can cause cancer and other diseases of the blood forming organs including Acute Myelogenous Leukemia (AML), and Aplastic Anemia (AA), an often fatal disease. Some studies suggest overexposure to benzene may also be associated with Myelodysplastic Syndrome (MDS). Findings from a case control study of workers exposed to benzene was reported during the 2009 Benzene Symposium in Munich included an increase in Acute Myeloid Leukemias and Non-Hodgkins Lymphoid Neoplasms (NHLN) of the subtype follicular lymphoma (FL) in some occupational categories. Some studies of workers exposed to benzene have shown an association with increased rates of chromosome aberrations in circulating lymphocytes. One study of women workers exposed to benzene suggested a weak association with irregular menstruation. However, other studies of workers exposed to benzene have not demonstrated clear evidence of an effect on fertility or reproductive outcome in humans. Benzene can cross the placenta and affect the developing fetus. Cases of AA have been reported in the offspring of persons severely overexposed to benzene. Studies in laboratory animals indicate that prolonged, repeated exposure to high levels of benzene vapor can cause bone marrow suppression and cancer in multiple organ systems. Studies in laboratory animals show evidence of adverse effects on male reproductive organs following high levels of exposure but no significant effects on reproduction have been observed. Embryotoxicity has been reported in studies of laboratory animals but effects were limited to reduced fetal weight and minor skeletal variations. Benzene has been classified as a proven human carcinogen by OSHA and a Group 1 (Carcinogenic to Humans) material by IARC. The current proposed IARC classification for benzene is summarized as follows: Sufficient evidence for Acute Myeloid Leukemia; limited evidence for Acute Lymphatic Leukemia, Chronic Lymphatic Leukemia, Non-Hodgkin Lymphoma, and Multiple Myeloma.

NAPHTHALENE: Severe jaundice, neurotoxicity (kernicterus) and fatalities have been reported in young children and infants as a result of hemolytic anemia from overexposure to naphthalene. Persons with glucose 6-phosphate dehydrogenase (G6PD) deficiency are more prone to the hemolytic effects of naphthalene. Adverse effects on the kidney have

been reported in persons overexposed to naphthalene but these effects are believed to be a consequence of hemolytic anemia, and not a direct effect. Hemolytic anemia has been observed in laboratory animals exposed to naphthalene. Laboratory rodents exposed to naphthalene vapor for 2 years (lifetime studies) developed non-neoplastic and neoplastic tumors and inflammatory lesions of the nasal and respiratory tract. Cataracts and other adverse effects on the eye have been observed in laboratory animals exposed to high levels of naphthalene. Findings from a large number of bacterial and mammalian cell mutation assays have been negative. A few studies have shown chromosomal effects (elevated levels of Sister Chromatid Exchange or chromosomal aberrations) in vitro. Naphthalene has been classified as Possibly Carcinogenic to Humans (2B) by IARC, based on findings from studies in laboratory animals.

CARBON MONOXIDE: is a chemical asphyxiant with no warning properties (such as odor). At 400-500 ppm for 1 hour headache and dyspnea may occur. If activity is increased, symptoms of overexposure may include nausea, irritability, increased respiration, tinnitus, sweating, chest pain, confusion, impaired judgement, dizziness, weakness, drowsiness, ataxia, irregular heart beat, cyanosis and pallor. Levels in excess of 1000 ppm can result in collapse, loss of conciousness, respiratory failure and death. Extremely high concentrations (12,800 ppm) can cause immediate unconsciousness and death in 1-3 minutes. Repeated anoxia can lead to central nervous system damage and peripheral neuropathy, with loss of sensation in the fingers, amnesia, and mental deterioration and possible congestive heart failure. Damage may also occur to the fetus, lung, liver, kidney, spleen, cardiovascular system and other organs.

WHOLLY-VAPORIZED UNLEADED GASOLINE: Lifetime exposure to wholly vaporized unleaded gasoline produced an increased incidence of liver tumors in female mice exposed to the highest exposure concentration (2056 ppm) and α-2 urinary globulin-mediated kidney tumors in male rats. No exposure-related tumors were observed in male mice or female rats. The male-specific rat kidney tumors are not considered relevant to human health. Mice receiving lifetime repeated skin application of various petroleum naphthas exhibited an irritation-dependent increased incidence of skin tumors. Additional studies suggest that these tumors occur through a mechanism that may not be relevant to human health. Epidemiological data from over 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma, or kidney cancer resulting from gasoline exposure. Unleaded gasoline has been identified as possibly carcinogenic to humans (2B) by the International Agency for Research on Cancer (IARC).

COMBUSTION ENGINE EXHAUST: Chronic inhalation studies of gasoline engine exhaust in mice, rats and hamsters did not produce any carcinogenic effects. Condensates/extracts of gasoline engine exhaust produced an increase in tumors compared to controls when testing by skin painting, subcutaneous injection, intratracheal instillation or implantation into the lungs. Gasoline exhaust has been classified as possibly carcinogenic to humans (2B) by the International Agency for Research on Cancer (IARC).

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Sensitization Not expected to be a skin or respiratory sensitizer.

Mutagenic effects May cause genetic defects.

Carcinogenicity May cause cancer.

Cancer designations are listed in the table below

Name	ACGIH	IARC	NTP	OSHA

	(Class)	(Class)		
Gasoline 86290-81-5	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Heptane (mixed isomers) 142-82-5	Not Listed	Not Listed	Not Listed	Not Listed
Butane (mixed isomers) 106-97-8	Not Listed	Not Listed	Not Listed	Not Listed
Pentane (mixed isomers) 78-78-4	Not Listed	Not Listed	Not Listed	Not Listed
Hexane Isomers (other than n-Hexane) 107-83-5	Not Listed	Not Listed	Not Listed	Not Listed
Toluene 108-88-3	Not Classifiable (A4)	Not Classifiable (3)	Not Listed	Not Listed
Xylene (mixed isomers) 1330-20-7	Not classifiable (A4)	Not classifiable (3)	Not Listed	Not Listed
n-Hexane 110-54-3	Not Listed	Not Listed	Not Listed	Not Listed
Cumene 98-82-8	Not listed	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not listed
1,2,4 Trimethylbenzene 95-63-6	Not Listed	Not Listed	Not Listed	Not Listed
Ethylbenzene 100-41-4	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Benzene 71-43-2	Confirmed human carcinogen (A1)	Carcinogenic to humans (1)	Known to be human carcinogen	Known carcinogen
Cyclohexane 110-82-7	Not Listed	Not Listed	Not Listed	Not Listed
Octane 111-65-9	Not Listed	Not Listed	Not Listed	Not Listed
1,2,3-Trimethylbenzene 526-73-8	Not Listed	Not Listed	Not Listed	Not Listed
Naphthalene 91-20-3	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not Listed

Reproductive toxicity Suspected of damaging fertility or the unborn child.

Specific Target Organ Toxicity (STOT) - single exposure Respiratory system. Central nervous system.

Specific Target Organ Toxicity (STOT) - repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed or vomited and enters airways.

12. ECOLOGICAL INFORMATION

Ecotoxicity This product should be considered toxic to aquatic organisms, with the potential to cause long lasting adverse effects in the aquatic environment.

Name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
Gasoline 86290-81-5	72-hr EC50 = 56 mg/l Algae	96-hr LC50 = 11 mg/l Rainbow trout (static)	-	48-hr LC50 = 7.6 mg/l Daphnia magna
Heptane (mixed isomers) 142-82-5	-	96-hr LC50 = 375 mg/L Tilapia	-	-
Butane (mixed isomers) 106-97-8	-	-	-	-
Pentane (mixed isomers) 78-78-4	-	96-hr LC50 = 3.1 mg/L Rainbow trout	-	48-hr EC50 = >1 - <10 mg/L Daphnia magna
Hexane Isomers (other than n-Hexane) 107-83-5	-	-	-	-
Toluene	72-hr EC50 = 12.5 mg/l	96-hr LC50 <= 10 mg/l	-	48-hr EC50 = 5.46-9.83 mg/l

108-88-3	Algae	Rainbow trout		Daphnia magna 48-hr EC50 = 11.5 mg/l Daphnia magna (Static)
Xylene (mixed isomers) 1330-20-7	72-hr EC50 = 11 mg/l Algae	96-hr LC50 = 8 mg/l Rainbow trout	-	48-hr LC50 = 3.82 mg/l Daphnia magna
n-Hexane 110-54-3	-	96-hr LC50 = 2.5 mg/l Fathead minnow	-	-
Cumene 98-82-8	72-hr EC50 = 2.6 mg/l Algae	96-hr LC50 = 6.04-6.61 mg/l Fathead minnow (Flow-through) 96-hr LC50 = 2.7 mg/l Rainbow trout (semi-static)	-	48-hr EC50 = 7.9-14.1 mg/l Daphnia magna (static)
1,2,4 Trimethylbenzene 95-63-6	-	96-hr LC50 = 7.19-8.28 mg/l Fathead minnow (flow-through)	-	48-hr EC50 = 6.14 mg/L Daphnia magna
Ethylbenzene 100-41-4	72-hr EC50 = 1.7-7.6 mg/l Algae	96-hr LC50 = 4 mg/L Rainbow trout	-	48-hr EC50 = 1-4 mg/L Daphnia magna
Benzene 71-43-2	72-hr EC50 = 29 mg/l Algae	96-hr LC50 = 5.3 mg/l Rainbow trout (flow-through)	-	48-hr EC50 = 8.76-15.6 mg/l Daphnia magna (Static)
Cyclohexane 110-82-7	72-hr EC50 = 500 mg/l Algae	96-hr LC50 = 3.96-5.18 mg/l Fathead minnow	-	48-hr EC50 = 1.7-3.5 mg/L Bay shrimp
Octane 111-65-9	-	-	-	48-hr LC50 = 0.38 mg/l Daphnia magna
1,2,3-Trimethylbenzene 526-73-8	-	96-hr LC50 = 7.72 mg/l Fathead Minnow (flow-through)	-	-
Naphthalene 91-20-3	-	96-hr LC50 = 0.91-2.82 mg/l Rainbow trout (static) 96-hr LC50 = 1.99 mg/l Fathead minnow (static)	-	48-hr LC50 = 1.6 mg/l Daphnia magna

Persistence and degradability Expected to be inherently biodegradable. The presence of ethanol in this product may impede the biodegradation of benzene, toluene, ethylbenzene and xylene in groundwater, resulting in elongated plumes of these constituents.

Bioaccumulation Has the potential to bioaccumulate.

Mobility in soil May partition into air, soil and water.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
This material may be a flammable liquid waste.

Safe Handling of Wastes
Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required. Use appropriate grounding and bonding practices. Use only non-sparking tools. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. No smoking.

Disposal of Wastes / Methods of Disposal
The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal
Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

UN Proper Shipping Name:	Gasoline
UN/Identification No:	UN 1203
Class:	3
Packing Group:	II

TDG (Canada):

UN Proper Shipping Name:	Gasoline
UN/Identification No:	UN 1203
Transport Hazard Class(es):	3
Packing Group:	II

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product does not contain any component(s) included on EPA's Extremely Hazardous Substance (EHS) List.

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Gasoline	NA
Heptane (mixed isomers)	NA
Butane (mixed isomers)	NA
Pentane (mixed isomers)	NA
Hexane Isomers (other than n-Hexane)	NA
Toluene	NA
Xylene (mixed isomers)	NA
n-Hexane	NA
Cumene	NA
1,2,4 Trimethylbenzene	NA
Ethylbenzene	NA
Benzene	NA
Cyclohexane	NA
Octane	NA
1,2,3-Trimethylbenzene	NA
Naphthalene	NA

SARA Section 304: This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	Hazardous Substances RQs
Gasoline	NA
Heptane (mixed isomers)	NA
Butane (mixed isomers)	NA
Pentane (mixed isomers)	NA
Hexane Isomers (other than n-Hexane)	NA
Toluene	1000 lb final RQ 454 kg final RQ
Xylene (mixed isomers)	100
n-Hexane	5000
Cumene	5000
1,2,4 Trimethylbenzene	NA
Ethylbenzene	1000

Benzene	10
Cyclohexane	1000
Octane	NA
1,2,3-Trimethylbenzene	NA
Naphthalene	100 lb final RQ 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product may contain component(s), which if in exceedance of the de minimus threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

Name	CERCLA/SARA 313 Emission reporting:
Gasoline	None
Heptane (mixed isomers)	None
Butane (mixed isomers)	None
Pentane (mixed isomers)	None
Hexane Isomers (other than n-Hexane)	None
Toluene	1.0 % de minimis concentration
Xylene (mixed isomers)	1.0 % de minimis concentration
n-Hexane	1.0 % de minimis concentration
Cumene	1.0 % de minimis concentration
1,2,4 Trimethylbenzene	1.0 % de minimis concentration
Ethylbenzene	0.1 % de minimis concentration
Benzene	0.1 % de minimis concentration
Cyclohexane	1.0 % de minimis concentration
Octane	None
1,2,3-Trimethylbenzene	None
Naphthalene	0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Gasoline

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0957
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen; Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0957 TPQ: 10000 lb (Under N.J.A.C. 7:1G, environmental hazardous substances in mixtures such as gasoline or new and used petroleum oil may be reported under these categories)
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Heptane (mixed isomers)

Louisiana Right-To-Know:	Not Listed

California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1339
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Butane (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0273
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 0273 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Pentane (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1064
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 1064 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Hexane Isomers (other than n-Hexane)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1285
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present

Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Toluene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Developmental toxicity, initial date 1/1/91 Female reproductive toxicity, initial date 8/7/09
New Jersey Right-To-Know:	SN 1866
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree; Teratogen
New Jersey - Environmental Hazardous Substances List:	SN 1866 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Xylene (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 2014
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold all isomers
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

n-Hexane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1340
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed

Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1340 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1 lb RQ (air); 1 lb RQ (land/water)

Cumene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/6/10
New Jersey Right-To-Know:	SN 0542
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0542 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	5000 lb RQ (air); 1 lb RQ (land/water)

1,2,4 Trimethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1929
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Ethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 6/11/04
New Jersey Right-To-Know:	SN 0851
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed

New Jersey - Special Hazardous Substances:	Carcinogen; flammable - Third degree
New Jersey - Environmental Hazardous Substances List:	SN 0851 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 2/27/87 Developmental toxicity, initial date 12/26/97 Male reproductive toxicity, initial date 12/26/97
New Jersey Right-To-Know:	SN 0197
Pennsylvania Right-To-Know:	Environmental hazard; Special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin); Carcinogen (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Carcinogen; Extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Present
New Jersey - Special Hazardous Substances:	Carcinogen; Flammable - third degree; Mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	10 lb RQ (air); 1 lb RQ (land/water)

Cyclohexane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0565
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0565 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Octane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1434
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous	Not Listed

Substances List:	
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

1,2,3-Trimethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1929
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/19/02
New Jersey Right-To-Know:	SN 1322 SN 3758
Pennsylvania Right-To-Know:	Environmental hazard Present (particulate)
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 1322 TPQ: 500 lb (Reportable at the de minimis quantity of >0.1%)
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	100 lb RQ (air); 1 lb RQ (land/water)

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Gasoline	B2,D2A,D2B	0.1%
Heptane (mixed isomers)	B2,D2B	1%
Butane (mixed isomers)	A,B1	1%
Pentane (mixed isomers)	B2	1%
Hexane Isomers (other than n-Hexane)	B2	1%
Toluene	B2,D2A,D2B	0.1%
Xylene (mixed isomers)	B2,D2A,D2B	m-, o-isomers 1.0%; p-isomer 0.1%
n-Hexane	B2,D2A,D2B	1%

Cumene	B2,D2A	0.1%
1,2,4 Trimethylbenzene	B3,D2B	1%
Ethylbenzene	B2,D2A,D2B	0.1%
Benzene	B2,D2A,D2B	0.1%
Cyclohexane	B2,D2B	1%
Octane	B2,D2B	1%
1,2,3-Trimethylbenzene	B3	1%
Naphthalene	B4,D2A	0.1%

Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 06/01/2016

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is intended as guidance for safe handling, use, processing, storage, transportation, accidental release, clean-up and disposal and is not considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

SDS ID NO.: 0162MAR019
Revision Date 05/22/2015

1. IDENTIFICATION

Product Name: Marathon Petroleum Multipower-3 15W-40 Motor Oil

Synonym: Multipower-3 15W-40 Motor Oil; Multipower-3 15W-40 Heavy Duty Motor Oil
Product Code: 0162MAR019
Chemical Family: Motor/Lube Oil

Recommended Use: Engine Oil.
Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:

MARATHON PETROLEUM COMPANY LP
539 South Main Street
Findlay, OH 45840

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Serious eye damage/eye irritation	Category 2A

Hazards Not Otherwise Classified (HNOC)
Not applicable.

Label elements

EMERGENCY OVERVIEW

Warning

Causes serious eye irritation

Appearance Brown Liquid	**Physical State** Liquid	**Odor** Petroleum

Precautionary Statements - Prevention
Wash hands and any possibly exposed skin thoroughly after handling
Wear eye/face protection

Precautionary Statements - Response
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical attention

Precautionary Statements - Storage
Not applicable.

Precautionary Statements - Disposal
Not applicable.

Additional Information
Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Motor oil is a complex mixture of highly refined lubricating oil base stocks and additives.

Composition Information:

Name	CAS Number	% Concentration
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts	113706-15-3	1-5
Dinonyl diphenylamine	36878-20-3	1-5
Butene, homopolymer	9003-29-6	1-5
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.	84605-20-9	1-5

All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

4. FIRST AID MEASURES

First Aid Measures

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).

Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. If symptoms occur get medical attention.

Skin Contact: Wash skin with plenty of soap and water. If irritation or other symptoms occur get medical attention. Wash contaminated clothing and clean shoes before reuse.

Eye Contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention.

Ingestion: Rinse mouth out with water. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected person warm and at rest. If symptoms develop, seek medical attention.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: Causes eye irritation. Symptoms may include redness, itching, and inflammation. May

cause skin irritation and/or dermatitis Preexisting skin conditions and/or respiratory disorders may be aggravated by exposure to this product.

Indication of any immediate medical attention and special treatment needed

Notes To Physician: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media
Do not use a solid water stream as it may scatter and spread fire.

Specific hazards arising from the chemical
The product is not combustible per the OSHA Hazard Communication Standard, but will ignite and burn at temperatures exceeding the flash point.

Hazardous combustion products
Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact No.
Sensitivity to Static Discharge No.

Special protective equipment and precautions for firefighters
Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Use water spray to cool exposed surfaces from as far a distance as possible. Keep run-off water out of sewers and water sources.

Additional firefighting tactics
Not applicable.

NFPA	Health 1	Flammability 1	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so.

Protective equipment: Use personal protection measures as recommended in Section 8.

Emergency procedures: Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.

Environmental precautions: Avoid release to the environment. Avoid subsoil penetration.

Methods and materials for containment: Prevent further leakage or spillage if safe to do so.

Methods and materials for cleaning up: Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids. Recover and return free product to proper containers.

7. HANDLING AND STORAGE

Safe Handling Precautions: Avoid contact with skin, eyes and clothing. Do not swallow. Avoid breathing vapors or mists. Use good personal hygiene practices. Wash thoroughly after handling. Use personal protection measures as recommended in Section 8. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Lifetime, continuous skin contact with used motor oils has caused skin cancer in laboratory tests. In testing, thorough washing has been found to prevent the development of skin cancer from used motor oil exposure. Avoid excessive skin contact. Exercise good personal hygiene including the removal and washing of soiled clothing and destroy used motor oil contaminated leather shoes/boots.

Storage Conditions: Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Store away from incompatible materials.

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Name	ACGIH TLV	OSHA PELS:	OSHA - Vacated PELs	NIOSH IDLH
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts 113706-15-3	-	-	-	-
Dinonyl diphenylamine 36878-20-3	-	-	-	-
Butene, homopolymer 9003-29-6	-	-	-	-
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs. 84605-20-9	-	-	-	-

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Personal protective equipment

Eye protection: Use goggles or face-shield if the potential for splashing exists.

Skin and body protection: Wear neoprene, nitrile or PVA gloves to prevent skin contact. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times. Wear appropriate protective clothing.

Respiratory protection: Use a NIOSH approved organic vapor chemical cartridge or supplied air respirators when there is the potential for airborne exposures to exceed permissible exposure limits or if excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid
Appearance	Brown Liquid
Color	Brown
Odor	Petroleum
Odor Threshold	No data available.

Property	**Values (Method)**
Melting Point / Freezing Point	No data available.
Initial Boiling Point / Boiling Range	No data available.
Flash Point	> 220 °C / > 428 °F (Cleveland Open-Cup)
Evaporation Rate	No data available.
Flammability (solid, gas)	Not applicable.
Flammability Limit in Air (%):	
Upper Flammability Limit:	No data available.
Lower Flammability Limit:	No data available.
Explosion limits:	No data available.
Vapor Pressure	No data available.
Vapor Density	No data available.
Specific Gravity / Relative Density	0.86-0.875
Water Solubility	No data available.
Solubility in other solvents	No data available.
Partition Coefficient	No data available.
Decomposition temperature	No data available.
pH:	No available data.
Autoignition Temperature	No data available.
Kinematic Viscosity	82 mm2/s @ 40°C / 104°F
Dynamic Viscosity	No data available.
Explosive Properties	No data available.
VOC Content (%)	1.7 (w/w)
Density	No data available.
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

Reactivity	The product is non-reactive under normal conditions.
Chemical stability	Stable under recommended storage conditions.
Possibility of hazardous reactions	None under normal processing.
Hazardous polymerization	Will not occur.
Conditions to avoid	Sources of heat or ignition.
Incompatible Materials	Strong oxidizing agents.
Hazardous decomposition products	None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation	Overheating may produce vapors which may cause respiratory irritation, dizziness and nausea.
Eye contact	Irritating to eyes. May cause reddening and tearing.
Skin contact	May cause skin irritation. Prolonged or repeated exposure may cause dermatitis, folliculitis

or oil acne.

Ingestion May cause irritation of the mouth, throat and gastrointestinal tract.

Acute toxicological data

Name	Oral LD50	Dermal LD50	Inhalation LC50
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts 113706-15-3	-	-	-
Dinonyl diphenylamine 36878-20-3	-	-	-
Butene, homopolymer 9003-29-6	-	-	-
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs. 84605-20-9	-	-	-

Delayed and immediate effects as well as chronic effects from short and long-term exposure

This product is considered to have a low order of acute and chronic oral and dermal toxicity.

USED MOTOR OIL: Lifetime, continuous skin contact with used motor oils has caused skin cancer in laboratory tests. The combustion process produces compounds (polycyclic aromatic hydrocarbons) in motor oils that increase with use and are responsible for the cancer induction. Thorough washing has been found to prevent the development of skin cancer on animals from used motor oil exposure.

ZDDP: Zinc dialkyldithiophosphate (ZDDP) additives are primarily eye and/or skin irritants or corrosives with low acute toxicity via oral, dermal, and inhalation routes of exposure and are not skin sensitizers. In laboratory repeat dose studies by the dermal and oral routes, ZDDPs cause effects only at high doses, primarily due to irritation, in a manner similar to other irritating materials. The weight-of- evidence of genotoxicity testing indicates that ZDDPs are not mutagenic and do not cause larger chromosomal effects.

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms Causes eye irritation. Symptoms may include redness, itching, and inflammation. Contact may cause skin dermatitis and/or irritation. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Sensitization Not expected to be a skin or respiratory sensitizer.

Mutagenic effects None known.

Carcinogenicity Cancer designations are listed in the table below

Name	ACGIH (Class)	IARC (Class)	NTP	OSHA
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts 113706-15-3	Not Listed	Not Listed	Not Listed	Not Listed
Dinonyl diphenylamine 36878-20-3	Not Listed	Not Listed	Not Listed	Not Listed
Butene, homopolymer 9003-29-6	Not Listed	Not Listed	Not Listed	Not Listed
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs. 84605-20-9	Not Listed	Not Listed	Not Listed	Not Listed

Reproductive toxicity None known.

Specific Target Organ Toxicity (STOT) - single exposure Not classified.

Specific Target Organ Toxicity (STOT) - repeated exposure Not classified.

Aspiration hazard Not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Used motor and/or lube oils can be toxic to birds and fish.

Name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts 113706-15-3	-	-	-	-
Dinonyl diphenylamine 36878-20-3	-	-	-	-
Butene, homopolymer 9003-29-6	-	-	-	-
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs. 84605-20-9	-	-	-	-

Persistence and degradability Not expected to be readily biodegradable.

Bioaccumulation Contains component(s) with the potential to bioaccumulate.

Mobility in soil No information available.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
No information available.

Safe Handling of Wastes
Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required.

Disposal of Wastes / Methods of Disposal
The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal
Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

UN Proper Shipping Name: Not Regulated
UN/Identification No: Not applicable
Class: Not applicable.
Packing Group: Not applicable.

TDG (Canada):
UN Proper Shipping Name: Not Regulated
UN/Identification No: Not applicable.
Transport Hazard Class(es): Not applicable.
Packing Group: Not applicable.

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product may contain component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts	NA
Dinonyl diphenylamine	NA
Butene, homopolymer	NA
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.	NA

SARA Section 304: This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	Hazardous Substances RQs
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts	NA
Dinonyl diphenylamine	NA
Butene, homopolymer	NA
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.	NA

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard

SARA Section 313: This product may contain component(s), which if in exceedance of the de minimus threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

Name	CERCLA/SARA 313 Emission reporting:
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts	None
Dinonyl diphenylamine	None
Butene, homopolymer	None
Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.	None

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed
Pennsylvania Right-To-Know:	Not Listed
Massachusetts Right-To Know:	Not Listed
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Dinonyl diphenylamine

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed
Pennsylvania Right-To-Know:	Not Listed
Massachusetts Right-To Know:	Not Listed
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Butene, homopolymer

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed
Pennsylvania Right-To-Know:	Not Listed
Massachusetts Right-To Know:	Not Listed
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed

New Jersey Right-To-Know:	Not Listed
Pennsylvania Right-To-Know:	Not Listed
Massachusetts Right-To Know:	Not Listed
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts	D2B	1%
Butene, homopolymer	Uncontrolled product according to WHMIS classification criteria	

Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 05/22/2015

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is intended as guidance for safe handling, use, processing, storage, transportation, accidental release, clean-up and disposal and is not considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

SDS ID NO.: 0196MAR019
Revision Date 05/22/2015

1. IDENTIFICATION

Product Name: Marathon Petroleum Maratrac Grease

Synonym: Maratrac™ Grease; Maratrac Construction Farm Grease; Maratrac CF Grease; Maratrac No. 2 Grease
Product Code: 0196MAR019
Chemical Family: Petroleum Based Grease

Recommended Use: Lubricating Grease.
Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:

MARATHON PETROLEUM COMPANY LP
539 South Main Street
Findlay, OH 45840

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Hazards Not Otherwise Classified (HNOC)
Not applicable.

Label elements

EMERGENCY OVERVIEW

No known significant effects or critical hazards.

Appearance Gray semi-solid **Physical State** Semi-Solid **Odor** Petroleum

Precautionary Statements - Prevention
Not applicable.

Precautionary Statements - Response
Not applicable.

Precautionary Statements - Storage
Not applicable.

Precautionary Statements - Disposal
Not applicable.

Additional Information
Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Maratrac™ Grease is a mixture of high viscosity, highly refined lubricating oil base stock with a lithium complex soap thickener.

Composition Information:

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. FIRST AID MEASURES

First Aid Measures

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).

Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. If symptoms occur get medical attention.

Skin Contact: Wash skin with plenty of soap and water. If irritation or other symptoms occur get medical attention. Wash contaminated clothing and clean shoes before reuse.

Eye Contact: Immediately flush eyes with plenty of water. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

Ingestion: Rinse mouth out with water. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected person warm and at rest. If symptoms develop, seek medical attention.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: May cause eye irritation May cause skin irritation and/or dermatitis Symptoms may include redness, itching, and inflammation. Preexisting skin conditions and/or respiratory disorders may be aggravated by exposure to this product.

Indication of any immediate medical attention and special treatment needed

Notes To Physician: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media
Do not use a solid water stream as it may scatter and spread fire.

Specific hazards arising from the chemical

The product is not combustible per the OSHA Hazard Communication Standard, but will ignite and burn at temperatures exceeding the flash point.

Hazardous combustion products
Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact No.
Sensitivity to Static Discharge No.

Special protective equipment and precautions for firefighters
Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Use water spray to cool exposed surfaces from as far a distance as possible. Keep run-off water out of sewers and water sources.

Additional firefighting tactics
Not applicable.

NFPA	Health 1	Flammability 1	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. All contaminated surfaces will be slippery.

Protective equipment: Use personal protection measures as recommended in Section 8.

Emergency procedures: Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.

Environmental precautions: Avoid release to the environment.

Methods and materials for containment: Prevent further leakage or spillage if safe to do so.

Methods and materials for cleaning up: Cover with absorbent materials such as sand or clay. Shovel or sweep up material and place in a designated, labeled waste container.

7. HANDLING AND STORAGE

Safe Handling Precautions: Avoid contact with skin, eyes and clothing. Do not swallow. Avoid breathing vapors or mists. Use good personal hygiene practices. Wash thoroughly after handling. Use personal protection measures as recommended in Section 8. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Storage Conditions: Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Store away from incompatible materials.

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Personal protective equipment

Eye protection: Use goggles or face-shield if the potential for splashing exists.

Skin and body protection: Wear neoprene, nitrile or PVA gloves to prevent skin contact. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times. Wear appropriate protective clothing.

Respiratory protection: Use a NIOSH approved organic vapor chemical cartridge or supplied air respirators when there is the potential for airborne exposures to exceed permissible exposure limits or if excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Semi-Solid
Appearance	Gray semi-solid
Color	Gray
Odor	Petroleum
Odor Threshold	No data available.

Property	**Values (Method)**
Melting Point / Freezing Point	> 260 °C / > 500 °F
Initial Boiling Point / Boiling Range	> 316 °C / > 600 °F
Flash Point	> 204 °C / > 400 °F Pensky-Martens Closed Cup (PMCC)
Evaporation Rate	< 1 (ether (anhydrous) = 1)
Flammability (solid, gas)	Not applicable.
Flammability Limit in Air (%):	
Upper Flammability Limit:	No data available.
Lower Flammability Limit:	No data available.
Explosion limits:	No data available.
Vapor Pressure	<0.13 kPa (<1 mm Hg) [room temperature]
Vapor Density	> 1 (Air = 1)
Specific Gravity / Relative Density	0.92
Water Solubility	Partially soluble in water
Solubility in other solvents	No data available.
Partition Coefficient	No data available.
Decomposition temperature	No data available.
pH:	No available data.
Autoignition Temperature	371 °C / 700 °F
Kinematic Viscosity	No data available.
Dynamic Viscosity	No data available.
Explosive Properties	No data available.
VOC Content (%)	No data available.
Density	No data available.
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

Reactivity The product is non-reactive under normal conditions.

Chemical stability Stable under recommended storage conditions.

Possibility of hazardous reactions	None under normal processing.
Hazardous polymerization	Will not occur.
Conditions to avoid	Sources of heat or ignition.
Incompatible Materials	Strong oxidizing agents.
Hazardous decomposition products	None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation	Overheating may produce vapors which may cause respiratory irritation, dizziness and nausea.
Eye contact	Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.
Skin contact	May cause skin irritation. Prolonged or repeated exposure may cause dermatitis, folliculitis or oil acne.
Ingestion	May cause irritation of the mouth, throat and gastrointestinal tract.

Acute toxicological data

No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

This product is considered to have a low order of acute and chronic oral and dermal toxicity.

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms	May cause eye irritation Contact may cause skin dermatitis and/or irritation. Symptoms may include redness, itching, and inflammation. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.
Sensitization	Not expected to be a skin or respiratory sensitizer.
Mutagenic effects	None known.
Carcinogenicity	None known.
Reproductive toxicity	None known.
Specific Target Organ Toxicity (STOT) - single exposure	Not classified.
Specific Target Organ Toxicity (STOT) - repeated exposure	Not classified.
Aspiration hazard	Not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity	No information available.

Persistence and degradability	No information available.
Bioaccumulation	No information available.
Mobility in soil	No information available.
Other adverse effects	No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
No information available.

Safe Handling of Wastes
Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required.

Disposal of Wastes / Methods of Disposal
The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal
Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

UN Proper Shipping Name:	Not Regulated
UN/Identification No:	Not applicable
Class:	Not applicable.
Packing Group:	Not applicable.

TDG (Canada):

UN Proper Shipping Name:	Not Regulated
UN/Identification No:	Not applicable.
Transport Hazard Class(es):	Not applicable.
Packing Group:	Not applicable.

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b):	This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302:	This product may contain component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:
SARA Section 304:	This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:
SARA Section 311/312:	The following EPA hazard categories apply to this product:
	None
SARA Section 313:	This product may contain component(s), which if in exceedance of the de minimus

threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

Note: Uncontrolled product according to WHMIS classification criteria.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 05/22/2015

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is intended as guidance for safe handling, use, processing, storage, transportation, accidental release, clean-up and disposal and is not considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

1. Product And Company Identification

SDS ID: SDS 501
PRODUCT NAME: Prestone ® Antifreeze/Coolant
PRODUCT NUMBER: AF2000X, AF2000L, AF2050, AF2055, 72025, 71605, 71621, PRES04C, AF2000UK, AF2000PL. AF2000-1KL, AF2000LRU, AF2000RU, 65069, AF2000/GF, AF2000/GFC, AF2055/GF, AF2000-1KL/GF, AF2000/GXF, AF2000/GXF-HT, 71621/GF, 71621/GFC, 71621/GFC3
FORMULA NUMBER: YA956BY, YA956BY-B, YA956BY-ED, YA956BY-ED-B, YA-956BY-GLY, YA-992

MANUFACTURER:
Prestone Products Corporation
Danbury, CT 06810-5109

CANADIAN OFFICE:
FRAM Group (Canada), Inc.
Mississauga, Ontario L5L 3S6

MEDICAL EMERGENCIES AND ALL OTHER INFORMATION PHONE NUMBER:
(800)890-2075 (in the US)
(800)668-9349 (in Canada)
TRANSPORTATION EMERGENCY PHONE NUMBER (Chemical Spills and Transport Accidents only):
CHEMTREC 1-800-424-9300 (in the US)
CANUTEC (613)996-6666 (in Canada)
SDS DATE OF PREPARATION/REVISION: 09/24/15

PRODUCT USE: Automobile Antifreeze – consumer product
RESTRICTIONS ON USE: None identified

2. Hazards Identification

GHS/HAZCOM 2012 Classification:

Health	Physical
Acute Toxicity Category 4 (oral) Specific Target Organ Toxicity – Repeated Exposure Category 2 Toxic to Reproduction Category 2	Not Hazardous

Label Elements

WARNING!
H302 Harmful if swallowed.
H361d Suspected of damaging the unborn child.
H373 May cause damage to kidneys through prolonged or repeated exposure.

Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe mist or vapors.
P264 Wash exposed skin thoroughly after handling.
P270 Do not eat, drink, or smoke when using this product.

P280 Wear protective gloves.
Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell.
P330 Rinse mouth.
P308 + P313 IF exposed or concerned: Get medical advice.
Disposal:
P405 Store locked up.
P501 Dispose of contents and container in accordance with local and national regulations.

3. Composition/Information On Ingredients

Component	CAS No.	Amount
Ethylene Glycol	107-21-1	75-95%
2-Ethyl Hexanoic Acid, Sodium Salt	19766-89-3	1-5%
Neodecanoic Acid, Sodium Salt	31548-27-3	1-5%
Diethylene Glycol	111-46-6	0-5%

The exact concentrations are a trade secret.

4. First Aid Measures

INHALATION: Remove the victim to fresh air. If breathing has stopped administer artificial respiration. If breathing is difficult, have medical personnel administer oxygen. Get medical attention.

SKIN CONTACT: Remove contaminated clothing. Immediately wash contacted area thoroughly with soap and water. If irritation persists, get medical attention.

EYE CONTACT: Immediately flush eyes with large amounts of water for 15 minutes. Get medical attention if irritation persists.

INGESTION: Seek immediate medical attention. Immediately call local poison control center or go to an emergency department. Never give anything by mouth to or induce vomiting in an unconscious or drowsy person.

MOST IMPORTANT SYMPTOMS: May cause eye irritation. Inhalation of mists may cause nose and throat irritation and nervous system effects. Ingestion may cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, back pain, decrease in urine output, kidney failure, and central nervous system effects.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT, IF NEEDED: Seek immediate medical attention for large ingestions.

NOTES TO PHYSICIAN: The principal toxic effects of ethylene glycol, when swallowed, are kidney damage and metabolic acidosis. The combination of metabolic acidosis, an osmol gap and oxalate crystals in the urine is evidence of ethylene glycol poisoning. Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. Respiratory support with mechanical ventilation may be required. There may be cranial nerve involvement in the late stages of toxicity from swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth, and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing and dysphagia.

Ethanol is antidotal and its early administration may block the formation of nephrotoxic metabolites of ethylene glycol in the liver. The objective is to rapidly achieve and maintain a blood ethanol level of approximately 100 mg/dl by giving a loading dose of ethanol followed by a maintenance dose. Intravenous administration of ethanol is the preferred route. Ethanol blood levels should be checked frequently. Hemodialysis may be required. 4-Methyl pyrazole (Fomepizole®), a potent inhibitor of alcohol dehydrogenase, has been used therapeutically to decrease the metabolic consequences of ethylene glycol poisoning. Fomepizole® is easier to use clinically than ethanol, does not cause CNS depression or hypoglycemia and requires less

monitoring than ethanol. Additional therapeutic modalities which may decrease the adverse consequences of ethylene glycol metabolism are the administration of both thiamine and pyridoxine. As there are complicated and serious overdoses, we recommend you consult with the toxicologists at your poison control center.

5. Firefighting Measures

SUITABLE EXTINGUISHING MEDIA: For large fires, use alcohol type or all-purpose foams. For small fires, use water spray, carbon dioxide or dry chemical.

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: A solid stream of water or foam directed into hot, burning liquid can cause frothing. Burning may produce carbon monoxide and carbon dioxide.

SPECIAL FIRE FIGHTING PROCEDURES: Do not spray pool fires directly. Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing for fires in areas where chemicals are used or stored.

6: Accidental Release Measures

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Wear appropriate protective clothing and equipment (See Section 8).

METHODS AND MATERIALS FOR CONTAINMENT/CLEANUP: Collect with absorbent material and place in appropriate, labeled container for disposal or, if permitted flush spill area with water.

7. Handling and Storage

PRECAUTIONS FOR SAFE HANDLING:

Harmful or Fatal if Swallowed. Do not drink antifreeze or solution. Avoid eye and prolonged or repeated skin contact. Avoid breathing vapors or mists. Wash exposed skin thoroughly with soap and water after use. Do not store in opened or unlabeled containers. Keep container away from open flames and excessive heat. Do not reuse empty containers unless properly cleaned. Empty containers retain product residue and may be dangerous. Do not cut, weld, drill, etc. containers, even empty.

Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without any obvious ignition sources. Published "autoignition" or "ignition" temperatures cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Use of this product in elevated temperature applications should be thoroughly evaluated to assure safe operating conditions.

CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES: Store away from excessive heat and oxidizers.

NFPA CLASSIFICATION: IIIB

8. Exposure Controls / Personal Protection

EXPOSURE GUIDELINES

CHEMICAL	EXPOSURE LIMIT
Ethylene Glycol (as aerosol)	100 mg/m^3 Ceiling ACGIH TLV
2-Ethyl Hexanoic Acid, Sodium Salt	None Established
Neodecanoic Acid, Sodium Salt	None Established
Diethylene Glycol	10 mg/m^3 TWA AIHA WEEL

VENTILATION: Use general ventilation or local exhaust as required to maintain exposures below the occupational exposure limits.

RESPIRATORY PROTECTION: For operations where the TLV is exceeded a NIOSH approved respirator with organic vapor cartridges and dust/mist prefilters or supplied air respirator is recommended. Equipment selection depends on contaminant type and concentration. Select and use in accordance with 29 CFR 1910.134 and good industrial hygiene practice. For firefighting, use self-contained breathing apparatus.

GLOVES: Chemical resistant gloves such as neoprene or PVC where contact is possible.

EYE PROTECTION: Splash-proof goggles.

OTHER PROTECTIVE EQUIPMENT/CLOTHING: Appropriate protective clothing as needed to minimize skin contact.

9. Physical and Chemical Properties

APPEARANCE:	Yellow liquid	ODOR:	Characteristic odor
ODOR THRESHOLD:	None	pH:	8.7-9.2
MELTING/FREEZING POINT:	-34°F (-36.6°C) – -36°F (-37.7°C)	BOILING POINT/RANGE:	327°F (164°C) – 340°F (171.1°C)
FLASH POINT:	254 °F (123 °C) TOC >230 °F (>110 °C) Setaflash	EVAPORATION RATE:	Not determined
FLAMMABILITY (SOLID, GAS)	Not Applicable	FLAMMABILITY LIMITS:	LEL: Not determined UEL: Not determined
VAPOR PRESSURE:	<0.06 mm Hg @20°C	VAPOR DENSITY:	2.1
RELATIVE DENSITY:	1.07-1.14	SOLUBILITIES	Water: Complete
PARTITION COEFFICIENT (n-octanol/water)	Not determined	AUTOIGNITION TEMPERATURE:	Not determined
DECOMPOSITION TEMPERATURE:	Not determined	VISCOSITY:	Not determined

10. Stability and Reactivity

REACTIVITY: Normally unreactive

CHEMICAL STABILITY: Stable

POSSIBILITY OF HAZARDOUS REACTIONS: Reaction with strong oxidizers will generate heat.

CONDITIONS TO AVOID: None known

INCOMPATIBLE MATERIALS: Avoid strong bases at high temperatures, strong acids, strong oxidizing agents, and materials reactive with hydroxyl compounds.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide.

11. Toxicological Information

POTENTIAL HEALTH EFFECTS:

ACUTE HAZARDS:
INHALATION: May cause irritation of the nose and throat with headache, particularly from mists. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting,

headache, dizziness and irregular eye movements.

SKIN CONTACT: No evidence of adverse effects from available information.

EYE CONTACT: Liquid, vapors or mist may cause discomfort in the eye with persistent conjunctivitis, seen as slight excess redness or conjunctiva. Serious corneal injury is not anticipated.

INGESTION: May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, back pain, decrease in urine output, kidney failure, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure and pulmonary edema may develop. Severe kidney damage which may be fatal may follow the swallowing of ethylene glycol. A few reports have been published describing the development of weakness of the facial muscles, diminishing hearing, and difficulty with swallowing, during the late stages of severe poisoning.

CHRONIC EFFECTS: Prolonged or repeated inhalation exposure may produce signs of central nervous system involvement, particularly dizziness and jerking eye movements. Prolonged or repeated skin contact may cause skin sensitization and an associated dermatitis in some individuals. Ethylene glycol has been found to cause birth defects in laboratory animals. The significance of this finding to humans has not been determined. 2-Ethyl Hexanoic Acid, Sodium Salt is suspected of causing developmental effects based on animal data.

CARCINOGENICITY LISTING: None of the components of these products is listed as a carcinogen or suspected carcinogen by IARC, NTP, ACGIH or OSHA.

ACUTE TOXICITY VALUES:
Ethylene Glycol: LD50 Oral Rat: 4700 mg/kg
LD50 Skin Rabbit: 9530 mg/kg

Diethylene Glycol: LD50 Oral Rat: 12,565 mg/kg
LD50 Skin Rabbit: 11,890 mg/kg

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH: Ethylene glycol has been shown to produce dose-related teratogenic effects in rats and mice when given by gavage or in drinking water at high concentrations or doses. Also, in a preliminary study to assess the effects of exposure of pregnant rats and mice to aerosols at concentrations 150, 1,000 and 2,500 mg/m3 for 6 hours a day throughout the period of organogenesis, teratogenic effects were produced at the highest concentrations, but only in mice. The conditions of these latter experiments did not allow a conclusion as to whether the developmental toxicity was mediated by inhalation of aerosol, percutaneous absorption of ethylene glycol from contaminated skin, or swallowing of ethylene glycol as a result of grooming the wetted coat. In a further study, comparing effects from high aerosol concentration by whole-body or nose-only exposure, it was shown that nose-only exposure resulted in maternal toxicity (1,000 and 2,500 mg/m3) and developmental toxicity in with minimal evidence of teratogenicity (2,500 mg/m3). The no-effects concentration (based on maternal toxicity) was 500 mg/m3. In a further study in mice, no teratogenic effects could be produced when ethylene glycol was applied to the skin of pregnant mice over the period of organogenesis. The above observations suggest that ethylene glycol is to be regarded as an animal teratogen; there is currently no available information to suggest that ethylene glycol caused birth defects in humans. Cutaneous application of ethylene glycol is ineffective in producing developmental toxicity; exposure to high aerosol concentration is only minimally effective in producing developmental toxicity; the major route for producing developmental toxicity is perorally.

Two chronic feeding studies, using rats and mice, have not produced any evidence that ethylene glycol causes dose-related increases in tumor incidence or a different pattern of tumors compared with untreated controls. The absence of carcinogenic potential for ethylene glycol has been supported by numerous invitro genotoxicity studies showing that it does not produce mutagenic or clastogenic effects. This product contains less than 0.3% tolytriazole which has demonstrates mutagenic activity in a bacterial test system. A correlation has been established between mutagenic activity and carcinogenic activity for many chemicals. Tolytriazole has not been identified as a carcinogen or probable carcinogen by NTP, IARC or OSHA.

In a study of Wistar rats, adverse developmental results were reported at a dose of 100 mg / kg of body weight for 2-Ethyl Hexanoic Acid, Sodium Salt.

12. Ecological Information

ECOTOXICITY:

Ethylene Glycol: LC50 Fathead Minnow <10,000 mg/L/96 hr.
EC50 Daphnia Magna 100,000 mg/L/48 hr.
Bacterial (Pseudomonas putida): 10,000 mg/l
Protozoa (Entosiphon sulcatum and Uronema parduczi; Chatton-Lwoff) : >10,000 mg/l
Algae (Microcystis aeruginosa): 2,000 mg/l
Green algae (Scenedesmus quandricauda) : >10,000 mg/l

Diethylene Glycol: LC50 western mosquitofish >32,000 mg/L/96 hr.

PERSISTENCE AND DEGRADABILITY:

Ethylene Glycol is readily biodegradable (97-100% in 2-12 days). Diethylene glycol is readily biodegradable (>70% in 19 days).

BIOACCUMULATIVE POTENTIAL:

Ethylene glycol: A BCF of 10, reported for ethylene glycol in fish, Golden ide (Leuciscus idus melanotus), after 3 days of exposure suggests the potential for bio concentration in aquatic organisms is low.
Diethylene glycol: An estimated BCF of 3 suggests the potential for bio concentration in aquatic organisms is low.

MOBILITY IN SOIL: Ethylene glycol and diethylene glycol are highly mobile in soil.

OTHER ADVERSE EFFECTS: None known

13. Disposal Considerations

Dispose of product in accordance with all local, state/provincial and federal regulations.

14. Transport Information

U.S. DOT HAZARD CLASSIFICATION: Not Regulated (unless package contains a reportable quantity)

Note: IF A SHIPMENT OF A REPORTABLE QUANTITY (5,260 LBS/553 GAL.) IN A SINGLE PACKAGE IS INVOLVED, THE FOLLOWING INFORMATION APPLIES:

PROPER SHIPPING NAME: RQ, Environmentally hazardous substance, liquid, n.o.s. (Ethylene glycol)
UN NUMBER: UN3082
PACKING GROUP: III
LABELS REQUIRED: Class 9

DOT MARINE POLLUTANTS: This product does not contain Marine Pollutants as defined in 49 CFR 171.8.

IMDG CODE SHIPPING CLASSIFICATION: Not Regulated

CANADIAN TDG CLASSIFICATION: Not Regulated

15. Regulatory Information

EPA SARA 311/312 HAZARD CLASSIFICATION: Acute health, chronic health

EPA SARA 313: This Product Contains the Following Chemicals Subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372):

Ethylene Glycol	107-21-1	75-95%

PROTECTION OF STRATOSPHERIC OZONE: This product is not known to contain or to have been manufactured with ozone depleting substances as defined in 40 CFR Part 82, Appendix A to Subpart A.

CERCLA SECTION 103: Spills of this product over the RQ (reportable quantity) must be reported to the National Response Center. The RQ for this product, based on the RQ for Ethylene Glycol (95% maximum) of 5,000 lbs, is 5,260 lbs. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

CALIFORNIA PROPOSITION 65: This product contains the following chemicals known to the State of California to cause cancer or reproductive toxicity (birth defects):

Ethylene Glycol	107-21-1	75-95%	Developmental

EPA TSCA INVENTORY: All of the components of this material are listed on or exempt from the Toxic Substances Control Act (TSCA) Chemical Substances Inventory.

CANADIAN ENVIRONMENTAL PROTECTION ACT: All of the ingredients are listed on or exempt from the Canadian Domestic Substances List.

EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS): All of the ingredients are listed on or exempt from the EINECS inventory.

JAPAN: All of the ingredients of this product are listed on or exempt from the Japanese Existing and New Chemical Substances (MITI) List.

AUSTRALIA: All of the ingredients of this product are listed on or exempt from the Australian Inventory of Chemical Substances.

KOREA: All of the ingredients of this product are listed on or exempt from the Korean Existing Chemical List (KECL).

PHILIPPINES: All of the ingredients of this product are listed on or exempt from the Philippine Inventory of Chemical and Chemical Substance (PICCS)

CHINA: All of the ingredients of this product are listed on or exempt from the Inventory of Existing Chemical Substance in China (IECSC).

16. Other Information

NFPA RATING (NFPA 704) - FIRE: 1 HEALTH: 2 INSTABILITY: 0

REVISION SUMMARY: Section 15: Chemical inventories, California Proposition 65.

SDS Date of Preparation/Revision: September 24, 2015

This SDS is directed to professional users and bulk handlers of the product. Consumer products are labeled in accordance with Federal Hazardous Substances Act regulations.

While Prestone Products Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which Prestone Products Corporation assumes legal responsibility. They are offered solely for your consideration, investigation and verification. Any use of these data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.

If more information is needed, please contact:

Prestone Products Corporation
69 Eagle Road
Danbury CT 06810
(800) 890-2075

Appendix C

Equipment Inspection Forms

HEAVY EQUIPMENT – Inspection Form

		Date:	
Project Name:	AmMg – Deming Mining Project	Project Number:	
Location:	Deming, New Mexico	Project Manager:	
Completed by:		Reviewed by:	
Manufacturer:		Equipment ID:	

- Check “Yes” if an assessment item is complete or is determined to be correct.
- Check “No” if an item is deficient for determined to be incorrect. Items determined to be deficiencies shall be brought to the immediate attention of the Site Supervisor or Safety Officer. Corrective Action must be completed for assessment items marked “No”.
- Check “N/A” if the item is not applicable.

1.0 General Equipment Inspection	Yes	No	N/A
1.1 Boom/Blade/Ripper in good condition?	☐	☐	☐
1.2 Ground engaging attachments in good condition?	☐	☐	☐
1.3 Frame, ladders, access point free of debris and in good condition?	☐	☐	☐
1.4 Hand grabs and steps free of debris and in good condition?	☐	☐	☐
1.5 Power cables and/or hoist cables free of damage?	☐	☐	☐
1.6 Braking system and steering components operational?	☐	☐	☐
1.7 Tire and/or tracks in good condition?	☐	☐	☐
1.8 Horn tested and operational?	☐	☐	☐
1.9 Mirrors in good condition?	☐	☐	☐
1.10 Gauges/turn signals/backup lights operational?	☐	☐	☐
1.11 Fire extinguisher maintained and within inspection date?	☐	☐	☐

2.0 Spill Prevention and Control	Yes	No	N/A
2.1 Verified no visible signs of leaking hydraulic oil?	☐	☐	☐
2.2 Hydraulic oil level verified?	☐	☐	☐
2.3 Verified no visible signs of leaking motor oil/transmission fluid?	☐	☐	☐
2.4 Motor oil/transmission level verified?	☐	☐	☐
2.5 Verified no visible signs of brake fluid/transfer case fluids?	☐	☐	☐
2.6 Brake fluid level verified?	☐	☐	☐
2.7 Verified no visible signs of leaking coolant/cooling system fluid?	☐	☐	☐
2.8 Verified no staining on ground surface, no visible signs of leaking fuel?	☐	☐	☐
2.9 Fuel level verified?	☐	☐	☐

3.0 Other Comments

Corrective Action		
Item	Corrective Action Planned	Date Corrected

DRILLING RIG – Inspection Form

		Date:	
Project Name:	AmMg – Deming Mining Project	Project Number:	
Location:	Deming, New Mexico	Project Manager:	
Completed by:		Reviewed by:	
Manufacturer:		Equipment ID:	

- Check “Yes” if an assessment item is complete or is determined to be correct.
- Check “No” if an item is deficient for determined to be incorrect. Items determined to be deficiencies shall be brought to the immediate attention of the Site Supervisor or Safety Officer. Corrective Action must be completed for assessment items marked “No”.
- Check “N/A” if the item is not applicable.

1.0 General Equipment Inspection	Yes	No	N/A
1.1 Kill switch clearly identified and operational?	☐	☐	☐
1.2 Ground engaging attachments in good condition?	☐	☐	☐
1.3 Rig ropes not wrapped around body parts?	☐	☐	☐
1.4 Pressurized lines and hoses secured?	☐	☐	☐
1.5 Cathead in clean, sound condition?	☐	☐	☐
1.6 Drill rig ropes in clean, sound condition?	☐	☐	☐
1.7 Augers/bits in clean, sound condition?	☐	☐	☐
1.8 Stabilization and leveling mechanisms operational?	☐	☐	☐
1.9 Fire extinguisher maintained and within inspection date?	☐	☐	☐

2.0 Spill Prevention and Control	Yes	No	N/A
2.1 Verified no visible signs of leaking hydraulic oil?	☐	☐	☐
2.2 Hydraulic oil level verified?	☐	☐	☐
2.3 Verified no visible signs of leaking motor oil/transmission fluid?	☐	☐	☐
2.4 Motor oil/transmission level verified?	☐	☐	☐
2.5 Verified no visible signs of brake fluid/transfer case fluids?	☐	☐	☐
2.6 Brake fluid level verified?	☐	☐	☐
2.7 Verified no visible signs of leaking coolant/cooling system fluid?	☐	☐	☐
2.8 Verified no staining on ground surface, no visible signs of leaking fuel?	☐	☐	☐
2.9 Fuel level verified?	☐	☐	☐

3.0 Other comments

Corrective Action		
Item	Corrective Action Planned	Date Corrected

Appendix D

Natural Resources Conservation Service Soil Report

United States Department of Agriculture

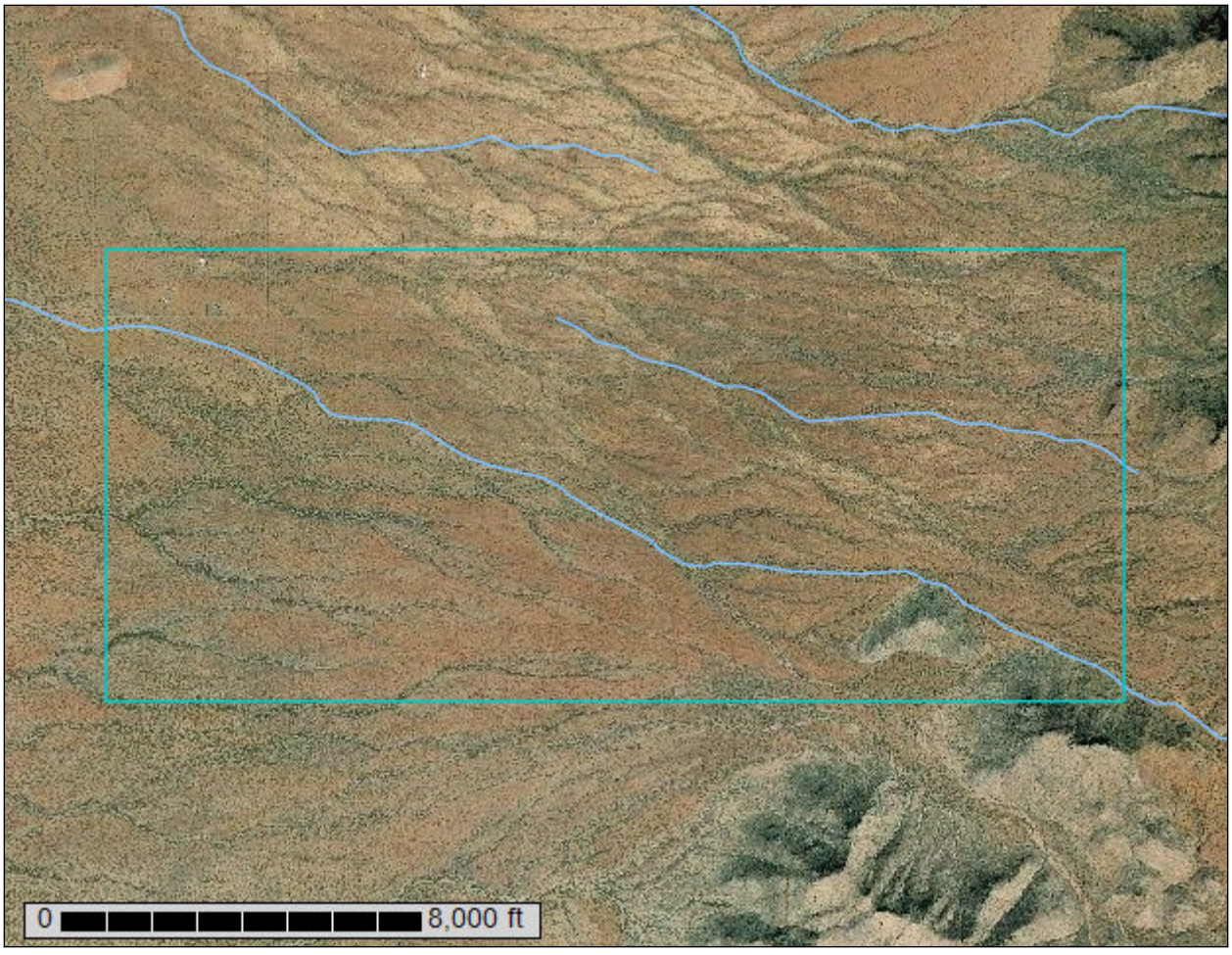
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Luna County, New Mexico

Foothill Dolomite Mine Area



April 1, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

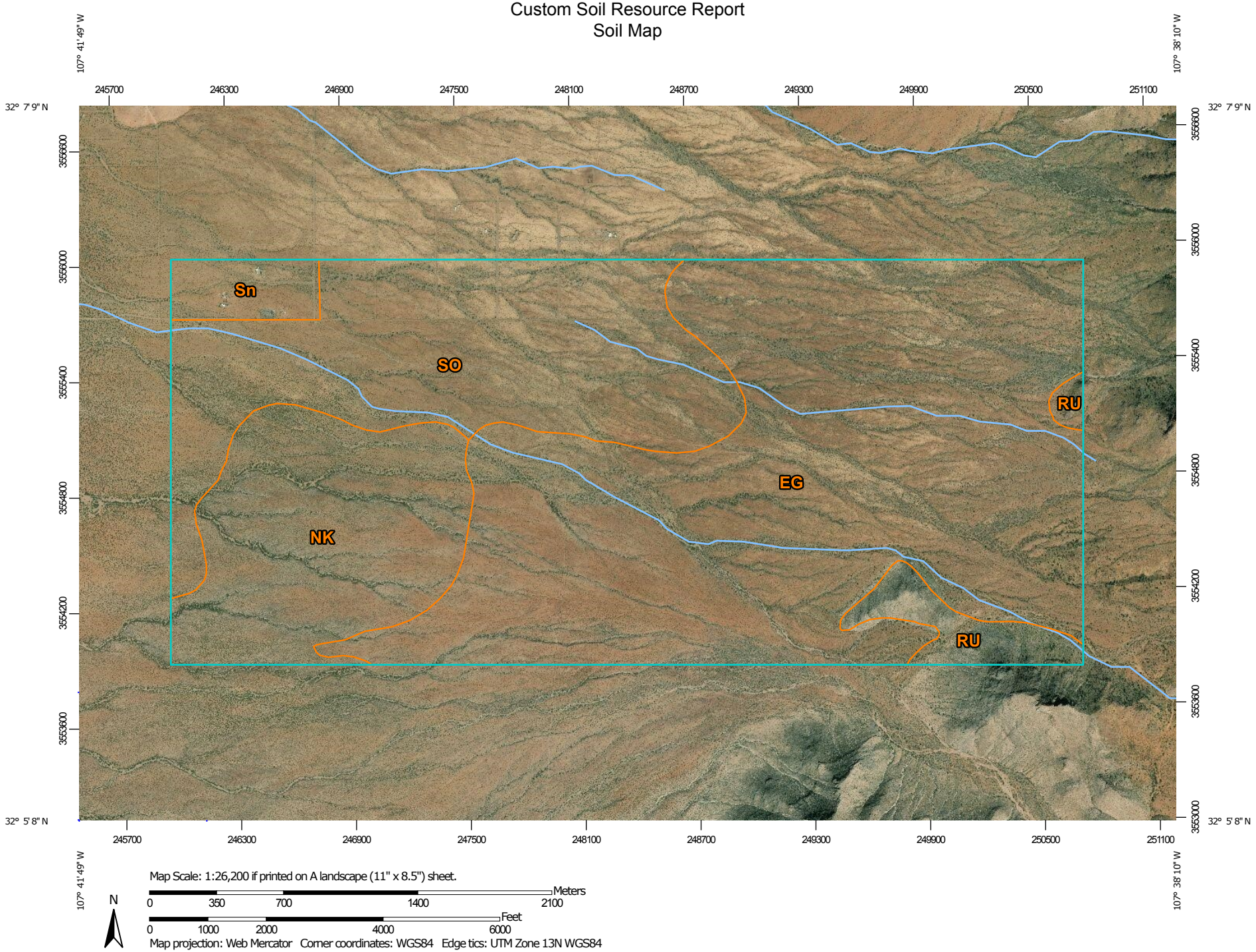
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Luna County, New Mexico
Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 26, 2015—Nov 23, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EG	Eba very gravelly clay loam, 0 to 10 percent slopes	1,354.5	54.4%
NK	Nickel very gravelly sandy loam, 3 to 9 percent slopes	399.0	16.0%
RU	Rough broken and Rock land	79.5	3.2%
Sn	Sonoita gravelly sandy loam	60.3	2.4%
SO	Sonoita gravelly sandy loam	594.9	23.9%
Totals for Area of Interest		**2,488.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Luna County, New Mexico

EG—Eba very gravelly clay loam, 0 to 10 percent slopes

Map Unit Setting

National map unit symbol: 1w94
Elevation: 1,800 to 6,000 feet
Mean annual precipitation: 7 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 170 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Eba and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eba

Setting

Landform: Fan remnants, alluvial fans
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 2 inches: very gravelly clay loam
H2 - 2 to 60 inches: very gravelly clay

Properties and qualities

Slope: 0 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: Gravelly Loam (R042XB035NM)
Hydric soil rating: No

Minor Components

Mohave

Percent of map unit:
Ecological site: Loamy (R042XB014NM)

Hydric soil rating: No

Nickel

Percent of map unit:
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

NK—Nickel very gravelly sandy loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 1wb8
Elevation: 2,200 to 6,000 feet
Mean annual precipitation: 8 to 17 inches
Mean annual air temperature: 55 to 70 degrees F
Frost-free period: 160 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Nickel and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nickel

Setting

Landform: Fan remnants, fan piedmonts
Landform position (two-dimensional): Footslope, shoulder, backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 4 inches: very gravelly sandy loam
H2 - 4 to 18 inches: very gravelly loam
H3 - 18 to 60 inches: very gravelly loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

Minor Components

Eba

Percent of map unit:
Ecological site: Gravelly Loam (R042XB035NM)
Hydric soil rating: No

Sonoita

Percent of map unit:
Ecological site: Gravelly Loam (R042XB035NM)
Hydric soil rating: No

RU—Rough broken and Rock land

Map Unit Setting

National map unit symbol: 1wbg
Elevation: 0 to 8,400 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 50 to 68 degrees F
Frost-free period: 150 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Rough broken: 50 percent
Lozier and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rough Broken

Typical profile

H1 - 0 to 60 inches: bedrock

Properties and qualities

Slope: 25 to 75 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Lozier

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from limestone

Typical profile

H1 - 0 to 8 inches: very stony loam
H2 - 8 to 60 inches: bedrock

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: 4 to 16 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 70 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Hills (R042XB027NM)
Hydric soil rating: No

Minor Components

Lehmans

Percent of map unit:
Ecological site: Hills (R042XB027NM)
Hydric soil rating: No

Graham

Percent of map unit:
Ecological site: Malpais (R042XB037NM)
Hydric soil rating: No

Lozier

Percent of map unit:
Ecological site: Limestone Hills (R042XB021NM)
Hydric soil rating: No

Sn—Sonoita gravelly sandy loam

Map Unit Setting

National map unit symbol: 1wbn
Elevation: 1,400 to 5,900 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Sonoita and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sonoita

Setting

Landform: Terraces, hillslopes
Landform position (two-dimensional): Footslope, shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 3 inches: gravelly sandy loam
H2 - 3 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Gravelly Loam (R042XB035NM)

Hydric soil rating: No

Minor Components

Bluepoint

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Tres hermanos

Percent of map unit:
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

Mohave

Percent of map unit:
Ecological site: Loamy (R042XB014NM)
Hydric soil rating: No

Onite

Percent of map unit:
Ecological site: Sandy (R042XB012NM)
Hydric soil rating: No

SO—Sonoita gravelly sandy loam

Map Unit Setting

National map unit symbol: 1wbj
Elevation: 1,400 to 5,700 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Sonoita and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sonoita

Setting

Landform: Terraces, hillslopes
Landform position (two-dimensional): Footslope, shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 3 inches: gravelly sandy loam
H2 - 3 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Gravelly Loam (R042XB035NM)
Hydric soil rating: No

Minor Components

Onite

Percent of map unit:
Ecological site: Sandy (R042XB012NM)
Hydric soil rating: No

Mohave

Percent of map unit:
Ecological site: Loamy (R042XB014NM)
Hydric soil rating: No

Bluepoint

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

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Appendix E

Biological Information

Appendix E1

Biological Survey

BIOLOGICAL EVALUATION

OF THE PROPOSED FOOTHILLS DOLOMITE QUARRY SOUTH OF DEMING, LUNA COUNTY, NEW MEXICO

PREPARED FOR

AMERICAN MAGNESIUM, LLC

SUBMITTED TO

BUREAU OF LAND MANAGEMENT, LAS CRUCES DISTRICT OFFICE

PREPARED BY

EnviroSystems Management, Inc.

Environmental Planning • Regulatory Compliance

SEPTEMBER 7, 2016

Biological Evaluation

Proposed Foothills Dolomite Quarry South of Deming, Luna County, New Mexico

Las Cruces District Office
Bureau of Land Management
Las Cruces, New Mexico

PROPOSED ACTION

American Magnesium proposes to construct a dolomite quarry on 40 acres of Bureau of Land Management (BLM) Las Cruces District Office (LCDO) land in the western foothills of the Florida Mountains, centered on a small hill just west of Mahoney Park. The exceptionally pure dolomite would be mined in a quarry, trucked or conveyed via conveyor belt to a processing facility at Peru Mill Industrial Park in Deming, and shipped via rail to market.

The two claims which comprise the proposed quarry are centered on a small, unnamed hill in the western foothills of the Florida Mountains, approximately 14 miles south-southeast of Deming, New Mexico (Figure 1). The claims are located in the SE ¼ of Section 27, T25S, R8W, New Mexico Baseline & Meridian.

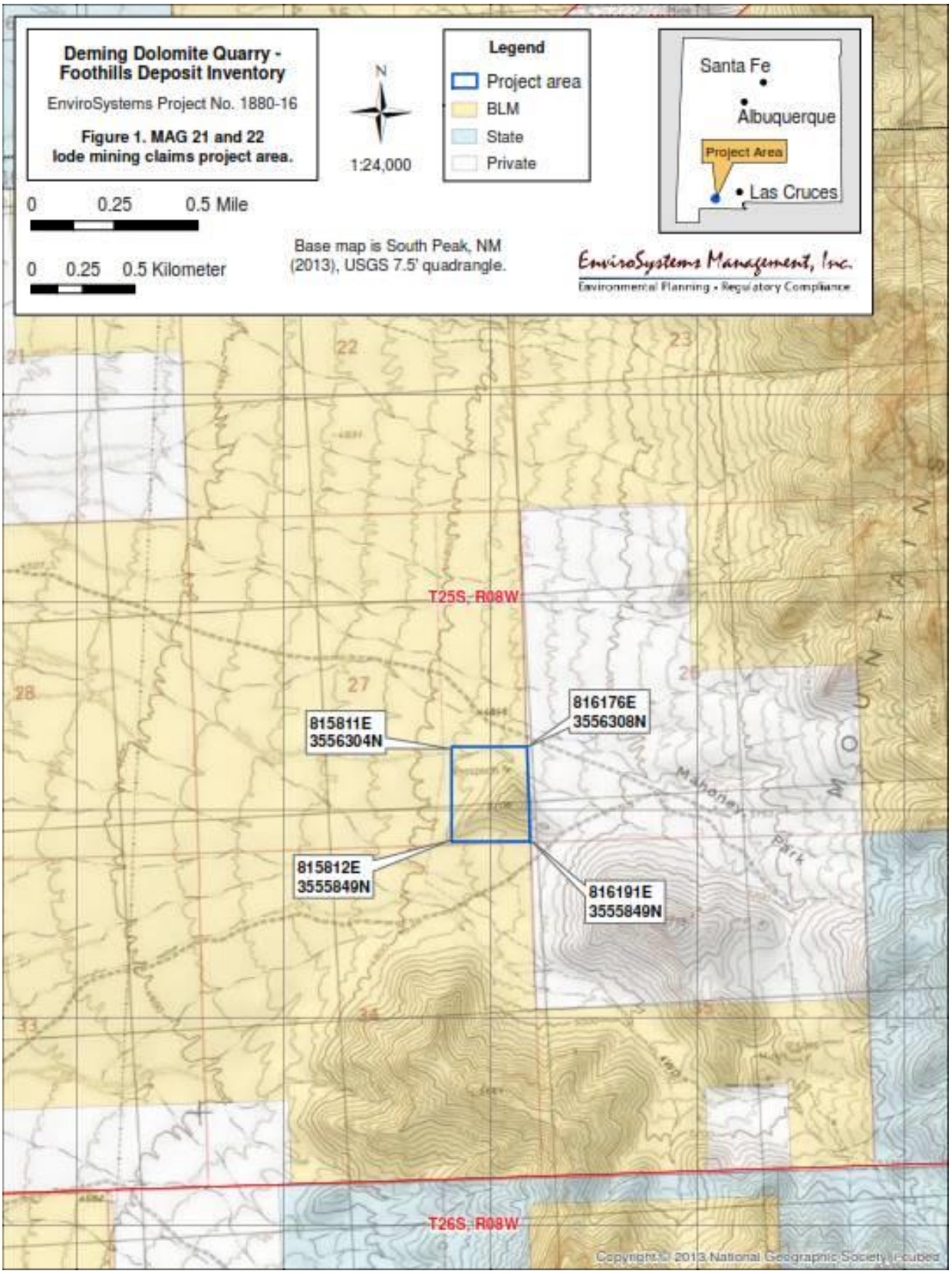
EXISTING CONDITION

The project area is located in a desert scrub community, with a sparse vegetation cover of cacti, agave, and grasses and dotted with occasional shrubs or small trees including saltbush, snakeweed, juniper, and honey mesquite. The area proposed for the quarry is currently undeveloped and does not appear to have been previously used except for grazing.

Hydrology

The project area covers a small hill on the western flanks of the Florida Mountains. Ephemeral washes on the northern and southern edges of the hill carry runoff from the nearby foothills and mountains during heavy rain events. The U.S. Fish and Wildlife Service (USFWS) Wetlands Inventory shows these and numerous other ephemeral washes along the slope of the mountains, draining west toward a series of agricultural fields with occasional ponds in the valley below (USFWS 2016a). These wetlands are classified as intermittent riverine habitats which may be seasonally flooded. The washes were dry during the biological field survey of the proposed project area.

Figure 1. Project Location.



Geology and Soils

The proposed Foothills Dolomite Quarry project is based around on a single large outcrop of Silurian-age Fusselman Dolomite, with smaller outcrops of Ordovician-age Montoya Formation Dolomite along the southern flanks, all rising out of a fan of Quaternary-age alluvial material descending from the mountains to the east (Clemons 1985).

Soils on the dolomite outcrop are classified as rough broken and rock land, and soils at the base of the outcrop as Eba very gravelly clay loam (NRCS 2016). The rough broken and rock land has very little soil development, with at most a few inches of very stony loam over bedrock on slopes of at least 25 percent. The Eba soils are common on alluvial fans and are well drained, with 0 to 2 inches of very gravelly clay loam over a very gravelly clay.

Vegetation

The plant community in the project area and vicinity is a matrix of Chihuahuan Desert Broadleaf Evergreen Scrub and Chihuahuan Desert Broadleaf Deciduous Desert Scrub (BISON-M 2016). Shrubby species dominated the vegetation of the project area and included honey mesquite (*Prosopis glandulosa*), broom snakeweed (*Gutierrezia sarothrae*), ocotillo (*Fouquieria splendens*), sotol (*Dasylirion wheeleri*), redberry juniper (*Juniperus arizonica*), and yellow trumpetbush (*Tecoma stans*). Cactus species and other succulents such as candy barrelcactus (*Ferocactus wislizeni*), cholla (*Cylindropuntia* sp.), prickly pear cactus (*Opuntia* sp.), Graham's nipple cactus (*Mammillaria grahamii*), and Palmer's century plant (*Agave palmeri*) were also common. Grasses and forbs were less common in the rocky, shrubby terrain, including threeawn (*Aristida* sp.), matted grama (*Bouteloua simplex*), and silverleaf nightshade (*Solanum elaeagnifolium*). Table 1 contains a list of all plant species identified in the project area during the biological field survey on July 28, 2016.

Table 1. Complete List of Plant Species Observed in the Project Area.

Common Name	Scientific Name
Trees	
redberry juniper	*Juniperus arizonica*
singleneedle pinyon	*Pinus monophylla*
honey mesquite	*Prosopis glandulosa*
Shrubs/Sub-shrubs	
saltbush	*Atriplex* sp.
broom snakeweed	*Gutierrezia sarothrae*
yellow trumpetbush	*Tecoma stans*
Forbs	
Cochise scaly cloakfern	*Astrolepis cochisensis*
silverleaf nightshade	*Solanum elaeagnifolium*
Cacti, Agave, & Succulents	
Palmer's century plant	*Agave palmeri*
cholla	*Cylindropuntia sp.*
sotol	*Dasylirion wheeleri*
candy barrelcactus	*Ferocactus wislizeni*

Common Name	Scientific Name
ocotillo	*Fouquieria splendens*
Graham's nipple cactus	*Mammillaria grahamii*
prickly pear cactus	*Opuntia* sp.
soaptree yucca	*Yucca elata*
Grasses	
threeawn	*Aristida* sp.
matted grama	*Bouteloua simplex*

Wildlife

The project area provides habitat for a variety of mammals, reptiles, and birds. Wildlife species encountered during the biological survey included a whiptail lizard (*Aspidoscelis* sp.) and various species of birds, including cactus wren (*Campylorhynchus brunneicapillus*), Gambel's quail (*Callipepla gambelii*), northern mockingbird (*Mimus polyglottos*), black-chinned sparrow (*Spizella atrogularis*), bushtit (*Psaltriparus minimus*), thrasher (*Toxostoma* sp.), and greater roadrunner (*Geococcyx californianus*). See Table 2 for a list of all wildlife species identified during the biological field survey.

Table 2. Complete List of Wildlife Species Observed in the Project Area.

Common Name	Scientific Name
Birds	
black-chinned sparrow	*Spizella atrogularis*
bushtit	*Psaltriparus minimus*
cactus wren	*Campylorhynchus brunneicapillus*
Gambel's quail	*Callipepla gambelii*
greater roadrunner	*Geococcyx californianus*
northern mockingbird	*Mimus polyglottos*
thrasher	*Toxostoma* sp.
Reptiles	
whiptail lizard	*Aspidoscelis* sp.

SPECIES IDENTIFICATION

Prior to the site visit, the USFWS Information, Planning, and Conservation System (iPaC) online tool was consulted for a Trust Resources List of Threatened, Endangered, Proposed Threatened or Endangered, and Candidate species (T & E species) for the project area (Appendix A; USFWS 2016b). Four species were identified as potentially occurring in the project area. This reference also provided information pertaining to Critical Habitats, USFWS National Wildlife Refuges, USFWS migratory birds, and USFWS National Wetlands Inventory (NWI) Wetlands. There are no Critical Habitats or National Wildlife Refuges identified within the project area; the only wetlands identified within the project area are the ephemeral washes described in the Hydrology section above (USFWS 2016a; USFWS 2016b).

The Biota Information System of New Mexico (BISON-M) online database query was consulted for a list of state-listed species with potential habitat near the project area (Appendix B; BISON-M 2016). The BISON-M database was queried using the following search terms: county, status, habitat, and gap vegetation type. Results indicated that seven state threatened or endangered species have the possibility of occurring in the project area. Note that one state-listed species (northern aplomado falcon) is also on the federal list, so it was not analyzed separately in the state table.

BLM state and district offices were also contacted to obtain information on BLM sensitive species with potential habitat in or near the project area. BLM sensitive species are species that require special management consideration to avoid potential future listing under the Endangered Species Act (ESA) and that have been identified in accordance with procedures set forth in BLM Manual 6840: Special Status Species Management. BLM special status species are (1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as BLM sensitive by the BLM State Director. All Federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as BLM sensitive species. The BLM Las Cruces District biologist provided a list of BLM sensitive animal species, and a list of BLM sensitive plant species was obtained from the state office (Appendix C). A total of 27 animal and 18 plant species are on the BLM sensitive species lists for the Las Cruces District.

A qualified biologist of EnviroSystems conducted a comprehensive biological resource evaluation of the project area on July 28, 2016. Photographic documentation of the biological field survey is included in Appendix D. The project area was searched for individuals, sign and/or habitat of each special status species listed in Tables 3 – 5.

ANALYSIS OF EFFECTS

Table 3 includes the analysis of impacts and determination of effects for federally listed and proposed species that could potentially occur in the project area. Table 4 shows the same analysis for state-listed species. Table 5 includes the analysis of effects and the determination of impacts for BLM sensitive species.

Table 3. Analysis of Effects and Determination of Effects for Federally-listed Threatened, Endangered, and Proposed Species.

Species	FWS Status & Year	Critical Habitat Present	Key Habitat Elements	Status within Action Area of Project	Determination of Effect
AMPHIBIANS (1)					
Lithobates chiricahuensis **Chiricahua leopard frog**	**Threatened 2002**	**NO**	Occurs primarily in the oak and mixed oak and pine woodlands. Highly aquatic and almost always associated with permanent or semi-permanent water, preferably with emergent and submergent aquatic vegetation. Prefers rocky streams with deep rock bound pools. Species inhabits montane springs, streams, rivers, backwaters, ponds, and stock tanks that are mostly free from non-native fish, crayfish, bullfrogs, and other species (AGFD 2006).	There is no suitable or potential habitat for this species within the project area. Critical Habitat was designated final in April, 2012. No critical habitat was designated in Luna County (USFWS 2016c). No effects from the proposed action would occur.	**NO EFFECT**
BIRDS (2)					
Falco femoralis **northern aplomado falcon**	**Experimental Population, Non-Essential 2006**	**NO**	The Aplomado Falcon has extremely broad habitat preferences. Most late nineteenth- and early twentieth-century Aplomado records from Arizona, New Mexico, transPecos Texas, and central Mexico, were in semi-desert grassland or riparian associations with scattered trees and shrubs, with elevations from 3,300-4,900 feet above sea level. (AGFD 2001a).	Suitable nesting and feeding habitat occurs within the project area. No critical habitat was designated in Luna County (USFWS 2016c). Although individuals may be affected by the proposed quarry, adults would be able to relocate to avoid harm from quarry activities.	**NOT LIKELY TO JEOPARDIZE**
Coccyzus americanus occidentalis **western yellow-billed cuckoo**	**Threatened 2014**	**NO**	Cuckoos generally prefer mature riparian habitats and are most commonly associated with cottonwood or other native forests. However, Yellow-billed Cuckoos breed extensively in the dense saltcedar stands along parts of the Pecos River (BISON-M 2016).	No suitable habitat exists within or near the analysis area. No critical habitat was designated in Luna County (USFWS 2016c). No effects from the proposed action would occur.	**NO EFFECT**
FISHES (1)					
Cyprinella formosa **beautiful shiner**	**Threatened 1984**	**NO**	Beautiful shiners live mainly in pools of small to medium streams and along shorelines in larger streams. They remain near, but rarely move within beds of aquatic vegetation or other cover (BISON-M 2016).	There is no suitable habitat present in the analysis area. No critical habitat was designated in Luna County (USFWS 2016c). Additionally, there is no potential for downstream impacts generated by this project that would affect occupied or suitable habitat for this species.	**NO EFFECT**

The proposed action would have no effect on any Federally-listed threatened or endangered species or Critical Habitat, and is not likely to jeopardize species proposed for listing.

Table 4. Analysis of Effects and Determination of Impacts for New Mexico Threatened and Endangered Species.

Species	Status	Key Habitat Elements	Status within Action Area of Project	Determination of Impact
AMPHIBIANS (1)				
Gastrophryne olivacea **Great Plains narrowmouth toad**	**NM Endangered**	The Great Plains narrowmouth toad occurs primarily in grassland and desert-grassland habitats, in seasonally or permanently wet areas (BISON-M 2016).	No suitable habitat exists within or near the analysis area. No impacts from the proposed action would occur.	**NO IMPACT**
BIRDS (4)				
Falco peregrinus tundrius **Arctic peregrine falcon**	**NM Threatened**	In New Mexico, the breeding territories of peregrine falcons center on cliffs that are in wooded/forested habitats, with large "gulfs" of air nearby in which these predators can forage (BISON-M 2016).	No suitable habitat exists within or near the analysis area. No impacts from the proposed action would occur.	**NO IMPACT**
Columbina passerina **common ground-dove**	**NM Endangered**	Occurs in marshes and desert riparian deciduous woodland, especially of cottonwoods, that occur where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins (BISON-M 2016).	No suitable habitat exists within or near the analysis area. No impacts from the proposed action would occur.	**NO IMPACT**
Falco peregrinus **peregrine falcon**	**NM Threatened**	In New Mexico, the breeding territories of peregrine falcons center on cliffs that are in wooded/forested habitats, with large "gulfs" of air nearby in which these predators can forage (BISON-M 2016).	No suitable habitat exists within or near the analysis area. No impacts from the proposed action would occur.	**NO IMPACT**
Passerina versicolor **varied bunting**	**NM Threatened**	In New Mexico the species seems to prefer dense stands of mesquite (*Prosopis* spp.) and associated growth in canyon bottoms (BISON-M 2016).	Although mesquite is present in the study area, it does not grow in dense stands. Individuals may pass through the area on occasion, but it is highly unlikely that varied buntings would nest in the project area. No impacts from the proposed action would therefore occur.	**NO IMPACT**
REPTILES (1)				
Heloderma suspectum suspectum **Reticulate gila monster**	**NM Endangered**	This species is most widely distributed in desert and mesquite-grassland, but also occurs in pine-oak forest, tropical deciduous forest, and thorn forest. It is usually found in rocky foothill regions and avoids open flats (BISON-M 2016).	Suitable habitat occurs within the project area. Individuals inhabiting the area that did not relocate off-site would be adversely impacted by mining activities.	**MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT**

Table 5. Analysis of Impacts and Determination of Impacts for BLM Sensitive Species

Species	Status	Key Habitat Elements	Status within Action Area of Project	Determination of Impact
BIRDS (7)				
Athene cunicularia hypugaea **western burrowing owl**	**Sensitive**	Variable in open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Burrowing owls are at times observed open areas such as vacant lots near human habitation, golf courses and airports (AGFD 2001b).	Suitable habitat may exist in the project area, although no mammal burrows were detected during the biological survey. Although individuals may be impacted by the proposed quarry, adults would be able to relocate to avoid harm from quarry activities.	**MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT**
Gymnorhinus cyanocephalus **pinyon jay**	**Sensitive**	This species is closely tied to pinyon-juniper woodlands, but also breeds in sagebrush, scrub oak, chaparral, ponderosa pine, and Jeffrey pine forests. It prefers mature stages of pinyon, which produce more seeds (BISON-M 2016).	Pinyon and juniper trees are found in the project area, although not in great abundance, as it is primarily a desert scrub environment. Although pinyon jays may occasionally pass through on foraging expeditions, it is unlikely that they would nest in the project area.	**MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT**
Toxostoma bendirei **Bendire's thrasher**	**Sensitive**	Found in Sonoran desert scrub, Chihuahuan desert scrub, desert riparian deciduous woodlands, marshes, annual grasslands, and farms (BISON-M 2016).	Suitable habitat exists in the project area. Although individuals may be impacted by the proposed quarry, adults would be able to relocate to avoid harm from quarry activities.	**MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT**
Anthus spragueii **Sprague's pipit**	**Sensitive**	Sprague's pipit is known to prefer nesting in short-grass plains, mixed-grass prairie, alkaline and wet meadows. Birds are often found in grasslands with mid-height vegetation including upland mixed-grass prairie, alkaline meadows and wet meadow zones around alkali and freshwater lakes (AGFD 2010a).	Although there are grasses in the project area, they are sparse and not likely to support nesting by Sprague's pipit. No impacts from the proposed action would occur.	**NO IMPACT**
Ammodramus savannarum ammolegus **Arizona grasshopper sparrow**	**Sensitive**	The preferred habitat of the Arizona grasshopper sparrow is open grassland between 3800 and 5300 feet. Within this range, the sparrow is limited to areas with moderate to high coverage of medium-height grass and with relatively low shrub coverage (AGFD 2010b).	Although there are grasses in the project area, they are sparse and not likely to support nesting by the Arizona grasshopper sparrow. No impacts from the proposed action would occur.	**NO IMPACT**
Ammodramus bairdii **Baird's sparrow**	**Sensitive**	Breeds in shorgrass prairies. In New Mexico it has been found in a variety of habitats, ranging from desert grasslands in the south to prairies in the northeast and mountain meadows in the San Juan and Sangre de Cristo mountains--including to an elevation of 3600 m (BISON-M 2016).	Although there are grasses in the project area, they are sparse and not likely to support nesting by Baird's sparrow. No impacts from the proposed action would occur.	**NO IMPACT**

Species	Status	Key Habitat Elements	Status within Action Area of Project	Determination of Impact
Passerina ciris **Painted Bunting**	**Sensitive**	Woodland edges, roadsides, brush, towns, gardens. Favors semi-open areas with dense low growth at all seasons. Breeds around thickets, hedgerows, woodland clearings and edges, and undergrowth of open woods. Winters in similar habitats in Florida, plus areas of scrub and second growth in the tropics. (Audubon 2016a).	Potential habitat may occur in the project area. However the project area is outside of the known range for the species (BISON-M), and while the occasional vagrant may pass through during migration, it is highly unlikely that the species would nest in the area. No impacts from the proposed action would occur.	**NO IMPACT**
MAMMALS (4)				
Choeronycteris mexicana **Mexican long-tongued bat**	**Sensitive**	These bats inhabit deep canyons where they use caves and mine tunnels as day roosts. They have also been found in buildings and often are associated with big-eared bats (BISON-M 2016).	Suitable habitat may occur in the vicinity of the project area, but no deep canyons are found in the project area itself, nor were caves or mine shafts located during the biological survey. The project area is also located outside of the known range for the species (BISON-M 2016). No impacts from the proposed action would occur.	**NO IMPACT**
Idionycteris phyllotis **Allen's lappet-browed bat**	**Sensitive**	Inhabit primarily conifer, oak, and riparian forests in mountainous areas They are frequently captured near cliffs, outcroppings, boulders, and lava flows and it is likely they roost in such sites They are also known to roost in tree snags. Found in ponderosa pine, pinyon-juniper, Mexican-type woodlands, white fir, and Mohave desertscrub vegetative communities (AGFD 2001c, Solvesky and Chambers 2009).	Suitable habitat may exist in the rock outcrops and boulders in the project area. However the project area is outside the known distribution of the species, so it is unlikely that development of the proposed quarry would impact the species.	**NO IMPACT**
Corynorhinus townsendii **Townsend's big-eared bat**	**Sensitive**	Townsend's big-eared bats are to be found during the day mostly in caves or mine tunnels, but at night they often rest in abandoned buildings. Insummer these bats occur widely in the state and can be found over desert-scrub, in shelters in desert-mountains, oak-woodland, pinon-juniper, or coniferous forests (BISON-M 2016).	Suitable habitat exists in the project area. Although individuals may be impacted by the proposed quarry, adults would be able to relocate to avoid harm from quarry activities.	**MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT**
Lepus callotis **White-sided jack rabbit**	**Sensitive**	In the United States portion of its range, the white-sided jackrabbit appears to be a virtual obligate of grasslands. These hares apparently spend the daylight hours hiding in the grass, and almost all observations of the species at that time are of animals flushed from cover (BISON-M 2016).	Although there are grasses in the project area, they are sparse and would not appear to support habitat needs of the white-sided jack rabbit. No impacts from the proposed action would occur.	**NO IMPACT**
PLANTS (4)				

Species	Status	Key Habitat Elements	Status within Action Area of Project	Determination of Impact
Escobaria duncanii **Duncan pincushion cactus**	**Sensitive**	Cracks in limestone and limy shale in broken terrain in Chihuahuan desert scrub; 1,550 m (5,100 ft) in New Mexico (NMRPTC 2005).	Although the habitat described for the species exists in the project area, the only known population is located in central Sierra County. It is unlikely that another population would be located this far south, and the species was not detected during the biological survey. No impacts would occur.	**NO IMPACT**
Pediomelum pentaphyllum **Chihuahua scurfpea**	**Sensitive**	Desert grassland or desertscrub among creosote bush or mesquite in sandy or gravelly loam soils; 1,350-2,000 m (4,400-6,600 ft) (NMRPTC 2005).	Although the habitat described for the species exists in the project area, the only known New Mexico population is located in Hidalgo County. It is unlikely that another population would be located this far east, and the species was not detected during the biological survey. No impacts would occur.	**NO IMPACT**
Peniocereus greggii var. *greggii* **night-blooming cereus**	**Sensitive**	Mostly in sandy to silty gravelly soils in gently broken to level terrain in desert grassland or Chihuahuan desert scrub. Typically found growing up through and supported by shrubs, especially *Larrea divaricata* and *Prosopis glandulosa* (NMRPTC 2005).	Potential habitat for the species exists in the project area, but it has not been collected or documented from near the Florida Mountains, and no individuals were detected during the biological survey. Although individuals could be impacted by development of the proposed quarry, the species or its overall habitat would not be impacted.	**MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT**
Sclerocactus papyracanthus grama grass cactus	**Sensitive**	Desert grasslands, pinyon-juniper woodlands, Chihuahuan desert scrub; 1500-2200 m (FNA 2016).	Potential habitat exists in the project area, but the species has not been recorded from Luna County, and it was not detected during the biological survey. No impacts would occur.	**NO IMPACT**

An additional 30 BLM Las Cruces District sensitive species were not analyzed in detail because they did not have appropriate habitat within the project area and/or the project area is well outside their known range. These include the following:

- Amphibians: southwestern toad, lowland leopard frog;
- Arthropods: Moore's fairy shrimp, Sublette's fairy shrimp, Lynch's tadpole shrimp, Anthony blister beetle;
- Birds: bald eagle, western yellow-billed cuckoo, Bell's vireo;
- Mammals: western yellow bat, spotted bat, black-tailed prairie dog, meadow (New Mexico) jumping mouse, white-nosed coati;
- Plants: Howard's gyp ringstem, Chapline's columbine, copppermine milkvetch, Guadalupe mescalbean, Roetter's hedgehog cactus, Villard's pincushion cactus, gypsum scalebroom, Guadalupe stickleaf, sand pricklypear, Alamo beardtongue, nodding cliff daisy, Parish's alkaligrass, Mimbres figwort, Texas thelypody;
- Reptiles: narrow-headed gartersnake, Big Bend slider.

The proposed action would not likely lead to a trend toward listing for any of the BLM sensitive species considered.

Cumulative Impacts

There are no known past, current, or proposed actions on federal, state, tribal, or private lands that would generate effects that would combine with those of the proposed action to constitute an accumulation of effects on wildlife species. The bulk of the Florida Mountains just east and north of the project area is included in state parks and a wilderness study area currently precluding significant development in the surrounding arid mountain environment.

Table 6. Summary of Determination of Effects for Federally-Listed and Proposed or Candidate Species.

Species	Determination of Effect
Chiricahua leopard frog	No Effect
northern aplomado falcon	Not Likely To Jeopardize
western yellow-billed cuckoo	No Effect
beautiful shiner	No Effect

MIGRATORY BIRDS

On January 10, 2001, President Clinton signed Executive Order 13186 placing emphasis on the conservation of migratory birds. The BLM has developed a strategic plan for migratory bird conservation (BLM 2013), which provides preliminary guidance on addressing migratory birds in environmental planning documents. The plan recommends two sources for determining which

migratory birds should be considered for analysis: the BLM Priority Migratory Birds Table (BLM 2013), and the Game Birds Below Desired Condition list (USFWS 2004).

The BLM Priority Migratory Birds Table is organized by habitat and bird conservation region (BCR). Species which occupy the desert scrub habitat of the project area and BCR 35 (Chihuahuan Desert) were analyzed for potential impacts from the proposed quarry project (Table 7). The Game Birds Below Desired Condition (GBBDC) list was also reviewed and species which could potentially utilize the project area were also analyzed.

Table 7. Migratory birds of high priority and conservation concern listed for the project area.

Species	Status	Habitat	Disturbance Effects
Columba fasciata band-tailed pigeon	GBBDC	Oak canyons, foothills, chaparral, mountain forests. Mainly in wooded or semi-open habitats; moves around to take advantage of changing food supplies. Breeds in oak woodland along the coast and in mountains, also in pine-oak woods and fir forest. May forage along streams in lowland desert (Audubon 2016b).	Suitable habitat does not exist in the project area, so no effects to species or its habitat anticipated.
Oreothlypis luciae Lucy's warbler	BLM PMBT	Mesquite along desert streams and washes; willows, cottonwoods. Breeds mostly in cottonwood-mesquite woods near desert streams or in open groves of mesquite along dry washes in the Sonoran desert. Also found in sycamore and live oak groves near streams in the lower parts of canyons close to arid lowlands (Audubon 2016c).	Marginal habitat present in project area, as there are scattered mesquite trees along the dry washes at the base of the dolomite outcrop, although the project area is on the periphery of the species range (Audubon 2016c). If mining activities commence prior to the beginning of the breeding season, minimal impacts to the species are anticipated, as adults can relocate to avoid the area.
Phainopepla nitens phainopepla	BLM PMBT	Desert scrub, mesquites, oak foothills, mistletoe clumps. Occurs in many lowland and foothills habitats, moving around with availability of berries. Often in Sonoran desert areas and mesquite groves at various times of year; at some seasons, moves into chaparral, streamside trees, and oak woodlands (Audubon 2016d).	Suitable habitat present in the project area. If mining activities commence prior to the beginning of the breeding season, minimal impacts to the species are anticipated, as adults can relocate to avoid the area.
Zenaida macroura mourning dove	GBBDC	Farms, towns, open woods, roadsides, grasslands. Found in almost any kind of open or semi-open habitat in temperate parts of North America, including forest clearings, farmland, suburbs, prairies, deserts. May be most common in edge habitats having both trees and open ground, but also found in some treeless areas. Avoids unbroken forest (Audubon 2016e).	Suitable habitat present in the project area. If mining activities commence prior to the beginning of the breeding season, minimal impacts to the species are anticipated, as adults can relocate to avoid the area.

Important Bird Areas

Important Bird Areas (IBAs) are listed on the Audubon Society's website. The closest IBA is the Mimbres River IBA, located approximately 40 miles north-northwest of the project area. Project activities are sufficiently removed from this and other more distant IBAs to avoid any adverse effects to IBAs. There are no other identified or potential IBAs that would be affected by the proposed project.

Migratory Bird Mitigation Recommendations

To avoid potential impacts to and unintentional take of migratory bird species, it is recommended that significant mining activities be initiated outside of the breeding season (March 1 to August 31). If activities were to occur during this time period, a survey for nesting birds would be completed to ensure there are none on-site. It is expected that the ongoing disturbance caused by these activities will then deter migratory birds from nesting in the project area in the future.

BALD AND GOLDEN EAGLE PROTECTION ACT

The bald eagle was removed from the list of threatened and endangered species August 8, 2007 (USDI 2007). Although bald and/or golden eagles could potentially use the project area for foraging, the proposed project will not result in take as defined by the Bald and Golden Eagle Protection Act. Effects to bald and golden eagles are insignificant and discountable and will not cause 1) injury to an eagle, 2) a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

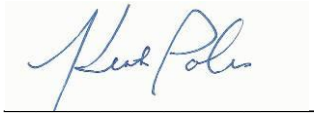
SIGNATURES AND DATE

Preparer of this Document

09/07/2016

Mark Daniels, M.S., M.Eng. Date
Senior Ecologist/Environmental Engineer
EnviroSystems Management, Inc.

Reviewer of this Document



09/07/2016

Keith Pohs, M.S., CPM Date
Project Manager
EnviroSystems Management, Inc.

Bureau of Land Management Approval

Steven Torrez, Date
Wildlife Biologist
Las Cruces District Office

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APPENDIX A

USFWS Trust Resources List of Threatened, Endangered, Proposed Threatened or Endangered, and Candidate species (T & E species) for the project area

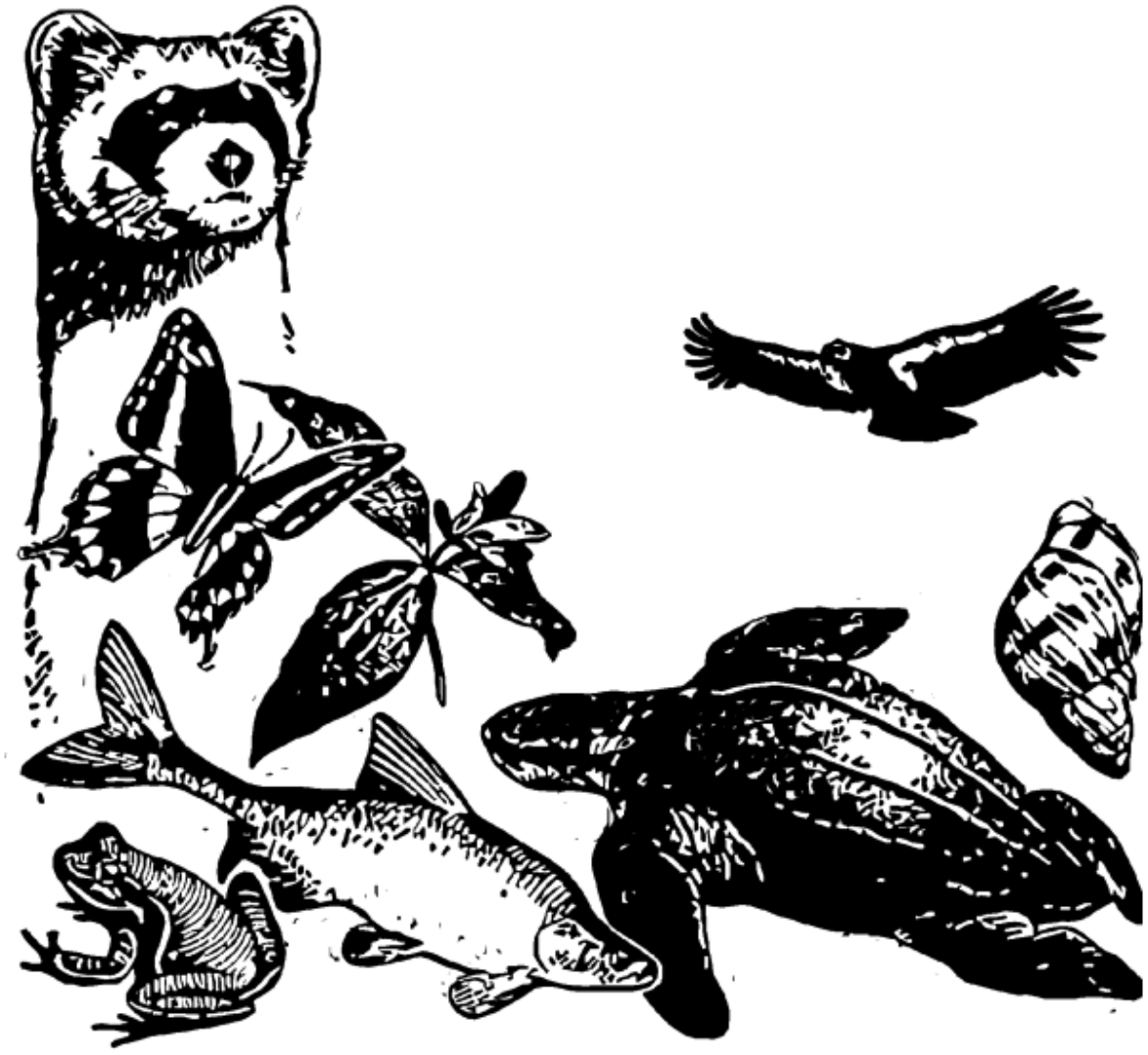
U.S. Fish & Wildlife Service

Proposed Deming Mine

IPaC Trust Resources Report

Generated July 15, 2016 10:23 AM MDT, IPaC v3.0.8

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Table of Contents

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

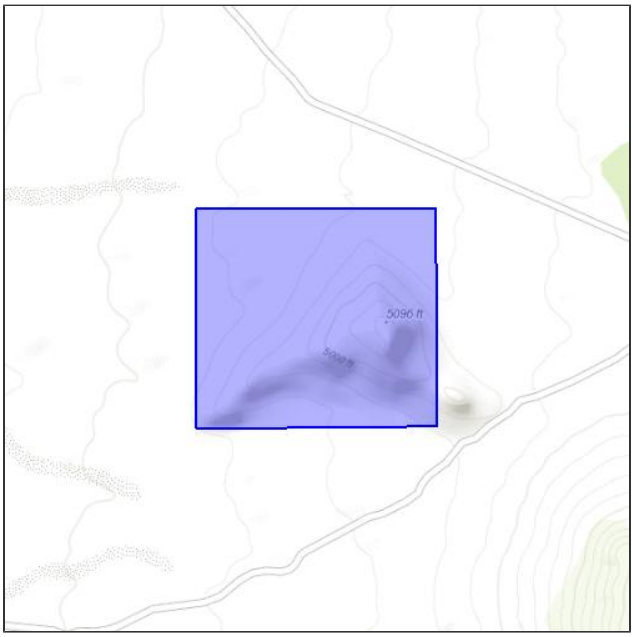
Proposed Deming Mine

LOCATION

Luna County, New Mexico

IPAC LINK

https://ecos.fws.gov/ipac/project/XBSMD-QRYAN-F4NP5-OHNTY-REAETM



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

New Mexico Ecological Services Field Office
2105 Osuna Road Ne
Albuquerque, NM 87113-1001
(505) 346-2525

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Amphibians

Chiricahua Leopard Frog Rana chiricahuensis — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D02F

Birds

Northern Aplomado Falcon Falco femoralis septentrionalis — Experimental Population, Non-Essential

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06V

Yellow-billed Cuckoo Coccyzus americanus — Threatened

CRITICAL HABITAT

There is **proposed** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06R

Fishes

Beautiful Shiner Cyprinella formosa — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E04B

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Bell's Vireo Vireo bellii — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JX

Bendire's Thrasher Toxostoma bendirei — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IF

Black-chinned Sparrow Spizella atrogularis — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IR

Brewer's Sparrow Spizella breweri — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HA

Burrowing Owl Athene cunicularia — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0NC

Cassin's Sparrow Aimophila cassinii — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0K2

Chestnut-collared Longspur Calcarius ornatus — Bird of conservation concern
Season: Wintering

Golden Eagle Aquila chrysaetos — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DV

Gray Vireo Vireo vicinior — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G5

Lark Bunting Calamospiza melanocorys — Bird of conservation concern
Season: Wintering

Lawrence's Goldfinch Carduelis lawrencei — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J8

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Long-billed Curlew Numenius americanus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S

Lucy's Warbler Vermivora luciae — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DL

Mccown's Longspur Calcarius mccownii — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HB

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Red-faced Warbler Cardellina rubrifrons — Bird of conservation concern
Season: Breeding

Rufous-crowned Sparrow Aimophila ruficeps — Bird of conservation concern
Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MX

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Sonoran Yellow Warbler Dendroica petechia ssp. sonorana — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F7

Sprague's Pipit Anthus spragueii — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0GD

Swainson's Hawk Buteo swainsoni — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B070

Virginia's Warbler Vermivora virginiae — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IL

Williamson's Sapsucker Sphyrapicus thyroideus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FX

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

Riverine

R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

APPENDIX B

BISON-M online database query results for the project area

Biota Information System of New Mexico

Maintained by: New Mexico Game & Fish; Natural Heritage New Mexico

Close Window

Disclaimer Policy

Print Page

Database Query

Your search terms were as follows:

County Name	Status	Habitat	Gap Veg
Luna	State NM: Endangered State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite /ocotillo

7 species returned.

Taxonomic Group	# Species	Taxonomic Group	# Species
Amphibians	1	Birds	5
Reptiles	1		

Export to Excel

Species ID	Common Name	Scientific Name	Photo	USGS Distribution Map	County	Status	Habitat	GapVeg
040380	**Aplomado Falcon**	Falco femoralis		no map	Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT tarbush/mesquite/ocotillo
040384	**Peregrine Falcon**	Falco peregrinus		no map	Luna	State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
040385	**Arctic Peregrine Falcon**	Falco peregrinus tundrius	no photo	no map	Luna	State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush

040690	**Common Ground-dove**	Columbina passerina			Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
040125	**Varied Bunting**	Passerina versicolor			Luna	State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
030135	**Reticulate Gila Monster**	Heloderma suspectum suspectum			Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
020110	**Great Plains Narrowmouth Toad**	Gastrophryne olivacea		no map	Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo

Close Window

APPENDIX C

BLM Las Cruces District sensitive animal and plant species lists

BLM Sensitive Species List
Las Cruces District Office

Mammals	
Choeronycteris mexicana	Mexican long-tongued bat
Lasiurus xanthinus	Western yellow bat
Euderma maculatum	Spotted bat
Idionycteris phyllotis	Allen's lappet-browed bat
Corynorhinus townsendii	Townsend's big-eared bat
Lepus callotis	White-sided jack rabbit
Cynomys ludovicianus	Black-tailed prairie dog
Zapus hudsonius luteus	Meadow (New Mexico) jumping mouse
Nasua narica	White-nosed coati

Birds	
Haliaeetus leucocephalus	Bald Eagle
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo
Athene cunicularia hypugaea	Western Burrowing Owl
Gymnorhinus cyanocephalus	Piñon Jay
Toxostoma bendirei	Bendire's Thrasher
Vireo bellii arizonae	Bell's Vireo
Anthus spragueii	Sprague's Pipit
Ammodramus savannarum ammolegus	Arizona Grasshopper Sparrow
Ammodramus bairdii	Baird's Sparrow
Passerina ciris	Painted Bunting

Amphibians	
Anaxyrus (Bufo) microscaphus	Southwestern toad
Lithobates (Rana) yavapaiensis	Lowland leopard frog

Reptiles	
Thamnophis rufipunctatus	Narrow-headed Garter Snake
Trachemys gaigeae gaigeae	Big Bend Slider

Molluscs, Crustacieans, & other Arthropods	
Streptocephalus moorei	Moore's Fairy Shrimp
Phallocryptus (Branchinella) sublettei	Sublette's fairy shrimp
Lepidurus lemmoni	Lynch's tadpole shrimp
Lytta mirifica	Anthony Blister Beetle

NM - BLM SPECIAL STATUS PLANT SPECIES LIST

UPDATED WITH ESA STATUS SPECIES 1/4/12

FIELD OFFICE OCCURRENCE - VERIFIED, HYPOTHETICAL, PERIPERAL (WITHIN OFFICE BDRY BUT NOT ON BLM)

STATUS

FAMILY	SPECIES	COMMON NAME	RIO PUERCO - NM110	SOCORRO - NM120	FARMINGTON - NM210	TAOS - NM220	LAS CRUCES - NM030	ROSWELL - NM510	CARLSBAD - NM520	NATURESERVE GLOBAL RANK	NATURESERVE STATE RANK	FWS STATUS	STATE STATUS	USFS STATUS	BLM SPECIAL STATUS LIST
NYCTAGINACEAE	*ABRONIA BIGELOVII*	SAND VERBENA, GALISTEO	VERIFIED			PERIPHERAL				G3	S3	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
ACAROSPORACEAE	*ACAROSPORA CLAUZADEANA*	LICHEN, ACAROSPORA CLAUZADEANA						VERIFIED		G1G2		PETITIONED / NEGATIVE 90 DAY FINDING			**BLM SENSITIVE**
POLEMONIACEAE	*ALICIELLA FORMOSA*	GILIA, AZTEC			VERIFIED					G2	S2	PETITIONED / NEGATIVE 90 DAY FINDIN	ENDANGERED	NONE	**BLM SENSITIVE**
APOCYNACEAE	*AMSONIA FUGATEI*	AMSONIA, FUGATE'S		VERIFIED						G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
APOCYNACEAE	*AMSONIA THARPII*	BLUESTAR, THARP'S							VERIFIED	G1	S1	SPECIES OF CONCERN + PETITIONED - POSITIVE 90 DAY FINDING	ENDANGERED	NONE	**BLM SENSITIVE**
NYCTAGINACEAE	*ANULOCAULIS LEIOSOLENUS VAR. HOWARDII*	RINGSTEM, HOWARD'S GYP					VERIFIED			G2T2	SNR	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
RANUNCULACEAE	*AQUILEGIA CHRYSANTHA VAR. CHAPLINEI*	COLUMBINE, CHAPLINE'S					VERIFIED		VERIFIED	G4T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
ASCLEPIADACEAE	*ASCLEPIAS SANJUANENSIS*	MILKWEED, SAN JUAN			VERIFIED					GUQ	S3	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS COBRENSIS VAR. MAGUIREI*	MILKVETCH, COPPERMINE					VERIFIED			G4T2	S2,S1?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS GYPSODES*	MILKVETCH, GYPSUM							VERIFIED	G3	S3	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS KNIGHTII*	MILKVETCH, KNIGHT'S	VERIFIED							NONE	NONE	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS RIPLEYI*	MILKVETCH, RIPLEY	HYPOTHETICAL			VERIFIED				G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
FABACEAE	*DERMATOPHYLLUM GUADALUPENSE*	MESCALBEAN, GUADALUPE					VERIFIED		VERIFIED	G1		PETITIONED / NEGATIVE 90 FINDING	SPECIES OF CONCERN		**BLM SENSITIVE**
CACTACEAE	*ECHINOCEREUS X ROETTERI VAR. ROETTERI*	CACTUS, ROETTER'S HEDGEHOG					VERIFIED			NONE	NONE	NONE	NONE	NONE	**BLM SENSITIVE**
ASTERACEAE	*ERIGERON ACOMANUS*	FLEABANE, ACOMA	VERIFIED		HYPOTHETICAL					GNR	SNR	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
CACTACEAE	*ESCOBARIA DUNCANII*	CACTUS, DUNCAN'S PINCUSHION					VERIFIED			G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
CACTACEAE	*ESCOBARIA VILLARDII*	CACTUS, VILLARD'S PINCUSHION					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	**BLM SENSITIVE**
ASTERACEAE	*LEPIDOSPARTUM BURGESSII*	SCALEBROOM, GYPSUM					VERIFIED			G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
LINACEAE	*LINUM ALLREDII*	FLAX, ALLRED'S							VERIFIED	NONE	NONE	NONE	NONE	NONE	**BLM SENSITIVE**
LOASACEAE	*MENTZELIA HUMILUS VAR. GUADALUPENSIS*	STICKLEAF, GUADALUPE					VERIFIED			G4T2	SNR	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
CACTACEAE	*OPUNTIA ARENARIA*	PRICKLYPEAR, SAND					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
CACTACEAE	*OPUNTIA X VIRIDIFLORA*	CHOLLA, SANTA FE				VERIFIED				G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
FABACEAE	*PEDIOMELUM PENTAPHYLLUM*	SCURFPEA, CHIHUAHUA					VERIFIED			G1	SH,S1	SPECIES OF CONCERN + PETITIONED - POSITIVE 90 DAY FINDING	ENDANGERED	SENSITIVE	**BLM SENSITIVE**
CACTACEAE	*PENIOCEREUS GREGGII VAR GREGGII*	CEREUS, NIGHT-BLOOMING					VERIFIED			G3G4T2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
SCROPHULARIACEAE	*PENSTEMON ALAMOSENSIS*	BEARDTONGUE, ALAMO					VERIFIED			G3	S3	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
SCROPHULARIACEAE	*PENSTEMON CARDINALIS SSP. REGALIS*	PENSTEMON, GUADALUPE							VERIFIED	G3T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
ASTERACEAE	*PERITYLE CERNUA*	CLIFF DAISY, NODDING					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
CHENOPODIACEAE	*PROATRIPLEX PLEIANTHA*	SALTBUSH, MANCOS			VERIFIED					G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
POACEAE	*PUCCINELLIA PARISHII*	ALKALIGRASS, PARISH'S	VERIFIED	HYPOTHETICAL	HYPOTHETICAL		VERIFIED			G2	S2,S1	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	**BLM SENSITIVE**
CACTACEAE	*SCLEROCACTUS CLOVERAE SSP. BRACKII*	CACTUS, BRACK'S HARDWALL			VERIFIED					G3T1	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
CACTACEAE	*SCLEROCACTUS PAPYRACANTHUS*	CACTUS, GRAMA GRASS	VERIFIED	HYPOTHETICAL	HYPOTHETICAL	VERIFIED	VERIFIED	HYPOTHETICAL		G4	S2S3,S4	SPECIES OF CONCERN	NONE	NONE	**BLM SENSITIVE**
SCROPHULARIACEAE	*SCROPHULARIA MACRANTHA*	FIGWORT, MIMBRES					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
BRASSICACEAE	*SIBARA GRISEA*	THELYPODY, TEXAS; SIBARA, GRAY					VERIFIED			G3	S3?	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
BRASSICACEAE	*STREPTANTHUS PLATYCARPUS*	JEWELFLOWER, BROADPOD							VERIFIED	G1?Q	S1?	PETITIONED / NEGATIVE 90 DAY FINDIN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
ASTERACEAE	*TOWNSENDIA GYPSOPHILA*	TOWNSEND DAISY, GYPSUM	VERIFIED							G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**

APPENDIX D

Photographic log from the biological survey conducted July 28, 2016

Photo 1. Looking west from a wash near the southeast corner of the project area.

Photo 2. Looking west from the eastern boundary of the project area.

Photo 3. Small wash on the south side of the project area with the Florida Mountains behind.

Photo 4. Top of the hill in the center of the project area.

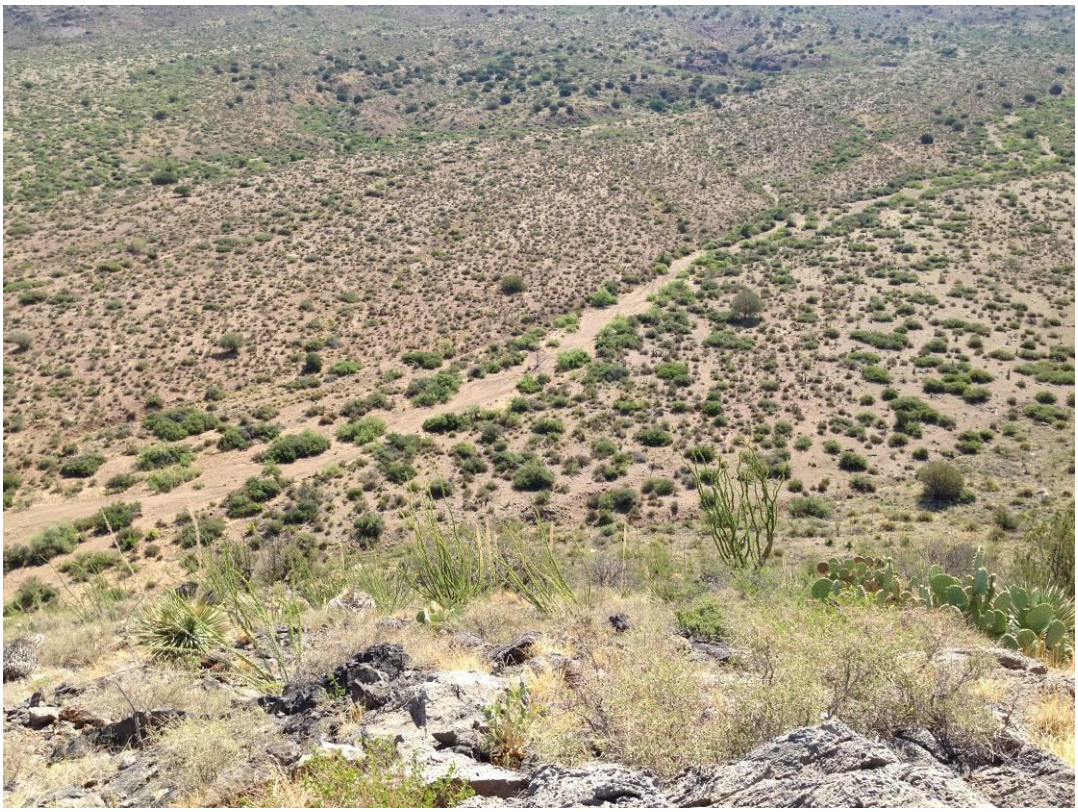


Photo 5. Small wash on the north side of the project area.

Photo 6. View northwest from the hill in the center of the project area.

Appendix E2

Technical Memorandum

ENVIROSYSTEMS
ENVIRONMENTAL PLANNING, COMPLIANCE, AND PERMITTING

TECHNICAL MEMORANDUM

TO: David Tognoni, American Magnesium, LLC; Vickie Maranville, Amec Foster Wheeler
FROM: Mark Daniels, Senior Ecologist/Environmental Engineer, EnviroSystems Management, Inc.
SUBJECT: Biological Resources Evaluation of Proposed Mag Hill Dolomite Mine South of Deming, Luna County, New Mexico
DATE: August 10, 2016

Introduction

On July 28, 2016, EnviroSystems conducted a biological resources evaluation for a proposed dolomite mine on Bureau of Land Management (BLM) Las Cruces District Office (LCDO) land south-southeast of Deming, Luna County, New Mexico. The evaluation was conducted on behalf of American Magnesium, LLC, who has initiated the environmental permit process for the proposed mine. The proposed mine is comprised of two claims situated on a 40-acre parcel on the western edge of the Florida Mountains. The parcel was surveyed to determine the presence or absence of threatened, endangered, and sensitive species (TES) and/or their habitats.

Consultation to Date

Information obtained from the U.S. Fish and Wildlife Service (USFWS), New Mexico Department of Game and Fish (NMDGF), and the Bureau of Land Management (BLM) regarding TES was used to inform the field survey. Specifically, the USFWS website was checked for those species occurring in the project area (USFWS 2016), the Biota Information System of New Mexico (BISON-M) online database query (BISON-M 2016) was consulted for a list of state-listed species with potential habitat near the project area, and the BLM sensitive species lists were consulted for species verified in the LCDO which could occur in the project area (BLM 2016).

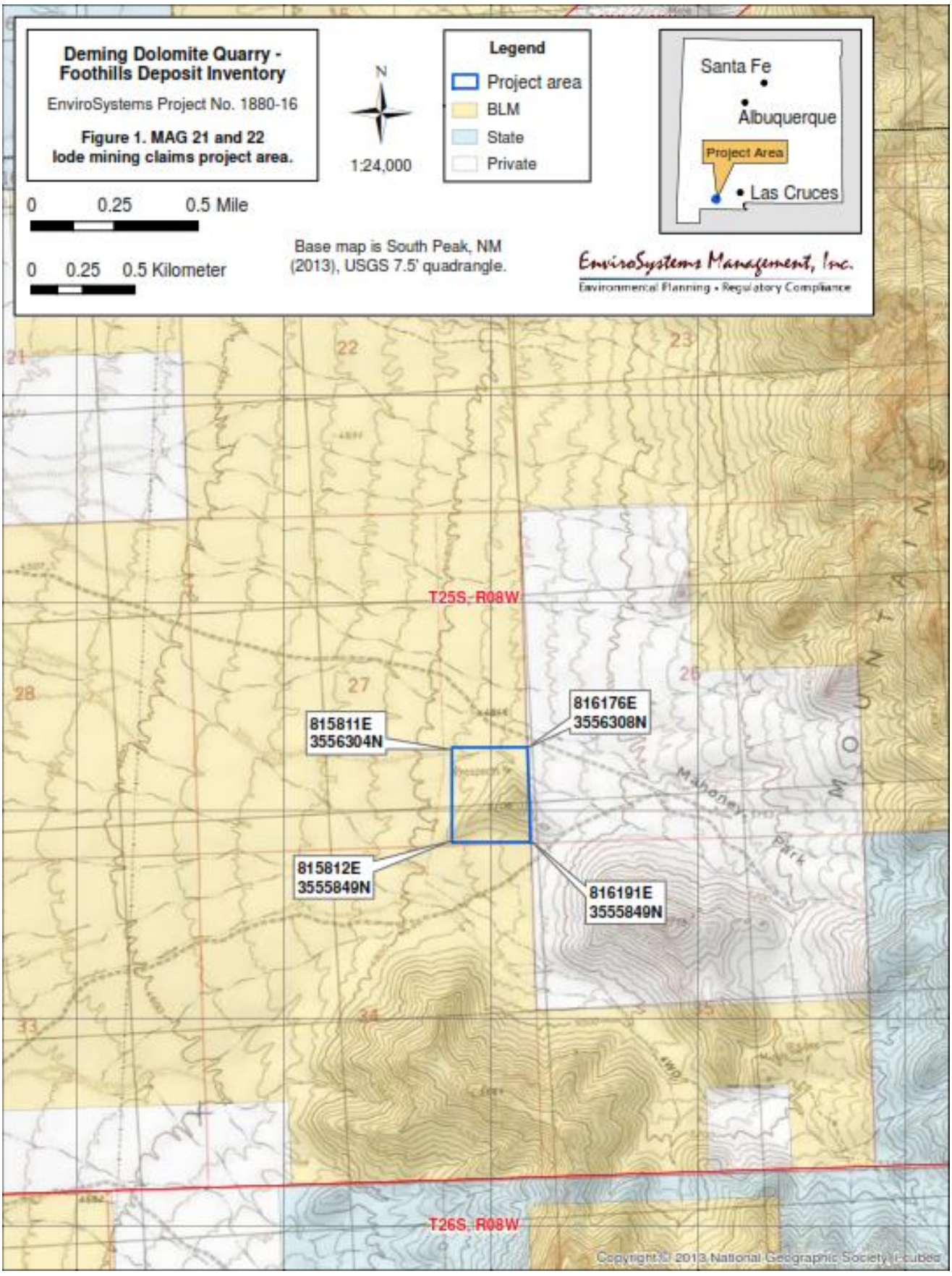
Proposed Action

American Magnesium proposes to construct a dolomite mine on 40 acres of land in the western foothills of the Florida Mountains, centered on a small hill just west of Mahoney Park. The exceptionally pure dolomite would be mined in a quarry, trucked or conveyed via conveyor belt to a processing facility at Peru Mill Industrial Park in Deming, and shipped via rail to market.

Project Area Description

The two claims which comprise the proposed mine are centered on a small, unnamed hill in the western foothills of the Florida Mountains, approximately 14 miles south-southeast of Deming, New Mexico (Figure 1). The claims are located in the SE ¼ of Section 27, T25S, R8W, New Mexico Baseline & Meridian.

Figure 1. Project Location.



Species Analyses

A habitat evaluation and TES survey of the project area was conducted on July 28, 2016 (see Appendix A for photos from the survey). BLM, USFWS, and NMDGF lists were consulted regarding those special-status species potentially occurring in the project area (Table 1 and Appendices B and C). The 40-acre project area was surveyed for the presence/absence of TES and their habitats.

Table 1. USFWS Threatened, Endangered, Candidate, and New Mexico Threatened or Endangered Species Potentially Occurring in the Project Area (see Appendices B and C for BLM Sensitive Species)

Common Name	Scientific Name	Federal Status	State Status	Suitable Habitat Present?	Individuals Observed?
Arctic peregrine falcon	*Falco peregrinus tundrius*		Threatened	No	No
Beautiful shiner	*Cyprinella formosa*	Threatened		No	No
Chiricahua leopard frog	*Lithobates (=Rana) chiricahuensis*	Threatened		No	No
Common ground-dove	*Columbina passerina*		Endangered	No	No
Great Plains narrowmouth toad	*Gastrophryne olivacea*		Endangered	No	No
Northern aplomado falcon	*Falco femoralis*	Experimental Pop'n, Non-Essential	Endangered	Yes	No
Peregrine falcon	*Falco peregrinus*		Threatened	No	No
Reticulate gila monster	*Heloderma suspectum suspectum*		Endangered	Yes	No
Varied bunting	*Passerina versicolor*		Threatened	No	No
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened		No	No

Threatened, Endangered, and Special-Status Species (TES)

The entire project area was surveyed for the presence/absence of special-status species and their habitats. Suitable habitat for the northern aplomado falcon and reticulate gila monster was found in the project area. The northern aplomado falcon is considered an experimental, non-essential population by the USFWS, and is listed as endangered by the State of New Mexico. The reticulate gila monster is listed as threatened by the State of New Mexico. However, neither species, nor any other species on the federal or state lists, was observed during the field evaluation. BLM sensitive species lists (see Appendix B) were also consulted for species which are verified to occur in the LCDO. Although suitable habitat may exist for some of the wildlife and plant species, none were observed in the project area.

Biological Resources Evaluation

General Habitat

The project area lies in the Chihuahuan Desert within the Basin and Range physiographic province, a region characterized by rugged mountain ranges alternating with valleys. Mountains tend to rise sharply from the basin floors, with gravel fans extending from the bases of the mountain ranges. The region is underlain by sand and gravel and by thick layers of salt and other evaporites (Chronic 1983). Soils in the project area consist of sand and gravel with multiple outcrops of the dolomitic limestone bedrock of the area. Small, sandy washes are present on both

the north and south sides of the project area. Both washes are ephemeral in nature and were dry during the field survey.

The plant community in the project area and vicinity lies in a complex matrix of Chihuahuan Desert Broadleaf Evergreen Scrub and Chihuahuan Desert Broadleaf Deciduous Desert Scrub vegetation classes (BISON-M 2016). Shrubby species dominated the vegetation of the project area, including honey mesquite (*Prosopis glandulosa*), broom snakeweed (*Gutierrezia sarothrae*), ocotillo (*Fouquieria splendens*), stool (*Dasylirion wheeleri*), redberry juniper (*Juniperus arizonica*), and yellow trumpetbush (*Tecoma stans*). Cactus species and other succulents such as candy barrelcactus (*Ferocactus wislizeni*), cholla (*Cylindropuntia* sp.), prickly pear cactus (*Opuntia* sp.), Graham's nipple cactus (*Mammillaria grahamii*), and Palmer's century plant (*Agave palmeri*) were also common. Grasses and forbs were less common in the rocky, shrubby terrain, including threeawn (*Aristida* sp.), matted grama (*Bouteloua simplex*), and silverleaf nightshade (*Solanum elaeagnifolium*).

Wildlife species encountered during the biological survey included a whiptail lizard (*Aspidoscelis* sp.) and various species of birds, including cactus wren (*Campylorhynchus brunneicapillus*), Gambel's quail (*Callipepla gambelii*), northern mockingbird (*Mimus polyglottos*), black-chinned sparrow (*Spizella atrogularis*), bushtit (*Psaltriparus minimus*), thrasher (*Toxostoma* sp.), and greater roadrunner (*Geococcyx californianus*).

Conclusion

The site of a proposed dolomite mine on BLM land south of Deming, New Mexico was the subject of a desktop and field evaluation for biological resources and special status species. The project area was surveyed, and an inventory made of all plant and animal species encountered. No USFWS, state, or BLM special status species were detected at the site.

References

BISON-M. 2016. Biota Information System of New Mexico Database Query. Website: http://bison-m.org/. Accessed July 15, 2016.

BLM (Burueau of Land Management). 2016. Wildlife Conservation. Website: http://www.blm.gov/nm/st/en/prog/more/wildlife/conservation.html. Accessed July 15, 2016.

Brown, David E. 1994. *Biotic Communities of the Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City, Utah, 342 pp.

Chronic, Halka. 1983. *Roadside Geology of Arizona*. Mountain Press Publishing Company, Missoula, Montana

USFWS (United States Fish and Wildlife Service). 2016. IPaC Trust Resources Report. Website: https://ecos.fws.gov/ipac/. Accessed July 15, 2016.

APPENDIX A

Photos of the Proposed Mine Site
(taken July 28, 2016)

Photo 1. Looking west from a wash near the southeast corner of the project area.

Photo 2. Looking west from the eastern boundary of the project area.

Photo 3. Small wash on the south side of the project area with the crest of the Florida Mountains behind.

Photo 4. Top of the hill in the center of the project area.

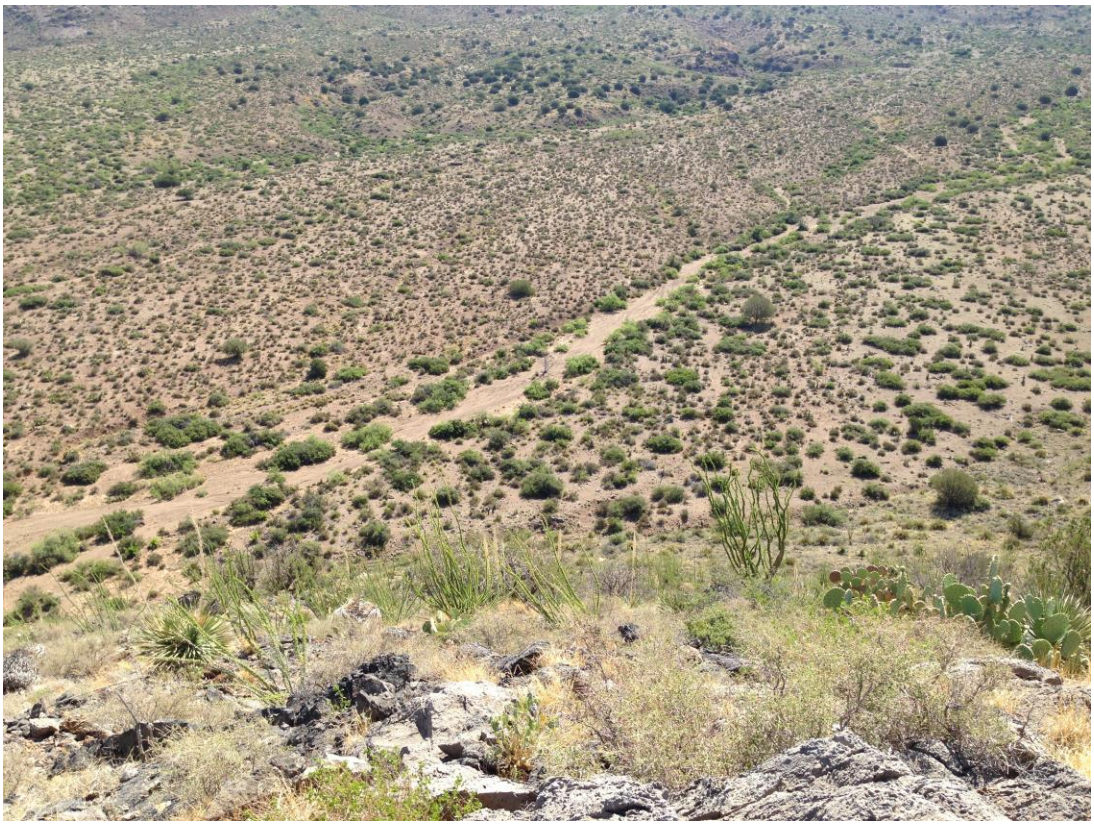


Photo 5. Small wash on the north side of the project area.

Photo 6. View northwest from the hill in the center of the project area.

APPENDIX B

New Mexico BLM Sensitive Animal Species List

New Mexico BLM Sensitive Animal Species List (Final) - August 2011

SPECIES	COMMON NAME	FARMINGTON - LLNMFO1000	TAOS - LLNMF02000	RIO PUERCO - LLNMA01000	SOCORRO - LLNMA02000	LAS CRUCES - LLNML00000	ROSWELL - LLNMP01000	CARLSBAD - LLNMP02000
AMPHIBIANS (3)								
Anaxyrus (Bufo) microscaphus	Southwestern Toad	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	NONE	NONE
Lithobates (Rana) yavapaiensis	Lowland Leopard Frog	NONE	NONE	NONE	HYPOTHETICAL	VERIFIED	NONE	NONE
Lithobates (Rana) pipiens	Northern Leopard Frog	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL	NONE	NONE	NONE
ARTHROPODS (2)								
Lytta mirifica	Anthony Blister Beetle	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Ochlodes yuma anasazi	Yuma Skipper	NONE	VERIFIED	NONE	NONE	NONE	NONE	NONE
BIRDS (12)								
Haliaeetus leucocephalus	Bald Eagle	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
Tympanuchus pallidicinctus	Lesser Prairie-chicken	NONE	PERIPHERAL	NONE	NONE	NONE	VERIFIED	VERIFIED
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
Athene cunicularia hypugaea	Western Burrowing Owl	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
Gymnorhinus cyanocephalus	Piñon Jay	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL
Toxostoma bendirei	Bendire's Thrasher	VERIFIED	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL	NONE
Vireo bellii arizonae	Bell's Vireo	NONE	NONE	NONE	NONE	VERIFIED	PERIPHERAL	VERIFIED
Anthus spragueii	Sprague's Pipit	NONE	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED
Ammodramus savannarum ammolegus	Arizona Grasshopper Sparrow	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Ammodramus bairdii	Baird's Sparrow	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Passerina ciris	Painted Bunting	NONE	NONE	NONE	NONE	VERIFIED	PERIPHERAL	VERIFIED
Calcarius ornatus	Chestnut-collared Longspur	PERIPHERAL	VERIFIED	NONE	VERIFIED	VERIFIED	VERIFIED	VERIFIED
CRUSTACEANS (5)								
Streptocephalus thomasbowmani	Thomas Bowman's Fairy Shrimp	NONE	NONE	NONE	NONE	NONE	NONE	NONE
Streptocephalus moorei	Moore's Fairy Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Phallocryptus (Branchinella) sublettei	Sublette's Fairy Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Eulimnadia follisimilis	Clam Shrimp	NONE	NONE	NONE	VERIFIED	NONE	VERIFIED	NONE
Lepidurus lemmoni	Lynch's Tadpole Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
FISH (17)								
Oncorhynchus clarki virginalis	Rio Grande Cutthroat Trout	NONE	PERIPHERAL	PERIPHERAL	PERIPHERAL	PERIPHERAL	PERIPHERAL	NONE
Agosia chrysogaster	Longfin Dace	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE

Astyanax mexicanus	Mexican Tetra	NONE	NONE	NONE	EXTIRPATED	EXTIRPATED	VERIFIED	VERIFIED			
Catostomus discobolus discobolus	Bluehead Sucker	VERIFIED	HYPOTHETHICAL	PERIPHERAL	PERIPHERAL	NONE	NONE	NONE			
Catostomus latipinnis	Flannelmouth Sucker	VERIFIED	HYPOTHETHICAL	NONE	NONE	HYPOTHETHICAL	NONE	NONE			
Catostomus plebeius	Rio Grande Sucker	NONE	VERIFIED	PERIPHERAL	PERIPHERAL	VERIFIED	PERIPHERAL	PERIPHERAL			
Gila pandora	Rio Grande Chub	NONE	VERIFIED	PERIPHERAL	PERIPHERAL	PERIPHERAL	VERIFIED	VERIFIED			
Ictiobus bubalus	Smallmouth Buffalo	NONE	HYPOTHETHICAL	HISTORICAL	HISTORICAL	VERIFIED	HISTORICAL	VERIFIED			
Macrhybopsis aestivalis aestivalis	Speckled Chub	NONE	PERIPHERAL	EXTIRPATED	EXTIRPATED	EXTIRPATED	VERIFIED	VERIFIED			
Percina macrolepida	Bigscale Logperch	NONE	INTRODUCED	NONE	NONE	NONE	VERIFIED	VERIFIED			
Phenacobius mirabilis	Suckermouth Minnow	NONE	VERIFIED	NONE	NONE	NONE	VERIFIED	NONE			
Catostomus clarki	Desert Sucker	NONE	NONE	NONE	PERIPHERAL	NONE	NONE	NONE			
Catostomus insignis	Sonora Sucker	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE			
Cycleptus elongatus	Blue Sucker	NONE	EXTIRPATED	EXTIRPATED	EXTIRPATED	EXTIRPATED	PERIPHERAL	VERIFIED			
Cyprinodon pecosensis	Pecos Pupfish	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Etheostoma lepidum	Greenthroat Darter	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Gila robusta	Roundtail Chub	HYPOTHETHICAL	HYPOTHETHICAL	PERIPHERAL	PERIPHERAL	VERIFIED	NONE	NONE			
Ictalurus lupus	Headwater Catfish	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Macrhybopsis tetranema	Peppered Chub	NONE	PERIPHERAL	NONE	NONE	NONE	NONE	NONE			
Moxostoma congestum	Gray Redhorse	NONE	HISTORICAL	HISTORICAL	HISTORICAL	PERIPHERAL	HISTORICAL	VERIFIED			
Notropis jemezanus	Rio Grande Shiner	NONE	EXTIRPATED	PERIPHERAL	EXTIRPATED	EXTIRPATED	VERIFIED	VERIFIED			
MAMMALS (12)											
Choeronycteris mexicana	Mexican Long-tongued Bat	NONE	NONE	NONE	NONE	VERIFIED	NONE	PERIPHERAL			
Lasiurus xanthinus	Western Yellow Bat	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Lasiurus blossevillii	Western Red Bat	NONE	NONE	NONE	VERIFIED	VERIFIED	PERIPHERAL	NONE			
Euderma maculatum	Spotted Bat	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL			
Idionycteris phyllotis	Allen's Lappet-browed Bat	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	NONE	NONE			
Corynorhinus townsendii	Townsend's Big-eared Bat	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED			
Lepus callotis	White-sided Jack Rabbit	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Cynomys ludovicianus	Black-tailed Prairie Dog	NONE	VERIFIED	PERIPHERAL	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED			
Cynomys gunnisoni	Gunnison's Prairie Dog	VERIFIED	VERIFIED	VERIFIED	VERIFIED	NONE	NONE	NONE			
Thomomys bottae (umbrinus) paguatae	Cebolleta Pocket Gopher	PERIPHERAL	NONE	VERIFIED	PERIPHERAL	NONE	NONE	NONE			
Zapus hudsonius luteus	Meadow (New Mexico) Jumping Mouse	PERIPHERAL	HYPOTHETHICAL	HYPOTHETHICAL	HYPOTHETHICAL	HYPOTHETHICAL	NONE	NONE			
Nasua narica	White-nosed Coati	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
MOLLUSCS (1)											

Popenaias popeii	Texas Hornshell	NONE	NONE	NONE	NONE	NONE	NONE	VERIFIED			
REPTILES (7)											
Heloderma suspectum suspectum	Reticulate Gila Monster	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Sceloporus arenicolus	Sand Dune Lizard	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Aspidoscelis dixoni	Gray-checkered Whiptail	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Thamnophis eques megalops	Mexican Garter Snake	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Thamnophis rufipunctatus	Narrow-headed Garter Snake	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE			
Trachemys gaigeae gaigeae	Big Bend Slider	NONE	NONE	NONE	VERIFIED	VERIFIED	NONE	NONE			
Pseudemys gorzugi	Western River Cooter	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			

APPENDIX C

New Mexico BLM Sensitive Plant Species List

NM - BLM SPECIAL STATUS PLANT SPECIES LIST

UPDATED WITH ESA STATUS SPECIES 1/4/12

FIELD OFFICE OCCURRENCE - VERIFIED, HYPOTHETICAL, PERIPERAL (WITHIN OFFICE BDRY BUT NOT ON BLM)

STATUS

FAMILY	SPECIES	COMMON NAME	RIO PUERCO - NM110	SOCORRO - NM120	FARMINGTON - NM210	TAOS - NM220	LAS CRUCES - NM030	ROSWELL - NM510	CARLSBAD - NM520	NATURESERVE GLOBAL RANK	NATURESERVE STATE RANK	FWS STATUS	STATE STATUS	USFS STATUS	BLM SPECIAL STATUS LIST
NYCTAGINACEAE	*ABRONIA BIGELOVII*	SAND VERBENA, GALISTEO	VERIFIED			PERIPHERAL				G3	S3	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
ACAROSPORACEAE	*ACAROSPORA CLAUZADEANA*	LICHEN, ACAROSPORA CLAUZADEANA						VERIFIED		G1G2		PETITIONED / NEGATIVE 90 DAY FINDING			BLM SENSITIVE
POLEMONIACEAE	*ALICIELLA FORMOSA*	GILIA, AZTEC			VERIFIED					G2	S2	PETITIONED / NEGATIVE 90 DAY FINDIN	ENDANGERED	NONE	BLM SENSITIVE
APOCYNACEAE	*AMSONIA FUGATEI*	AMSONIA, FUGATE'S		VERIFIED						G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
APOCYNACEAE	*AMSONIA THARPII*	BLUESTAR, THARP'S							VERIFIED	G1	S1	SPECIES OF CONCERN + PETITIONED - POSITIVE 90 DAY FINDING	ENDANGERED	NONE	BLM SENSITIVE
NYCTAGINACEAE	*ANULOCAULIS LEIOSOLENUS VAR. HOWARDII*	RINGSTEM, HOWARD'S GYP					VERIFIED			G2T2	SNR	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
RANUNCULACEAE	*AQUILEGIA CHRYSANTHA VAR. CHAPLINEI*	COLUMBINE, CHAPLINE'S					VERIFIED		VERIFIED	G4T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
ASCLEPIADACEAE	*ASCLEPIAS SANJUANENSIS*	MILKWEED, SAN JUAN			VERIFIED					GUQ	S3	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
FABACEAE	*ASTRAGALUS COBRENSIS VAR. MAGUIREI*	MILKVETCH, COPPERMINE					VERIFIED			G4T2	S2,S1?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
FABACEAE	*ASTRAGALUS GYPSODES*	MILKVETCH, GYPSUM							VERIFIED	G3	S3	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
FABACEAE	*ASTRAGALUS KNIGHTII*	MILKVETCH, KNIGHT'S	VERIFIED							NONE	NONE	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
FABACEAE	*ASTRAGALUS RIPLEYI*	MILKVETCH, RIPLEY	HYPOTHETICAL			VERIFIED				G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
FABACEAE	*DERMATOPHYLLUM GUADALUPENSE*	MESCALBEAN, GUADALUPE					VERIFIED		VERIFIED	G1		PETITIONED / NEGATIVE 90 FINDING	SPECIES OF CONCERN		BLM SENSITIVE
CACTACEAE	*ECHINOCEREUS X ROETTERI VAR. ROETTERI*	CACTUS, ROETTER'S HEDGEHOG					VERIFIED			NONE	NONE	NONE	NONE	NONE	BLM SENSITIVE
ASTERACEAE	*ERIGERON ACOMANUS*	FLEABANE, ACOMA	VERIFIED		HYPOTHETICAL					GNR	SNR	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
CACTACEAE	*ESCOBARIA DUNCANII*	CACTUS, DUNCAN'S PINCUSHION					VERIFIED			G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
CACTACEAE	*ESCOBARIA VILLARDII*	CACTUS, VILLARD'S PINCUSHION					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	BLM SENSITIVE
ASTERACEAE	*LEPIDOSPARTUM BURGESSII*	SCALEBROOM, GYPSUM					VERIFIED			G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
LINACEAE	*LINUM ALLREDII*	FLAX, ALLRED'S							VERIFIED	NONE	NONE	NONE	NONE	NONE	BLM SENSITIVE
LOASACEAE	*MENTZELIA HUMILUS VAR. GUADALUPENSIS*	STICKLEAF, GUADALUPE					VERIFIED			G4T2	SNR	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
CACTACEAE	*OPUNTIA ARENARIA*	PRICKLYPEAR, SAND					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
CACTACEAE	*OPUNTIA X VIRIDIFLORA*	CHOLLA, SANTA FE				VERIFIED				G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
FABACEAE	*PEDIOMELUM PENTAPHYLLUM*	SCURFPEA, CHIHUAHUA					VERIFIED			G1	SH,S1	SPECIES OF CONCERN + PETITIONED - POSITIVE 90 DAY FINDING	ENDANGERED	SENSITIVE	BLM SENSITIVE
CACTACEAE	*PENIOCEREUS GREGGII VAR GREGGII*	CEREUS, NIGHT-BLOOMING					VERIFIED			G3G4T2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
SCROPHULARIACEAE	*PENSTEMON ALAMOSENSIS*	BEARDTONGUE, ALAMO					VERIFIED			G3	S3	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
SCROPHULARIACEAE	*PENSTEMON CARDINALIS SSP. REGALIS*	PENSTEMON, GUADALUPE							VERIFIED	G3T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
ASTERACEAE	*PERITYLE CERNUA*	CLIFF DAISY, NODDING					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
CHENOPODIACEAE	*PROATRIPLEX PLEIANTHA*	SALTBUSH, MANCOS			VERIFIED					G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
POACEAE	*PUCCINELLIA PARISHII*	ALKALIGRASS, PARISH'S	VERIFIED	HYPOTHETICAL	HYPOTHETICAL		VERIFIED			G2	S2,S1	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	BLM SENSITIVE
CACTACEAE	*SCLEROCACTUS CLOVERAE SSP. BRACKII*	CACTUS, BRACK'S HARDWALL			VERIFIED					G3T1	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
CACTACEAE	*SCLEROCACTUS PAPYRACANTHUS*	CACTUS, GRAMA GRASS	VERIFIED	HYPOTHETICAL	HYPOTHETICAL	VERIFIED	VERIFIED	HYPOTHETICAL		G4	S2S3,S4	SPECIES OF CONCERN	NONE	NONE	BLM SENSITIVE
SCROPHULARIACEAE	*SCROPHULARIA MACRANTHA*	FIGWORT, MIMBRES					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
BRASSICACEAE	*SIBARA GRISEA*	THELYPODY, TEXAS; SIBARA, GRAY					VERIFIED			G3	S3?	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
BRASSICACEAE	*STREPTANTHUS PLATYCARPUS*	JEWELFLOWER, BROADPOD							VERIFIED	G1?Q	S1?	PETITIONED / NEGATIVE 90 DAY FINDIN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
ASTERACEAE	*TOWNSENDIA GYPSOPHILA*	TOWNSEND DAISY, GYPSUM	VERIFIED							G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE

Appendix E3

Updated Sensitive Species Lists

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Plants													
Abronia bigelovii	Sand verbena, Galisteo		Potential	Verified					G3	S2	None	Species of Concern	BLM SENSITIVE
Acarospora clauzadeana	Lichen, acarospora clauzadeana						Verified		G1G2	S1	Petitioned/ negative 90 day finding	None	BLM SENSITIVE
Agastache pringlei var. *verticillata*	Giant hyssop, Organ Mountains					Verified			G3G4T2	S2	None	Species of Concern	BLM SENSITIVE *New*
Aliciella formosa	Gilia, Aztec	Verified							G2	S2	Petitioned/ negative 90 day finding	Endangered	BLM SENSITIVE
Amsonia fugatei	Amsonia, Fugate's				Verified				G2	S2	None	Species of Concern	BLM SENSITIVE
Amsonia tharpii	Bluestar, Tharp's							Verified	G1	S1	Petitioned/ positive 90 day finding	Endangered	BLM SENSITIVE
Anulocaulis leiosolenus var. *howardii*	Ringstem, Howard's gyp					Verified			G2T1	S1	None	Species of Concern	BLM SENSITIVE
Aquilegia chrysantha var.*chaplinei*	Columbine, Chapline's					Verified		Verified	G4T2	S2	None	Species of Concern	BLM SENSITIVE

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Asclepias sanjuanensis	Milkweed, San Juan	Verified							G2G3	S2S3	None	Species of Concern	BLM SENSITIVE
Astragalus cobrensis var. *maguirei*	Milkvetch, coppermine					Verified			G4T1	S1	None	Species of Concern	BLM SENSITIVE
Astragalus Gypsodes	Milkvetch, Gypsum							Verified	G2	S2	None	Species of Concern	BLM SENSITIVE
Astragalus Knightii	Milkvetch, Knight's			Verified					G2	S2	None	Species of Concern	BLM SENSITIVE
Astragalus Ripleyi	Milkvetch, Ripley		Verified	Potential					G3	S3?	None	Species of Concern	BLM SENSITIVE
Boechera zephyra	Wind Mountain Rockcress					Verified		Potential	G1	S1	None	None	BLM SENSITIVE *New*
Castilleja organorum	Paintbrush, Organ Mountains					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE *New*
Cirsium wrightii	Thistle, wright's Marsh				Potential	Potential	Potential	Potential	G2	S2	Candidate	Endangered	BLM SENSITIVE
Coryphantha robustispina ssp.*scheeri*	Cactus, scheer's beehive					Verified		Verified	G4T3	S2	None	Endangered	BLM SENSITIVE *New*
Cymopterus spellenbergii	Taos springparsley		Verified						G2	S2	None	Species of Concern	BLM SENSITIVE

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Dermatophyllum guadalupense	Mescalbean, Guadalupe					Verified		Verified	G1T1	S1	Petitioned/ negative 90 day finding	Species of Concern	BLM SENSITIVE
Erigeron acomanus	Fleabane, Acoma	Potential		Verified					G1G2	S1S2	None	Species of Concern	BLM SENSITIVE
Eriogonum lachnogynum var.colobum	Wildbuckwheat, clipped	Potential	Verified	Potential					G4?T2	S2	None	Species of Concern	BLM SENSITIVE
Escobaria duncanii	Cactus, Duncan's Pincushion					Verified			G3T1T2	S1	None	Endangered	BLM SENSITIVE
Escobaria villardii	Cactus, Villard's Pincushion					Verified			G2Q	S2	None	Endangered	BLM SENSITIVE
Hymenoxys ambigens var. Neomexicana	Bitterweed, New Mexico					Verified			G3?T2	S2	None	Species of Concern	BLM SENSITIVE *New*
Justicia wrightii	Water- Willow, Wright's							Verified	G2	S1	None	Species of Concern	BLM SENSITIVE *New*
Lepidospartum burgessii	Scalebroom, gypsum					Verified			G2	S1	None	Endangered	BLM SENSITIVE
Linum allredii	Flax, Allred's							Verified	G1G2	S1S2	None	Species of Concern	BLM SENSITIVE
Mentzelia conspicua	Blazingstar, Rio Chama		Verified						G2	S2	None	Species of Concern	BLM SENSITIVE *New*

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Mentzelia humilus var. *Guadalupensis*	Stickleaf, Guadalupe					Verified			G4T1T2	S1S2	None	Species of Concern	BLM SENSITIVE
Mentzelia sivinskii	Sivinski's BlazingstaR	Verified							G3	S3	None	Species of Concern	BLM SENSITIVE *New*
Mentzelia todiltoensis	Stickleaf,Todilito		Potential	Verified	Potential				G1?Q	S3	None	Species of Concern	BLM SENSITIVE *New*
Nerisyrenia hypercorax	Greggia, Crow Flat					Verified			G1G2	S1S2	None	Species of Concern	BLM SENSITIVE
Opuntia Arenaria	Pricklypear, Sand					Verified			G2	S2	None	Endangered	BLM SENSITIVE
Opuntia x viridiflora	Cholla, Santa Fe		Verified						G1Q	S1	None	Endangered	BLM SENSITIVE
Paronychia wilkinsonii	Nailwort, Wilkinson's					Verified			G2	S1	None	Species of Concern	BLM SENSITIVE *New*
Pediomelum pentaphyllum	Scurfpea, Chihuahua					Verified			G1G2	S1	Petitioned/ positive 90 day finding	Endangered	BLM SENSITIVE
Peniocereus greggii var *greggii*	Cereus, Night-Blooming					Verified			G3G4T2	S3	None	Endangered	BLM SENSITIVE
Penstemon alamosensis	Beardtongue, Alamo					Verified			G3	S3	None	Species of Concern	BLM SENSITIVE

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Penstemon cardinalis ssp. *regalis*	Penstemon, Guadalupe							Verified	G3T2T3	S2	None	Species of Concern	BLM SENSITIVE
Perityle Cernua	Cliff Daisy, Nodding					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE
Physaria newberryi var. *yesicola*	Twinpod, Yeso			Verified	Potential				G3G4T2	S2	None	Species of Concern	BLM SENSITIVE *New*
Proatriple x pleiantha	Saltbush, Mancos	Verified							G3	S3?	None	Species of Concern	BLM SENSITIVE
Puccinellia Parishii	Alkaligrass, Parish's	Potential		Verified	Potential	Verified			G2G3	S1	None	Endangered	BLM SENSITIVE
Sclerocactus cloverae	Cactus, Clover's	Verified		Potential					G3T3	S3	None	None	BLM SENSITIVE *New*
Sclerocactus cloverae ssp. *brackii*	Cactus, Brack's Hardwall	Verified		Potential					G3T1	S2	None	Endangered	BLM SENSITIVE
Scrophularia laevis	Figwort, Organ Mountain					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE *New*
Scrophularia macrantha	Figwort, Mimbres					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE
Sibara grisea	Sibara, Gray; Thelypody, Texas					Verified			G3	S3?	None	Species of Concern	BLM SENSITIVE

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Spermolepis organensis	Scaleseed, Organ Mountains					Verified			G1	S1	None	Species of Concern	BLM SENSITIVE *New*
Streptanthus sparsiflorus	Jewelflower, Sparseflower							Verified	G2Q	S2	Petitioned/ negative 90 day finding	Species of Concern	BLM SENSITIVE
Townsendia gypsophila	Townsend Daisy, Gypsum			Verified					G2	S2	None	Species of Concern	BLM SENSITIVE
Plants - Watch													
Adenophyllum wrightii var. *Wrightii*	Dogweed, Wright's					Verified			G1?	SNR,S1	Petitioned/ negative 90 day finding	None	WATCH
Agalinis calycina	False Foxglove, Leoncita						Potential	Potential	G1	S1	Petitioned/ negative 90 day finding	None	WATCH
Agastache cana	Giant Hyssop, Grayish-White					Verified			G4	S3	None	Species of Concern	WATCH
Anulocaulis leiosolenus var. *gypsogenus*	Ringstem, Pecos Gyp						Verified	Verified	G4	S4	None	Species of Concern	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Arida blepharophylla	Aster, Gypsum Hotspring					Potential			G1	SH	Petitioned/ negative 90 day finding	Species of Concern	WATCH
Asclepias uncialis ssp. *ruthiae*	Milkweed, Ruth's	Potential							GNR	S1	None	None	WATCH
Astragalus accumbens	Milkvetch, Zuni			Verified					G3	S3	None	Species of Concern	WATCH
Astragalus castetteri	Milkvetch, Castetter's					Verified			G3	S3	None	Species of Concern	WATCH
Astragalus cliffordii	Milkvetch, Clifford's	Potential							GNR	S1	None	Species of Concern	WATCH
Astragalus cyaneus	Milkvetch, Cyanic		Verified	Potential					G4	S4	None	Species of Concern	WATCH
Astragalus feensis	Milkvetch, Santa Fe			Verified		Verified			G3	S3	None	Species of Concern	WATCH
Astragalus heilii	Milkvetch, Heil's	Potential							G1?	S1	None	Species of Concern	WATCH
Astragalus humistratus var. *crispulus*	Milkvetch, Villous Groundcover				Potential				G4G5T3?	S2	None	None	WATCH
Astragalus kerrii	Milkvetch, Kerr's						Potential		G2	S2	None	Species of Concern	WATCH
Astragalus micromerius	Milkvetch, Chaco	Potential		Potential					G3	S2S3	None	Species of Concern	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Astragalus missouriensis var. *humistratus*	Milkvetch, Pagosa	Potential	Potential						G5T1	S1	None	None	WATCH
Astragalus monumentalis var. *cottamii*	Milkvetch, Cottam's	Verified							G4T4	S3	None	Species of Concern	WATCH
Astragalus naturitensis	Milkvetch, Naturita	Potential							G2G3	S2	None	Species of Concern	WATCH
Astragalus neomexicanus	Milkvetch, New Mexico						Potential		G3	S3	None	Species of Concern	WATCH
Astragalus nutriosensis	Milkvetch, Apache				Verified				G3?	SNR	None	None	WATCH *New*
Astragalus oocalycis	Milkvetch, Arboles	Verified							G4	S3	None	Species of Concern	WATCH
Astragalus puniceus var. *gertrudis*	Milkvetch, Taos	Potential	Verified						G4T3?Q	S3?	None	Species of Concern	WATCH
Astragalus siliceus	Milkvetch, Flint Mountains		Verified						G3	S3	None	Species of Concern	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Astragalus waterfallii	Milkvetch, Waterfall's					Verified		Verified	G3?	S2	None	None	WATCH *New*
Astragalus wittmannii	Milkvetch, One-Flowered		Potential						G3	S3	None	Species of Concern	WATCH
Atriplex griffithsii	Saltbush, Griffith's					Verified			G2G3	S2	None	Species of Concern	WATCH
Castilleja ornata	Paintbrush, Swale					Potential			G1	S1	Petitioned/ positive 90 day finding	Species of Concern	WATCH
Castilleja tomentosa	Hairy Indian Paintbrush					Potential			G1Q	S1	None	None	WATCH *New*
Chaetopappa hersheyi	Leastdaisy, Guadalupe							Verified	G3	S3	None	Species of Concern	WATCH
Cleome multicaulis	Spiderflower, Slender		Potential			Potential			G2G3	SH	None	Endangered	WATCH
Cuscuta warneri	Dodder, Warner's					Potential	Potential		GH	S1	None	Species of Concern	WATCH
Dalea scariosa	Prairie Clover, La Jolla			Potential	Potential				G4	S3	None	Species of Concern	WATCH
Delphinium robustum	Larkspur, Robust		Potential						G2G3	S2	None	Species of Concern	WATCH
Draba smithii	Whitlowgrass, Smith's		Potential						G2	S1	None	Species of Concern	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Ericameria nauseosa ssp. *nauseosa* var. *texensis*	Rabbitbrush, Guadalupe					Verified		Potential	G5T2	S2	None	Species of Concern	WATCH
Erigeron bistiensis	Fleabane, Bisti	Verified							G1	S1	Petitioned/ negative 90 day finding	None	WATCH
Eriogonum aliquantum	Wild Buckwheat, Cimarron		Potential						G3	S3	None	Species of Concern	WATCH
Eriogonum lachnogynum var.*sarhiae*	Buckwheat, Sarah's	Potential							G4?T1	S1	None	Species of Concern	WATCH
Escobaria guadalupensis	Cactus, Guadalupe Pincushion							Potential	G1	S1	Petitioned/ negative 90 day finding	Species of Concern	WATCH
Escobaria organensis	Cactus, Organ Mountains Pincushion					Verified			G2	S2	None	Endangered	WATCH
Euphorbia rayturneri	Spurge, Ray Turner's					Verified			G1	S1	None	None	WATCH
Fissidens littlei	Fissidens Moss, Little's					Potential			G1?	S1	Petitioned/ negative 90 day finding	None	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Grindelia arizonica var. *neomexicana*	Gumweed, New Mexico					Potential			G4T3?	SNR	None	Species of Concern	WATCH
Hedeoma apiculata	Pennyroyal, Mckittrick							Verified	G3	S3	None	Species of Concern	WATCH
Helianthus arizonensis	Sunflower, Arizona				Potential				G2G4	SNR	None	Species of Concern	WATCH
Helianthus neglectus	Sunflower, Neglected							Potential	G2Q	SNR	None	None	WATCH
Hexalectris nitida	Coralroot, Shining					Potential		Potential	G3	S1	None	Endangered	WATCH
Hexalectris revoluta	Coralroot, Chisos Mtn					Potential		Potential	G1	S1	Petitioned/ positive 90 day finding	None	WATCH
Hexalectris spicata var. *arizonica*	Coralroot, Arizona					Potential		Potential	G5T2T4	S2	None	Endangered	WATCH
Hymenoxys vaseyi	Bitterweed, Vasey's					Verified			G2	S2	None	Species of Concern	WATCH
Limosella pubiflora	Mudwort, Chiricahua					Potential			G1Q	S1	None	Species of Concern	WATCH
Mentzelia filifolia	Threadleaf Blazingstar	Potential							G3	S1?	None	Species of Concern	WATCH *New*

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Mentzelia springeri	Blazingstar, Springer's		Potential	Potential					G3	S3	None	Species of Concern	WATCH
Nama xylopodum	Nama, Cliff					Verified		Verified	G4?	S4?	None	Species of Concern	WATCH
Oenothera organensis	Evening Primrose, Organ Mountains					Verified			G2	S2	None	Species of Concern	WATCH
Packera spellenbergii	Groundsel, Spellenberg's		Potential						G2	S2	None	Species of Concern	WATCH
Panicum mohavense	Panicum, Mohave				Potential	Potential			G1	S1	Petitioned/ negative 90 day finding	Species of Concern	WATCH
Perityle quinqueflora	Rockdaisy, Five-Flowered					Potential		Potential	G4	S3	None	Species of Concern	WATCH
Perityle staurophylla var. *staurophylla*	Rockdaisy, New Mexico					Verified			G4T3T4	S3	None	Species of Concern	WATCH
Phacelia cloudcroftensis	Cloudcroft Phacelia					Potential			G1	S1	None	Species of Concern	WATCH *New*
Phacelia serrata	Phacelia, Cinder			Potential					G3	S2	None	Species of Concern	WATCH
Phacelia sivinskii	Scorpionweed, Sivinski's			Verified	Verified	Verified			G3	S3	None	Species of Concern	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Phemeranthus humilis	Flameflower, Pinos Altos					Potential			G2	S2	None	Species of Concern	WATCH
Phlox caryophylla	Phlox, Pagosa	Potential	Potential						G4	S2	None	Species of Concern	WATCH
Physaria navajoensis	Bladderpod, Navajo	Potential							G2	S1	Petitioned/ positive 90 day finding	Species of Concern	WATCH
Physaria pruinosa	Bladderpod, Pagosa Springs	Potential	Potential						G2	S1	None	Species of Concern	WATCH
Polygala rimulicola var. *Rimulicola*	Milkwort, Guadalupe							Verified	G3T3	S2	None	Species of Concern	WATCH
Sclerocactus papyracanthus	Cactus, Grama Grass	Potential	Verified	Verified	Potential	Verified	Potential		G4	S4	None	None	WATCH (downlisted)
Senecio Cliffordii	Groundsel, Clifford's	Potential							GNR	S2	None	Species of Concern	WATCH
Senecio Warnockii	Ragwort, Warnock's					Verified		Verified	G3Q	S2	Species of Concern	Species of Concern	WATCH *New*
Sicyos glaber	Cucumber, Smooth Bur					Verified			G3	S1S2	None	Species of Concern	WATCH *New*
Silene Plankii	Catchfly, Plank's				Verified	Potential			G2	S2	None	Species of Concern	WATCH
Silene Thurberi	Campion, Thurber's					Potential			G4	S3?	None	Species of Concern	WATCH

Plant Species Data

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Silene Wrightii	Catchfly, Wright's				Potential	Verified			G3	S2	None	Species of Concern	WATCH
Stellaria porsildii	Starwort, Porsild's					Potential			G1	S1	Petitioned/ negative 90 day finding	Species of Concern	WATCH
Talinum brachypodum	Fameflower, Laguna			Potential	Potential				GNRQ	S1	None	Species of Concern	WATCH
Valeriana texana	Valerian, Guadalupe							Verified	G3	S3	None	Species of Concern	WATCH
Viola calcicola	Limestone Violet					Potential		Verified	G3	S3	None	Species of Concern	WATCH *New*

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Amphibians													
Anaxyrus (Bufo) microscaphus	Southwestern (Arizona) toad	None	None	Potential	Verified	Verified	None	None	G3G4	S3	Under Review	SGCN	**BLM Sensitive**
Lithobates (Rana) pipiens	Northern leopard frog	Verified	Verified	Verified	Verified	None	None	None	G5	S3	None	SGCN	**BLM Sensitive**
Amphibians - Watch													
Craugastor (Eleutherodactylus) augusti latrans	Eastern barking frog	None	None	None	None	Verified	Verified	Verified	G5T4	S2S3	None	SGCN	**Watch**
Gastrophryne olivacea	Western narrowmouth toad	None	Potential	None	None	Verified	None	Verified	G5	S1	None	Endangered, SGCN	**Watch**
Lithobates (Rana) blairi	Plains leopard frog	Verified	Verified	None	None	Verified	Verified	Verified	G5	S4	Former FWS Species	SGCN	**Watch**
Lithobates yavapaiensis	Lowland Leopard Frog	None	None	None	Potential	Potential	None	None	G4	S1	None	SCGN	**Watch *New***
Arthropods													
Danaus plexippus plexippus	Monarch Butterfly	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	SNR	Under Review	None	**BLM Sensitive *New***
Lytta mirifica	Anthony Blister Beetle	None	None	None	None	Verified	None	None	G2	SH	Former Category 2	Former (2006)	**BLM Sensitive**
Ochlodes yuma anasazi	Yuma Skipper	None	Verified	None	None	None	None	None	G5	SNR	None	None	**BLM Sensitive**
Arthropods - Watch													
Bombus occidentalis	Western Bumble Bee	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	SNR	None	None	**Watch *New***
Deronectes (Stictotarsus)	Bonita Diving Beetle	None	None	None	None	None	Potential	None	G2	SNR	Former Category 2	Former (2006)	**Watch *New***
Birds													
Aimophila boterii	Botteri's Sparrow	None	None	None	None	Verified	None	None	G4	S1B,S1N	None	SGCN	**BLM Sensitive *New***
Ammodramus bairdii	Baird's Sparrow	None	None	None	None	Verified	None	None	G4	S1N	None	Threatened	**BLM Sensitive**
Ammodramus savannarum	Arizona Grasshopper	None	None	None	None	Verified	None	None	G5TU	S1B,S1N	None	Endangered	**BLM Sensitive**
Athene cunicularia	Western Burrowing Owl	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4T4	S3	None	SGCN	**BLM Sensitive**
Anthus spragueii	Sprague's Pipit	None	None	None	Potential	Verified	Verified	Verified	G3G4	S2N	None	SGCN	**BLM Sensitive**
Antrostomus arizonae	Mexican Whip-poor-will	Potential	Verified	Verified	Verified	Verified	Potential	Potential	GNR	SNR	None	SGCN	**BLM Sensitive *New***
Calcarius mccownii	McCown's Longspur	None	Potential	None	Potential	Verified	Verified	Verified	G4	S3N	None	SGCN	**BLM Sensitive *New***
Calcarius ornatus	Chestnut-collared Longspur	Potential	Verified	None	Verified	Verified	Verified	Verified	G5	S3N	None	SGCN	**BLM Sensitive**
Gymnorhinus	Pinyon Jay	Verified	Verified	Verified	Verified	Verified	Verified	Potential	G3	S2S3	None	SGCN	**BLM Sensitive**
Toxostoma bendirei	Bendire's Thrasher	Verified	Potential	Verified	Verified	Verified	Potential	None	G4	S3B,S3N	None	SGCN	**BLM Sensitive**

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Tympanuchus pallidicinctus	Lesser Prairie-chicken	None	None	None	None	None	Verified	Verified	G3	S2B,S2N	Under Review	SGCN	**BLM Sensitive**
Vireo bellii arizonae	Bell's Vireo	None	Verified	None	Verified	Verified	Verified	Verified	G5	S2B,S3N	None	Threatened SGCN	**BLM Sensitive**
Vermivora virginiae	Virginia's Warbler	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S3B,S4N	None	SGCN	**BLM Sensitive *New***
Birds - Watch													
Aphelocoma woodhouseii	Woodhouse's Scrub- Jay	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S5B, S5N	None	None	**Watch *New***
Aquila chrysaetos	Golden Eagle	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	SB3, S4N	None	None	**Watch**
Baeolophus ridgwayi	Juniper Titmouse	Verified	Verified	Verified	Verified	Verified	Potential	Potential	G5	S4B	None	SGCN	**Watch *New***
Botaurus lentiginosus	American Bittern	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S2	None	SGCN	**Watch**
Buteogallus anthracinus	Common Black-Hawk	Potential	Potential	Verified	Verified	Verified	Verified	Verified	G4G5	S2B,S3N	None	Threatened SGCN	**Watch**
Callipepla squamata	Scaled Quail	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S3	None	None	**Watch *New***
Camptostoma imberbe	Northern Beardless-	None	None	None	None	Verified	None	None	G5	S1B,S1N	None	Endangered	**Watch**
Carpodacus cassinii	Cassin's Finch	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S3B,S5N	None	SGCN	**Watch**
Charadrius montanus	Mountain Plover	Verified	Verified	Verified	Verified	None	None	None	G3	S2B,S4N	None	SGCN	**Watch**
Columbina passerina	Common Ground Dove	None	None	None	Potential	Verified	Potential	Verified	G5	S1B,S1N	None	Endangered	**Watch**
Falco peregrinus	Peregrine Falcon								G4T4	S2B, S3N	Delisted in 1999	SGCN	**Watch *New***
Lanius ludovicianus	Loggerhead Shrike	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S3	None	SGCN	**Watch**
Melanerpes lewis	Lewis's Woodpecker	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S3B,S3N	None	SGCN	**Watch *New***
Meleagris gallopavo mexicana	Gould's Wild Turkey	None	None	None	None	Verified	None	None	G5T3	S2B S2N	None	Threatened SGCN	**Watch**
Micrathene whitneyi	Elf Owl	None	None	Verified	Verified	Verified	None	None	G5	S3B,S3N	None	SGCN	**Watch**
Numenius americanus	Long- billed Curlew	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	SB3, S4N	None	SGCN	**Watch**
Oreoscoptes montanus	Sage Thrasher	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S3B,S4N	None	None	**Watch**
Passerina ciris	Painted Bunting	None	None	None	None	Verified	Potential	Verified	G5	S4B,S4N	None	None	**Watch**
Psiloscops flammeolus	Flammulated Owl								G4	S3B, S3N	None	SGCN	**Watch *New***
Setophaga graciae	Grace's Warbler	Verified	Verified	Verified	Verified	Verified	Verified	None	G5	S3B, S4N	None	SGCN	**Watch *New***
Setophaga nigrescens	Black-throated Gray	Verified	Verified	Verified	Verified	Verified	Verified	None	G5	S3B,S4N	None	SGCN	**Watch *New***
Spizella atrogularis evura	Black-chinned Sparrow	None	None	Verified	Verified	Verified	Verified	Verified	G5	S3B,S3N	None	SGCN	**Watch**

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Vermivora luciae	Lucy's Warbler	None	None	None	Verified	Verified	None	None	G5	S3B,S4N	None	SGCN	**Watch**
Vireo vicinior	Gray Vireo	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S4B S3N	None	Threatened SGCN	**Watch**
Crustaceans													
Eulimnadia follisimilis	Clam Shrimp	None	None	None	Verified	None	Verified	None	GNR	SNR	None	SGCN	**BLM Sensitive**
Phallocryptus sublettei	Salt Playa (Sublette's) Fairy Shrimp	None	None	None	None	Verified	None	None	G2	SNR	None	SGCN	**BLM Sensitive**
Streptocephalus moorei	Moore's Fairy Shrimp	None	None	None	None	Verified	None	None	G1	SNR	None	SGCN	**BLM Sensitive**
Streptocephalus	Bowman's Fairy Shrimp	None	None	None	None	Verified	None	None	G1	SNR	None	SGCN	**BLM Sensitive**
Crustaceans - Watch													
Eocyzicus concavus	Sway-backed Clam Shrimp	None	None	None	None	None	Potential	None	G1G3Q	SNR	None	SGCN	**Watch *New***
Lepidurus lemmoni	Lynch's Tadpole	None	None	None	None	Verified	None	None	G4	SNR	None	SGCN	**Watch *New***
Thamnocephalus mexicanus	Mexican Beavertail	None	None	None	None	Potential	None	None	G3	SNR	None	SGCN	**Watch *New***
Fish													
Astyanax mexicanus	Mexican Tetra	None	None	None	None	None	Verified	Verified	G5	S2	None	SGCN	**BLM Sensitive**
Catostomus clarkii	Desert Sucker	None	None	None	Potential	Verified	None	None	G3G4	S2	Former species of consern	SGCN	**BLM Sensitive**
Catostomus insignis	Sonora Sucker	None	None	None	Potential	Verified	None	None	G3G4	S2	Former species of consern	SGCN	**BLM Sensitive**
Catostomus plebeius	Rio Grande Sucker	None	Verified	Potential	Potential	Verified	Potential	Potential	G3G4	S2	None	SGCN	**BLM Sensitive**
Cycleptus elongatus	Blue Sucker	None	None	None	None	None	Potential	Verified	G3G4	S1	None	Endangered SGCN	**BLM Sensitive**
Cyprinodon pecosensis	Pecos Pupfish	None	None	None	None	None	Verified	Verified	G2	S1	Former species of consern	SGCN	**BLM Sensitive**
Etheostoma lepidum	Greenthroat Darter	None	None	None	None	None	Verified	Verified	G3G4	S2	Former species of consern	Threatened SGCN	**BLM Sensitive**
Gila pandora	Rio Grande Chub	None	Verified	Potential	Potential	Potential	Verified	Verified	G3	S3	None	SGCN	**BLM Sensitive**
Gila robusta	Roundtail Chub	Potential	Potential	Potential	Potential	Verified	None	None	G3	S2	None	Endangered SGCN	**BLM Sensitive**
Macrhybopsis tetranema	Peppered Chub	None	Potential	None	None	None	None	None	G1	S1	Former species of consern	SGCN	**BLM Sensitive**
Moxostoma congestum	Gray Redhorse	None	None	None	None	None	None	Verified	G4	S1	Former species of consern	Endangered SGCN	**BLM Sensitive**
Percina macrolepida	Bigscale Logperch	None	Introduced	None	None	None	Verified	Verified	G5	S2	None	Threatened SGCN	**BLM Sensitive**
Phenacobius mirabilis	Suckermouth Minnow	None	Verified	None	None	None	Verified	None	G5	S2	None	SGCN	**BLM Sensitive**

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Fish - Watch													
Agosia chrysogaster	Longfin Dace	None	None	None	Potential	Verified	Verified	None	G4	S3S4	Former FWS Species of Concern	None	**Watch *New***
Ictiobus bubalus	Smallmouth Buffalo	None	None	None	Potential	Verified	Verified	Verified	G5	S3S4	None	None	**Watch *New***
Catostomus discobolus discobolus	Bluehead Sucker	Verified	None	None	None	None	None	None	G4T4	S2	None	None	**Watch *New***
Catostomus latipinnis	Flannelmouth Sucker	Verified	Potential	None	None	Potential	None	None	G3G4	S1	Former Category 2 Candidate	None	**Watch *New***
Ictalurus lupus	Headwater Catfish	None	None	None	None	None	Verified	Verified	G3	S1	Former species of consern	None	**Watch *New***
Macrhybopsis aestivalis	Speckled Chub	None	Potential	None	None	None	Verified	Verified	G3G4	S2	None	None	**Watch *New***
Notropis jemezanus	Rio Grande Shiner	None	None	None	Potential	None	Verified	Verified	G3	S2	Former species of consern	None	**Watch *New***
Oncorhynchus clarki virginalis	Rio Grande Cutthroat Trout	None	Potential	Potential	Potential	Potential	Potential	None	G5	S2	Former Candidate	None	**Watch *New***
Mammals													
Choeronycteris mexicana	Mexican long-tongued bat	None	None	None	None	Verified	None	Potential	G3G4	S2S3	None	SGCN	**BLM Sensitive**
Corynorhinus townsendii	Townsend's big-eared bat	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G3G4T3T4	S3S4	None	SGCN	**BLM Sensitive**
Cynomys gunnisoni	Gunnison's prairie dog	Verified	Verified	Verified	Verified	None	None	None	G5	S2	None	SGCN	**BLM Sensitive**
Cynomys ludovicianus	Black-tailed prairie dog	None	Verified	Potential	Potential	Verified	Verified	Verified	G4	S2	None	SGCN	**BLM Sensitive**
Euderma maculatum	Spotted bat	Verified	Verified	Verified	Verified	Verified	Verified	Potential	G4	S3	None	Threatened, SGCN	**BLM Sensitive**
Lasiurus xanthinus	Western yellow bat	None	None	None	None	Verified	None	None	G5	S1	None	Threatened, SGCN	**BLM Sensitive**
Leptonycteris yerbabuenae	Lesser long-nosed bat	None	None	None	None	Verified	None	None	G3	S3	Delisted 2018	Threatened, SGCN	**BLM Sensitive**
Lepus callotis	White-sided jack rabbit	None	None	None	None	Verified	None	None	G4T3	S1	None	Threatened,	**BLM Sensitive**
Sorex arizonae	Arizona shrew	None	None	None	None	Verified	None	None	G3	S1	None	Endangered	**BLM Sensitive *New***
Mammals - Watch													
Cratogeomys castanops	Yellow-faced pocket	None	Verified	Verified	Verified	Verified	Verified	Verified	G5	S2	None	None	**Watch**
Cryptotis parva	Least shrew	None	Potential	None	None	None	Verified	Verified	G5	S2	None	Threatened,	**Watch *New***
Idionycteris phyllotis	Allen's lappet-browed	None	None	Potential	Verified	Verified	None	None	G4	S3	None	None	**Watch *New***
Lasiurus blossevillii	Western red bat	None	None	None	Verified	Verified	Potential	None	G4	S3	None	None	**Watch *New***

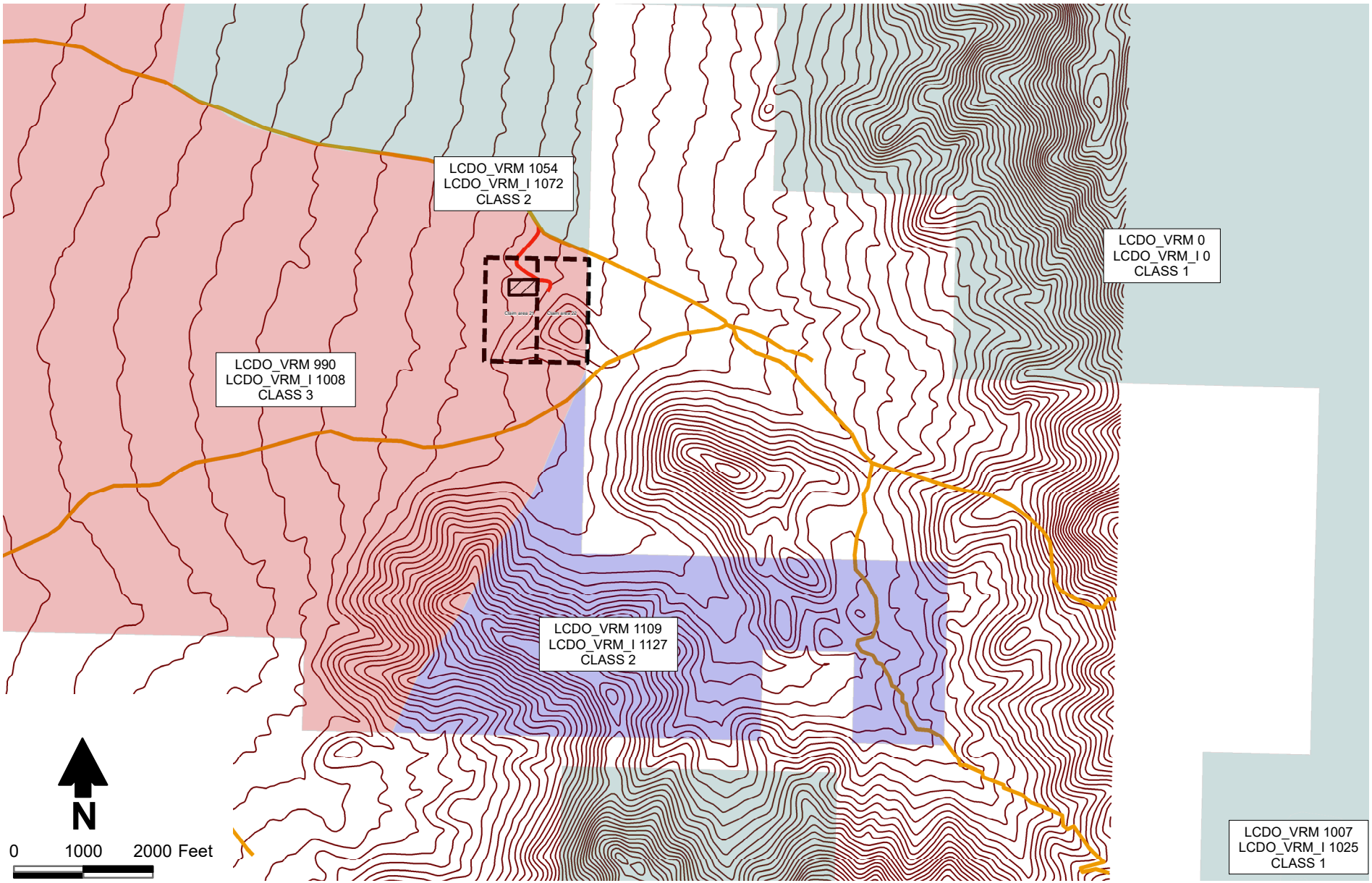
Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Lepus townsendii	White-tailed jack rabbit	Potential	Verified	None	None	None	None	None	G5	S3	None	None	**Watch**
Nasua narica	White-nosed coati	None	None	None	Verified	Verified	None	None	G5	S2	None	None	**Watch *New***
Nyctinomops femorosaccus	Pocketed free-tailed	None	None	None	None	Verified	None	Verified	G4	S1	None	None	**Watch**
Ovis canadensis mexicana	Desert bighorn sheep	None	None	None	Verified	Verified	None	None	G3	S1	None	Threatened	**Watch**
Reithrodontomys fulvescens canus	Fulvous harvest mouse	None	None	None	None	Verified	None	None	G5	S1	None	None	**Watch**
Sigmodon ochrognathus	Yellow-nosed cotton rat	None	None	None	None	Verified	None	None	G4	S2	None	None	**Watch**
Thomomys umbrinus	Southern pocket	None	None	None	Potential	Verified	None	None	G5T2	S2	None	Threatened,	**Watch *New***
Mollusks													
Ashmunella hebardi	Hacheta Grande Woodlandsnail	None	None	None	None	Verified	None	None	G1	S1	None	SGCN	**BLM Sensitive *New***
Ashmunella macromphala	Cooke's Peak	None	None	None	None	Verified	None	None	G1	S1	None	SGCN	**BLM Sensitive *New***
Gastrocopta dalliana dalliana	Shortneck Snaggletooth Snail	None	None	None	None	Potential	None	None	G2G4	S3S4	None	SGCN	**BLM Sensitive *New***
Holospira crossei	Cross Holospira Snail	None	None	None	None	Verified	None	None	G2	S1	None	SGCN	**BLM Sensitive *New***
Holospira metcalfi	Metcalf Holospira Snail	None	None	None	None	Verified	None	None	G1	S1	None	SGCN	**BLM Sensitive *New***
Pyrgulopsis pecosensis	Pecos Springsnail	None	None	None	None	None	None	Potential	G1	S1	None	SGCN	**BLM Sensitive *New***
Radiocentrum ferrissi	Fringed Mountainsnail	None	None	None	None	Potential	None	None	G1	S1	None	SGCN	**BLM Sensitive *New***
Sonorella hachitana	New Mexico Talussnail	None	None	None	None	Verified	None	None	G2	S2	None	SGCN	**BLM Sensitive *New***
Sonorella hachitana flora	New Mexico Talussnail	None	None	None	None	Verified	None	None	G2T1	S1	None	SGCN	**BLM Sensitive *New***
Sonorella todseni	Doña Ana Talussnail	None	None	None	None	Verified	None	None	G1	S1	Former Category 2	SGCN	**BLM Sensitive *New***
Mollusks -Watch													
Ashmunella amblya cornudasensis	Woodlandsnail	None	None	None	None	Potential	None	None	G3T3	S3	None	SGCN	**Watch *New***
Holospira animasensis	Animas Mountains Holospira Snail	None	None	None	None	Potential	None	None	G1G2	S1	None	SGCN	**Watch *New***
Reptiles													
Aspidoscelis dixoni	Gray-checkered Whiptail	None	None	None	None	Verified	None	None	G3G4	S1	None	Endangered SGCN	**BLM Sensitive**

Species	Common Name	Farmington	Taos	Rio Puerco	Socorro	Las Cruces	Roswell	Carlsbad	Natureserve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
Heloderma suspectum	Gila Monster	None	None	None	None	Verified	None	None	G4	S2	None	Endangered, SGCN	**BLM Sensitive**
Pseudemys gorzugi	Western River (Rio Grande) Cooter	None	None	None	None	None	Verified	Verified	G3G4	S2	Under Review	Threatened, SGCN	**BLM Sensitive**
Sceloporus arenicolus	Dunes Sagebrush Lizard	None	None	None	None	None	Verified	Verified	G2G3	S2	Formerly proposed, withdrawn following	Endangered SGCN	**BLM Sensitive**
Sistrurus tergeminus	Desert massasauga	None	None	Verified	Verified	Verified	Verified	Verified	G3G4T3T4	S3	Under Review	SGCN	**BLM Sensitive *New***
Trachemys gaigeae	Big Bend Slider	None	None	None	Verified	Verified	None	None	G3	S2	None	SGCN	**BLM Sensitive**
Reptiles - Watch													
Aspidoscelis stictogramma	Giant Spotted Whiptail	None	None	None	None	Verified	None	None	G4	S1	None	Threatened, SGCN	**Watch**
Crotalus cerberus	Arizona black rattlesnake	None	None	None	Verified	Verified	None	None	G5	SNR	None	SGCN	**Watch *New***
Crotalus lepidus lepidus	Mottled Rock Rattlesnake	None	None	None	None	Verified	Potential	Verified	G5T4T5	S2	None	Threatened, SGCN	**Watch**
Lampropeltis alterna	Gray-banded Kingsnake	None	None	None	None	None	None	Verified	G5	S1	None	Endangered, SGCN	**Watch**
Sceloporus slevini	Slevin's Bunchgrass Lizard	None	None	None	None	Verified	None	None	G4	S1	None	Threatened, SGCN	**Watch**

Appendix F

Visual Contrast Rating Forms

S:\Projects\DB19.1011_American_Mg\GIS\MXDs\F03_BLM_VRM.mxd



Data Source: N.M. Bureau of Land Management, Las Cruces District Office Spatial Data

Explanation

- Proposed laydown yard
- Claim area boundary
- Proposed road
- Unimproved road

Las Cruces District Office
VRM Classification
1 2 3

Daniel B. Stephens & Associates, Inc.
1/31/2019
JN DB19.1011

AMERICAN MAGNESIUM

Bureau of Land Management Visual Resource Classes

APPENDIX B – VISUAL RESOURCES ANALYSIS AND SIMULATIONS

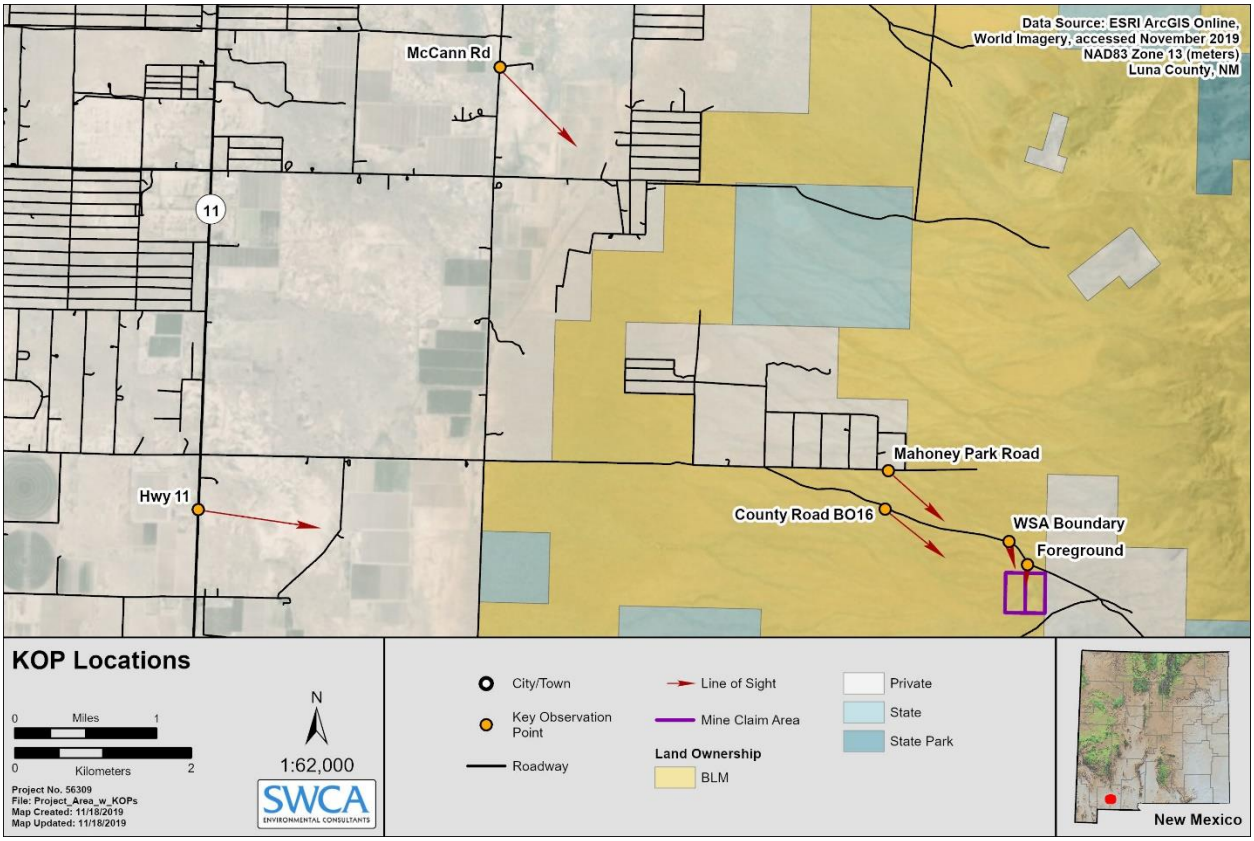
From: BLM, 2020. Environmental Assessment, American Magnesium Foothill Dolomite Mine Project. Document No. DOI-BLM-NM-L000-2020-0024-EA. May 18, 2020.

Appendix B - Visual Resources Analysis and Simulations

Six key observation points (KOPs) were identified to analyze the impacts of the Proposed Action on visual and scenic values. These are:

- McCann Road
- Highway 11
- Mahoney Park Road
- County Road B016
- WSA Boundary
- Foreground

The KOP locations are mapped as follows:



On the following pages are the photographic simulations at the 5 year and post reclamation phases of the life of the project. Given the distance from McCann Road and Highway 11, no post-reclamation simulations were provided as the difference is not discernible.

The contrast rating forms are also included for all simulations provided.

Foothill Dolomite Mine

KOP
McCann Road

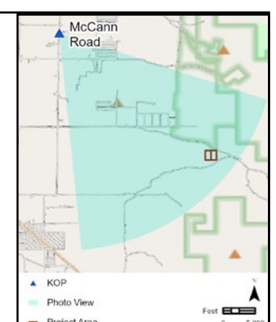
Summer / Midday
Existing and Proposed

Sun and Weather Information

Sun Azimuth (°)	263 W
Sun Elevation (°)	41
Lighting Angle on Project	right lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*97*
Humidity (%)	*7*

Proposed Infrastructure Information

Nearest ground disturbance (miles)	5.25



Camera Information

Camera Make & Model	iPhone 8, dual cam.
Camera Sensor Size	On chip sensor
Lens Specification	3.99-6.6mm f/1.8-2.8
Lens Focal Legth	4mm
35mm in film	28mm
Angle of View (°)	65.47x46.4

Base Photographic Documentation

Date	07/25/2019
Time (24H)	16:10
Lattitude (°)	32.149442
Longitude (°)	-107.716981
Viewpoint Elevation (ft)	4243
Camera Height (f)	5
Camera Heading (°)	131

Photosimulation Created Using:
ArcGIS; Adobe Photoshop; SketchUp;
Google EarthPro

Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS

Foothill Dolomite Mine

KOP
Highway 11

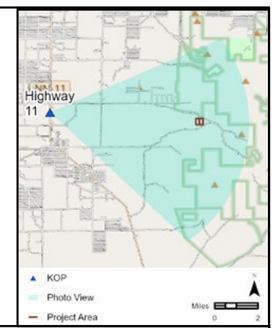
Summer / Midday
Existing and Proposed

Sun and Weather Information

Sun Azimuth (°)	146 SE
Sun Elevation (°)	75
Lighting Angle on Project	top lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*91*
Humidity (%)	*20*

Proposed Infrastructure Information

Nearest ground disturbance (miles)	5.78



Camera Information

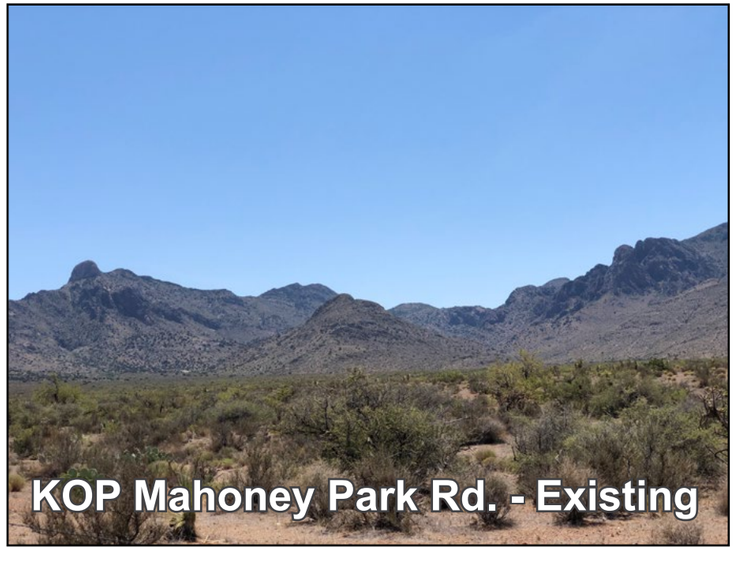
Camera Make & Model	iPhone 8, dual cam.
Camera Sensor Size	On chip sensor
Lens Specification	3.99-6.6mm f/1.8-2.8
Lens Focal Legth	4mm
35mm in film	28mm
Angle of View (°)	65.47x46.4

Base Photographic Documentation

Date	07/25/2019
Time (24H)	12:42
Lattitude (°)	32.103414
Longitude (°)	-107.751892
Viewpoint Elevation (ft)	4226
Camera Height (f)	5
Camera Heading (°)	94

Photosimulation Created Using:
ArcGIS; Adobe Photoshop; SketchUp;
Google EarthPro

Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS



Foothill Dolomite Mine

KOP
Mahoney Park Road

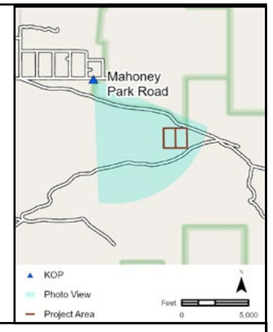
Summer / Midday
Existing and Proposed

Sun and Weather Information

Sun Azimuth (°)	135 SE
Sun Elevation (°)	73
Lighting Angle on Project	top lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*92*
Humidity (%)	*19*

Proposed Infrastructure Information

Nearest ground disturbance (miles)	1.25



Camera Information

Camera Make & Model	iPhone 8, dual cam.
Camera Sensor Size	On chip sensor
Lens Specification	3.99-6.6mm f/1.8-2.8
Lens Focal Legth	4mm
35mm in film	28mm
Angle of View (°)	65.47x46.4

Base Photographic Documentation

Date	07/25/2019
Time (24H)	12:26
Lattitude (°)	32.109181
Longitude (°)	-107.669036
Viewpoint Elevation (ft)	4573
Camera Height (f)	5
Camera Heading (°)	126

Photosimulation Created Using:
ArcGIS; Adobe Photoshop; SketchUp;
Google EarthPro

Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS

Foothill Dolomite Mine

KOP
County Road B016

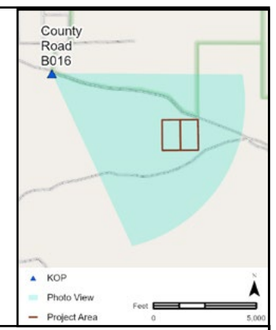
Summer / Midday
Existing and Proposed

Sun and Weather Information

Sun Azimuth (°)	125 SSE
Sun Elevation (°)	70
Lighting Angle on Project	top lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*90*
Humidity (%)	*20*

Proposed Infrastructure Information

Nearest ground disturbance (miles)	1.06



Camera Information

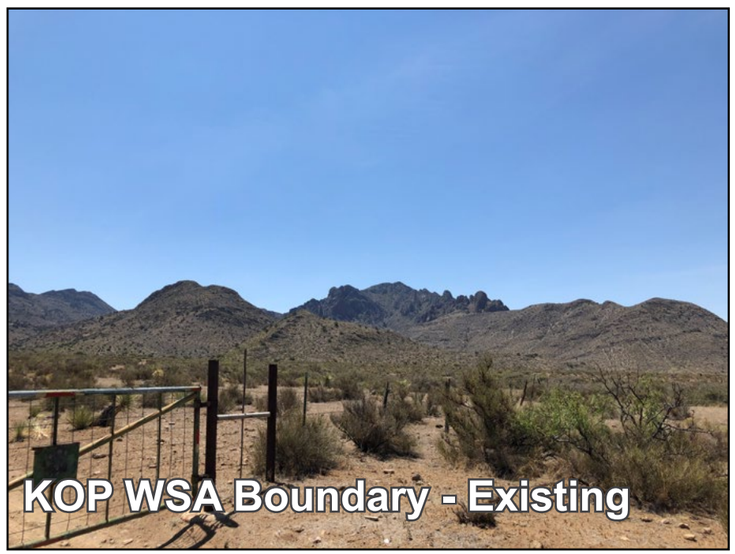
Camera Make & Model	iPhone 8, dual cam.
Camera Sensor Size	On chip sensor
Lens Specification	3.99-6.6mm f/1.8-2.8
Lens Focal Legth	4mm
35mm in film	28mm
Angle of View (°)	65.47x46.4

Base Photographic Documentation

Date	07/25/2019
Time (24H)	12:10
Lattitude (°)	32.105267
Longitude (°)	-107.669333
Viewpoint Elevation (ft)	4588
Camera Height (f)	5
Camera Heading (°)	115

Photosimulation Created Using:
ArcGIS; Adobe Photoshop; SketchUp;
Google EarthPro

Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS



Foothill Dolomite Mine

KOP
WSA Boundary

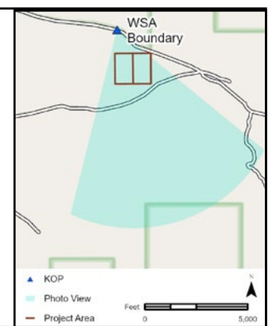
Summer / Midday
Existing and Proposed

Sun and Weather Information

Sun Azimuth (°)	121 SSE
Sun Elevation (°)	69
Lighting Angle on Project	top lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*88*
Humidity (%)	*21*

Proposed Infrastructure Information

Nearest ground disturbance (miles)	0.31



Camera Information

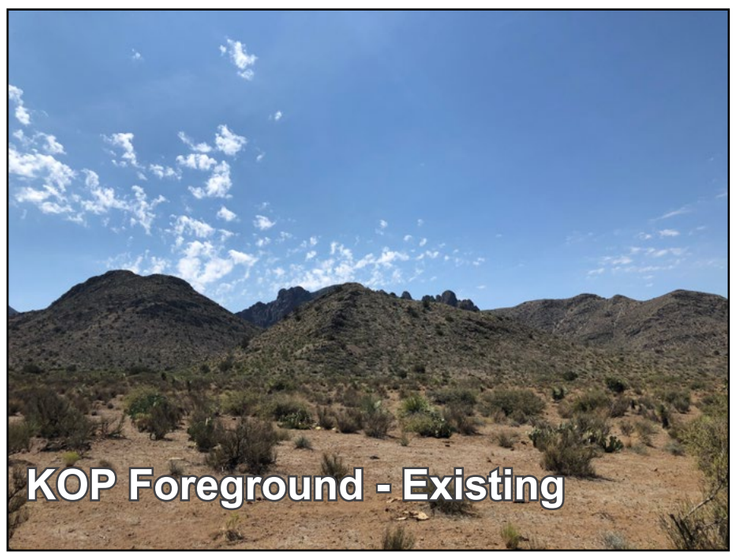
Camera Make & Model	iPhone 8, dual cam.
Camera Sensor Size	On chip sensor
Lens Specification	3.99-6.6mm f/1.8-2.8
Lens Focal Legth	4mm
35mm in film	28mm
Angle of View (°)	65.47x46.4

Base Photographic Documentation

Date	07/25/2019
Time (24H)	12:00
Lattitude (°)	32.1022556°N
Longitude (°)	107.6543500°W
Viewpoint Elevation (ft)	4808
Camera Height (f)	5
Camera Heading (°)	154

Photosimulation Created Using:
ArcGIS; Adobe Photoshop; SketchUp;
Google EarthPro

Provided by
SWCA®
ENVIRONMENTAL CONSULTANTS



Foothill Dolomite Mine

KOP Foreground

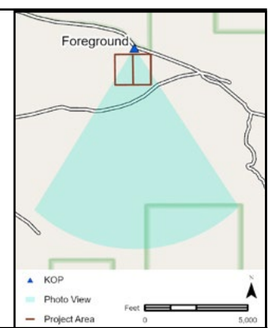
Summer / Midday
Existing and Proposed

Sun and Weather Information

Sun Azimuth (°)	111 ESE
Sun Elevation (°)	63
Lighting Angle on Project	top lit
Weather Conditions	Sunny
Avg. Predicted Visibility	10 miles
Tempature (°F)	*87*
Humidity (%)	*21*

Proposed Infrastructure Information

Nearest ground disturbance (miles)	0.14



Camera Information

Camera Make & Model	iPhone 8, dual cam.
Camera Sensor Size	On chip sensor
Lens Specification	3.99-6.6mm f/1.8-2.8
Lens Focal Legth	4mm
35mm in film	28mm
Angle of View (°)	65.47x46.4

Base Photographic Documentation

Date	07/25/2019
Time (24H)	11.30
Lattitude (°)	32.0999500°N
Longitude (°)	107.6520611°W
Viewpoint Elevation (ft)	4858
Camera Height (f)	5
Camera Heading (°)	178

Photosimulation Created Using:
ArcGIS; Adobe Photoshop; SketchUp;
Google EarthPro

Provided by
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ENVIRONMENTAL CONSULTANTS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019
District/ Field Office: Las Cruces District Office
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch See Map
2. Key Observation Point: Foreground 5-Year	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* Gentle, simple, numerous, domed and flattened *Background:* Asymmetrical, steep, jagged, conical	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	None
LINE	*Foreground/Middleground:* Continuous, linear, wavy, sloping, diagonal *Background: irregular*, complex, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	None
COLOR	*Foreground/Middleground:* dull subtle light red browns *Background:* dark cool blue greys	*Foreground/Middleground:* dark browns, light yellow greens *Background:* deep browns and greys	None
TEX-TURE	*Foreground/Middleground:* medium uniform, continuous, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse *Background:* nondirectional, fine, grainy, blanketed	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, smooth, steep, repeating regular strip	*Foreground/Middleground:* amorphous, low, patchy	*Foreground/Middleground:* bold, simple, geometric, contrasting, few curving band (access road)
LINE	*Foreground/Middleground:* bold, angular, straight, horizontal, hard	*Foreground/Middleground:* weak, complex	*Foreground/Middleground:* bold, regular, straight, simple, hard, geometric, horizontal, vertical parallel curving
COLOR	*Foreground/Middleground:* dull grayish white, contrasting, bright, glaring	*Foreground/Middleground:* soft complimentary deep yellow-greens and browns	*Foreground/Middleground:* vibrant contrasting vivid and harmonious dull browns tan to gray
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, uniform, discontinuous	*Foreground/Middleground:* medium, nondirectional, uniform	*Foreground/Middleground:* ordered, contrasting, clumped

SECTION D. CONTRAST RATING _☑_SHORT TERM __LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM		X					X			X		
	LINE		X					X			X		
	COLOR		X					X			X		
	TEXTURE		X					X				X	

2. Does project design meet visual resource management objectives? ☑__Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended ___Yes _☑_No (Explain on reverses side)

Evaluator's Names	Date
E. Hunt	11/04/2019
E. Treiman	4/21/2020

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from the intersection of the unnamed BLM road and the proposed access road. The proposed project is approximately 0.14 miles from the KOP. Landscape modifications from access road construction, ground disturbance, active mining, and vegetation removal would create moderate to weak contrasts with the existing landscape forms, lines, colors, and textures. From this KOP the project area would attract the attention of the casual observer and should not dominate the viewshed at the 5-year mark. VRM Class III objectives would be met in the short-term.

Additional Mitigating Measures (See item 3)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 0.31 miles north northwest of the project area See Map
2. Key Observation Point: WSA boundary 5 Year	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* Gentle, simple, numerous, domed and flattened *Background:* Asymmetrical, steep, jagged, conical	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	*Foreground/Middleground:* bold, geometric, regular, contrasting, linear
LINE	*Foreground/Middleground:* Continuous, linear, wavy, sloping, diagonal *Background: irregular*, complex, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	*Foreground/Middleground:* simple, hard, parallel, geometric, vertical, horizontal, complex
COLOR	*Foreground/Middleground:* dull subtle light red browns *Background:* dark cool blue greys	*Foreground/Middleground:* dark browns, light yellow greens *Background:* deep browns and greys	*Foreground/Middleground:* dark monotone warm brown and black, silver-gray
TEX-TURE	*Foreground/Middleground:* medium uniform, continuous, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse, *Background:* nondirectional, fine, grainy, blanketed	*Foreground/Middleground:* medium, uniform, directional

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, smooth, steep, repeating regular strips	*Foreground/Middleground:* amorphous, low, patchy	*Foreground/Middleground:* bold, simple, geometric, contrasting, few
LINE	*Foreground/Middleground:* bold, angular, straight, horizontal, hard	*Foreground/Middleground:* weak, broken	*Foreground/Middleground:* bold, regular, straight, simple, hard, geometric, horizontal, vertical
COLOR	*Foreground/Middleground:* dull grayish white, contrasting, bright	*Foreground/Middleground:* soft, complimentary deep yellow-greens and browns	*Foreground/Middleground:* vibrant contrasting vivid and harmonious dull browns
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, uniform, discontinuous	*Foreground/Middleground:* medium, nondirectional, uniform	*Foreground/Middleground:* ordered, contrasting, clumped

SECTION D. CONTRAST RATING _☑_ SHORT TERM __LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM		X					X			X		
	LINE		X					X			X		
	COLOR		X					X			X		
	TEXTURE			X				X				X	

2. Does project design meet visual resource management objectives? ☑ __Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names	Date
E. Hunt	11/04/2019
E. Treiman	4/21/2020

SECTION D. (Continued)

Comments from item 2.

This KOP represents the viewshed from the WSA Boundary where recreationists travel on the unnamed BLM road. The proposed project is approximately 0.31 mile from KOP. Landscape modifications from ground disturbance, active mining, temporary structures, and vegetation removal would create moderate to weak contrasts with the existing landscape forms, lines, colors, and textures. Because the KOP is relatively close to the proposed mine site, the proposed project would attract the attention of the casual observer but would not dominate the landscape. VRM Class III objectives would be met in the short-term.

Additional Mitigating Measures (See item 3)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 1.06 miles northwest of the project area See Map
2. Key Observation Point: County road BO16, 5-Year	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* low, simple, horizontal *Background:* jagged, steep, complex	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	*Foreground/Middleground:* curving band
LINE	*Foreground/Middleground:* bold, flowing, smooth, simple *Background:* angular, irregular, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	*Foreground/Middleground:* parallel, curved
COLOR	*Foreground/Middleground:* dull warm grey browns *Background:* muted dark cool blue browns	*Foreground/Middleground:* dark browns, light yellow greens *Background:* deep browns and greys	*Foreground/Middleground:* tan
TEX-TURE	*Foreground/Middleground:* medium uniform, continuous, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse, *Background:* nondirectional, fine, grainy, blanketed	*Foreground/Middleground:* fine, continuous

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, geometric, smooth, steep, repeating regular strips	*Foreground/Middleground:* amorphous, low, patchy, simple	*Foreground/Middleground:* linear, simple, few
LINE	*Foreground/Middleground:* bold, angular, straight, hard, simple, rugged, horizontal	*Foreground/Middleground:* weak, irregular	*Foreground/Middleground:* regular, soft, horizontal
COLOR	*Foreground/Middleground:* muted warm grayish white, brown, tan	*Foreground/Middleground:* soft complimentary deep yellow-greens and browns	*Foreground/Middleground:* dull cool browns, muted, tan
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, ordered, striated	*Foreground/Middleground:* medium, nondirectional, uniform, ordered	*Foreground/Middleground:* coarse, patchy, discontinuous

SECTION D. CONTRAST RATING _☑_SHORT TERM __LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X				X	
	LINE			X				X				X	
	COLOR			X				X				X	
	TEXTURE				X			X				X	

2. Does project design meet visual resource management objectives? ☑ __Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names	Date
E. Hunt	11/04/2019
E. Treiman	4/22/2020

SECTION D. (Continued)

Comments from item 2.

This KOP represents the viewshed from County Road B016 where recreationists would approach the Florida Mountains. The proposed project is approximately 1.06 miles from this KOP. Landscape modification from ground disturbance, active mining, and vegetation removal would create moderate to weak contrasts with the existing landscape forms, line, colors, and textures. Because the KOP is approximately 1.06 miles from the proposed mine site, the proposed project would attract the attention of the casual observer but would not dominate the landscape. VRM Class III objectives would be met during operations at the 5-year mark.

Additional Mitigating Measures (See item 3)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 1.25 miles northwest of the project area See Map
2. Key Observation Point: Mahoney Park Road 5-Year	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* simple, horizontal *Background:* jagged, steep, complex	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	None
LINE	*Foreground/Middleground:* bold, smooth, simple *Background:* angular, irregular, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	None
COLOR	*Foreground/Middleground:* dull warm grey browns *Background:* muted dark cool blue browns	*Foreground/Middleground:* dark browns, light yellow greens *Background:* deep browns and greys	None
TEX-TURE	*Foreground/Middleground:* medium uniform, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse *Background:* nondirectional, fine, grainy, blanketed	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, geometric, smooth, steep, repeating regular strips	*Foreground/Middleground:* amorphous, low, patchy, simple	*Foreground/Middleground:* linear, simple, few
LINE	*Foreground/Middleground:* bold, angular, straight, hard, simple, rugged, horizontal	*Foreground/Middleground:* weak, irregular	*Foreground/Middleground:* simple, broken, angular
COLOR	*Foreground/Middleground:* muted glaring warm grayish white	*Foreground/Middleground:* soft complimentary deep yellow-greens and browns	*Foreground/Middleground:* dull cool browns, muted
TEX-TURE	*Foreground/Middleground* :contrasting, uniform, ordered, striated, clumped	*Foreground/Middleground:* medium, nondirectional, uniform, ordered	*Foreground/Middleground:* coarse, patchy, discontinuous

SECTION D. CONTRAST RATING _☑_SHORT TERM __LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1) STRONG	MODERATE	WEAK	NONE	VEGETATION (2) STRONG	MODERATE	WEAK	NONE	STRUCTURES (3) STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM		X					X				X	
	LINE		X					X				X	
	COLOR		X					X				X	
	TEXTURE			X				X				X	

2. Does project design meet visual resource management objectives? ☑ __Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names	Date
E. Hunt	11/04/2019
E. Treiman	4/22/2020

SECTION D. (Continued)

Comments from item 2.

This KOP represents the viewshed from Mahoney Park Road where nearby residents would approach the Florida Mountains. The proposed project is approximately 1.25 miles from this KOP. Landscape modifications from ground disturbance, active mining, and vegetation removal would create moderate to weak contrasts with the existing landscape forms, line, colors, and textures. Introduction of temporary structures would create weak contrasts because of the distance. The land color during mine operations, a warm grey, contrasts moderately with the brownish, dark-colored mountains in the background. VRM Class III objectives would be met, because the proposed modifications would be visible to the casual observer, may attract attention, but do not dominate the landscape.

Additional Mitigating Measures (See item 3)

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 5.78 miles west of the project area See Map
2. Key Observation Point: Hwy 11 5-Year	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* low, simple, horizontal *Background:* jagged, steep, complex	*Foreground/Middleground:* irregular, short, low, simple, numerous *Background:* indistinct	Not applicable
LINE	*Foreground/Middleground:* Linear, parallel, straight *Background:* complex, jagged, irregular	*Foreground/Middleground:* simple, continuous, horizonal *Background:* indistinct	Not applicable
COLOR	*Foreground/Middleground:* warm light dull greys *Background :*deep cool browns and blacks	*Foreground/Middleground:* vibrant yellow-greens, deep brown-black and dull cool greys *Background:* indistinct	Not applicable
TEX-TURE	*Foreground/Middleground:* smooth, uniform, continuous *Background:* rough, coarse, contrasting, directional	*Foreground/Middleground:* continuous, fine, patchy, random *Background:* indistinct	Not applicable

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Background:* definite, irregular, short, few, small	*Background:* indistinct	*Background:* indistinct
LINE	*Background:* simple, curving, irregular	*Background:* indistinct	*Background:* indistinct
COLOR	*Background:* light muted warm grey	*Background:* indistinct	*Background:* indistinct
TEX-TURE	*Background:* fine, subtle, discontinuous	*Background:* indistinct	*Background:* indistinct

SECTION D. CONTRAST RATING _☑_SHORT TERM __LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X					X				X
	LINE			X					X				X
	COLOR			X					X				X
	TEXTURE			X					X				X

2. Does project design meet visual resource management objectives? _☑_Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names — Date
E. Hunt — 11/04/2019

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from human eye level from Highway 11 Road where general observers driving along Highway 11 would have a view of the Florida Mountains. The proposed project is approximately 5.78 miles away from KOP Highway 11. The greatest contrast would be in the short term, seen in the 5-year simulation, from the disturbance of the ground and removal of vegetation in the viewshed. The proposed project infrastructure and landscape modification would create a weak or no contrast for views from this KOP. This level of modification meets the management objectives of VRM Class III because, from this KOP, the proposed modification may not be visible to the casual viewer and would not attract attention or dominate the view. This analysis is for the project interim at 5-years into construction.

Additional Mitigating Measures (See item 3)

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 5.25 miles northwest of the project area See Map
2. Key Observation Point: McCann Rd 5-Year	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* low, simple, horizontal *Background:* jagged, steep, complex	*Foreground/Middleground:* irregular, short, low, simple, numerous *Background:* indistinct	Not applicable
LINE	*Foreground/Middleground:* Linear, parallel, straight *Background:* complex, jagged, irregular	*Foreground/Middleground:* simple, continuous, horizonal *Background:* indistinct	Not applicable
COLOR	*Foreground/Middleground:* warm light dull greys *Background :*deep cool browns and blacks	*Foreground/Middleground:* vibrant yellow-greens, deep brown-black and dull cool greys *Background:* indistinct	Not applicable
TEX-TURE	*Foreground/Middleground:* smooth, uniform, continuous *Background:* rough, coarse, contrasting, directional	*Foreground/Middleground:* continuous, fine, patchy, random *Background:* indistinct	Not applicable

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Background:* definite, irregular, short, few, small	*Background:* indistinct	*Background:* indistinct
LINE	*Background:* simple, curving, irregular	*Background:* indistinct	*Background:* indistinct
COLOR	*Background:* light muted warm grey	*Background:* indistinct	*Background:* indistinct
TEX-TURE	*Background:* fine, subtle, discontinuous	*Background:* indistinct	*Background:* indistinct

SECTION D. CONTRAST RATING _☑_SHORT TERM __LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X					X				X
	LINE			X					X				X
	COLOR			X					X				X
	TEXTURE			X					X				X

2. Does project design meet visual resource management objectives? _☑_Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names — Date
E. Hunt — 11/04/2019

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from human eye level from McCann Road where residents and general observers driving along McCann Road would have a view of the Florida Mountains. The proposed project is approximately 5.25 miles away from KOP McCann Road. The greatest contrast would be in the short term, seen in the 5-year simulation, from the disturbance of the ground and removal of vegetation in the viewshed. The proposed project infrastructure and landscape modification would create a weak or no contrast for views from this KOP. This level of modification meets the management objectives of VRM Class III because, from this KOP, the proposed modification would be indistinct to the casual viewer and would therefore not attract attention or dominate the view. This analysis is for the project interim at 5-years into construction.

Additional Mitigating Measures (See item 3)

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019
District/ Field Office: Las Cruces District Office
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 0.14 miles north of the project area
2. Key Observation Point: Foreground Reclamation	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* Gentle, simple, numerous, domed and flattened, *Background:* Asymmetrical, steep, jagged, conical	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	Not applicable
LINE	*Foreground/Middleground:* Continuous, linear, wavy, sloping *Background: irregular*, complex, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	Not applicable
COLOR	*Foreground/Middleground:* dull subtle light red browns *Background:* dark cool blue greys	*Foreground/Middleground:* dark browns, light blue greens *Background:* deep browns and greys	Not applicable
TEX-TURE	*Foreground/Middleground:* medium uniform, continuous, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse, *Background:* nondirectional, fine, grainy, blanketed	Not applicable

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FOR M	*Foreground/Middleground:* angular, smooth, steep, regular, strip	*Foreground/Middleground:* amorphous, low, patchy	Not applicable
LINE	*Foreground/Middleground:* bold, angular, straight, hard	*Foreground/Middleground:* weak, complex	Not applicable
COLOR	*Foreground/Middleground:* dull grayish grey, contrasting	*Foreground/Middleground:* soft complimentary deep blue-greens and browns	Not applicable
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, uniform, discontinuous	*Foreground/Middleground:* medium, nondirectional, uniform	Not applicable

SECTION D. CONTRAST RATING __SHORT TERM _☑_LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X					X
	LINE			X				X					X
	COLOR			X				X					X
	TEXTURE			X				X					X

2. Does project design meet visual resource management objectives? _☑_Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names — Date
E. Hunt — 11/04/2019

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from human eye level from the edge of the intersection of the unnamed BLM road and proposed access road. The proposed project is approximately 0.14 miles away from KOP Foreground. Reclamation would create a weaker contrast than during mining because reclamation would include revegetation and topsoil replacement and would mimic adjacent undisturbed areas existing form, line, color, and texture on the landscape. This KOP is the closest to the project area, 0.14 mile, and this proximity allows for the mine project to attract attention of the casual observer but not to dominate the viewshed after reclamation. This level of modification does meet the management objectives of VRM Class III because, from this KOP, the proposed reclamation may attract the viewer's attention but does not dominate the view. This analysis is for the after the project has ended and the reclamation plans are complete.

Additional Mitigating Measures (See item 3)

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 0.31 miles north northwest of the project area
2. Key Observation Point: WSA boundary Reclamation	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* Gentle, simple, numerous, domed and flattened, *Background:* Asymmetrical, steep, jagged, conical	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	*Foreground/Middleground:* bold, geometric, regular, contrasting, linear
LINE	*Foreground/Middleground:* Continuous, linear, wavy, sloping *Background: irregular*, complex, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	*Foreground/Middleground:* simple, hard, parallel, geometric
COLOR	*Foreground/Middleground:* dull subtle light red browns *Background:* dark cool blue greys	*Foreground/Middleground:* dark browns, light blue greens *Background:* deep browns and greys	*Foreground/Middleground:* dark monotone warm brown blacks
TEX-TURE	*Foreground/Middleground:* medium uniform, continuous, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse, *Background:* nondirectional, fine, grainy, blanketed	*Foreground/Middleground:* medium, uniform, directional, striped

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, smooth, steep, regular, strips	*Foreground/Middleground:* amorphous, low, patchy	Not applicable
LINE	*Foreground/Middleground:* bold, angular, straight, hard	*Foreground/Middleground:* weak, broken	Not applicable
COLOR	*Foreground/Middleground:* dull grayish grey, contrasting	*Foreground/Middleground:* soft complimentary deep blue-greens and browns	Not applicable
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, uniform, discontinuous	*Foreground/Middleground:* medium, nondirectional, uniform	Not applicable

SECTION D. CONTRAST RATING __SHORT TERM _☑_LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1) STRONG	MODERATE	WEAK	NONE	VEGETATION (2) STRONG	MODERATE	WEAK	NONE	STRUCTURES (3) STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X					X
	LINE			X				X					X
	COLOR			X				X					X
	TEXTURE			X				X					X

2. Does project design meet visual resource management objectives? _☑_Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names — Date
E. Hunt — 11/04/2019

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from human eye level from the WSA Boundary where recreationists may occur. The proposed project is approximately 0.31 mile away from KOP WSA Boundary. Reclamation would create a weaker contrast than during mining because reclamation would include revegetation and topsoil replacement and would mimic adjacent undisturbed areas existing form, line, color, and texture on the landscape. In addition, given that the KOP is approximately 0.31 mile away from the proposed mine site, the proposed project would not dominate the viewshed after reclamation and would therefore conform to VRM Class III objectives after the project has ended and reclamation plans are complete.

Additional Mitigating Measures (See item 3)

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 1.06 miles northwest of the project area
2. Key Observation Point: County road BO16 Reclamation	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* low, simple, horizontal *Background:* jagged, steep, complex	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	Not applicable
LINE	*Foreground/Middleground:* bold, flowing, smooth, simple *Background:* angular, irregular, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	Not applicable
COLOR	*Foreground/Middleground:* dull warm grey browns, monotone *Background:* muted dark cool blue browns	*Foreground/Middleground:* dark browns, light blue greens *Background:* deep browns and greys	Not applicable
TEX-TURE	*Foreground/Middleground:* medium uniform, continuous, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse, *Background:* nondirectional, fine, grainy, blanketed	Not applicable

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, smooth, regular, strip	*Foreground/Middleground:* amorphous, low, patchy, simple	Not applicable
LINE	*Foreground/Middleground:* bold, angular, straight, simple	*Foreground/Middleground:* weak, irregular	Not applicable
COLOR	*Foreground/Middleground:* muted warm gray, monotone	*Foreground/Middleground:* soft complimentary deep blue-greens and browns	Not applicable
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, uniform, ordered	*Foreground/Middleground:* medium, nondirectional, uniform, ordered	Not applicable

SECTION D. CONTRAST RATING __SHORT TERM _☑_LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X					X
	LINE			X				X					X
	COLOR			X				X					X
	TEXTURE			X				X					X

2. Does project design meet visual resource management objectives? _☑_Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names — Date
E. Hunt — 11/04/2019

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from human eye level from County Road B016 where recreationists would approach the Florida Mountains. The proposed project is approximately 1.06 miles away from KOP County Road B016. Reclamation would create a weaker contrast than during mining because reclamation would include revegetation and topsoil replacement and would mimic adjacent undisturbed areas existing form, line, color, and texture on the landscape. In addition, given that the KOP is approximately 1.06 miles away from the proposed mine site, the proposed project would not dominate the viewshed after reclamation and, therefore, would conform to VRM Class III objectives. This analysis is for the after the project has ended and the reclamation plans are complete.

Additional Mitigating Measures (See item 3)

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: October 2, 2019

District/ Field Office: Las Cruces District Office

Resource Area:

Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Foothill Dolomite Mine EA	4. Location Township 25 South	5. Location Sketch 1.25 miles northwest of the project area
2. Key Observation Point: Mahoney Park Road Reclamation	Range 8 West	
3. VRM Class: III	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* simple, horizontal *Background:* jagged, steep, complex	*Foreground/Middleground:* nondirectional, short, patchy few *Background:* compatible, irregular, few, simple	Not applicable
LINE	*Foreground/Middleground:* bold, smooth, simple *Background:* angular, irregular, jagged	*Foreground/Middleground:* complex, broken, irregular *Background:* continuous, simple	Not applicable
COLOR	*Foreground/Middleground:* dull warm grey browns *Background:* muted dark cool blue browns	*Foreground/Middleground:* dark browns, light blue greens *Background:* deep browns and greys	Not applicable
TEX-TURE	*Foreground/Middleground:* medium uniform, smooth *Background:* coarse, contrasting, gradational, rough	*Foreground/Middleground:* rough coarse, *Background:* nondirectional, fine, grainy, blanketed	Not applicable

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	*Foreground/Middleground:* angular, smooth, regular, low, strip	*Foreground/Middleground:* amorphous, low, patchy, simple	Not applicable
LINE	*Foreground/Middleground:* bold, straight, simple	*Foreground/Middleground:* weak, irregular	Not applicable
COLOR	*Foreground/Middleground:* muted dull grayish grey, contrasting	*Foreground/Middleground:* soft complimentary deep blue-greens and browns	Not applicable
TEX-TURE	*Foreground/Middleground:* uniform, contrasting, uniform, ordered	*Foreground/Middleground:* medium, nondirectional, uniform, ordered	Not applicable

SECTION D. CONTRAST RATING __SHORT TERM _☑_LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			X				X					X
	LINE			X				X					X
	COLOR			X				X					X
	TEXTURE			X				X					X

2. Does project design meet visual resource management objectives? _☑_Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes _☑_No (Explain on reverses side)

Evaluator's Names — Date
E. Hunt — 11/04/2019

SECTION D. (Continued)

Comments from item 2.

This KOP was selected to represent the viewshed from human eye level from Mahoney Park Road where recreationists and nearby residents would approach the Florida Mountains. The proposed project is approximately 1.25 miles away from KOP Mahoney Park Road. The long-term impacts to the viewshed from this location would be less than when the mining is in process because reclamation of the project area would include vegetation and topsoil replacement that would mimic adjacent undisturbed areas. Given the proximity of the KOP to the mine site (1.25 miles), the proposed project would not dominate the viewshed after reclamation and, therefore, would conform to VRM III objectives. This analysis is for the after the project has ended and the reclamation plans are complete.

Additional Mitigating Measures (See item 3)

Appendix G

Laboratory Reports

Appendix G1

Whole-Rock Analysis

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: +1 775 356 5395 Fax: +1 775 355 0179 www.alsglobal.com

To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

Page:
Total # Pages: 4 (A -
Plus Appendix Pag
Finalized Date: 30- MAR- 201
Account: TOGVI

CERTIFICATE RE16038329

.O. No.: 16038329

his report is for 90 Rock samples submitted to our lab in Reno, NV, USA on 5- MAR- 2016.

he following have access to data associated with this certificate:

DAVID TOGNONI

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
CRU- QC	Crushing QC Test
PUL- QC	Pulverizing QC Test
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% <2mm
SPL- 21	Split sample - riffle splitter
PUL- 31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- XRF26	Whole Rock By Fusion/XRF	XRF
OA- GRA05x	LOI for XRF	WST- SEQ

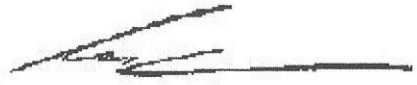
The results of this assay were based solely upon the content of the sample submitted. Any decision to inv should be made only after the potential investment value of the claim 'or deposit has been determined based the results of assays of multiple samples of geological materials collected by the prospective investor or b qualified person selected by him/her and based on an evaluation of all engineering data which is availa concerning any proposed project. Statement required by Nevada State Law NRS 519

To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

is is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as bmitted. All pages of this report have been checked and approved for release.

*** See Appendix Page for comments regarding this certificate *****

Signature:



Colin Ramshaw, Vancouver Laboratory Manag

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: +1 775 356 5395 Fax: +1 775 355 0179 www.alsglobal.com

To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

CERTIFICATE OF ANALYSIS RE16038329

nple Description	Method	WEI- 21	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF2
	Analyte	Recvd Wt.	Al2O3	BaO	CaO	Cr2O3	Fe2O3	K2O	MgO	MnO	Na2O	P2O5	SO3	SiO2	SrO	TiO2
	Units	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		0.68	0.06	<0.01	30.9	<0.01	0.37	0.01	21.8	0.07	0.05	<0.01	0.03	0.20	0.01	<0.01
		0.54	12.27	0.08	10.80	<0.01	3.42	1.95	6.51	0.06	3.22	0.12	0.01	48.04	0.05	0.40
		0.46	0.07	<0.01	30.8	<0.01	0.13	0.02	21.5	0.03	0.04	<0.01	0.02	0.22	<0.01	<0.01
		0.59	0.07	<0.01	31.1	<0.01	0.25	0.02	21.3	0.04	0.06	<0.01	0.04	0.50	0.01	<0.01
		0.52	0.04	<0.01	30.8	<0.01	0.19	0.02	22.0	0.04	0.04	<0.01	0.01	0.28	0.01	<0.01
		0.63	0.06	<0.01	31.1	<0.01	0.25	0.02	22.0	0.05	0.03	<0.01	0.02	0.11	0.01	<0.01
		0.76	0.06	<0.01	31.0	<0.01	0.17	0.02	21.1	0.04	0.04	<0.01	0.04	0.53	0.01	0.01
		0.57	0.06	<0.01	31.3	<0.01	0.33	0.02	21.5	0.06	0.04	<0.01	0.03	0.38	0.01	0.01
		0.63	0.06	<0.01	29.0	<0.01	0.30	0.02	20.5	0.08	0.06	<0.01	0.04	5.54	0.01	<0.01
		0.58	0.05	<0.01	30.7	<0.01	0.15	0.02	21.5	0.03	0.04	<0.01	0.02	0.10	<0.01	<0.01
		0.54	0.06	<0.01	31.0	<0.01	0.23	0.02	21.7	0.05	0.03	<0.01	0.02	0.20	0.01	<0.01
		0.68	0.05	<0.01	29.8	<0.01	0.14	0.02	21.3	0.07	0.03	0.02	<0.01	2.71	0.01	<0.01
		0.61	0.04	<0.01	31.2	<0.01	0.21	0.02	21.9	0.06	0.05	<0.01	0.03	0.08	0.01	<0.01
		0.55	0.26	<0.01	30.9	<0.01	0.13	0.07	21.7	0.03	0.05	<0.01	0.03	0.65	0.01	0.01
		0.46	0.21	<0.01	30.8	0.01	0.23	0.06	21.5	0.03	0.05	<0.01	0.02	0.50	0.01	0.02
		0.47	0.32	<0.01	30.8	<0.01	0.24	0.09	21.4	0.04	0.05	<0.01	0.03	0.90	0.01	0.02
		0.44	0.41	<0.01	30.5	<0.01	0.23	0.09	21.1	0.04	0.05	<0.01	0.03	1.53	0.01	0.02
		0.55	0.13	<0.01	30.5	<0.01	0.23	0.04	21.8	0.04	0.05	<0.01	0.02	0.52	0.01	0.01
		0.40	0.20	<0.01	31.3	<0.01	0.16	0.04	21.4	0.02	0.05	<0.01	0.02	0.48	0.01	0.01
		0.45	0.05	<0.01	31.4	<0.01	0.15	0.02	21.4	0.02	0.04	<0.01	0.01	0.50	<0.01	<0.01
		0.50	0.05	<0.01	30.3	<0.01	0.20	0.02	21.7	0.05	0.05	<0.01	0.02	2.01	0.01	<0.01
		0.40	0.17	<0.01	32.7	<0.01	0.21	0.06	20.2	0.04	0.05	<0.01	0.03	0.41	0.01	0.01
		0.54	0.12	<0.01	31.1	<0.01	0.13	0.03	21.1	0.03	0.05	<0.01	0.02	0.49	0.01	0.01
		0.45	0.16	<0.01	30.3	0.01	0.17	0.02	21.7	0.03	0.05	<0.01	0.02	0.97	0.01	0.02
		0.52	0.25	<0.01	30.6	0.01	0.14	0.03	21.1	0.02	0.05	<0.01	0.01	1.16	0.01	0.02
		0.45	0.18	<0.01	30.0	<0.01	0.13	0.03	21.8	0.02	0.05	<0.01	0.02	0.81	0.01	0.01
		0.40	0.17	<0.01	31.2	0.01	0.14	0.05	21.3	0.03	0.06	<0.01	0.03	0.50	0.01	0.02
		0.55	0.17	<0.01	31.0	0.01	0.15	0.05	21.2	0.03	0.05	<0.01	0.02	0.38	0.01	0.03
		0.51	0.05	<0.01	30.7	<0.01	0.13	0.02	22.3	0.04	0.04	<0.01	<0.01	0.12	0.01	<0.01
		0.40	0.14	<0.01	33.1	<0.01	0.68	0.04	18.10	0.31	0.06	<0.01	0.02	1.64	0.02	0.01
		0.57	0.05	<0.01	30.4	0.01	0.14	0.01	22.0	0.04	0.03	<0.01	<0.01	0.37	<0.01	<0.01
		0.66	0.04	<0.01	31.0	<0.01	0.17	0.02	22.1	0.06	0.03	<0.01	<0.01	0.06	<0.01	<0.01
		0.70	0.09	<0.01	31.1	0.01	0.20	0.02	21.4	0.05	0.03	<0.01	0.01	0.26	0.01	0.01
		0.56	0.10	<0.01	31.0	<0.01	0.20	0.03	21.7	0.06	0.06	<0.01	0.04	0.25	0.01	0.01
		0.48	0.32	<0.01	47.2	<0.01	0.12	0.05	5.15	0.02	<0.01	0.01	0.02	3.88	0.03	0.02
		0.58	0.18	<0.01	30.8	<0.01	0.25	0.03	21.5	0.05	0.03	0.16	0.02	1.96	0.01	0.01
		0.54	0.12	<0.01	33.3	<0.01	0.32	0.01	18.25	0.06	0.02	0.05	0.01	2.90	0.01	0.01
		0.57	0.06	<0.01	30.5	<0.01	0.15	0.01	21.0	0.04	0.04	<0.01	0.02	1.44	0.01	<0.01
		0.47	0.06	<0.01	31.1	<0.01	0.16	<0.01	20.1	0.05	0.02	<0.01	0.01	3.19	0.01	<0.01
		0.65	0.06	<0.01	30.7	<0.01	0.18	<0.01	21.1	0.05	0.04	<0.01	0.02	1.56	0.01	<0.01

** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: +1 775 356 5395 Fax: +1 775 355 0179 www.alsglobal.com

To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

Finalized Date: 30- MAR- 20
Account: TOGV

CERTIFICATE OF ANALYSIS RE16038329

nple Description	Method Analyte Units LOR	ME- XRF26 Total % 0.01	OA- GRA05x LOI 1000 % 0.01
		100.25	46.70
		99.13	12.14
		99.49	46.63
		99.99	46.57
		100.10	46.65
		100.30	46.61
		99.45	46.40
		100.35	46.56
		100.10	44.43
		99.32	46.68
		99.93	46.58
		99.61	45.42
		100.45	46.82
		100.25	46.40
		100.00	46.55
		100.35	46.40
		99.85	45.81
		100.05	46.66
		100.15	46.44
		100.00	46.39
		100.40	45.96
		100.30	46.40
		99.54	46.42
		99.80	46.31
		99.54	46.11
		99.43	46.34
		100.15	46.57
		99.73	46.59
		100.15	46.72
		99.72	45.38
		99.62	46.53
		100.35	46.83
		99.77	46.55
		100.40	46.89
		99.07	42.22
		100.40	45.37
		100.20	45.11
		99.75	46.45
		100.10	45.39
		100.10	46.35

** See Appendix Page for comments regarding this certificate *****

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To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

CERTIFICATE OF ANALYSIS RE16038329

nple Description	Method	WEI- 21	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF2
	Analyte	Recvd Wt.	Al2O3	BaO	CaO	Cr2O3	Fe2O3	K2O	MgO	MnO	Na2O	P2O5	SO3	SiO2	SrO	TiO2
	Units	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		0.66	0.04	<0.01	30.4	<0.01	0.13	<0.01	21.7	0.03	0.03	<0.01	0.01	0.23	0.01	<0.01
		0.60	0.07	<0.01	30.3	<0.01	0.13	0.01	21.8	0.02	0.05	<0.01	0.03	0.71	0.01	<0.01
		0.64	0.05	<0.01	30.6	<0.01	0.16	<0.01	21.5	0.03	0.03	<0.01	0.01	0.35	<0.01	<0.01
		0.55	0.08	<0.01	30.7	<0.01	0.26	0.01	21.4	0.05	0.06	0.01	0.04	0.55	0.01	0.01
		0.67	0.22	<0.01	30.2	<0.01	0.15	0.05	21.5	0.04	0.05	<0.01	0.02	0.86	0.01	0.01
		0.52	0.09	0.01	30.7	<0.01	0.18	0.01	21.3	0.04	0.04	<0.01	0.01	0.58	0.01	0.01
		0.54	0.12	<0.01	30.9	<0.01	0.16	0.01	21.4	0.03	0.05	0.01	0.02	1.03	0.01	<0.01
		0.53	0.05	<0.01	31.1	<0.01	0.11	<0.01	21.2	0.03	0.03	0.01	0.01	0.35	<0.01	<0.01
		0.59	0.05	<0.01	29.2	<0.01	0.12	<0.01	20.5	0.03	0.03	<0.01	0.01	6.02	0.02	<0.01
		0.67	0.12	<0.01	30.7	<0.01	0.17	0.02	21.3	0.03	0.04	<0.01	0.02	0.37	0.01	0.01
		0.63	0.39	<0.01	30.6	<0.01	0.15	0.04	21.2	0.02	0.07	0.01	0.03	1.38	0.01	0.03
		0.67	0.16	0.01	30.0	<0.01	0.16	0.02	21.4	0.02	0.06	<0.01	0.02	1.77	0.01	0.01
		0.54	0.28	<0.01	48.3	<0.01	0.10	0.08	4.96	0.02	<0.01	0.02	0.02	2.12	0.03	0.02
		0.66	0.33	<0.01	50.6	<0.01	0.17	0.09	3.60	0.02	<0.01	0.02	0.02	1.82	0.03	0.02
		0.65	0.31	<0.01	49.4	<0.01	0.22	0.08	4.52	0.03	<0.01	0.02	0.01	1.99	0.03	0.02
		0.54	0.13	<0.01	31.4	<0.01	0.17	0.01	20.5	0.03	0.03	0.17	0.02	0.75	0.01	0.01
		0.56	0.09	<0.01	31.6	<0.01	0.14	0.01	20.6	0.03	0.03	0.02	0.01	0.62	0.01	<0.01
		0.90	0.14	<0.01	33.5	<0.01	0.22	0.01	18.85	0.05	0.03	0.13	0.01	1.37	0.01	0.01
		0.57	0.18	<0.01	31.6	<0.01	0.18	0.01	20.7	0.04	0.03	0.10	0.02	1.50	0.01	0.01
		0.69	0.14	<0.01	32.2	<0.01	0.15	0.01	19.90	0.04	0.04	0.02	0.02	1.32	0.01	0.01
		0.65	0.25	<0.01	45.5	<0.01	0.16	0.06	6.99	0.02	<0.01	0.03	0.01	2.71	0.03	0.02
		0.60	0.22	<0.01	50.4	<0.01	0.19	0.04	3.62	0.03	<0.01	0.01	0.01	2.90	0.03	0.02
		0.73	0.06	<0.01	31.0	<0.01	0.16	<0.01	21.1	0.06	0.03	<0.01	<0.01	0.32	<0.01	<0.01
		0.53	0.09	<0.01	31.2	<0.01	0.13	0.01	21.2	0.04	0.04	<0.01	0.02	1.18	0.01	0.01
		0.69	0.16	<0.01	30.4	<0.01	0.15	0.02	21.7	0.02	0.05	<0.01	0.03	0.87	0.01	0.01
		0.53	0.10	<0.01	31.3	<0.01	0.17	0.01	21.4	0.03	0.04	0.01	0.02	0.44	0.01	<0.01
		0.52	0.08	<0.01	31.5	<0.01	0.17	0.01	21.2	0.05	0.05	<0.01	0.02	0.42	0.01	<0.01
		0.60	0.07	<0.01	31.8	<0.01	0.33	<0.01	20.7	0.06	0.05	0.01	0.02	0.38	0.01	<0.01
		0.52	0.28	<0.01	45.0	<0.01	0.25	0.07	7.42	0.06	<0.01	0.02	0.01	2.86	0.02	0.02
		0.49	0.15	<0.01	30.4	<0.01	0.16	0.02	21.3	0.04	0.05	<0.01	0.02	1.00	0.01	0.01
		0.56	0.11	<0.01	30.8	<0.01	0.33	0.01	20.00	0.05	0.03	<0.01	0.01	3.99	0.01	0.01
		0.52	0.28	<0.01	30.9	<0.01	0.24	0.04	21.2	0.04	0.04	<0.01	0.02	0.82	0.01	0.03
		0.49	0.11	<0.01	29.0	<0.01	0.27	0.02	19.00	0.05	0.03	<0.01	0.02	8.33	<0.01	<0.01
		0.56	0.02	<0.01	30.8	<0.01	0.15	<0.01	21.9	0.03	0.02	<0.01	<0.01	0.13	<0.01	<0.01
		0.49	0.05	0.01	30.9	<0.01	0.18	<0.01	21.4	0.04	0.04	<0.01	<0.01	0.46	<0.01	0.01
		0.51	0.04	0.02	31.8	<0.01	0.25	<0.01	20.7	0.05	0.03	<0.01	0.01	0.17	0.01	0.01
		0.53	0.07	0.01	31.0	<0.01	0.16	0.01	21.3	0.04	0.04	0.01	0.01	0.20	0.01	0.01
		0.50	0.05	<0.01	30.9	<0.01	0.14	<0.01	21.1	0.03	0.02	<0.01	<0.01	0.17	<0.01	<0.01
		0.39	0.32	0.01	32.0	<0.01	0.25	0.07	19.30	0.04	0.03	0.05	0.01	2.00	<0.01	0.02
		0.47	0.12	<0.01	30.4	<0.01	0.17	0.02	21.6	0.03	0.03	<0.01	0.02	0.34	0.01	0.01

** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
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To: TOGNONI, DAVID
P.O. BOX 684
ELEPHANT BUTTE NM 87935

CERTIFICATE OF ANALYSIS RE16038329

nple Description	Method Analyte Units LOR	ME- XRF26 Total % 0.01	OA- GRA05x LOI 1000 % 0.01
		99.56	46.95
		99.89	46.73
		99.58	46.82
		100.25	47.04
		99.82	46.68
		99.74	46.72
		100.30	46.51
		99.72	46.80
		100.20	44.18
		99.70	46.88
		100.00	46.05
		100.05	46.36
		99.36	43.37
		99.98	43.22
		99.99	43.32
		99.46	46.20
		99.71	46.52
		100.10	45.72
		100.30	45.91
		99.96	46.07
		99.23	43.41
		99.94	42.42
		99.59	46.83
		100.35	46.36
		100.00	46.56
		100.20	46.65
		100.30	46.78
		100.20	46.74
		99.49	43.44
		99.74	46.55
		100.30	44.92
		100.10	46.46
		99.93	43.07
		100.10	47.01
		100.05	46.91
		99.99	46.86
		99.86	46.95
		99.34	46.90
		99.93	45.80
		99.66	46.88

** See Appendix Page for comments regarding this certificate *****

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To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

Finalized Date: 30- MAR- 20
Account: TOGV

CERTIFICATE OF ANALYSIS RE16038329

nple Description	Method	WEI- 21	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF26	ME- XRF2
	Analyte	Recvd Wt.	Al2O3	BaO	CaO	Cr2O3	Fe2O3	K2O	MgO	MnO	Na2O	P2O5	SO3	SiO2	SrO	TiO2
	Units	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		0.56	0.08	0.01	31.2	<0.01	0.27	0.01	21.0	0.06	0.04	<0.01	0.02	0.38	0.01	0.02
		0.47	0.04	0.01	30.3	<0.01	0.22	<0.01	21.9	0.04	0.03	<0.01	0.01	0.81	<0.01	0.02
		0.53	0.24	0.01	31.5	<0.01	0.15	0.05	20.2	0.02	0.05	0.01	0.03	0.73	0.01	0.03
		0.56	0.15	0.01	30.5	<0.01	0.12	0.02	21.3	0.02	0.04	<0.01	0.02	1.27	0.01	0.02
		0.55	0.05	0.01	30.7	<0.01	0.09	<0.01	21.6	0.02	0.03	<0.01	0.01	0.43	0.01	0.02
		0.48	0.06	<0.01	30.5	<0.01	0.10	<0.01	21.3	0.03	0.02	<0.01	0.01	1.13	<0.01	<0.01
		0.59	0.10	0.01	31.1	<0.01	0.12	0.01	21.5	0.02	0.03	<0.01	0.02	0.46	<0.01	0.01
		0.53	0.03	<0.01	31.1	<0.01	0.13	<0.01	20.7	0.02	0.02	<0.01	0.01	1.13	<0.01	<0.01
		0.51	0.12	<0.01	30.4	<0.01	0.13	0.01	21.3	0.02	0.05	0.01	0.03	0.91	<0.01	<0.01
		0.66	0.08	0.01	30.8	<0.01	0.10	0.01	21.6	0.02	0.05	<0.01	0.02	0.96	0.01	<0.01

** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
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To: TOGNONI, DAVID
P.O. BOX 684
ELEPHANT BUTTE NM 87935

CERTIFICATE OF ANALYSIS RE16038329

nple Description	Method Analyte Units LOR	ME- XRF26 Total % 0.01	OA- GRA05x LOI 1000 % 0.01
		100.00	46.88
		100.15	46.74
		99.55	46.49
		99.92	46.41
		99.89	46.89
		99.69	46.51
		100.30	46.87
		99.55	46.38
		99.60	46.59
		100.25	46.58

** See Appendix Page for comments regarding this certificate *****

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To: **TOGNONI, DAVID**
P.O. BOX 684
ELEPHANT BUTTE NM 87935

CERTIFICATE OF ANALYSIS RE16038329

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Reno located at 4977 Energy Way, Reno, NV, USA.

CRU- 31	CRU- QC	LOG- 22	PUL- 31
PUL- QC	SPL- 21	WEI- 21	

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

ME- XRF26	OA- GRA05x

Appendix G2

2017 Synthetic Precipitation Leaching Procedure Analysis

Monday, September 18, 2017

Saul Alanis
AMEC Environment & Infrastructure, Inc.
8519 Jefferson St. NE
Albuquerque, NM 87113

Re: ALS Workorder: 1708586
Project Name: American Magnesium
Project Number: 1651700037

Dear Mr. Alanis:

One soil sample was received from AMEC Environment & Infrastructure, Inc., on 8/28/2017. The sample was scheduled for the following analysis:

Metals

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Lance R. Steere
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Connecticut (CT)	PH-0232
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
L-A-B (DoD ELAP/ISO 170250)	L2257
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1708586

Metals:
The sample was analyzed following SW-846, 3rd Edition procedures. Analysis by Trace ICP followed method 6010B and the current revision of SOP 834. Analysis by ICPMS followed method 6020A and the current revision of SOP 827. Mercury analysis by CVAA followed method 7470A and the current revision of SOP 812.

- All initial and continuing calibration blanks were below the reporting limit for the requested analytes with the exception of CCB1 for selenium. None of the samples associated with this order number were bracketed by this CCB.
- All initial and continuing calibration verifications were within the acceptance criteria for the requested analytes with the exception of CCV9 for uranium. None of the samples associated with this order number were bracketed by this CCV.
- A matrix spike and matrix spike duplicate were digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exceptions:

Analyte	Sample ID
Aluminum	-2MS/MSD
Boron	-2MS/MSD

The associated sample results are flagged for matrix spike failure and an analytical post spike was performed. The results of the spike were acceptable, indicating that the matrix was not significantly affecting quantitation of these analytes.

All remaining acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1708586
Client Name: AMEC Environment & Infrastructure, Inc.
Client Project Name: American Magnesium
Client Project Number: 1651700037
Client PO Number:

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
87	1708586-1		SOIL	24-Aug-17	15:46
87	1708586-2		LEACHAT	24-Aug-17	15:46

1708586

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Amec Foster Wheeler	TURNAROUND REQUIREMENTS: ☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: Albuquerque	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes No N/A
PROJECT: American Magnesium	ALS QUOTE NO.:	Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER: 1651700037	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER: Saul Alanis	CONTACT PH: OF: 1 2 3 4 5 6 7	Other comment:	
SAMPLER: Dave Tognoni	SAMPLER MOBILE:		
COC emailed to ALS? (YES) / NO	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): Saul.alanis@amecfw			
Email Invoice to (will default to PM if no other addresses are listed): Rosanne.Klaus@amecfw			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 8/25/17 9:40	DATE/TIME: 8/25/17 9:40 am	DATE/TIME: 8/25/17 14:00	DATE/TIME: 8-28-17 1140

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: N/A

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EPH 1312								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
(1)	B7	8/24/17/1546	Soil	B	1	X								
				TOTAL										

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Amec Workorder No: 1708586

Project Manager: LS Initials: COS Date: 8-28-17

1. Does this project require any special handling in addition to standard ALS procedures?		YES	(NO)
2. Are custody seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		(YES)	NO
5. Are the COC and bottle labels complete and legible?		(YES)	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	(N/A)	YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ dusting ____ moderate ____ heavy	(N/A)	YES	NO
16. Were the samples shipped on ice?		YES	(NO)
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4	RAD ONLY	YES	(NO)

Cooler #:	1							
Temperature (°C):	Amb							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	9							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? (YES) / NO / NA (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

If applicable, was the client contacted? YES / NO / (NA) Contact: _____ Date/Time: _____

Project Manager Signature / Date: 8/29/17

*IR Gun #2: Oakton, SN 29922500201-0066
*IR Gun #4: Oakton, SN 2372220101-0002

17085-9-1

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Client:	AMEC Environment & Infrastructure, Inc.	**Date:**	*18-Sep-17*
Project:	1651700037 American Magnesium	**Work Order:**	1708586
Sample ID:	87	**Lab ID:**	1708586-1
Legal Location:		**Matrix:**	SOIL
Collection Date:	8/24/2017 15:46	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Client: AMEC Environment & Infrastructure, Inc. **Date:** *18-Sep-17*
Project: 1651700037 American Magnesium **Work Order:** 1708586
Sample ID: 87 **Lab ID:** 1708586-2
Legal Location: **Matrix:** LEACHATE
Collection Date: 8/24/2017 15:46 **Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SPLP ICP Metals			**SW6010**		Prep Date: **9/12/2017**	PrepBy: **JML**
SILVER	ND		0.1	MG/L	1	9/13/2017 12:06
ALUMINUM	**6.6**	N	**2**	**MG/L**	1	9/13/2017 12:06
ARSENIC	ND		0.1	MG/L	1	9/13/2017 12:06
BORON	**2.4**	N	**1**	**MG/L**	1	9/13/2017 12:06
BARIUM	ND		1	MG/L	1	9/13/2017 12:06
CADMIUM	ND		0.05	MG/L	1	9/13/2017 12:06
COBALT	ND		0.1	MG/L	1	9/13/2017 12:06
CHROMIUM	ND		0.1	MG/L	1	9/13/2017 12:06
COPPER	ND		0.1	MG/L	1	9/13/2017 12:06
IRON	ND		1	MG/L	1	9/13/2017 12:06
MANGANESE	ND		0.1	MG/L	1	9/15/2017 12:11
MOLYBDENUM	ND		0.1	MG/L	1	9/13/2017 12:06
NICKEL	ND		0.2	MG/L	1	9/13/2017 12:06
LEAD	ND		0.03	MG/L	1	9/13/2017 12:06
SELENIUM	**0.068**		**0.05**	**MG/L**	1	9/15/2017 12:11
ZINC	ND		0.2	MG/L	1	9/13/2017 12:06
SPLP ICPMS Metals			**SW6020**		Prep Date: **9/12/2017**	PrepBy: **JML**
URANIUM	ND		0.001	MG/L	10	9/14/2017 01:07
SPLP Mercury			**SW7470**		Prep Date: **9/6/2017**	PrepBy: **CHW**
MERCURY	ND		0.0002	MG/L	1	9/6/2017 16:51

Client:	AMEC Environment & Infrastructure, Inc.	**Date:**	*18-Sep-17*
Project:	1651700037 American Magnesium	**Work Order:**	1708586
Sample ID:	87	**Lab ID:**	1708586-2
Legal Location:		**Matrix:**	LEACHATE
Collection Date:	8/24/2017 15:46	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **HG170906-1-2** Instrument ID **CETAC7500** Method: **SW7470**

LCS Sample ID: **HG170906-1** Units: **MG/L** Analysis Date: **9/6/2017 16:29**

Client ID: Run ID: **HG170906-2A3** Prep Date: **9/6/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
MERCURY	0.00101	0.0002	0.001		101	80-120				20	

MB Sample ID: **EX170905-9** Units: **MG/L** Analysis Date: **9/6/2017 16:27**

Client ID: Run ID: **HG170906-2A3** Prep Date: **9/6/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
MERCURY	ND	0.0002									

The following samples were analyzed in this batch: 1708586-2

Batch ID: **IP170912-1-1** Instrument ID **ICP6500** Method: **SW6010**

LCS Sample ID: **IP170912-1** Units: **MG/L** Analysis Date: **9/13/2017 12:03**
Client ID: Run ID: **IP170913-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
ALUMINUM	18	2	20		90	80-120				20	
ARSENIC	9.91	0.1	10		99	80-120				20	
BARIUM	10	1	10		100	80-120				20	
BORON	9.38	1	10		94	80-120				20	
CADMIUM	0.502	0.05	0.5		100	80-120				20	
CHROMIUM	1.87	0.1	2		93	80-120				20	
COBALT	5.06	0.1	5		101	80-120				20	
COPPER	2.56	0.1	2.5		102	80-120				20	
IRON	10.1	1	10		101	80-120				20	
LEAD	4.91	0.03	5		98	80-120				20	
MOLYBDENUM	9.79	0.1	10		98	80-120				20	
NICKEL	4.88	0.2	5		98	80-120				20	
SILVER	0.946	0.1	1		95	80-120				20	
ZINC	5.02	0.2	5		100	80-120				20	

MB Sample ID: **EX170905-9** Units: **MG/L** Analysis Date: **9/13/2017 12:00**
Client ID: Run ID: **IP170913-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
ALUMINUM	ND	2									
ARSENIC	ND	0.1									
BARIUM	ND	1									
BORON	ND	1									
CADMIUM	ND	0.05									
CHROMIUM	ND	0.1									
COBALT	ND	0.1									
COPPER	ND	0.1									
IRON	ND	1									
LEAD	ND	0.03									
MOLYBDENUM	ND	0.1									
NICKEL	ND	0.2									
SILVER	ND	0.1									
ZINC	ND	0.2									

Client: AMEC Environment & Infrastructure, Inc.
Work Order: 1708586
Project: 1651700037 American Magnesium

QC BATCH REPORT

Batch ID: **IP170912-1-1** Instrument ID **ICP6500** Method: **SW6010**

MS Sample ID: **1708586-2** Units: **MG/L** Analysis Date: **9/13/2017 12:15**
Client ID: **87** Run ID: **IP170913-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
ALUMINUM	21.1	2	20	6.6	72	80-120				20	N
ARSENIC	10.1	0.1	10	0.1	101	80-120				20	
BARIUM	10.1	1	10	1	101	80-120				20	
BORON	9.95	1	10	2.4	75	80-120				20	N
CADMIUM	0.506	0.05	0.5	0.05	101	80-120				20	
CHROMIUM	1.85	0.1	2	0.1	92	80-120				20	
COBALT	5.08	0.1	5	0.1	102	80-120				20	
COPPER	2.58	0.1	2.5	0.1	103	80-120				20	
IRON	10	1	10	1	100	80-120				20	
LEAD	4.95	0.03	5	0.03	99	80-120				20	
MOLYBDENUM	9.82	0.1	10	0.1	98	80-120				20	
NICKEL	4.89	0.2	5	0.2	98	80-120				20	
SILVER	0.958	0.1	1	0.1	96	80-120				20	
ZINC	5.06	0.2	5	0.2	101	80-120				20	

MSD Sample ID: **1708586-2** Units: **MG/L** Analysis Date: **9/13/2017 12:18**
Client ID: **87** Run ID: **IP170913-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
ALUMINUM	20.1	2	20	6.6	67.3	80-120		21.1	5	20	N
ARSENIC	9.89	0.1	10	0.1	99	80-120		10.1	2	20	
BARIUM	9.76	1	10	1	98	80-120		10.1	3	20	
BORON	9.41	1	10	2.4	69.6	80-120		9.95	6	20	N
CADMIUM	0.501	0.05	0.5	0.05	100	80-120		0.506	1	20	
CHROMIUM	1.86	0.1	2	0.1	93	80-120		1.85	1	20	
COBALT	5.04	0.1	5	0.1	101	80-120		5.08	1	20	
COPPER	2.55	0.1	2.5	0.1	102	80-120		2.58	1	20	
IRON	9.2	1	10	1	92	80-120		10	9	20	
LEAD	4.88	0.03	5	0.03	98	80-120		4.95	1	20	
MOLYBDENUM	9.66	0.1	10	0.1	97	80-120		9.82	2	20	
NICKEL	4.82	0.2	5	0.2	96	80-120		4.89	2	20	
SILVER	0.938	0.1	1	0.1	94	80-120		0.958	2	20	
ZINC	4.98	0.2	5	0.2	100	80-120		5.06	2	20	

The following samples were analyzed in this batch: 1708586-2

Client: AMEC Environment & Infrastructure, Inc.
Work Order: 1708586
Project: 1651700037 American Magnesium

QC BATCH REPORT

Batch ID: **IP170912-1-1** Instrument ID **ICP6500** Method: **SW6010**

LCS Sample ID: **IP170912-1** Units: **MG/L** Analysis Date: **9/15/2017 12:08**
Client ID: Run ID: **IP170915-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
MANGANESE	5	0.1	5		100	80-120				20	
SELENIUM	20	0.05	20		100	80-120				20	

MB Sample ID: **EX170905-9** Units: **MG/L** Analysis Date: **9/15/2017 12:26**
Client ID: Run ID: **IP170915-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
MANGANESE	ND	0.1									
SELENIUM	ND	0.05									

MS Sample ID: **1708586-2** Units: **MG/L** Analysis Date: **9/15/2017 12:20**
Client ID: **87** Run ID: **IP170915-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
MANGANESE	5.1	0.1	5	0.1	102	80-120				20	
SELENIUM	20	0.05	20	0.068	100	80-120				20	

MSD Sample ID: **1708586-2** Units: **MG/L** Analysis Date: **9/15/2017 12:23**
Client ID: **87** Run ID: **IP170915-1A1** Prep Date: **9/12/2017** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
MANGANESE	5.02	0.1	5	0.1	100	80-120		5.1	2	20	
SELENIUM	19.9	0.05	20	0.068	99.3	80-120		20	1	20	

The following samples were analyzed in this batch: 1708586-2

Client: AMEC Environment & Infrastructure, Inc.
Work Order: 1708586
Project: 1651700037 American Magnesium

QC BATCH REPORT

Batch ID: **IP170912-1-2** Instrument ID **ICPMS2** Method: **SW6020**

LCS Sample ID: **IM170912-1** Units: **MG/L** Analysis Date: **9/14/2017 01:01**
Client ID: Run ID: **IM170913-10A1** Prep Date: **9/12/2017** DF: **10**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
URANIUM	0.095	0.001	0.1		95	80-120				20	

MB Sample ID: **EX170905-9** Units: **MG/L** Analysis Date: **9/14/2017 00:58**
Client ID: Run ID: **IM170913-10A1** Prep Date: **9/12/2017** DF: **10**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
URANIUM	ND	0.001									

MS Sample ID: **1708586-2** Units: **MG/L** Analysis Date: **9/14/2017 01:16**
Client ID: **87** Run ID: **IM170913-10A1** Prep Date: **9/12/2017** DF: **10**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
URANIUM	0.0946	0.001	0.1	0.001	95	75-125				20	

MSD Sample ID: **1708586-2** Units: **MG/L** Analysis Date: **9/14/2017 01:19**
Client ID: **87** Run ID: **IM170913-10A1** Prep Date: **9/12/2017** DF: **10**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual
URANIUM	0.0941	0.001	0.1	0.001	94	75-125		0.0946	1	20	

The following samples were analyzed in this batch: 1708586-2

Appendix G3

Neutralization Potential Analysis

February 20, 2018 Service Request No:T1800235

Eric Koenig
AMEC Foster Wheeler E&I (Wood PLC)
8519 Jefferson Street NE
Albuquerque, NM 87113

Laboratory Results for: American Magnesium

Dear Eric,

Enclosed are the results of the sample(s) submitted to our laboratory February 15, 2018
For your reference, these analyses have been assigned our service request number **T1800235.**

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results
apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 7102. You may also contact me via email at Wendy.Hyatt@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Wendy Hyatt
Client Services
Manager

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061 | FAX +1 520 573 1063
ALS Group USA, Corp.
dba ALS Environmental

Client: AMEC Foster Wheeler E & I (Albuquerque, NM) **Service Request:**T1800235
Project: American Magnesium/16-517-00037

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
T1800235-001	87	2/12/2018	0000

T1800235 5

AMEC Foster Wheeler E&I (Wood PLC)
American Magnesium

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5630 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Amec Foster Wheeler E&I Inc.	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Albuquerque, NM		☑ Non Standard or urgent TAT (List due date): 19 Feb 2018	Custody Seal Intact? Yes No N/A
PROJECT:American Magnesium	ALS QUOTE NO.: 43672	COC SEQUENCE NUMBER (Circle) COC: (1) 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Saul Alanis	CONTACT PH: (505) 821-1801		Other comment:
SAMPLER: Eric Koenig	SAMPLER MOBILE: (505) 264-9211	RELINQUISHED BY: Eric D. Koenig	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME: 12 Feb 2018/16:00	DATE/TIME:
Email Reports to saul.alanis@amecfw.com		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to rosanne.klaus@amecfw.com		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: No special handling reqd

Note that expedited TAT is being requested to achieve the $150 minimum

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	Sobek Neutralization Potential								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	87	12-Feb-18	S	B	1	X								Sample wt 1 kg
				TOTAL	1	1								

Cynthia Vaugh
FEB 15 2018 0924

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

3860 S. Palo Verde Road, Suite 302
Tucson, AZ 85714
T: +1 520 573 1061
F: +1 520 573 1063

Sample Receipt Form

T1800235 5
AMEC Foster Wheeler E&I (Wood PLC)
American Magnesium

Client/Project: **Amec Foster Wheeler** Work Order Number:

Received by: Cynthia Vroegh Date & Time: 2/15/18 0924 Matrix: Solid

Samples were received via?: FedEx Samples were received in: Box

Were custody seals on containers? ○ Yes ◉ No ○ NA If yes, how many and where?

If present were custody seals intact? ○ Yes ◉ No If present, were they signed and dated? ○ Yes ◉ No

Arrival Temp C	Temp Blank C	Tracking Number
ambient	na	7714 6505 3769

Packing material used? Paper

Did all the bottles arrive in good condition (unbroken)? ○ Yes ○ No ◉ NA If No, record comments below

Did all sample labels and tags agree with COC? ◉ Yes ○ No ○ NA If No, record discrepancies below

Were all the appropriate containers and volumes received for the tests indicated? ◉ Yes ○ No ○ NA

Are samples received deemed acceptable? ◉ Yes ○ No

Comments:
1 - Qtsized ziploc with rock marked Sample 87

Notes, discrepancies, & resolutions:

As a part of ISO 17025 protocols, ALS must notify clients that the quoted analytical methods performed by ALS may have minor modifications from the methods as published. These modifications are written into our Standard Operating Procedures and do not impact the quality of the data. Receipt of this document will be considered an acceptance of the procedures used by the laboratory for analysis unless notified by the client.
Modifications may include, but are not limited to:

- The analysis of a sample matrix that differs from that stated in the published method (example - ASTM D5865 Standard Test Method for Gross Calorific Value of Coal and Coke is used for other matrices such as biomass, Tire Derived Fuel, etc.).
- Analyzing a sample mass that differs from those in the published method (example - to accommodate samples with high concentrations of analyte, samples of limited volume, or to comply with the instrument manufacturer's operating guidelines).
- Instruments used for the analysis may differ from those listed in the published method (example - using ICP- OES when the method references flame Atomic Absorption Spectroscopy)

Client: AMEC Foster Wheeler E & I (Albuquerque, NM)
8519 Jefferson Street NE
Albuquerque, NM 87113
Attn: Eric Koenig
Project: American Magnesium

Date Received: February 15, 2018

Certificate of Analysis

Sample ID:	Sample Date and Time:	Lab #:	Moisture, Total D2974 wt%			Neutralization Potential Sobek 3.2.3 t CaCO3/1000t		
87	2/12/18 n/a	T1800235-001	0.03			1,015		

Notes:
Sample was ground to < 60 mesh prior to analysis.

Appendix G4

Synthetic Precipitation Leaching Procedure Analysis June 12, 2019

August 19, 2019

Mr. Jeffrey Lewellin
New Mexico Environment Department
Ground Water Quality Bureau
Harold Runnels Building
1190 St. Francis Dr. Suite N4050
Santa Fe, NM 87505

Delivered via e-mail: jeffrey.lewellin@state.nm.us

Re: American Magnesium, LLC
Results for Outcrop Sampling and SPLP Testing

Dear Mr. Lewellin:

On behalf of American Magnesium, LLC (AmMg), Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this letter report summarizing the sampling and leach testing of exposed dolomite at the proposed Foothill Dolomite Mine Site (the site), located southeast of Deming, New Mexico. The sampling and analysis was performed in accordance with the work plan dated May 31, 2019, which was approved by the New Mexico Environment Department (NMED) in an e-mail dated June 4, 2019. The purpose of this work was to evaluate the potential for naturally occurring constituents to be leached from the Silurian Fusselman Dolomite, the targeted mining material. The Synthetic Precipitation Leaching Procedure (SPLP) testing procedure was selected because dolomite at the site is exposed to precipitation. Exposure to precipitation is the primary leaching mechanism and will continue to be so during mining.

Samples were collected along the west ridge of the foothill, a prominent ridge that extends west from the summit of the foothill to the bajada floor. Montoya Formation is exposed at the west end of the ridge and is overlain by Fusselman Dolomite. The lower dark unit (map unit SF1), the lower light unit (map unit SF2), and the middle dark unit (map unit SF3) of the Fusselman Dolomite are well exposed along this ridge. Five samples designated 19-1 through 19-5 were collected from the Fusselman Dolomite moving east uphill along the ridge (Figure 1). Thus, samples were collected from each of the three Fusselman Dolomite units.

The five rock samples were submitted to ACZ Laboratories, Inc. (ACZ) in Steamboat Springs, Colorado, for SPLP testing (U.S. Environmental Protection Agency [EPA] method 1312). The SPLP leachate was analyzed for the constituents listed in Table 1. The complete laboratory report is provided as Attachment 1. The results represent dissolved concentrations.

Due to miscommunication with ACZ, the analysis for total mercury, which was supposed to be performed on unfiltered SPLP leachate, was performed separately as a whole-rock analysis. By the time this miscommunication was discovered, the entire SPLP leachate of the five samples had been filtered. The filtered leachate of the five samples was subsequently analyzed for

Daniel B. Stephens & Associates, Inc.
6020 Academy NE, Suite 100 505-822-9400
Albuquerque, NM 87109 FAX 505-822-8877

mercury; it was not detected (Attachment 1). Mercury was also not detected in the whole-rock analyses.

The laboratory results are compared to the regulatory standards for groundwater listed in 20.6.2.3103 NMAC (Table 1). With the exception of pH, the constituents do not exceed regulatory standards. The results for pH do exceed the standard, but this is likely due to the high buffering capacity of the Fusselman Dolomite. We conclude that exposure of the Fusselman Dolomite to precipitation, which has been occurring for millenia and will continue during and after mining operations, does not pose a threat to water quality.

If you have any questions or comments regarding the SPLP data or analysis, please contact us at (505) 822-9400.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Bill Casadevall, C.P.G.
Geologist

John Ayarbe, P.G.
Senior Hydrologist

BC/JA/rpf
Attachments
cc: Kurt Vollbrecht (kurt.vollbrecht@state.nm.us)
Carol Ness Brewka, AmMg (cnbrewka@msn.com)

Figure

P:_DB19-1011\SPLP Ltr Rpt.8-19\Fig01_SmplLctns.docx

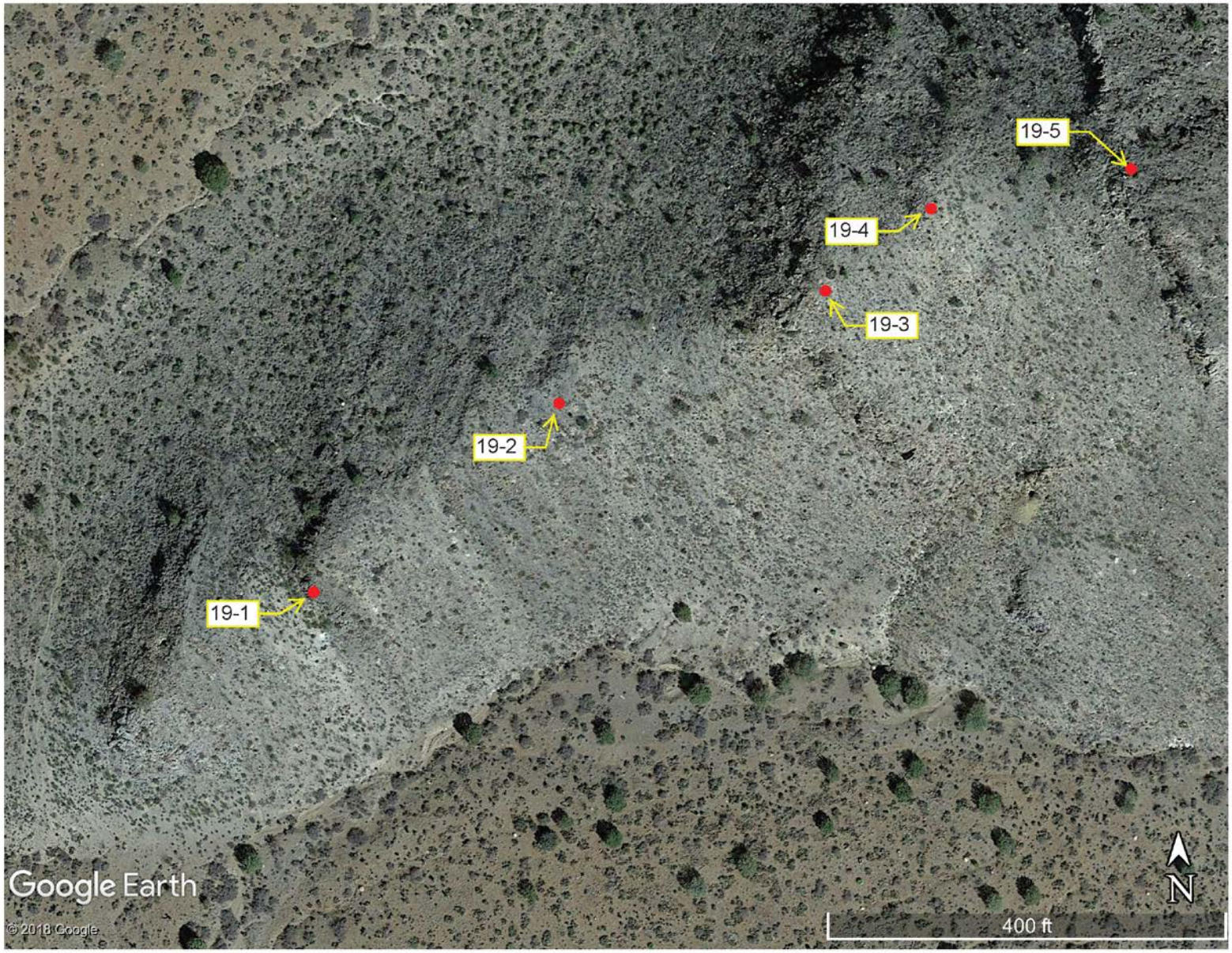

Figure 1

AMERICAN MAGNESIUM

Locations of Samples for SPLP Analysis

Daniel B. Stephens & Associates, Inc.

8/19/19

Table

Table 1. Synthetic Precipitation Leaching Procedure Results
Page 1 of 2

Analyte	Laboratory Method	Groundwater Standard (mg/L)	Sample ID and Results (mg/L [a]) [b]				
			19-1	19-2	19-3	19-4	19-5
Human Health Standards [20.6.2.3103(A) NMAC]							
Arsenic	6010D	0.1	<0.04	<0.04	<0.04	<0.04	<0.04
Barium	6010D	1.0	0.011 B	<0.007	<0.007	<0.007	<0.007
Cadmium	6010D	0.01	<0.008	<0.008	<0.008	<0.008	<0.008
Chromium	6010D	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	SM4500F-C	1.6	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	6010D	0.05	<0.03	<0.03	<0.03	<0.03	<0.03
Mercury	7470A	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	6020B	0.05	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Silver	6010D	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	6020B	0.03	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Other Standards for Domestic Water Supply [20.6.2.3103(B) NMAC]							
Chloride	SM4500Cl-E	250	2.1	1.1 B	1.8 B	2.7	0.5 B
Copper	M6010D	1.0	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	M6010D	1.0	<0.03	<0.03	<0.03	<0.03	<0.03
Manganese	M6010D	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfate	SM4500 SO4-D	600	<20	<20	<20	<20	<20
Zinc	M6010D	10	0.01 B	<0.01	0.01 B	0.01 B	0.01 B
pH (s.u.)	M9045D/M9040C	6–9	9.9	10.0	10.0	10.0	10.0

Note: Analyses performed by ACZ Laboratories, Inc., Steamboat Springs, Colorado

[a] Unless otherwise noted

[b] Results are for the dissolved portion of the analytes except for mercury, which is measured as total concentration per 20.6.2.3103 NMAC

mg/L = Milligrams per liter

< = Analyte not detected at concentration above the noted method detection limit (MDL)

B = Detected concentration is above the MDL but below the practical quantitation limit (PQL); result is considered an estimate

s.u. = Standard units

Table 1. Synthetic Precipitation Leaching Procedure Results
Page 2 of 2

Analyte	Laboratory Method	Groundwater Standard (mg/L)	Sample ID and Results (mg/L [a]) [b]				
			19-1	19-2	19-3	19-4	19-5
Standards for Irrigation Use [20.6.2.3103(C) NMAC]							
Aluminum	M6010D	5.0	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	M6010D	0.75	0.02 B	<0.02	<0.02	<0.02	<0.02
Cobalt	M6010D	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	M6010D	1.0	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	M6010D	0.2	<0.008	<0.008	<0.008	<0.008	<0.008
No New Mexico Groundwater Standard							
Alkalinity (as $CaCO_3$)	SM2320B	None	52.9	49.5	52.4	50.9	56.2
Calcium	6010D	None	5.8	4.0	5.6	5.6	7.4
Magnesium	6010D	None	8.9	8.6	8.2	7.7	8.2
Potassium	6010D	None	0.6 B	0.2 B	0.2 B	0.4 B	<0.02
Sodium	6010D	None	2.3	0.8 B	1.0	1.6	0.4 B

Note: Analyses performed by ACZ Laboratories, Inc., Steamboat Springs, Colorado
[a] Unless otherwise noted
[b] Results are for the dissolved portion of the analytes except for mercury, which is measured as total concentration per 20.6.2.3103 NMAC
mg/L = Milligrams per liter
< = Analyte not detected at concentration above the noted method detection limit (MDL)
B = Detected concentration is above the MDL but below the practical quantitation limit (PQL); result is considered an estimate
s.u. = Standard units

Attachment 1

Laboratory Report

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Revised Analytical Report

August 12, 2019

Report to:
John Ayarbe
Daniel B. Stephens & Assoc.
6020 Academy Rd NE
Suite 100
Albuquerque, NM 87109

Bill to:
John Ayarbe
Daniel B. Stephens & Assoc.
6020 Academy Rd NE
Suite 100
Albuquerque, NM 87109

cc: Bill Casadevall

Project ID:
ACZ Project ID: L52530

John Ayarbe:

Enclosed are revised analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on June 14, 2019 and originally reported on August 12, 2019. Refer to the case narrative for an explanation of the changes. This project was assigned to ACZ's project number, L52530. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L52530. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 10, 2019. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

Max Janicek has reviewed and approved this report.

Daniel B. Stephens Associates

August 12, 2019

Project ID:
ACZ Project ID: L52530

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 5 miscellaneous samples from Daniel B. Stephens & Associates on June 14, 2019. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L52530. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

Any analyses not performed within EPA recommended holding times have been qualified with an "H" flag.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

The SPLP Mercury results for L52530 have been qualified with the H1 flag on the extended qualifier report. The chemist noted that this analysis was performed outside the EPA-recommended hold time of 28 days for mercury analyses. This analysis was requested after the final report was initially submitted to the client; this request was made after the hold time had been exceeded. The revised report was sent to the client on 8/12/19.

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-1

ACZ Sample ID: ***L52530-01***
Date Sampled: *06/12/19 11:00*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP								07/25/19 17:56	jlw
Total Hot Plate Digestion	M3010A ICP-MS								07/26/19 11:00	mfm

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1		U	*	mg/L	0.05	0.3	07/26/19 17:36	aeh
Arsenic (1312)	M6010D ICP	1		U	*	mg/L	0.04	0.2	07/26/19 17:36	aeh
Barium (1312)	M6010D ICP	1	0.011	B	*	mg/L	0.007	0.04	07/26/19 17:36	aeh
Boron (1312)	M6010D ICP	1	0.02	B	*	mg/L	0.02	0.1	07/26/19 17:36	aeh
Cadmium (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.03	07/26/19 17:36	aeh
Calcium (1312)	M6010D ICP	1	5.8			mg/L	0.1	0.5	07/26/19 17:36	aeh
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:36	aeh
Cobalt (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:36	aeh
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:36	aeh
Iron (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.08	07/26/19 17:36	aeh
Lead (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.2	07/26/19 17:36	aeh
Magnesium (1312)	M6010D ICP	1	8.9			mg/L	0.2	1	07/26/19 17:36	aeh
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:36	aeh
Mercury (1312)	M7470A CVAA	1		UH	*	mg/L	0.0002	0.001	08/09/19 14:42	aeh
Mercury, total	M7471A CVAA	166		U	*	mg/Kg	0.03	0.2	07/01/19 13:06	slm
Molybdenum (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:36	aeh
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	07/26/19 17:36	aeh
Potassium (1312)	M6010D ICP	1	0.6	B	*	mg/L	0.2	1	07/26/19 17:36	aeh
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	07/29/19 14:51	mfm
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	07/26/19 17:36	aeh
Sodium (1312)	M6010D ICP	1	2.3		*	mg/L	0.2	1	07/26/19 17:36	aeh
Uranium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	07/29/19 14:51	mfm
Zinc (1312)	M6010D ICP	1	0.01	B	*	mg/L	0.01	0.05	07/26/19 17:36	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, (1312-DI)	M9045D/M9040C									
pH		1	9.9			units	0.1	0.1	07/30/19 0:00	cra
Temperature		1	21.7			C	0.1	0.1	07/30/19 0:00	cra
Solids, Percent	D2216-80	1	99.9		*	%	0.1	0.5	07/01/19 15:00	ms ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Synthetic Precip. Leaching Procedure	M1312								07/23/19 22:48	cra
Synthetic Precip. Leaching Procedure	M1312, DI Water		9.94						07/17/19 23:06	ajm

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-1

ACZ Sample ID: ***L52530-01***
Date Sampled: *06/12/19 11:00*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	17.3	B	*	mg/L	2	20	07/18/19 0:00	emk
Carbonate as CaCO3		1	35.7		*	mg/L	2	20	07/18/19 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	07/18/19 0:00	emk
Total Alkalinity		1	52.9		*	mg/L	2	20	07/18/19 0:00	emk
Chloride (1312 DI)	SM4500Cl-E	1	2.1		*	mg/L	0.5	2	07/23/19 15:27	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	07/18/19 17:43	emk
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	07/19/19 9:43	eij

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-2

ACZ Sample ID: ***L52530-02***
Date Sampled: *06/12/19 11:15*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP								07/25/19 19:36	jlw
Total Hot Plate Digestion	M3010A ICP-MS								07/26/19 11:30	mfm

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1		U	*	mg/L	0.05	0.3	07/26/19 17:47	aeh
Arsenic (1312)	M6010D ICP	1		U	*	mg/L	0.04	0.2	07/26/19 17:47	aeh
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	07/26/19 17:47	aeh
Boron (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:47	aeh
Cadmium (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.03	07/26/19 17:47	aeh
Calcium (1312)	M6010D ICP	1	4.0			mg/L	0.1	0.5	07/26/19 17:47	aeh
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:47	aeh
Cobalt (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:47	aeh
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:47	aeh
Iron (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.08	07/26/19 17:47	aeh
Lead (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.2	07/26/19 17:47	aeh
Magnesium (1312)	M6010D ICP	1	8.6			mg/L	0.2	1	07/26/19 17:47	aeh
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:47	aeh
Mercury (1312)	M7470A CVAA	1		UH	*	mg/L	0.0002	0.001	08/09/19 14:44	aeh
Mercury, total	M7471A CVAA	166		U	*	mg/Kg	0.03	0.2	07/01/19 13:07	slm
Molybdenum (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:47	aeh
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	07/26/19 17:47	aeh
Potassium (1312)	M6010D ICP	1	0.2	B	*	mg/L	0.2	1	07/26/19 17:47	aeh
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	07/29/19 14:53	mfm
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	07/26/19 17:47	aeh
Sodium (1312)	M6010D ICP	1	0.8	B	*	mg/L	0.2	1	07/26/19 17:47	aeh
Uranium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	07/29/19 14:53	mfm
Zinc (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:47	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, (1312-DI)	M9045D/M9040C									
pH		1	10.0			units	0.1	0.1	07/30/19 0:00	cra
Temperature		1	21.8			C	0.1	0.1	07/30/19 0:00	cra
Solids, Percent	D2216-80	1	100		*	%	0.1	0.5	07/01/19 22:25	ms ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Synthetic Precip. Leaching Procedure	M1312				*				07/24/19 3:13	cra
Synthetic Precip. Leaching Procedure	M1312, DI Water		10.06						07/18/19 1:22	ajm

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-2

ACZ Sample ID: ***L52530-02***
Date Sampled: *06/12/19 11:15*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	10.6	B	*	mg/L	2	20	07/18/19 0:00	emk
Carbonate as CaCO3		1	38.9		*	mg/L	2	20	07/18/19 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	07/18/19 0:00	emk
Total Alkalinity		1	49.5		*	mg/L	2	20	07/18/19 0:00	emk
Chloride (1312 DI)	SM4500Cl-E	1	1.1	B	*	mg/L	0.5	2	07/23/19 15:27	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	07/18/19 18:07	emk
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	07/19/19 9:51	eij

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-3

ACZ Sample ID: ***L52530-03***
Date Sampled: *06/12/19 11:45*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP								07/25/19 20:10	jlw
Total Hot Plate Digestion	M3010A ICP-MS								07/26/19 13:00	mfm

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1		U	*	mg/L	0.05	0.3	07/26/19 17:51	aeh
Arsenic (1312)	M6010D ICP	1		U	*	mg/L	0.04	0.2	07/26/19 17:51	aeh
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	07/26/19 17:51	aeh
Boron (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:51	aeh
Cadmium (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.03	07/26/19 17:51	aeh
Calcium (1312)	M6010D ICP	1	5.6			mg/L	0.1	0.5	07/26/19 17:51	aeh
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:51	aeh
Cobalt (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:51	aeh
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:51	aeh
Iron (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.08	07/26/19 17:51	aeh
Lead (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.2	07/26/19 17:51	aeh
Magnesium (1312)	M6010D ICP	1	8.2			mg/L	0.2	1	07/26/19 17:51	aeh
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:51	aeh
Mercury (1312)	M7470A CVAA	1		UH	*	mg/L	0.0002	0.001	08/09/19 14:45	aeh
Mercury, total	M7471A CVAA	168		U	*	mg/Kg	0.03	0.2	07/01/19 13:08	slm
Molybdenum (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:51	aeh
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	07/26/19 17:51	aeh
Potassium (1312)	M6010D ICP	1	0.2	B	*	mg/L	0.2	1	07/26/19 17:51	aeh
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	07/29/19 14:58	mfm
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	07/26/19 17:51	aeh
Sodium (1312)	M6010D ICP	1	1.0		*	mg/L	0.2	1	07/26/19 17:51	aeh
Uranium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	07/29/19 14:58	mfm
Zinc (1312)	M6010D ICP	1	0.01	B	*	mg/L	0.01	0.05	07/26/19 17:51	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, (1312-DI)	M9045D/M9040C									
pH		1	10.0			units	0.1	0.1	07/30/19 0:00	cra
Temperature		1	21.5			C	0.1	0.1	07/30/19 0:00	cra
Solids, Percent	D2216-80	1	100		*	%	0.1	0.5	07/02/19 2:07	ms ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Synthetic Precip. Leaching Procedure	M1312				*				07/24/19 7:38	cra
Synthetic Precip. Leaching Procedure	M1312, DI Water		10.09						07/18/19 2:31	ajm

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-3

ACZ Sample ID: ***L52530-03***
Date Sampled: *06/12/19 11:45*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	10.7	B	*	mg/L	2	20	07/18/19 0:00	emk
Carbonate as CaCO3		1	41.6		*	mg/L	2	20	07/18/19 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	07/18/19 0:00	emk
Total Alkalinity		1	52.4		*	mg/L	2	20	07/18/19 0:00	emk
Chloride (1312 DI)	SM4500Cl-E	1	1.8	B	*	mg/L	0.5	2	07/23/19 15:27	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	07/18/19 18:14	emk
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	07/19/19 9:55	eij

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-4

ACZ Sample ID: ***L52530-04***
Date Sampled: *06/12/19 12:15*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP								07/25/19 20:43	jlw
Total Hot Plate Digestion	M3010A ICP-MS								07/26/19 13:30	mfm

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1		U	*	mg/L	0.05	0.3	07/26/19 17:58	aeh
Arsenic (1312)	M6010D ICP	1		U	*	mg/L	0.04	0.2	07/26/19 17:58	aeh
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	07/26/19 17:58	aeh
Boron (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:58	aeh
Cadmium (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.03	07/26/19 17:58	aeh
Calcium (1312)	M6010D ICP	1	5.6			mg/L	0.1	0.5	07/26/19 17:58	aeh
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:58	aeh
Cobalt (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:58	aeh
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:58	aeh
Iron (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.08	07/26/19 17:58	aeh
Lead (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.2	07/26/19 17:58	aeh
Magnesium (1312)	M6010D ICP	1	7.7			mg/L	0.2	1	07/26/19 17:58	aeh
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 17:58	aeh
Mercury (1312)	M7470A CVAA	1		UH	*	mg/L	0.0002	0.001	08/09/19 14:46	aeh
Mercury, total	M7471A CVAA	163		U	*	mg/Kg	0.03	0.2	07/01/19 13:09	slm
Molybdenum (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 17:58	aeh
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	07/26/19 17:58	aeh
Potassium (1312)	M6010D ICP	1	0.4	B	*	mg/L	0.2	1	07/26/19 17:58	aeh
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	07/29/19 15:02	mfm
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	07/26/19 17:58	aeh
Sodium (1312)	M6010D ICP	1	1.6		*	mg/L	0.2	1	07/26/19 17:58	aeh
Uranium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	07/29/19 15:02	mfm
Zinc (1312)	M6010D ICP	1	0.01	B	*	mg/L	0.01	0.05	07/26/19 17:58	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, (1312-DI)	M9045D/M9040C									
pH		1	10.0			units	0.1	0.1	07/30/19 0:00	cra
Temperature		1	21.8			C	0.1	0.1	07/30/19 0:00	cra
Solids, Percent	D2216-80	1	99.9		*	%	0.1	0.5	07/02/19 5:50	ms ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Synthetic Precip. Leaching Procedure	M1312				*				07/24/19 9:06	cra
Synthetic Precip. Leaching Procedure	M1312, DI Water		10.01						07/18/19 3:39	ajm

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-4

ACZ Sample ID: ***L52530-04***
Date Sampled: *06/12/19 12:15*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	13.8	B	*	mg/L	2	20	07/18/19 0:00	emk
Carbonate as CaCO3		1	37.1		*	mg/L	2	20	07/18/19 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	07/18/19 0:00	emk
Total Alkalinity		1	50.9		*	mg/L	2	20	07/18/19 0:00	emk
Chloride (1312 DI)	SM4500Cl-E	1	2.7		*	mg/L	0.5	2	07/23/19 15:27	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	07/18/19 18:22	emk
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	07/19/19 9:59	eij

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-5

ACZ Sample ID: ***L52530-05***
Date Sampled: *06/12/19 12:45*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP								07/25/19 21:50	jlw
Total Hot Plate Digestion	M3010A ICP-MS								07/26/19 14:30	mfm

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum (1312)	M6010D ICP	1		U	*	mg/L	0.05	0.3	07/26/19 18:14	aeh
Arsenic (1312)	M6010D ICP	1		U	*	mg/L	0.04	0.2	07/26/19 18:14	aeh
Barium (1312)	M6010D ICP	1		U	*	mg/L	0.007	0.04	07/26/19 18:14	aeh
Boron (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 18:14	aeh
Cadmium (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.03	07/26/19 18:14	aeh
Calcium (1312)	M6010D ICP	1	7.4			mg/L	0.1	0.5	07/26/19 18:14	aeh
Chromium (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 18:14	aeh
Cobalt (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 18:14	aeh
Copper (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 18:14	aeh
Iron (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.08	07/26/19 18:14	aeh
Lead (1312)	M6010D ICP	1		U	*	mg/L	0.03	0.2	07/26/19 18:14	aeh
Magnesium (1312)	M6010D ICP	1	8.2			mg/L	0.2	1	07/26/19 18:14	aeh
Manganese (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.05	07/26/19 18:14	aeh
Mercury (1312)	M7470A CVAA	1		UH	*	mg/L	0.0002	0.001	08/09/19 14:50	aeh
Mercury, total	M7471A CVAA	163		U	*	mg/Kg	0.03	0.2	07/01/19 13:10	slm
Molybdenum (1312)	M6010D ICP	1		U	*	mg/L	0.02	0.1	07/26/19 18:14	aeh
Nickel (1312)	M6010D ICP	1		U	*	mg/L	0.008	0.04	07/26/19 18:14	aeh
Potassium (1312)	M6010D ICP	1		U	*	mg/L	0.2	1	07/26/19 18:14	aeh
Selenium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0003	07/29/19 15:09	mfm
Silver (1312)	M6010D ICP	1		U	*	mg/L	0.01	0.03	07/26/19 18:14	aeh
Sodium (1312)	M6010D ICP	1	0.4	B	*	mg/L	0.2	1	07/26/19 18:14	aeh
Uranium (1312)	M6020B ICP-MS	1		U	*	mg/L	0.0001	0.0005	07/29/19 15:09	mfm
Zinc (1312)	M6010D ICP	1	0.01	B	*	mg/L	0.01	0.05	07/26/19 18:14	aeh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
pH, (1312-DI)	M9045D/M9040C									
pH		1	10.0			units	0.1	0.1	07/30/19 0:00	cra
Temperature		1	21.9			C	0.1	0.1	07/30/19 0:00	cra
Solids, Percent	D2216-80	1	99.9		*	%	0.1	0.5	07/02/19 9:32	ms ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Synthetic Precip. Leaching Procedure	M1312				*				07/24/19 13:31	cra
Synthetic Precip. Leaching Procedure	M1312, DI Water		10.09						07/18/19 4:47	ajm

Daniel B. Stephens & Associates
Project ID:
Sample ID: 19-5

ACZ Sample ID: ***L52530-05***
Date Sampled: *06/12/19 12:45*
Date Received: *06/14/19*
Sample Matrix: *Soil*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity (1312 DI)	SM2320B - Titration									
Bicarbonate as CaCO3		1	12.5	B	*	mg/L	2	20	07/18/19 0:00	emk
Carbonate as CaCO3		1	43.6		*	mg/L	2	20	07/18/19 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	07/18/19 0:00	emk
Total Alkalinity		1	56.2		*	mg/L	2	20	07/18/19 0:00	emk
Chloride (1312 DI)	SM4500Cl-E	1	0.5	B	*	mg/L	0.5	2	07/23/19 15:27	ttg
Fluoride (1312 DI)	SM4500F-C	1		U	*	mg/L	0.1	0.4	07/18/19 18:30	emk
Sulfate (1312 DI)	SM4500 SO4-D	1		U	*	mg/L	20	50	07/19/19 10:03	eij

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA SW-846. Test Methods for Evaluating Solid Waste.
(5) Standard Methods for the Examination of Water and Wastewater.

Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
(5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Daniel B. Stephens & Associates

ACZ Project ID: ***L52530***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Alkalinity as CaCO3 SM2320B - Titration

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477315													
WG477315LCSW1	LCSW	07/18/19 16:05	WC190709-1	820.0001		828	mg/L	101	90	110			
WG477315PBW	PBW	07/18/19 16:11				2.8	mg/L		-20	20			
WG477190PBS	PBS	07/18/19 16:17				2.1	mg/L		-20	20			
L52530-01DUP	DUP	07/18/19 16:34			52.9	52	mg/L				2	20	
WG477315LCSW2	LCSW	07/18/19 17:21	WC190709-1	820.0001		819	mg/L	100	90	110			

Aluminum (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.969	mg/L	98	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.15	0.15			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.15	0.15			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	1.0006		.988	mg/L	99	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	1.0006	U	.992	mg/L	99	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	1.0006	U	.987	mg/L	99	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Arsenic (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	4		3.854	mg/L	96	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.12	0.12			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.12	0.12			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	1.0008		1.031	mg/L	103	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	1.0008	U	1.039	mg/L	104	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	1.0008	U	1.017	mg/L	102	75	125	2	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Barium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		2.003	mg/L	100	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.021	0.021			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.021	0.021			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.4995		.4922	mg/L	99	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.4995	.011	.5005	mg/L	98	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.4995	.011	.4989	mg/L	98	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Daniel B. Stephens & Associates

ACZ Project ID: ***L52530***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Boron (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		2.073	mg/L	104	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.06	0.06			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.06	0.06			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.5005		.517	mg/L	103	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.5005	.02	.523	mg/L	100	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.5005	.02	.522	mg/L	100	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Cadmium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.943	mg/L	97	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.024	0.024			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.024	0.024			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.502		.4912	mg/L	98	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.502	U	.4908	mg/L	98	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.502	U	.484	mg/L	96	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Calcium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	100		95.7	mg/L	96	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.3	0.3			
WG477642PBS	PBS	07/26/19 17:29				.1	mg/L		-0.3	0.3			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	68.11783		65.89	mg/L	97	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	68.11783	5.8	71.46	mg/L	96	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	68.11783	5.8	70.97	mg/L	96	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			5.6	6.7	mg/L				18	20	

Chloride (1312 DI) SM4500Cl-E

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477679													
WG477679ICB	ICB	07/23/19 12:57				U	mg/L		-1.5	1.5			
WG477679ICV	ICV	07/23/19 12:57	WI190501-1	54.835		53.18	mg/L	97	90	110			
WG477679LFB	LFB	07/23/19 15:27	WI190111-6	30.03		29.18	mg/L	97	90	110			
WG477190PBS	PBS	07/23/19 15:27				U	mg/L		-1.5	1.5			
L52530-01DUP	DUP	07/23/19 15:27			2.1	2.62	mg/L				22	20	RA
L52530-02AS	AS	07/23/19 15:27	WI190111-6	30.03	1.1	31.63	mg/L	102	90	110			

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ACZ Project ID: ***L52530***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Chromium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.992	mg/L	100	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.03	0.03			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.03	0.03			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.501		.498	mg/L	99	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.501	U	.497	mg/L	99	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.501	U	.497	mg/L	99	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Cobalt (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2.002		1.882	mg/L	94	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.03	0.03			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.03	0.03			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.5		.48	mg/L	96	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.5	U	.485	mg/L	97	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.5	U	.483	mg/L	97	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Copper (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.98	mg/L	99	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.03	0.03			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.03	0.03			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.5005		.499	mg/L	100	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.5005	U	.498	mg/L	100	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.5005	U	.494	mg/L	99	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Fluoride (1312 DI) SM4500F-C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477237													
WG477237ICV	ICV	07/18/19 9:55	WC190715-1	2.004		2.1	mg/L	105	90	110			
WG477237ICB	ICB	07/18/19 10:00				U	mg/L		-0.3	0.3			
WG477316													
WG477316ICV	ICV	07/18/19 17:15	WC190715-1	2.004		2.19	mg/L	109	90	110			
WG477316ICB	ICB	07/18/19 17:22				U	mg/L		-0.3	0.3			
WG477316LFB	LFB	07/18/19 17:30	WC190409-6	5.01		5.41	mg/L	108	90	110			
WG477190PBS	PBS	07/18/19 17:35				U	mg/L		-0.3	0.3			
L52530-01AS	AS	07/18/19 17:51	WC190409-6	5.01	U	5.33	mg/L	106	90	110			
L52530-01DUP	DUP	07/18/19 17:59			U	U	mg/L				0	20	RA

Daniel B. Stephens & Associates

ACZ Project ID: ***L52530***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Iron (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.957	mg/L	98	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.09	0.09			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.09	0.09			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	1.0018		1	mg/L	100	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	1.0018	U	.985	mg/L	98	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	1.0018	U	.982	mg/L	98	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Lead (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	4		4.036	mg/L	101	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.09	0.09			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.09	0.09			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	1.0017		1.042	mg/L	104	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	1.0017	U	1.053	mg/L	105	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	1.0017	U	1.05	mg/L	105	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Magnesium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	100		95.02	mg/L	95	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.6	0.6			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.6	0.6			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	50.31093		48.01	mg/L	95	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	50.31093	8.9	56.73	mg/L	95	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	50.31093	8.9	56.17	mg/L	94	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			7.7	8.54	mg/L				10	20	

Manganese (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.95	mg/L	98	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.03	0.03			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.03	0.03			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.5015		.493	mg/L	98	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.5015	U	.49	mg/L	98	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.5015	U	.489	mg/L	98	75	125	0	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Daniel B. Stephens & Associates

ACZ Project ID: ***L52530***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Mercury (1312) M7470A CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG479013													
WG479013ICV	ICV	08/09/19 13:33	HG190716-3	.004995		.00488	mg/L	98	95	105			
WG479013ICB	ICB	08/09/19 13:34				U	mg/L		-0.0002	0.0002			
WG479014													
WG477642PBS	PBS	08/09/19 14:40				U	mg/L		-0.0006	0.0006			
WG477642LFB1	LFB	08/09/19 14:41	HG190805-3	.002002		.00183	mg/L	91	85	115			
L52530-01MS	MS	08/09/19 14:43	HG190805-3	.002002	U	.00175	mg/L	87	85	115			
L52530-01MSD	MSD	08/09/19 14:44	HG190805-3	.002002	U	.00181	mg/L	90	85	115	3	20	
L52530-04DUP	DUP	08/09/19 14:47			U	U	mg/L				0	20	RA

Mercury, total M7471A CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG475778													
WG475778ICV1	ICV	07/01/19 12:52	HG190627-9	.00999		.0105	mg/L	105	90	110			
WG475778ICB	ICB	07/01/19 12:54				U	mg/L		-0.0006	0.0006			
WG475778PBS	PBS	07/01/19 12:55				U	mg/Kg		-0.12	0.12			
WG475778LCSS	LCSS	07/01/19 13:02	PCN53451	12.3		11.02	mg/Kg		7.88	16.7			
WG475778LCSSD	LCSSD	07/01/19 13:04	PCN53451	12.3		10.94	mg/Kg		7.88	16.7	1	20	
L52587-03MS	MS	07/01/19 13:20	HG190627-12	4.07407	1.2	5.13	mg/Kg	96	85	115			
L52587-03MSD	MSD	07/01/19 13:22	HG190627-12	4.06406	1.2	5.2	mg/Kg	98	85	115	1	20	

Molybdenum (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.989	mg/L	99	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.06	0.06			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.06	0.06			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.4975		.499	mg/L	100	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.4975	U	.503	mg/L	101	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.4975	U	.496	mg/L	100	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Nickel (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2.004		1.95	mg/L	97	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.024	0.024			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.024	0.024			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.5		.4943	mg/L	99	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.5	U	.4961	mg/L	99	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.5	U	.4928	mg/L	99	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Ph M9045D/M9040C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG478137													
WG478137ICV	ICV	07/30/19 10:46	PCN58495	4		3.9	units	98	3.9	4.1			

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NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Potassium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	20		19.51	mg/L	98	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.6	0.6			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.6	0.6			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	99.96426		97.68	mg/L	98	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	99.96426	.6	98.05	mg/L	97	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	99.96426	.6	97.38	mg/L	97	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			.4	.36	mg/L				11	20	RA

Selenium (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG478148													
WG478148ICV	ICV	07/29/19 14:35	MS190630-2	.05		.04947	mg/L	99	90	110			
WG478148ICB	ICB	07/29/19 14:37				U	mg/L		-0.0003	0.0003			
WG477642PBS	PBS	07/29/19 14:47				U	mg/L		-0.0003	0.0003			
WG477642LFB2	LFB	07/29/19 14:49	MS190719-2	.05005		.04654	mg/L	93	80	120			
L52530-02MS	MS	07/29/19 14:55	MS190719-2	.05005	U	.04842	mg/L	97	75	125			
L52530-02MSD	MSD	07/29/19 14:56	MS190719-2	.05005	U	.0489	mg/L	98	75	125	1	20	
L52530-04DUP	DUP	07/29/19 15:03			U	U	mg/L				0	20	RA

Silver (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	1.001		.996	mg/L	100	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.03	0.03			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.03	0.03			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.502		.484	mg/L	96	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.502	U	.5	mg/L	100	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.502	U	.482	mg/L	96	75	125	4	20	
L52530-04DUP	DUP	07/26/19 18:02			U	U	mg/L				0	20	RA

Sodium (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	100		96.55	mg/L	97	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.6	0.6			
WG477642PBS	PBS	07/26/19 17:29				U	mg/L		-0.6	0.6			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	100.0471		97.21	mg/L	97	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	100.0471	2.3	99.51	mg/L	97	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	100.0471	2.3	98.99	mg/L	97	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			1.6	1.45	mg/L				10	20	RA

Solids, Percent D2216-80

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG475990													
L52530-01DUP	DUP	07/01/19 18:42			99.9	99.93	%				0	20	
WG475990PBS	PBS	07/02/19 13:15				U	%		-0.1	0.1			

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NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Sulfate (1312 DI) SM4500 SO4-D

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477361													
WG477361PBW	PBW	07/19/19 9:31				U	mg/L		-60	60			
WG477361LCSW	LCSW	07/19/19 9:35	WC190603-2	100		90	mg/L	90	80	120			
WG477190PBS	PBS	07/19/19 9:39				U	mg/L		-60	60			
L52530-01DUP	DUP	07/19/19 9:47			U	U	mg/L				0	20	RA

Uranium (1312) M6020B ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG478148													
WG478148ICV	ICV	07/29/19 14:35	MS190630-2	.05		.04939	mg/L	99	90	110			
WG478148ICB	ICB	07/29/19 14:37				U	mg/L		-0.0003	0.0003			
WG477642PBS	PBS	07/29/19 14:47				U	mg/L		-0.0003	0.0003			
WG477642LFB2	LFB	07/29/19 14:49	MS190719-2	.05		.04691	mg/L	94	80	120			
L52530-02MS	MS	07/29/19 14:55	MS190719-2	.05	U	.04778	mg/L	96	75	125			
L52530-02MSD	MSD	07/29/19 14:56	MS190719-2	.05	U	.04875	mg/L	98	75	125	2	20	
L52530-04DUP	DUP	07/29/19 15:03			U	U	mg/L				0	20	RA

Zinc (1312) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG477994													
WG477994ICV	ICV	07/26/19 17:02	II190726-1	2		1.948	mg/L	97	90	110			
WG477994ICB	ICB	07/26/19 17:05				U	mg/L		-0.03	0.03			
WG477642PBS	PBS	07/26/19 17:29				.013	mg/L		-0.03	0.03			
WG477642LFB1	LFB	07/26/19 17:32	II190724-2	.50075		.525	mg/L	105	80	120			
L52530-01MS	MS	07/26/19 17:40	II190724-2	.50075	.01	.522	mg/L	102	75	125			
L52530-01MSD	MSD	07/26/19 17:43	II190724-2	.50075	.01	.517	mg/L	101	75	125	1	20	
L52530-04DUP	DUP	07/26/19 18:02			.01	.011	mg/L				10	20	RA

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L52530-01	WG477994	Aluminum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Boron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cadmium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477679	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cobalt (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477316	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Lead (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG479014	Mercury (1312)	M7470A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG475778	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG477994	Molybdenum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG478148	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG477994	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477361	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG478148	Uranium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L52530-02	WG477994	Aluminum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Boron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cadmium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477679	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cobalt (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477316	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Lead (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG479014	Mercury (1312)	M7470A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG475778	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG477994	Molybdenum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG478148	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG477994	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477361	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477642	Synthetic Precip. Leaching Procedure	M1312	EB	A pH value outside the range of the probe standardization is estimated.
	WG477315	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG478148	Uranium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L52530-03	WG477994	Aluminum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Boron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cadmium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477679	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cobalt (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477316	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Lead (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG479014	Mercury (1312)	M7470A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG475778	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG477994	Molybdenum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG478148	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG477994	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477361	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477642	Synthetic Precip. Leaching Procedure	M1312	EB	A pH value outside the range of the probe standardization is estimated.
	WG477315	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG478148	Uranium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Daniel B. Stephens & Associates ACZ Project ID: ***L52530***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L52530-04	WG477994	Aluminum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Boron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cadmium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477679	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cobalt (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477316	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Lead (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG479014	Mercury (1312)	M7470A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG475778	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG477994	Molybdenum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG478148	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Daniel B. Stephens & Associates ACZ Project ID: ***L52530***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG477994	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477361	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477642	Synthetic Precip. Leaching Procedure	M1312	EB	A pH value outside the range of the probe standardization is estimated.
	WG477315	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG478148	Uranium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Daniel B. Stephens & Associates ACZ Project ID: ***L52530***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L52530-05	WG477994	Aluminum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Arsenic (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Barium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Boron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cadmium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477679	Chloride (1312 DI)	SM4500Cl-E	HD	Analysis is outside the intended scope of the method, which does not provide hold time information for soil extracts. No hold time is observed for collection to extraction. The referenced method hold time is observed for extraction-to-analysis.
			SM4500Cl-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Chromium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Cobalt (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Copper (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477316	Fluoride (1312 DI)	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477315	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG477994	Iron (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Lead (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Manganese (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG479014	Mercury (1312)	M7470A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7470A CVAA	Q6	Sample was received above recommended temperature.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG475778	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG477994	Molybdenum (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Nickel (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Potassium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG478148	Selenium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Daniel B. Stephens & Associates

ACZ Project ID: ***L52530***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG477994	Silver (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Sodium (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477361	Sulfate (1312 DI)	SM4500 SO4-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477642	Synthetic Precip. Leaching Procedure	M1312	EB	A pH value outside the range of the probe standardization is estimated.
	WG477315	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG478148	Uranium (1312)	M6020B ICP-MS	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG477994	Zinc (1312)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
			M6010D ICP	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Solids, Percent	D2216-80

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bicarbonate as CaCO3	SM2320B - Titration
Carbonate as CaCO3	SM2320B - Titration
Chloride (1312 DI)	SM4500Cl-E
Fluoride (1312 DI)	SM4500F-C
Hydroxide as CaCO3	SM2320B - Titration
Sulfate (1312 DI)	SM4500 SO4-D
Total Alkalinity	SM2320B - Titration

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Daniel B. Stephens & Associates

ACZ Project ID: L52530
Date Received: 06/14/2019 12:53
Received By:
Date Printed: 6/18/2019

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?		X	
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? [1]			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

NA indicates Not Applicable

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
NA30769	17.1	NA	15	Yes

Was ice present in the shipment container(s)?

No - Wet or gel ice was not present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Daniel B. Stephens & Associates

ACZ Project ID:	L52530
Date Received:	06/14/2019 12:53
Received By:	
Date Printed:	6/18/2019

[1] The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

ACZ Laboratories, Inc. L52530

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: John Ayarbe	Address: 6020 Academy Rd NE, Suite 100
Company: Daniel B. Stephens & Assoc	Albuquerque, NM 87109
E-mail: jayarbe@geo-logic.com	Telephone: 505-822-9400

Copy of Report to:

Name: Bill Casadevall	E-mail: bcasadevall@geo-logic.com
Company: same as above	Telephone: 505-822-9400

Invoice to:

Name: John Ayarbe (same as above)	Address:
Company:	
E-mail:	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☐ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes ☐ No ☒

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: B. Casade **Sampler's Site Information** **State** NM **Zip code**_____ **Time Zone**_____

***Sampler's Signature:** Bill Casadevall *I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

Quote #: SPLP

PO#:

Reporting state for compliance testing:

Check box if samples include NRC licensed material? ☐

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	SPLP	Dissolved metals and ions per attached quote	Total Hg	pH					
19-1	6/12/19: 1100	Rock	1	☒	☒	☒	☒	☐	☐	☐	☐	
19-2	6/12/19: 1115	Rock	1	☒	☒	☒	☒	☐	☐	☐	☐	
19-3	6/12/19: 1145	Rock	1	☒	☒	☒	☒	☐	☐	☐	☐	
19-4	6/12/19: 1215	Rock	1	☒	☒	☒	☒	☐	☐	☐	☐	
19-5	6/12/19: 1245	Rock	1	☒	☒	☒	☒	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	☐	☐	

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Rock chip samples. Refer to attached Quote for list of analytes. All analyses, except mercury, are for dissolved constituents. Mercury to be analyzed for total concentration.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Bill Casadevall	6/13/19 0930	FedEx	
		SSC	6-14-19 12:53

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

L52530 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Bill Casadevall
Daniel B. Stephens & Associates
6020 Academy NE Suite 100
Albuquerque, NM 87109

5/20/2019

Quote Number: SPLP

Matrix: Soil Five samples: TaT of 21 days (15 working days)

Parameter	Method	Detection Limit	Cost/Sample
Inorganic Prep			
Total Hot Plate Digestion	M3010A ICP		$0.00
Total Hot Plate Digestion	M3010A ICP-MS		$0.00
Metals Analysis			
Metals by ICP			$75.00
Arsenic (1312)	M6010D ICP	0.04 mg/L	$0.00
Barium (1312)	M6010D ICP	0.007 mg/L	$0.00
Cadmium (1312)	M6010D ICP	0.008 mg/L	$0.00
Calcium (1312)	M6010D ICP	0.1 mg/L	$0.00
Chromium (1312)	M6010D ICP	0.01 mg/L	$0.00
Lead (1312)	M6010D ICP	0.03 mg/L	$0.00
Magnesium (1312)	M6010D ICP	0.2 mg/L	$0.00
Mercury (1312)	M7470A CVAA	0.0002 mg/L	$23.40
Potassium (1312)	M6010D ICP	0.2 mg/L	$0.00
Selenium (1312)	M6020B ICP-MS	0.0001 mg/L	$19.00
Silver (1312)	M6010D ICP	0.01 mg/L	$0.00
Sodium (1312)	M6010D ICP	0.2 mg/L	$0.00
Uranium (1312)	M6020B ICP-MS	0.0001 mg/L	$19.00
Misc.			
Electronic Data Deliverable			$0.00
Quality Control Summary			$0.00
Sample Preparation			
Synthetic Precip. Leaching Procedure	M1312		$67.50
Synthetic Precip. Leaching Procedure	M1312, DI Water		$67.50
Soil Analysis			
Sample Weight	Rad Disposal Compliance	g	$0.00
Wet Chemistry			
Alkalinity (1312 DI)	SM2320B - Titration	10 mg/L	$9.90
Chloride (1312 DI)	SM4500Cl-E	0.5 mg/L	$9.90
Fluoride (1312)	SM4500F-C	0.11 mg/L	$9.90
Sulfate (1312 DI)	SM4500 SO4-D	20 mg/L	$11.70
		Cost/Sample:	**$312.80**

ACZ assigns a Project Manager to all of our clients. Your Project Manager is Max Janicek. Max will serve as your main point of contact for all bottle orders, report statuses, questions on your data and changes to your account, and can be reached at maxj@acz.com or 970-879-6590 ext 128.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Bill Casadevall
Daniel B. Stephens & Associates
6020 Academy NE Suite 100
Albuquerque, NM 87109

5/20/2019

Quote Number: SPLP

CONTRACT DETAILS
Pricing includes coolers, bottles pre-preserved as needed, labels, COCs and ice-packs shipped to your site or office via UPS ground. Return shipping is the responsibility of the client. Please allow three to five days for delivery when ordering containers. ACZ must be notified prior to receiving samples of all special requests such as electronic data deliverables or special reporting requirements. The client will be charged for special sample containers or express shipping and additional charges may apply for non-standard requests.

This quotation is valid for six months from the bid date unless specified otherwise in the bid. All bids must be signed and returned to ACZ before the project(s) is received. The authorized signature represents acceptance of the pricing as well as the general terms and conditions of ACZ Laboratories, Inc. which may be downloaded from our web site at http://www.acz.com/wp-content/uploads/2015/10/ACZ_Terms_Conditions.pdf. Please note that MDL's in this quote may possibly increase due to sample matrix or samples with high TDS.

All orders that require shipping of coolers are subject to a minimum charge of $200.00. Local orders without shipping are subject to a minimum charge of $125.00. Samples may incur a $11.00/sample disposal fee for any samples deemed to be hazardous.

ACZ Representative (Authorized signature and date) _____

Client Representative (Authorized signature and date) _____

ACZ has signed contract.
BC