



April 9, 2019

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 (Revised)

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.

As you may have previously learned, Mr. David Tognoni passed away after a short illness on March 2, 2019. AmMg shareholders have elected me to succeed Mr. Tognoni as Managing Member and to assume his duties and responsibilities. Therefore, please note the change in the permit LU035MN and supplement the contact information listed therein as follows:

Carol Ness Brewka, Managing Member  
PO Box 1013  
Elephant Butte, NM 87935-1013  
Phone: (505) 699-8807  
Email: cnbrewka@msn.com

My primary purpose in contacting you is to provide you with the Plan of Operations (PoO) for the Foothill Dolomite Mine, which has been revised in accordance with AmMg's responses to comments from the Bureau of Land Management (BLM) dated December 12, 2018 and comments from the Mining and Minerals Division (MMD) dated October 2, 2018.

Enclosed please find two (2) copies of AmMg's Response to Comments Received and two (2) copies of AmMg's revised PoO. Also included is a compact disk with portable data files (pdfs) of the documents. Of note, in revising the PoO, AmMg has made several significant changes, including, but not limited to, the following:

- AmMg has decided that 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.
- Sections 2.4.1 through 2.4.6 have been added to more effectively respond to BLM and MMD comments regarding the proposed disturbances.
- Section 2.15.1, Geology, has been updated to include information regarding depth to groundwater and groundwater chemistry.
- Section 2.15.5, Visual Resources, has been added in response to a BLM comment.
- Section 3.4, Year 5 Reclamation Plan, has been expanded to discuss each aspect of reclamation of disturbed areas at the end of Year 5 of operations.
- Section 3.5, Year 20 Reclamation Plan, has been expanded to discuss each aspect of reclamation of disturbed areas at the end of Year 20 of operations.
- Sections 5.2 and 5.3 regarding regional and local geology, respectively, have been moved to Section 2.15.1, Geology. This change was made so that all related information is in one location.

Appendices from previous versions of the PoO have been included in the revised PoO except for former Appendix F, the Site Visit Report by RPA (USA), Ltd., which does not apply to the Foothill Site and has not been included. That information is available in the PoO dated September 21, 2018. New information provided in the appendices includes the following:

- Appendix A2 provides plan views and cross sections of the mine at the end of Years 1, 5, and 20, and reclamation plans at the end of Years 5 and 20.
- Appendix D, the Soil Resource Report, has been updated to cover a larger area.
- Appendix F now provides information regarding visual resources and includes a map showing BLM's visual resource classes for the Project Area and Contrast Rating Forms prepared by AmMg.
- Appendix G includes laboratory analytical reports for samples collected by AmMg from the Foothill Site.

Finally, I would like to make you aware, if you are not already, that 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 505-822-9400 or by e-mail at [jayarbe@geo-logic.com](mailto:jayarbe@geo-logic.com).

Regards,

American Magnesium, LLC

A handwritten signature in black ink, appearing to read 'Carol Ness Brewka'.

Carol Ness Brewka, Managing Member

Attachments

1. Response to Comments Received
2. Revised Plan of Operations



**CONSOLIDATED RESPONSE TO BLM AND MMD COMMENTS ON  
American Magnesium Plan of Operations dated September 21, 2018  
For Foothill Dolomite Mine, Deming, NM**

<b>MMD Comments by:</b> Holland Shepherd Program Manager Mining and Minerals Division 1220 South St. Francis Drive Santa Fe, NM 87505 October 2, 2018	<b>BLM Comments by:</b> Bill Childress, District Manager Bureau of Land Management 1800 Marquess St. Las Cruces, NM 88005 December 18, 2018	<b>Responses by:</b> Daniel B. Stephens & Associates, Inc. 6020 Academy Road NE, Suite 100 Albuquerque, NM 87109
#	Comment	American Magnesium (AmMg) Response
<b>BLM Comments</b>		
1	Contrast rating forms need to be completed. Two contrast rating forms for key observations points will be necessary from Highway 11; separate forms will be required for northbound traffic, and southbound traffic. Additionally, two separate forms will be needed from the subdivision near Mahoney Park Rd and another form where the WSA boundary starts. Other locations can be completed as well, but these four locations would be a good starting point. Attached are the Visual Resource Management Handbook 8431 and a contrast rating form. All facilities and equipment, including but not limited to trailers, stockpile areas, new road, road improvements, water tank (recommended green color), storage facilities, heavy equipment, fences, will all need to be included in the contrast rating form.	Visual Resources are discussed in new Section 2.15.5. A figure showing BLM's visual resource classes in the project area and the contrast rating forms are provided in Appendix F.
2	Additional cultural survey is needed. The cultural survey you submitted with the Plan did not include the road or any of the disturbance related to the road such as the pullouts.	Additional cultural survey was performed, including mapping of a site outside the area of interest. Results were submitted to BLM under separate cover and are discussed in Section 2.15.6.
3	More information is needed about the laydown yard. Will it be bladed and will there be storm water runoff and erosion protection around the yard?	Development of the laydown yard is discussed in new Section 2.4.3, and it is responsive to BLM's questions. Additional information regarding stormwater management is provided in Section 2.14.1.
4	The Plan references Best Management Practices (BMPs) from the New Mexico Mining and Minerals Division and the Luna County Soil Conservation District. What are those BMPs?	BMPs that will be employed to minimize the surface disturbance and erosion potential are listed in Section 2.8.
5	How would the road be constructed/improved? BLM needs site specific details, (i.e. crowning, low water crossings, culverts, water bars, water turnouts, etc.).	Improvements to the BLM road and construction of the mine access road are discussed in new Sections 2.4.1 and 2.4.2, respectively.
7	There are various concerns related to public access; your proposal is to close access of the road for public safety. BLM is requesting that you amend your plan to allow for public access as there is no other viable access for the public to use to gain access to that part of the Florida Mountains. The alternate access route you proposed in the Plan crosses private land; the legal ability for the public to use that route and the route's physical condition is questionable.	Public access to that part of the Florida Mountains using the existing BLM road will not be limited. Access restrictions are proposed for the new mine site access road as described in new Section 2.4.2 and Section 2.9.2.

1. MMD's letter included two comments numbered 2 and no comment numbered 6.





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<i>BLM Comments (cont.)</i>			
8	In addition to the biological survey that was submitted with the Plan, the following items are needed for the NEPA analysis:		
8a	Golden Eagle nesting data from New Mexico Game and Fish or the United States Fish and Wildlife Service.		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 ( <a href="http://bison-m.org/SuperSearch.aspx">http://bison-m.org/SuperSearch.aspx</a> ). The results indicate the presence (extant, possible, or accidental) of golden eagles in Luna County, but no records were identified in the Florida Mountains (Appendix E4).
8b	Bat data from the New Mexico Abandoned Mines Bureau		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 ( <i>Corynorhinus townsendii</i> ), big brown bat ( <i>Eptesicus fuscus</i> ), western small-footed bat ( <i>Myotis ciliolabrum</i> ), long-eared myotis ( <i>Myotis evotis</i> ), cave myotis ( <i>Myotis velifer</i> ), fringed myotis ( <i>Myotis thysanodes</i> ), and Brazilian free-tailed bat ( <i>Tadarida brasiliensis</i> ). 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 environmental assessment, the biological survey will be expanded to determine whether bats are present within the project area.
8c	An updated Sensitive Species List		On October 18, 2018, the New Mexico State Office of the BLM issued revisions to the New Mexico BLM sensitive animal and plant lists, which are provided in Appendix E3.



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BLM Comments (cont.)			
8d	Migratory Bird Nesting surveys		<p>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).</p> <p>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.</p> <p>The breeding season is from March 1 to August 31. To avoid potential impacts to and unintentional takes of migratory bird species, surveys for nesting birds will be completed to ensure that there are none on the mine site. It is expected that the ongoing disturbance caused by mining activities will deter migratory birds from nesting in the project area.</p>
8e	Pollinator plant information		<p>The seed mixture proposed by AmMg in Table 11 (Section 3.3) includes several pollinator plants identified in the NRCS publication <i>Pollinator Plant Recommendations for New Mexico</i> (Dreesen and Grasswitz, 2015).</p>
9	To assess air quality BLM needs the following information:		
9a	What will be the average vehicle speed for the project?		<p>Vehicle operating speeds will be consistent with conditions of roadways, grades, clearance, visibility, traffic, and the type of equipment used. Refer to discussion in new Section 2.4.6.</p>



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<i>BLM Comments (cont.)</i>			
9b	What is the average number of round trips per year?		AmMg estimates that a small fleet of haul trucks will make an average total of 12,000 round trips per year. Refer to discussion in new Section 2.4.6.
9c	Will there be generators onsite? If so what size and fuel type.		AmMg will use a portable, gasoline-powered, 10,000-watt generator in the laydown yard area to provide electricity to the office trailer. Refer to Section 2.9.1.
10	To assess noise impacts, what is the blasting schedule and how large would the blasts be?		During production, AmMg anticipates blasting once a month using approximately 30,000 pounds of explosives. Refer to new Section 2.4.6.
11	BLM is requesting geospatial data for the planned disturbances, projected in NAD 1983, Zone 13 North.		The requested geospatial data files will be provided to BLM under separate cover.
<i>MMD Comments</i>			
1	Under Section 3.1 Reclamation, of the Revised PoO, page 3, the applicant indicates that further detail of the reclamation plan will be provided once the project is underway and specific conditions are evaluated. MMD will need specific details of the mining and reclamation plan prior to moving forward with approval of the permit application. Additionally, the language in this section indicates that MMD already deemed AmMg's application administratively and technically complete subject to BLM approval. The application was deemed administratively complete on July 25, 2017. No correspondence has been sent to AmMg deeming the application technically complete.  A letter was sent to AmMg on November 1, 2017, indicating to AmMg that the BLM process needed to be completed before MMD could approve the application. In addressing the deficiencies provided by BLM in their letter of December 8, 2017 letter, AmMg has submitted a Revised PoO. MMD has reviewed the revised PoO, which provides updated and new information related to the state application.		In response to MMD and BLM comments, AmMg has added Sections 2.4.1 through 2.4.6 to provide details of proposed operations, and Sections 3.4 and 3.5 to provide details regarding reclamation. AmMg provides further details regarding reclamation and other topics where specifically requested by MMD in comments below.  Statements regarding having achieved technical completeness have been removed from the PoO.



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<i>MMD Comments (cont.)</i>			
2	AmMg’s mine plan states that the hill within Claim Area 21 and 22 will be mined from the highest elevation down to the valley floor. This will eventually (over approximately 30 years) result in an approximate 100 foot sheer vertical highwall along the eastern edge of the Phase 2 and Phase 3 Mining Areas and an approximate 40 foot highwall along the western edge of the Phase I Mining Area. Section 3.2 of the Revised PoO acknowledges that mining will result in "pit-like" walls and that during reclamation these walls will be "terraced to a slope comparable to the surrounding hill slopes." In MMD's experience, terracing/benching of a sheer highwall cannot be easily accomplished at reclamation; benching is more easily achieved during operations as part of the mine plan. Additionally, terracing to a slope comparable to the surrounding hill slope, does not provide MMD with enough information to determine if such terracing or benching provides for a slope that can be reclaimed (revegetated and stabilized). Pits and highwalls must be reclaimed at the end of mining to meet the requirements of the NM Mining Rules. Please provide:		AmMg respectfully disagrees with MMD’s conclusion that 100-foot and 40-foot sheer highwalls will result from mining. The previous PoO stated that the walls would consist of 20-foot-high terraces with a slope of 1:1, separated by 5-foot-wide benches. As described in Section 2.4.6 of the revised PoO dated April 9, 2019, during mining, AmMg intends to develop interim walls with 20-foot-tall near-vertical interim walls and 5-foot-wide benches in the center of the mine area. These interim walls will be removed as mining progresses. However, the perimeter of the mine, defined by the outer boundary of the mining phases, will consist of 20-foot-high walls sloped at 1:1, separated by 5-foot-wide benches, as shown in Figures A2-3a and A2-3b in Appendix A2 of the PoO. This mine plan allows AmMg to recover most of the dolomite resource, while leaving topography that is not unlike the current foothill site and nearby Florida Mountains, which includes many vertical faces and steep slopes. Each perimeter bench will be reclaimed (recontoured, ripped, covered with topdressing, and reseeded) as it is created and still relatively easily accessed.
2a	a detailed mining/quarry plan including proposed bench heights and bench widths; inter-bench slope lengths and inter-bench slope angles.		Figures A2-3a and A2-3b in Appendix A2 of the PoO shows the Foothill Mine at end of mining operations (Year 20).
2b	a map showing the location of the initial pit within the Phase I Mining Area at the approximate end of Year 1 of mining;		Refer to Figure A2-1a in Appendix A2 of the PoO.
2c	a map showing the surficial dimensions of the initial pit within the Phase I Mining Area at the approximate end of Year 1 of mining		Refer to Figure A2-1a in Appendix A2 of the PoO.
2d	North-south and east-west cross-sections of the initial pit depicting the proposed bench heights and bench widths at the approximate end of Year 1 of mining;		Refer to Figure A2-1b in Appendix A2 of the PoO.



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MMD Comments (cont.)			
2e	a map showing the surficial dimensions of the estimated pit dimensions within the Phase I Mining Area at the approximate end of Year 5 of mining;		Refer to Figure A2-2a in Appendix A2 of the PoO.
2f	North-south and east-west cross-sections of the estimated pit dimensions within the Phase I Mining Area at the approximate end of Year 5 of mining.		Refer to Figure A2-2b in Appendix A2 of the PoO.
2 <sup>1</sup>	A fundamental assumption in the PoO is that AmMg will mine the hill down to the valley floor. This may eventually be the case, but this is anticipated to take up to 30 years, according to the PoO. MMD requires a reclamation plan that takes a "snapshot-in-time approach" that is updated every 5 years. As such, MMD requires a reclamation plan that shows the approximate mine dimensions at the end of Year 5 of mining (as required in comment #1 above) and a plan for reclamation of the mine at the end of Year 5 of mining. Please provide a detailed reclamation plan for the anticipated configuration of the site at the end of Year 5 of mining.		The reclamation requirements for minimal impact mining operations in the MARP regulations speak in terms of providing general plans for reclamation, and nothing suggests that this level of detail is required. Nonetheless, AmMg voluntarily describes conditions and plans for reclamation at the ends of Years 5 and 20 in Sections 3.4 and 3.5 of the PoO. Drawings illustrating the reclamation plan at the end of Years 5 and 20 are provided as Figures A2-2c and A2-3c, respectively, included in Appendix A2 of the PoO.
3	The Amended PoO proposes hydroseeding as the primary revegetation technique. In MMD's experience, hydroseeding in an arid environment is ineffective except in steep locations where broadcast or drill seeding cannot be accomplished. Please note that salvage and replacement of topsoil followed by scarification, broadcast or drill seeding and mulching will be a condition of the permit, once approved.		Hydroseeding will not be used except in steep locations where broadcast or drill seeding cannot be safely accomplished. Seedbed preparation and seeding are discussed in Section 3.3.
4	AmMg states "the proposed verification drill holes will be used as blast holes during active mining." This is contradicted by the Blasting Plan submitted in Appendix A of the Amended Plan of Operations.  For example, the exploratory drill holes will be: up to 100 feet deep, placed on a 100' x 100' grid, using a 6" diameter bit.  The blasting plan calls for holes to be 12 to 50 feet deep, placed on a 9' x 9' grid, using a 3.5" or 4.5" diameter bit.  Therefore, the blasting plan renders the exploration drill holes impractical for future blasting. Please note that, MMD will require AmMg to properly plug and abandon all exploratory drill holes in accordance with 19.10.3.302.L NMAC, as a permit condition. Additionally, approvable plugging and abandoning should be addressed in the permit application.		Verification drill holes will not be used as blast holes. As noted in Sections 2.4.5, 2.14.1, and 3.1, 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.

1. MMD's letter included two comments numbered 2 and no comment numbered 6.



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<i>MMD Comments (cont.)</i>		
5	In the Amended PoO, AmMg issues contradictory statements about whether primary crushing will occur on-site or not. Please note that for purposes of determining financial assurance, on site primary crushing will not be included in the future MMD permit. However, if primary crushing on site is determined by AmMg to be necessary after issuance of the MMD permit, AmMg can submit a request to modify the MMD permit to include primary crushing on site.	Primary crushing will not occur on-site under current plans. References to primary crushing have been removed, except in new Section 2.4.6, which describes the mining process. AmMg appreciates MMD's willingness to consider a later modification. If needed, as indicated in Section 2.15, AmMg will request that MMD modify the permit to allow on-site crushing.
7 <sup>1</sup>	Where B016 and B013 cross drainages, AmMg proposes to use culverts to maintain existing drainage patterns. Section 404 Permitting with the Army Corp of Engineers or other permitting to place fill/culverts within drainages shall be incumbent on AmMg to obtain. Please note that, pursuant to §19.10.3.304.D(9) NMAC, these permits must be identified in the permit application and a schedule provided for obtaining the permit.	AmMg does not plan to use Road B013. As described in Section 2.8, low-water crossings (e.g., concrete slab fords) may be required in various areas such as along the existing unimproved BLM road and to cross the main dry arroyo on the new access road. Culverts may be used to cross narrow, deep gullies along the new access road.  Anticipated permits, including a Section 404 permit if one will be required by the Clean Water Act's evolving Waters of the United States (WOTUS) concept, and approvals are summarized in Table 2 (Section 1.7).
8	Pursuant to §19.10.12.1201.A, AmMg needs to provide a financial assurance cost estimate based on plugging and abandonment of exploration drill holes, and surface reclamation of the entire exploration project. Additionally, AmMg needs to provide a cost estimate for the first five years of mining disturbance to take place. Costs need to be itemized and broken down into direct and indirect costs.	AmMg has developed a preliminary financial assurance cost estimate using MMD's <i>Guidance for Estimating 3rd Party Reclamation (Financial Assurance) Costs for Minimal Impact Mining and Exploration Permit Applications</i> which was updated in September 2013. See Section 7 and Tables 12a and 12b.  AmMg will prepare final cost estimates required by BLM when the NEPA process is complete and the reclamation plan has been approved.

1. MMD's letter included two comments numbered 2 and no comment numbered 6.



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9	Section 3.3 of the PoO addresses salvageable soil. It is understood that the site provides for very little developed topsoil, however near surface materials can be salvaged and used as topdressing or cover materials where real topsoil does not exist. Areas where cover materials can be safely accessed should be identified in the plan. These materials need to be stockpiled in a given location and their volumes identified. The PoO does not provide enough detail concerning the salvage, storage, possible amendment, then reapplication of these materials.		The information requested has been compiled in Section 2.4.4 and Table 3.
10	Nothing was in the PoO concerning a seed mix, seeding methodology (other than hydroseeding), or possible amendments. Please provide seed mix to be used, and seeding rates.		Seedbed preparation and seeding methodology are discussed in Section 3.3. A proposed seed mix and seeding rates are provided in Table 11. Topdressing amendments are discussed in Section 2.4.4.
11	Pursuant to §19.10.3.304.D.(8), provide a plan for reclaiming the site to the reestablishment of a self-sustaining ecosystem, appropriate for the surrounding life zone. Provide MMD with information concerning current vegetation conditions and growth parameters. Provide in the plan an area to be used as a reference area, for meeting final reclamation standards. The reference area should be used to address the requirement to meet 90% cover of the reference, within 90% confidence.		As described in Section 3.3 and Figure 2, 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. 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 NEPA process (see Section 2.15.4). Revegetation success standards are provided in Section 3.
12	Pursuant to §19.10.3.304.D.(7)(d) and (e) describe how mining and reclamation will be conducted to control erosion. Please provide MMD with a description for storm water management.		Section 2.14.1 addresses storm water management and some BMPs for erosion control and sediment control.



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<i>NMED Comment (from MMD letter)</i>			
1	Please refer to NMED Comments dated August 18, 2017. Please pay particular attention to NMED Summary Comments on page 2 of that document. Pursuant to §19.10.3.304.J (6) NMAC, NMED is to provide a determination to AmMg, that the applicant has demonstrated compliance with all applicable air, water and other environmental requirements if carried out as described in the plan. NMED has indicated that it will provide the determination after review of the completed federal NEPA process.	NMED's Summary Comment states that "[p]ending final review of the NOI (Notice of Intent), NMED finds the proposed activities are likely to have a minimal environmental impact if conducted and reclaimed in accordance with the submitted MMD permit application, BLM PoO, and recommendations listed above." NMED indicates that they will provide the environmental determination after review of the NOI and the completed federal NEPA process. When the NOI review and NEPA process are complete, AmMg will respond to any comments that NMED may have.	
<i>BLM Comments (from MMD letter)</i>			
1	See BLM comments in letter dated August 31, 2018. Please provide MMD with changes to the PoO, which will address these comments.	AmMg responded to BLM's letter of August 31, 2018 by updating the PoO (September 21, 2018) and by further revising the PoO (April 9, 2019).	
2	As addressed in our earlier November 1, letter to AmMg, Pursuant to §19.10.3.304.G NMAC, MMD cannot issue the permit unless the BLM has approved or acknowledged the proposed operation. BLM has not yet formally acknowledged or approved the Plan of Operations. Based on BLM's August 31, 2018 letter this process is still underway.	AmMg acknowledges this comment and, as discussed above in response to MMD's first comment, has removed from the PoO statements to the effect that MMD has deemed AmMg's application to be technically complete or approvable at this juncture.	



**Plan of Operations  
Foothill Dolomite Mine  
Deming, New Mexico**



**Prepared for**

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Las Cruces, New Mexico**

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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 <sub>3</sub>	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
LOI	loss on ignition
MARP	New Mexico Mining Act Reclamation Program
mg/L	milligram(s) per liter
MgO	magnesium oxide
MMD	New Mexico Mining and Minerals Division



## Acronyms and Abbreviations (Continued)

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
SPLP	Synthetic Precipitation Leaching Procedure

## **Acronyms and Abbreviations (Continued)**

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. From State Road 11 (NM 11 or Columbus Road), the Project Area may be accessed by traveling 4 miles directly east on County Road B016 (identified as Camino Doce west of McCan Road and Mahoney Park Road east of McCan Road) to an existing unimproved BLM road and then approximately 2 miles east-southeast on the BLM road. From that point, a new, approximately 1,334-foot-long access road will be constructed by splitting off from the existing unimproved

BLM road and winding south into the mining site. No access road improvements to County Road B016 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 B016, 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 small 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).

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 near-vertical 20-foot-high interim walls and 5-foot-wide benches 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 1:1 (vertical:horizontal), which is consistent with the topography of the Florida Mountains. As 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
<i>MAG 21 Lode Claim (NMMC197579)</i>				
Southeast	27	25 South	8 West	NMPM
Northeast	34	25 South	8 West	NMPM
<i>MAG 22 Lode Claim (NMMC197580)</i>				
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](mailto: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
<i>Federal</i>	
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
<i>State</i>	
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
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. From State Road 11 (NM 11 or Columbus Road), the Project Area may be accessed by traveling 4 miles directly east on County Road B016 (also called Camino Doce Road west of McCan Road and Mahoney Park Road east of McCan Road) to an existing unimproved BLM road, and then bearing right and going approximately 2 miles east-southeast on the existing unimproved BLM road (Figure 1). From that point, a new approximately 1,334-foot-long access road will be constructed by splitting off the existing unimproved BLM road and winding south to the mining site. The claim area, mining site, proposed laydown yard, and access route are shown in Figure 2.

## **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 B016 will be required for the approximately 4 miles from NM 11 to its intersection with the existing unimproved BLM road because this road is wide enough (over 20 feet and paved in the westernmost portion) to accommodate passing haul

trucks. The approximately 2 miles of the existing unimproved BLM road from County Road B016 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), and all associated cut and fill. 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). Gravel may be placed on the road to improve road stability, minimize maintenance, and control dust. Roadwork will likely be accomplished with a bulldozer, a road grader, and haul trucks.

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). Gravel may be placed on the roadbed to improve road stability, minimize maintenance, and control dust. Roadwork will likely be accomplished with a bulldozer, a road grader, and an excavator.

The new road from the BLM road to the mine site should 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. 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 <sup>3</sup> )	Available Topdressing (yd <sup>3</sup> )
	acres	ft <sup>2</sup>			
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<sup>2</sup> = Square feet

ft<sup>3</sup> = Cubic feet

yd<sup>3</sup> = 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 6 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 3). 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 3). 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.

#### **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 3). 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 near-vertical 20-foot-high walls with 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 1:1, 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. At the end of mining operations (Year 20), the interim walls in the center of the mine will be gone and 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 as described above.

All blasting will be conducted under an approved blasting plan (Appendix B). Based on the currently proposed production schedule, blasting would occur approximately once per month and a typical blast would use approximately 30,000 pounds of explosives. The blasting plan in Appendix B may be modified as site-specific conditions and requirements are determined. Once the dolomite is blasted, it will be loaded into road haul trucks for transportation off-site. It is anticipated that the blasting operation will achieve the required size of material to directly load it into the haul vehicles. If AmMg determines that an on-site primary crusher is required, it will submit a request to modify the MMD permit. 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 46 round trips per day. Assuming that the facility operates 5 days per week and 52 weeks per year, the average number of round trips per year would be approximately 12,000. 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.

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 mine development and 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 construction. 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:

- Up to 10 haul trucks
- One 3,000-gallon water truck
- Two all-terrain support vehicles
- Excavator
- Grader
- Backhoe
- 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.

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.

**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

## 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 30,000 pounds of explosives. The blasting plan in Appendix B may be modified as site-specific conditions and requirements are determined. No crushing, screens, or conveyers are currently planned for use. 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 confirmed.

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 NM 11, travel 4 miles east on County Road B016 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 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 or otherwise resurfacing the existing road surface beginning at the intersection of County Road B016 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.

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, in order to be consistent with the BLM roads manual. 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 a dust control palliative, such as calcium chloride, to control dust on dirt roads. In addition, AmMg may need to blade and emplace gravel surfacing on the road to improve road stability, minimize maintenance, and control dust. The gravel would 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 appropriate.

AmMg will monitor any constructed fences on a regular basis and repairs will be made as needed. 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 Mining 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 readily available, 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**

The estimated daily water use will be 5,000 gallons for dust suppression, site reclamation activities, and potentially for resource verification and mining activities. Negotiations for purchase of commercial water by AmMg from the City of Deming are ongoing, and no on-site water supply wells will be required. Water will be brought to the site using a 5,000-gallon 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 Stormwater 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. 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. NMED personnel have verbally indicated that a groundwater discharge permit will likely not be required for this operation (Lewellin and Longmire, 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. 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**

The following steps will be taken to protect air quality.

- Emissions of fugitive dust from disturbed surfaces will be minimized to the extent possible by the application of water from a water truck as a method of dust control. AmMg will use a dust control palliative, such as calcium chloride, to control dust on dirt roads.
- In addition, gravel may be placed on the roadbeds to improve road stability, minimize maintenance, and control dust.
- Fugitive dust should remain localized; however, if air quality concerns do arise, then air samplers may be placed in appropriate locations outside of mining activities to determine effects to ambient air quality in the region.
- If AmMg determines that on-site primary crushing is needed to achieve proper sizing of blasted material for handling and hauling, AmMg will submit a request to modify the MMD 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 volcanoclastic 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  $\text{CaMg}(\text{CO}_3)_2$ . 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 6, 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 6). 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 7.

Geologic cross sections A-A' and B-B' (Figure 8) 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 9.

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 B016 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.

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 10). 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 11), 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
<i>Trees</i>	
redberry juniper	<i>Juniperus arizonica</i>
singleneedle pinyon	<i>Pinus monophylla</i>
honey mesquite	<i>Prosopis glandulosa</i>
<i>Shrubs and Sub-shrubs</i>	
saltbush	<i>Atriplex</i> sp.
snakeweed	<i>Gutierrezia sarothrae</i>
yellow trumpetbush	<i>Tecoma stans</i>
<i>Forbs</i>	
Cochise scaly cloakfern	<i>Astrolepis cochisensis</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>
<i>Cacti, Agave, and Succulents</i>	
Palmer's century plant	<i>Agave palmeri</i>
cholla	<i>Cylindropuntia</i> sp.
sotol	<i>Dasylirion wheeleri</i>
candy barrelcactus	<i>Ferocactus wislizeni</i>
ocotillo	<i>Fouquieria splendens</i>
Graham's nipple cactus	<i>Mammillaria grahamii</i>
prickly pear cactus	<i>Opuntia</i> sp.
soaptree yucca	<i>Yucca elata</i>
<i>Grasses</i>	
threeawn	<i>Aristida</i> sp.
matted grama	<i>Bouteloua simplex</i>

#### 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
- 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 B016 and the BLM road is illustrated by Figure 12.

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 13.

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 and contrast rating forms for the following locations:

- Highway 11 and Camino Doce (north along Highway 11 and east along Camino Doce)

- McCan Road and Mahoney Park Road (north along McCan Road and East along Mahoney Park Road)
- Mahoney Park Road and existing unimproved BLM road (east along BLM road and west along Mahoney Park Road)
- BLM road and Mine Site Access Road (west along BLM road and southeast along Mine Site Access Road)

The contrast rating forms were completed according to BLM's Visual Contrast Rating Manual 8431 (BLM, 1986). As a result of this 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 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.

Potential visual impacts would be caused by construction and operation of the proposed Foothill Dolomite Mine project. In general, the perimeter mine wall, the laydown yard, and the topdressing and waste rock stockpiles would be visible, but from the valley and perhaps from the end of County Road B016, these features would likely be indistinct to the naked eye because of the long viewing distance (2 miles), topography, atmospheric haze, heat simmer, and dust. Also, the project area is not on the skyline except from very close distances. Finally, reclamation should be able to blend the disturbed areas with the surrounding landscape. Based on this analysis, the Foothill Dolomite Mine Project should fall within the BLM’s management objectives for Class III visual resources.

#### ***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, 2007). 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 authorized officer, 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 authorized officer.
- In the unlikely event that previously undiscovered paleontological resources are discovered in the performance of any surface disturbing activities, the item(s) or condition(s) will be left intact and immediately brought to the attention of the authorized officer of the BLM. If significant paleontological resources are found, avoidance, recordation, and data recovery will be required.
- 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 any applicable cultural resources laws applicable to the site including, at a minimum, the authorized officer 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 authorized officer. 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 7 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 7. Complete List of Wildlife Species Observed in the Project Area**

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

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.

#### ***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.

To avoid potential impacts to and unintentional takes of migratory bird species, a survey for nesting birds will be completed to ensure that there are none on the mine site. In the event nesting migratory birds are discovered on the Project Site, potential impacts to and unintentional takes of migratory bird species can be mitigated by limiting initial ground-disturbing activities to outside of the breeding season (March 1 through August 31). 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**

- 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.
- 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 8).

**Table 8. 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 9.

**Table 9. 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 10. 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 10. 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. 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 would occur approximately once per month and a typical blast would use approximately 30,000 pounds of explosives. The blasting plan in Appendix B may be modified as site-specific conditions and requirements are determined. No crushing, screens, or conveyers are currently planned for use. 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 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 shall 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. 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.

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. 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, 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 13.

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 1:1, 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 11.

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 11. 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.

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.

**Table 11. Proposed Seed List and Seeding Rates for Reclamation**

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

<sup>a</sup> All species are native perennials.

<sup>b</sup> Rate is in pounds of pure live seed (PLS) per acre; substitutions may change seeding rates.

<sup>c</sup> Pollinator plant.

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 near-vertical walls 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 1:1, 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 1:1 or 1:2 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 1:1 wall along the north and northwest perimeter of the mine will not be recontoured. At closure, stable 1:1 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 1:1 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 1:1. 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 1:1 wall around the perimeter of the mine will not be recontoured. At closure, stable 1:1 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 shall be limited to the extent practicable and shall not cause downstream erosion or flooding or cause an exceedance of applicable water quality standards. AmMg will use water from the City of Deming for dust control and site reclamation activities, and potentially for resource verification activities. 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 run-on 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)]**

When 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 11).

#### **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 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, measures will be taken to control the spill, and spilled materials will be cleaned up in a timely manner. 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 than 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 6), 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<sub>2</sub>) compared to an average of 1.17 percent in the other 89 samples.



### **6.2.2 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 12; 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). The SPLP results are compared to the New Mexico groundwater standards (NMAC, 2012). Because there is a 20:1 ratio of extraction fluid to sample solid, the results would be divided by 20 for comparison to the groundwater standards. Based on this analysis, there is no indication that the sample from the Foothill site contains deleterious or acid-generating materials. NMED has verbally concurred with this interpretation (Lewellin and Longmire, 2019).

### **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 [ $\text{CaCO}_3$ ] 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 12. Synthetic Precipitation Leaching Procedure Results**

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

Source: ALS, 2017

**Bold** indicates that value exceeds the standard.

<sup>a</sup> Irrigation use (20.6.2.3103.C. NMAC)

<sup>b</sup> Human health standard (20.6.2.3103.A. NMAC)

<sup>c</sup> Secondary standard (20.6.2.3103.B. NMAC)

mg/L = Milligrams per liter

< = Not detected at indicated method reporting limit

### 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), iron staining, or fractures filled with iron oxides. 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.

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 13a and 13b). 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 13a), 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 13b), AmMg escalated the costs over a 26-year period.

**Table 13a. 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 13b. 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. As noted above, AmMg will submit a final financial assurance cost estimate to BLM and MMD once the NEPA process is complete and the reclamation plan presented herein has been approved by both BLM and MMD.

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## Figures

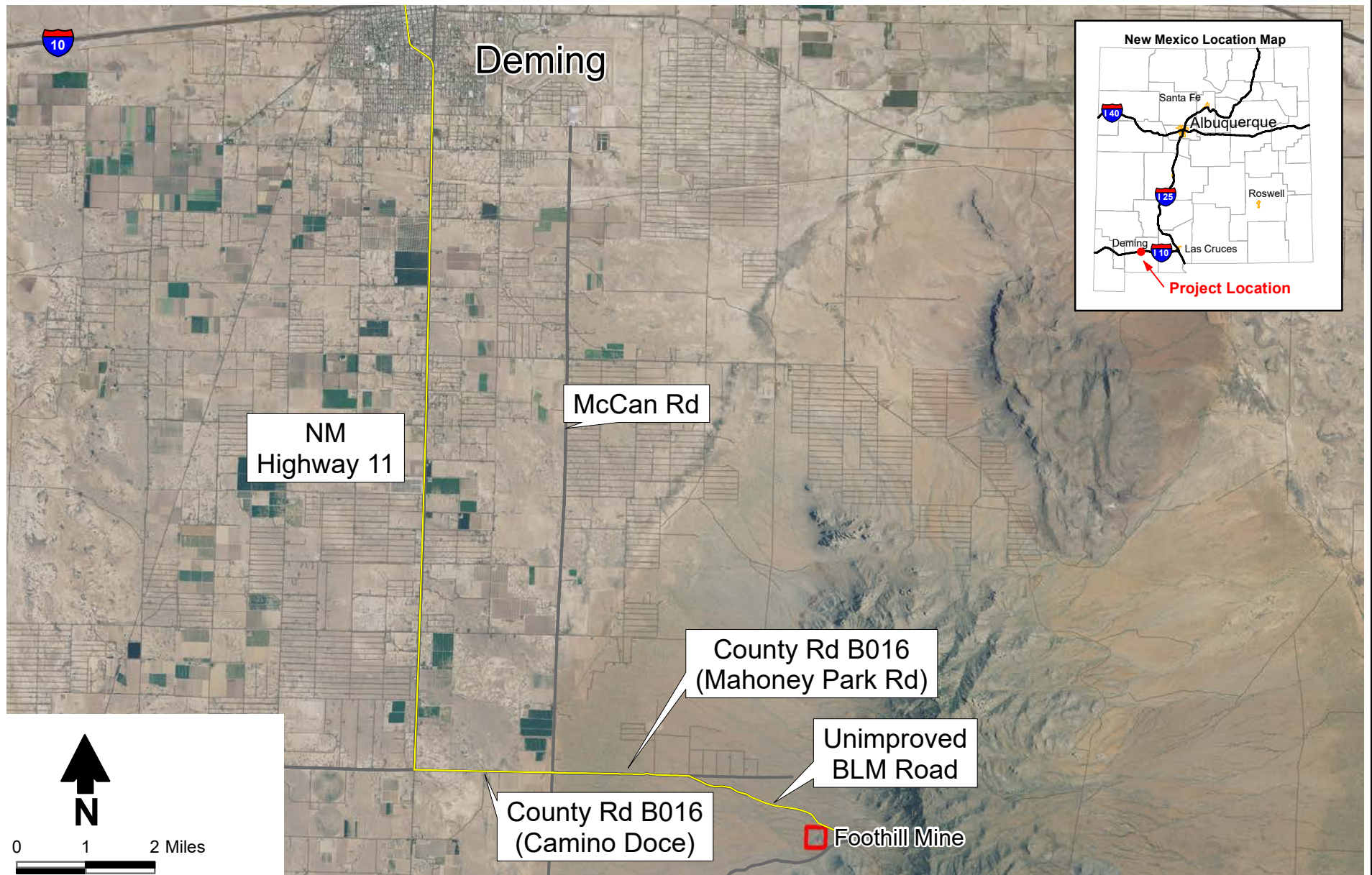


Image source: ESRI et al.

**Explanation**

Project location

Proposed route

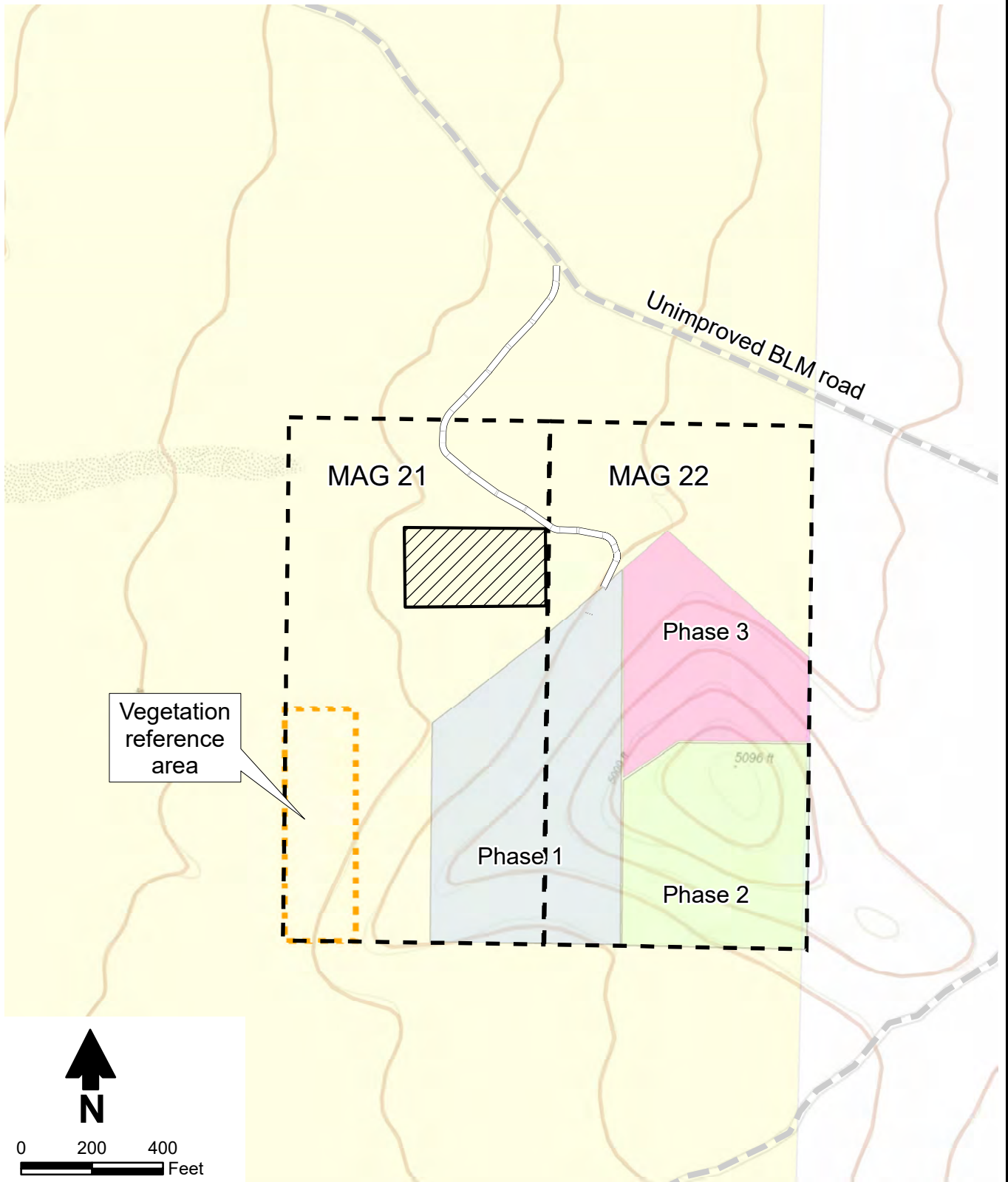
Road



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3/20/2019 JN DB19.1011

**AMERICAN MAGNESIUM  
Project Location**





Source: USGS 7.5 min, South Peak, NM 2017

#### Explanation

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



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04/20/2007 JN LT04.0008

**AMERICAN MAGNESIUM  
Foothill Mine Site**

Figure 2

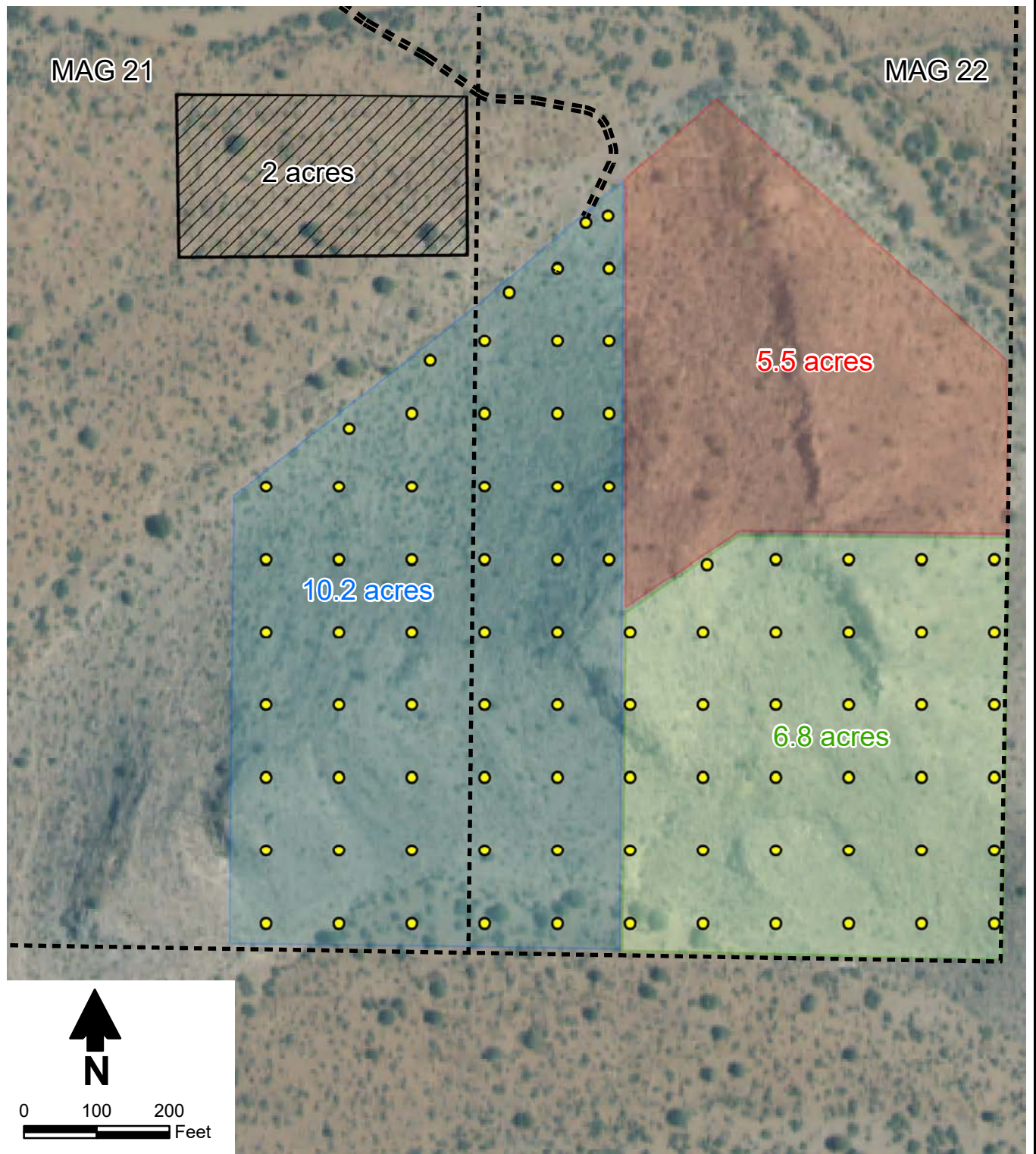


Image Source: ESRI et. al.

#### Explanation

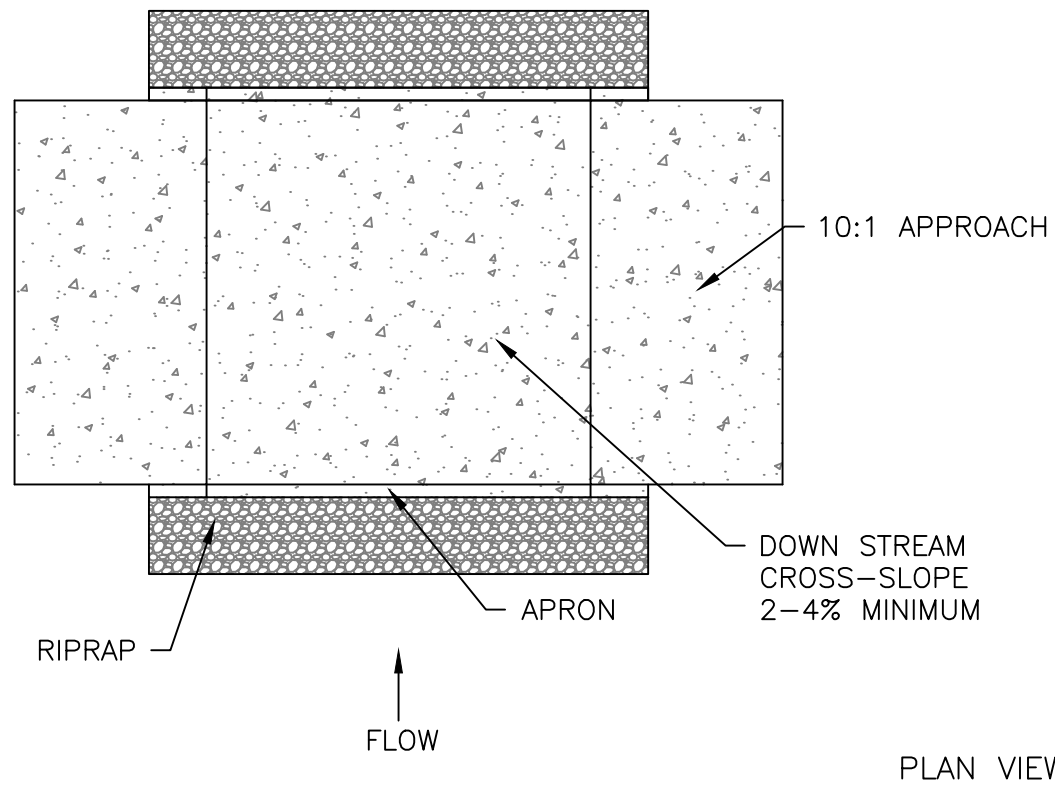
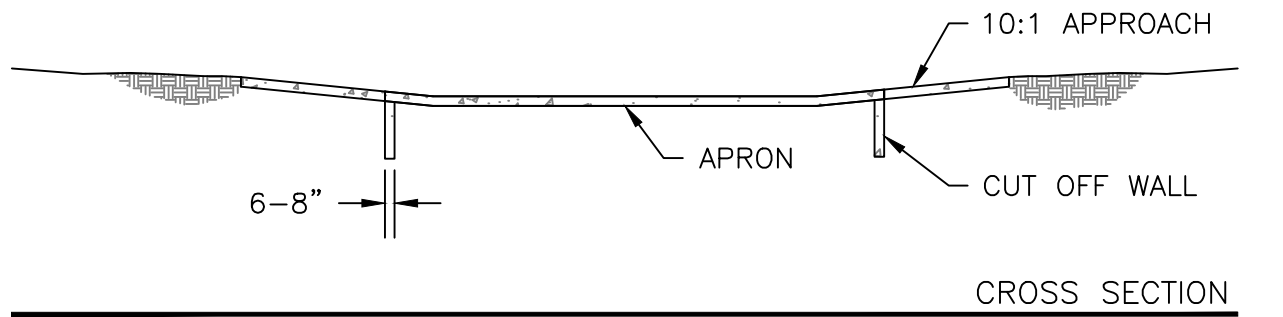
- Claim area(s) boundary
- Proposed borehole drilling location
- ▨ Proposed laydown yard
- === Proposed access road
- Phase 1 mining area
- Phase 2 mining area
- Phase 3 mining area

### AMERICAN MAGNESIUM Proposed Mining Phases and Drilling Locations



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Figure 3





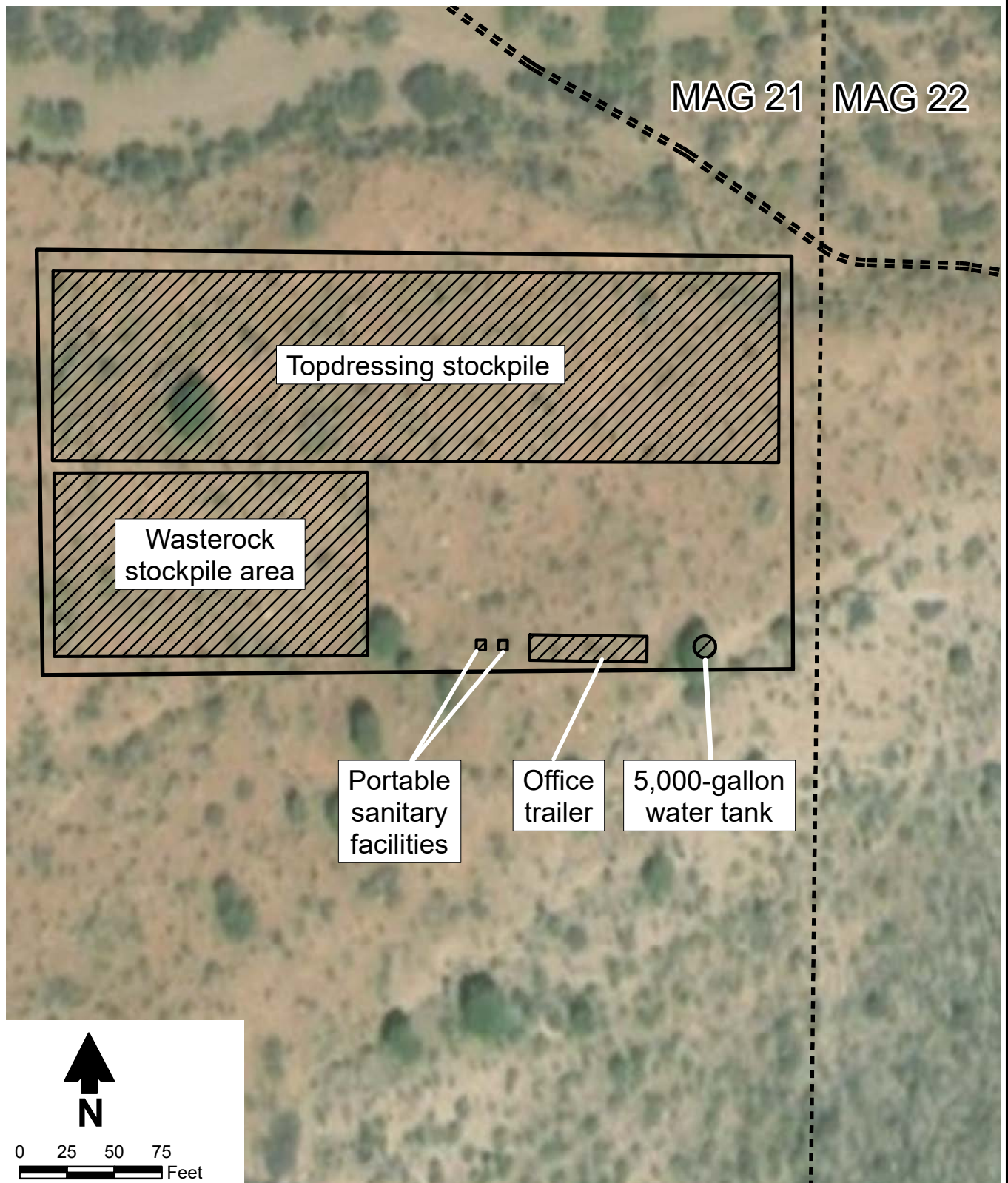






Image Source: ESRI et. al.

#### Explanation

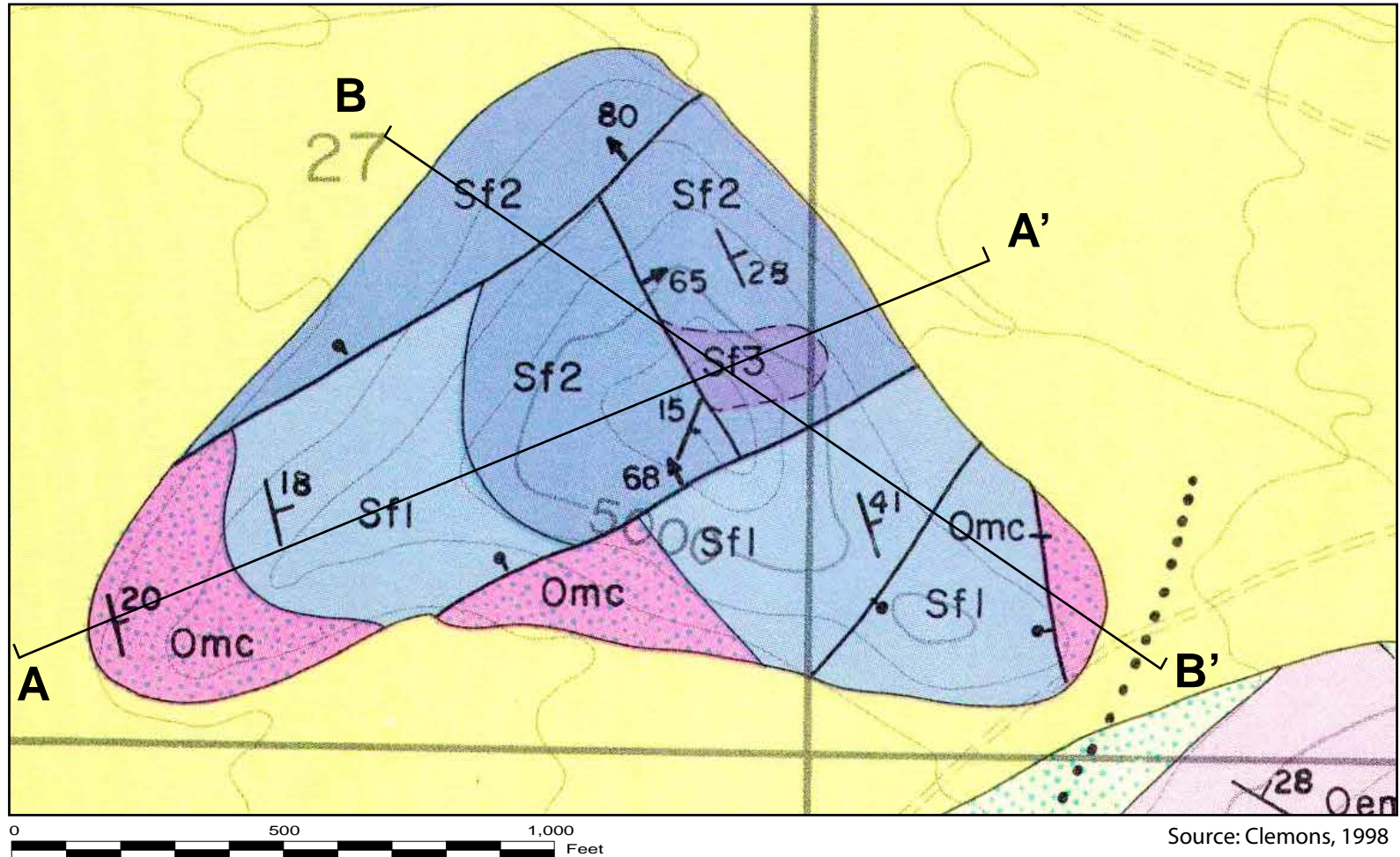
- |                                                                                                           |                                                                                                            |
|-----------------------------------------------------------------------------------------------------------|----------------------------------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



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04/20/2007 JN LT04.0008

AMERICAN MAGNESIUM  
**Proposed Laydown Yard**

Figure 5



### 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







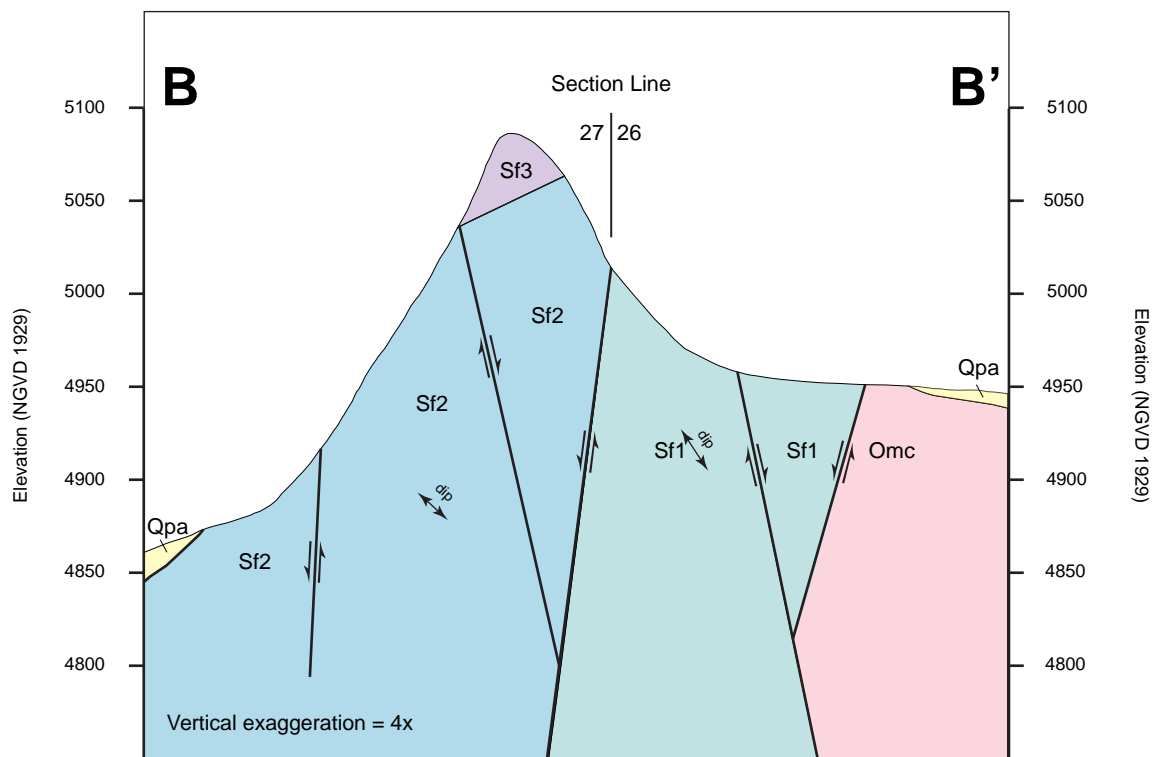
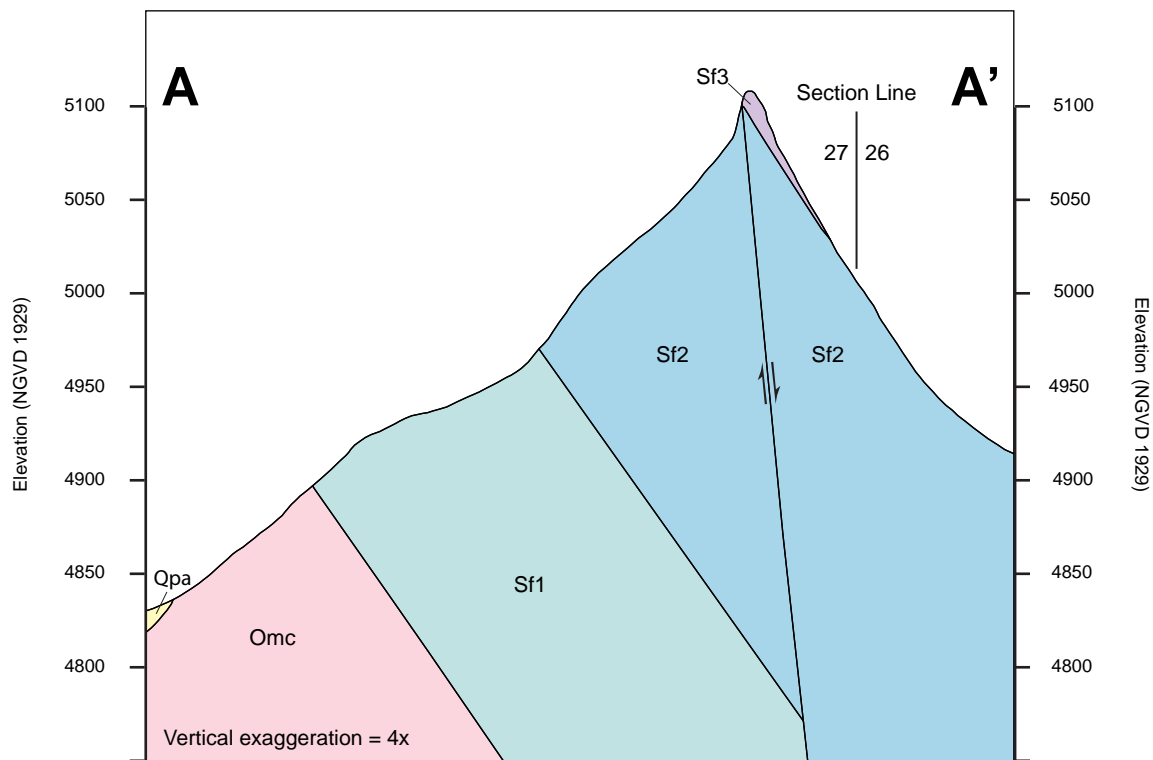
Figure 7



*Daniel B. Stephens & Associates, Inc.*

3/18/19

AMERICAN MAGNESIUM  
**South Side of Foothill Mine Area**



### Explanation

Quaternary

**Qpa** Alluvium

Fusselman Dolomite

**Sf3** Middle dark member

**Sf2** Lower light member

**Sf1** Lower dark member

Montoya Formation

**Omc** Cutter Member



**Daniel B. Stephens & Associates, Inc.**  
03-18-19 JN DB19.1011

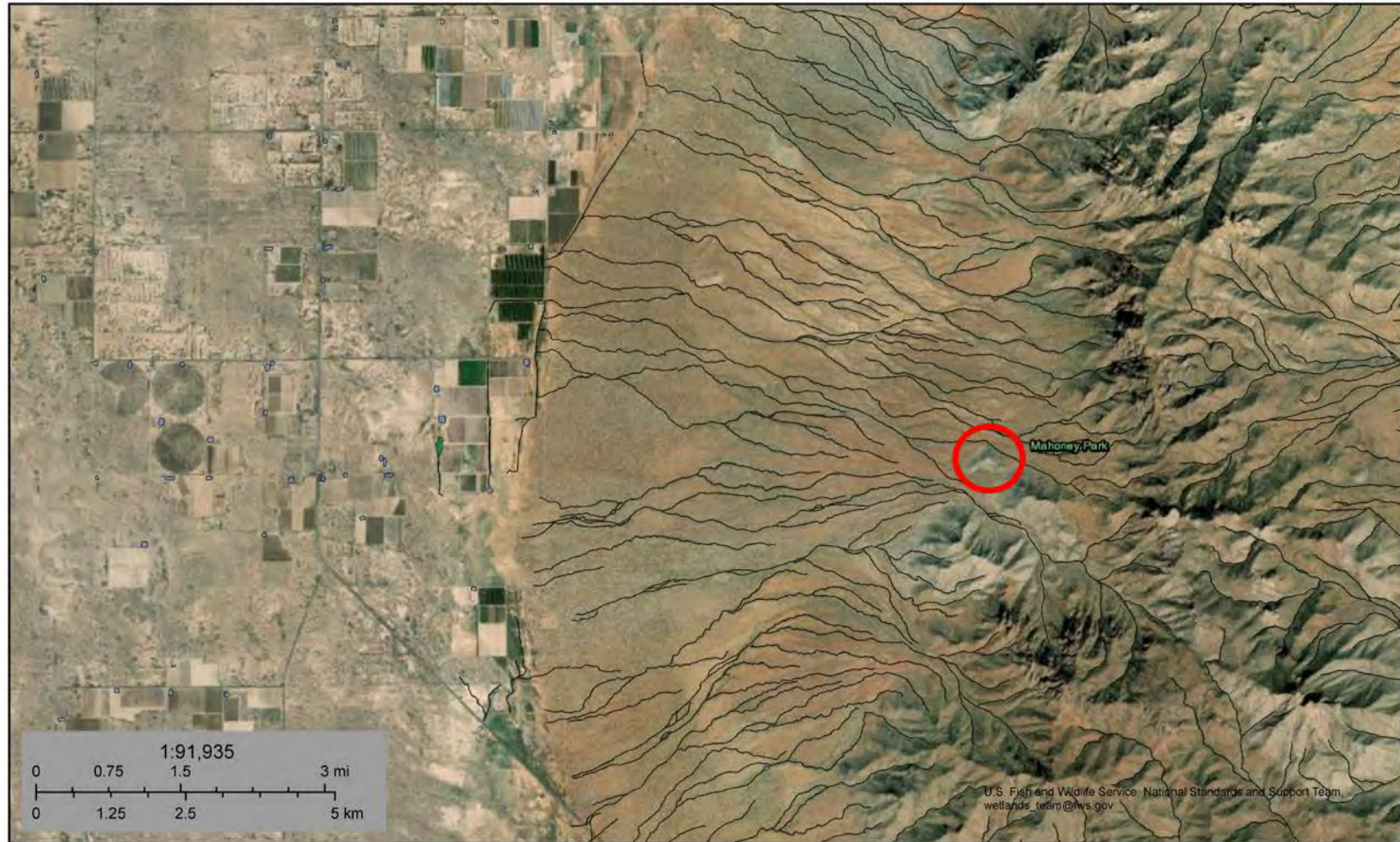
**AMERICAN MAGNESIUM  
Geologic Cross Sections**

Figure 8









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.

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

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



*Daniel B. Stephens & Associates, Inc.*

3/18/19

**AMERICAN MAGNESIUM**  
**Extent of Ephemeral Washes**









Foothill Mine  
Site

AMERICAN MAGNESIUM  
**View East of Foothill Mine Area from  
County Road B016 and BLM Road**





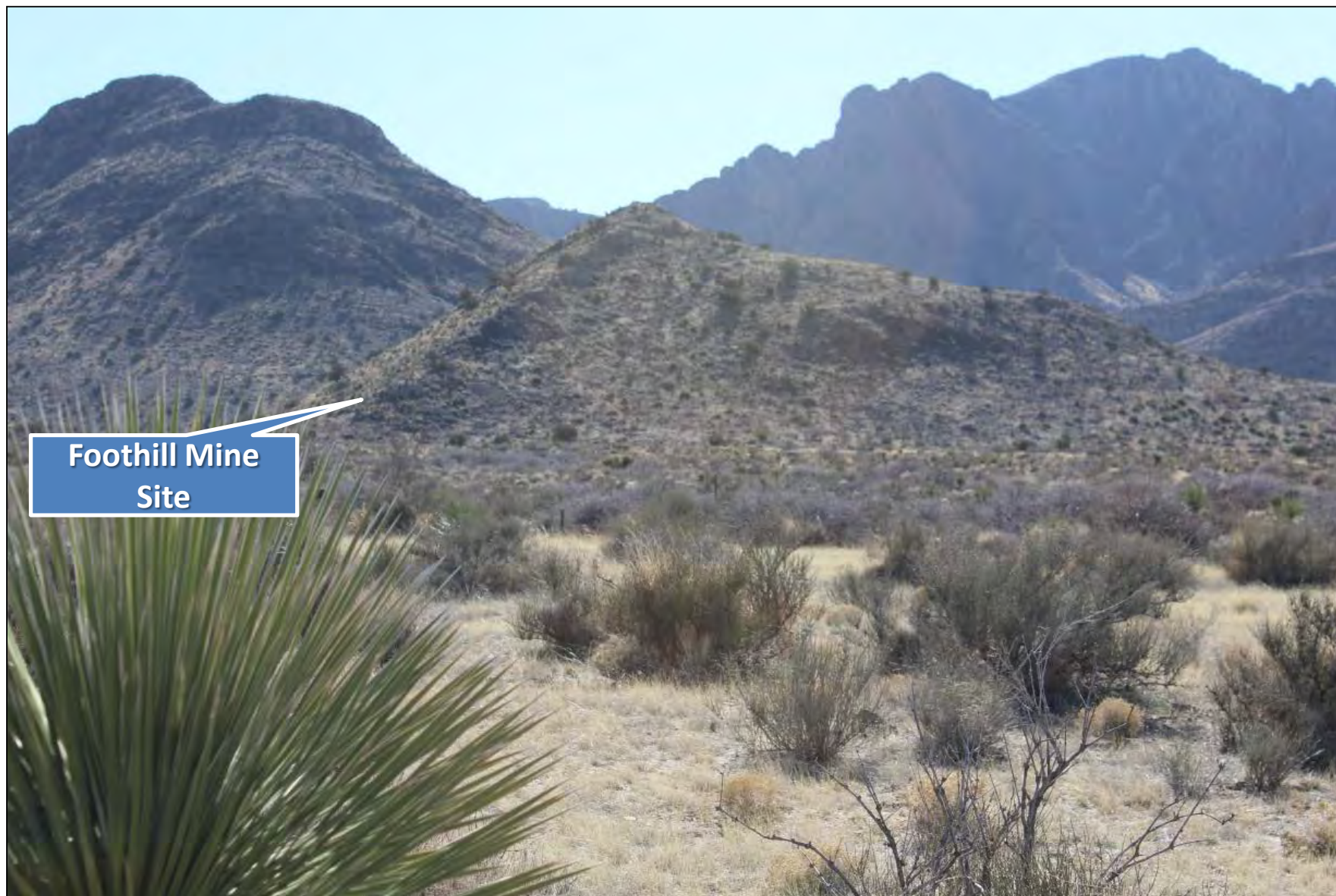


Figure 13



*Daniel B. Stephens & Associates, Inc.*

3/18/19

AMERICAN MAGNESIUM  
**View South of Foothill Mine Area from BLM Road**

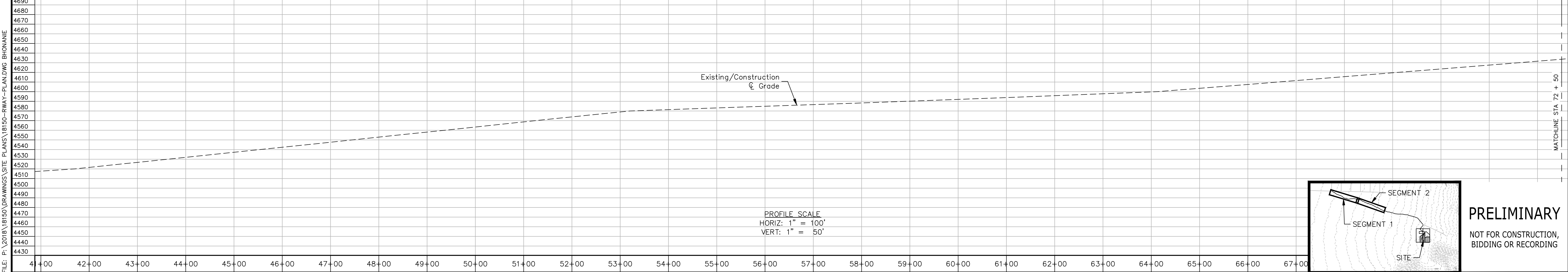
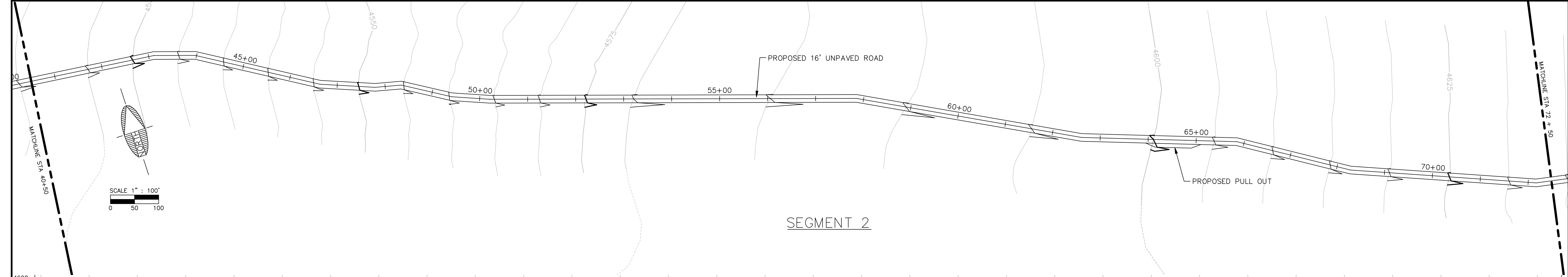
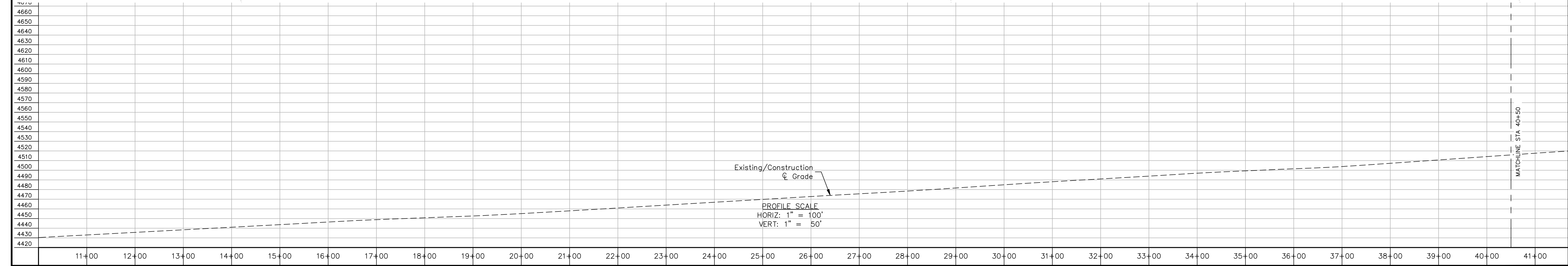
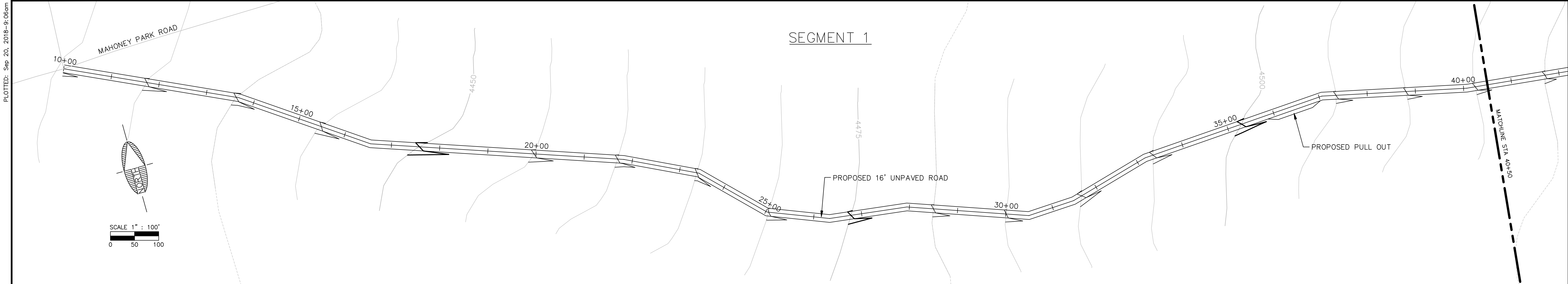
**Appendix A**

**Preliminary  
Design Drawings**

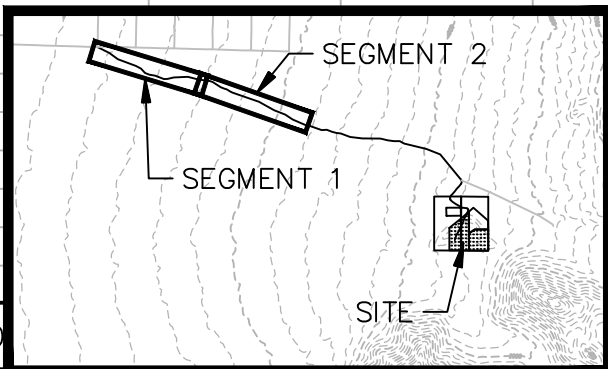
## **Appendix A1**

### **Roadway Improvements**

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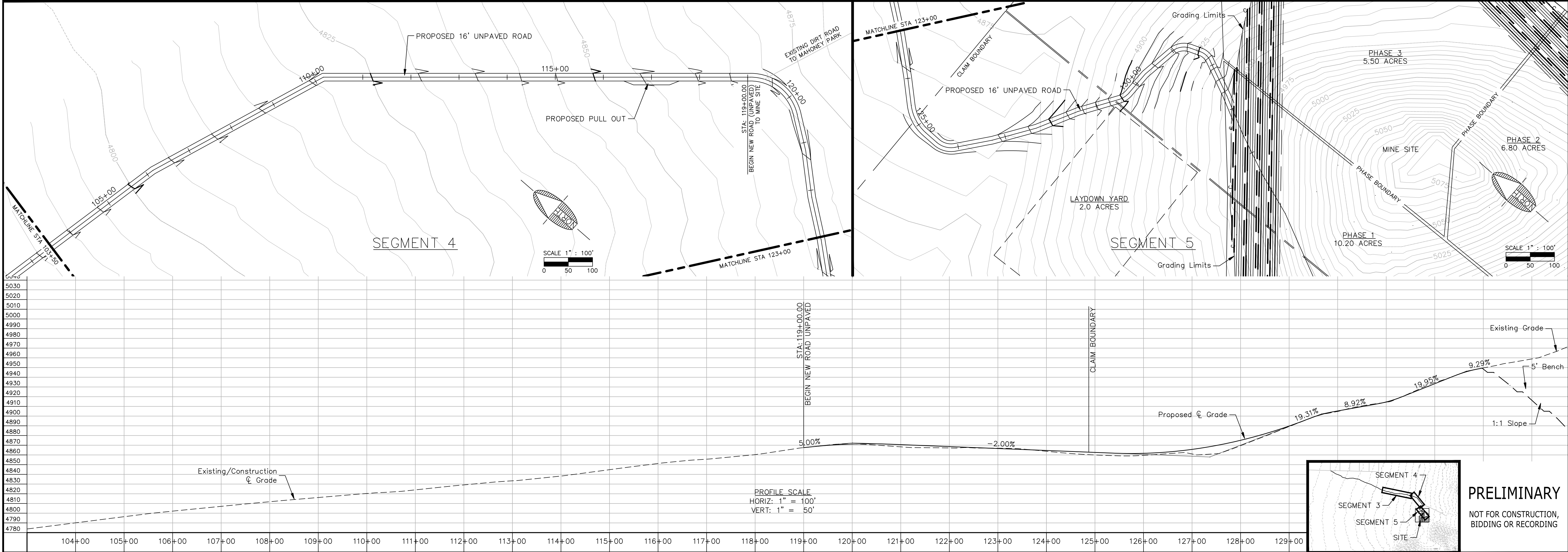
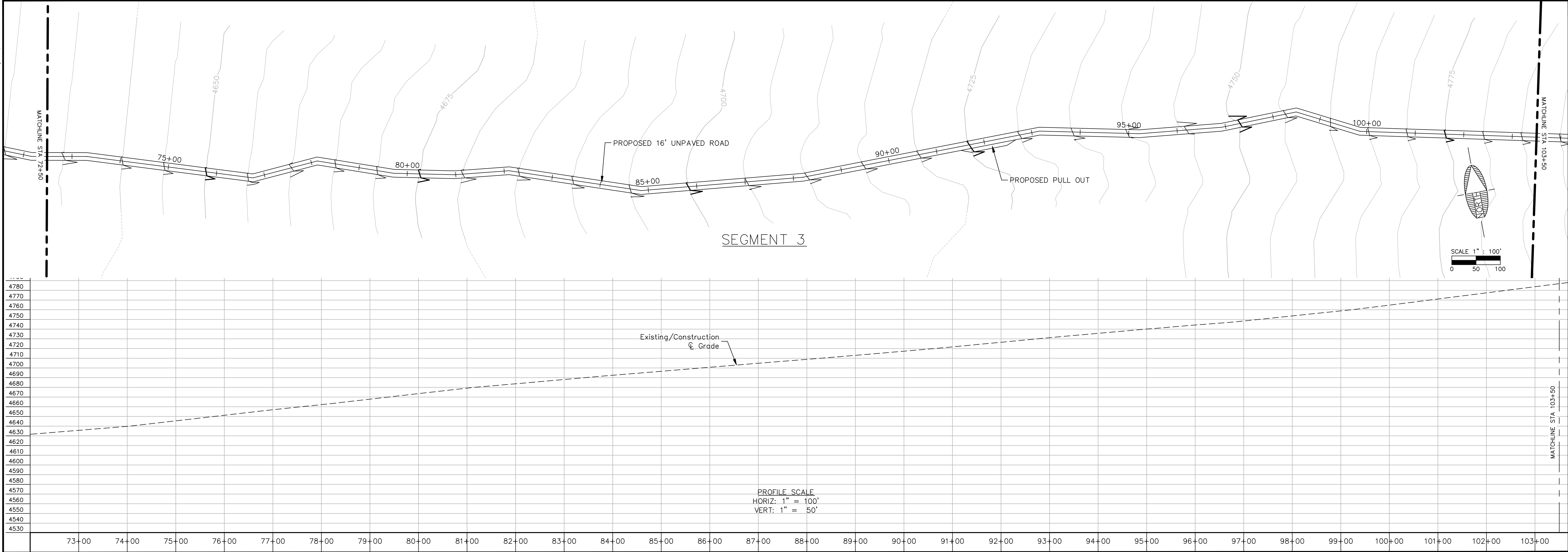
PRELIMINARY  
 NOT FOR CONSTRUCTION,  
 BIDDING OR RECORDING

JOB NO: 18150 DATE: SEP 18 SCALE: AS SHOWN DRAWN: BH DESIGN: BH CHECKED: GEC		110 W. Dole Avenue Flagstaff, AZ 86001 928.773.0354 928.774.8934 fax www.swioz.com	
AMERICAN MAGNESIUM DOLOMITE MINING LUNA COUNTY NEW MEXICO		ROADWAY IMPROVEMENT PLAN	
REVISIONS NO. DESCRIPTION BY DATE		DRAWING NO. IP01	
SHT NO. 1 OF 2		Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stakes, Inc. Dial 8-1-1 or 1-800-541-1111 (722-5348)	



PLOTTED: Sep 20, 2018-9:34am

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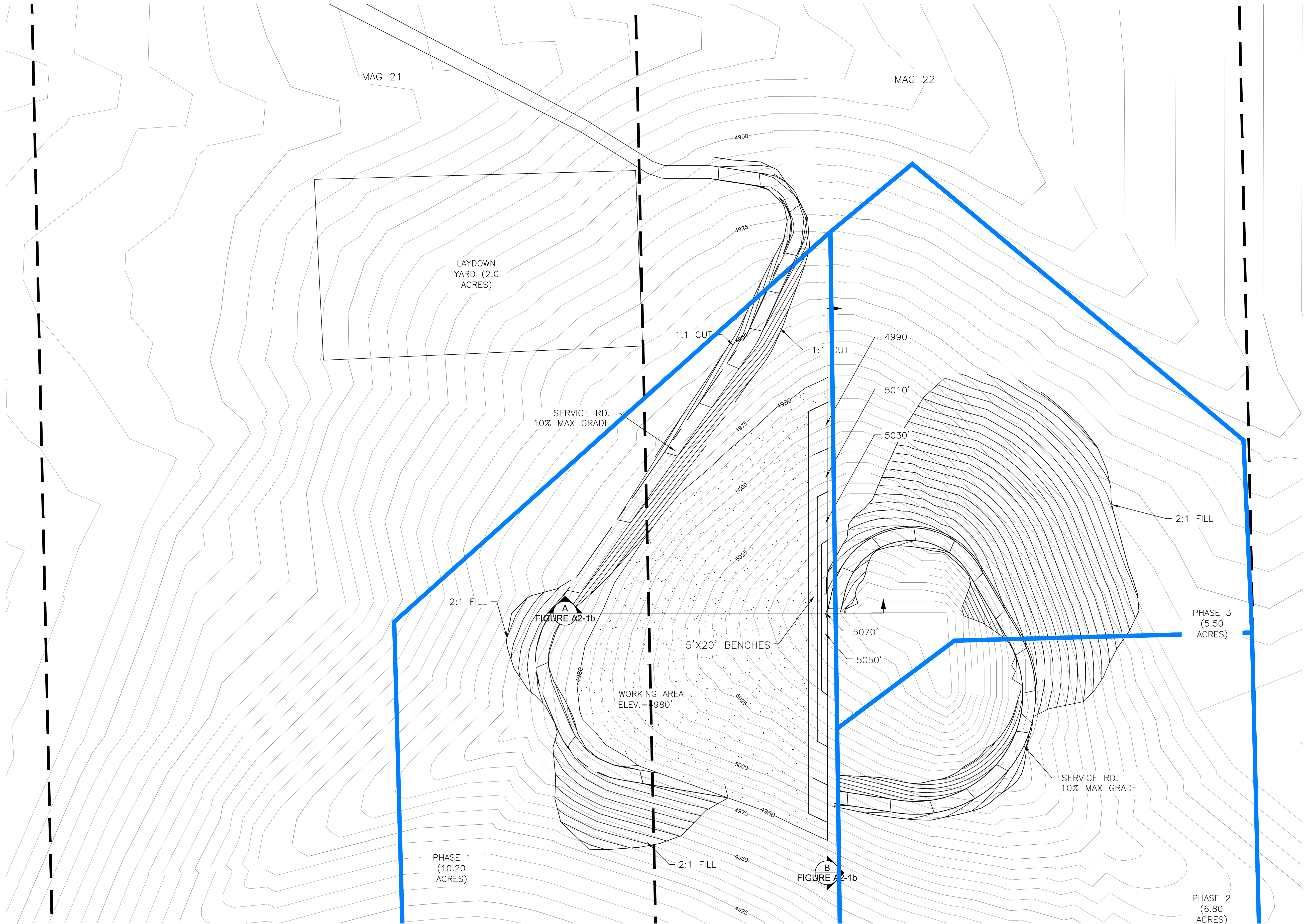
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110 W. Dole Avenue Flagstaff, AZ 86001 928.773.0354 928.774.8934 fax www.swicz.com		AMERICAN MAGNESIUM DOLOMITE MINING		LUNA COUNTY NEW MEXICO		ROADWAY IMPROVEMENT PLAN					
REVISIONS		NO.		DESCRIPTION		DATE		BY			
Call at least two full working days before you begin excavation.		ARIZONA 811 Arizona Blue Stakes, Inc.		Dial 8-1-1 or 1-800-5WAKE-11 (732-5348)							
DRAWING NO. IP02		SHT NO. 2		OF 2							

## **Appendix A2**

### **Mine Plans and Sections Years 1, 5, and 20**



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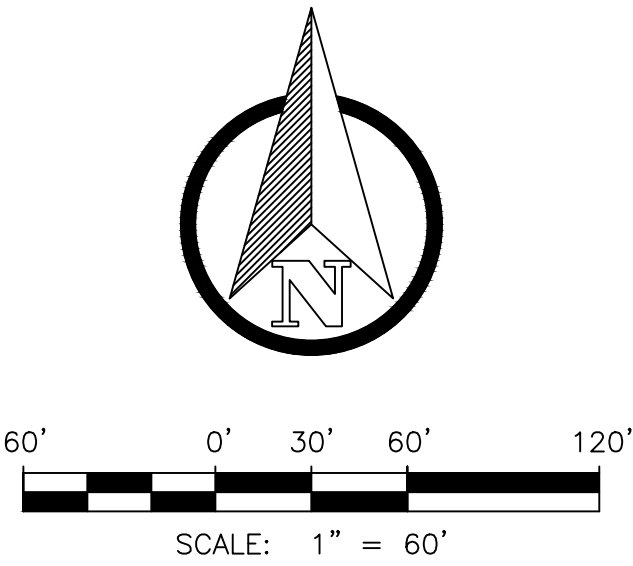
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1. THE DRAWINGS ARE PRELIMINARY AND SUBJECT TO CHANGE BASED ON RESOURCE VERIFICATION DRILLING.
2. THE TOPOGRAPHY IS BASED ON EXTRAPOLATION OF 40-FOOT CONTOUR INTERVAL FROM THE SOUTH PEAK, NM 7.5-MINUTE TOPOGRAPHIC MAP (USGS, 1996). A TOPOGRAPHIC SURVEY 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)

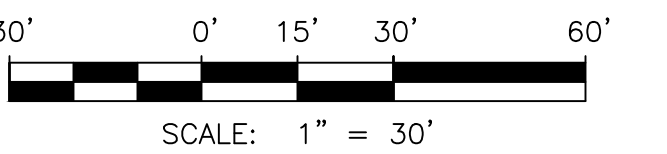
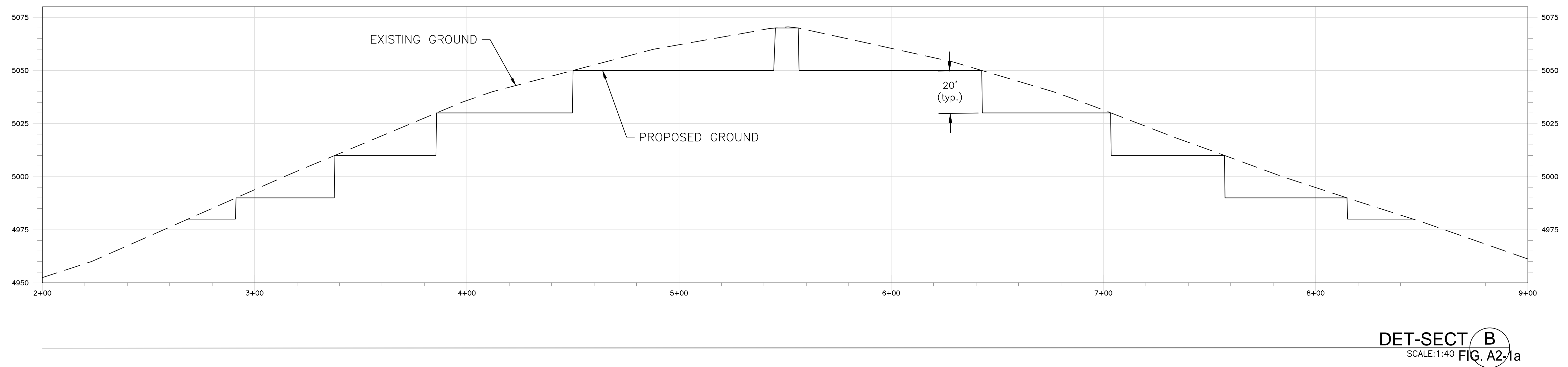
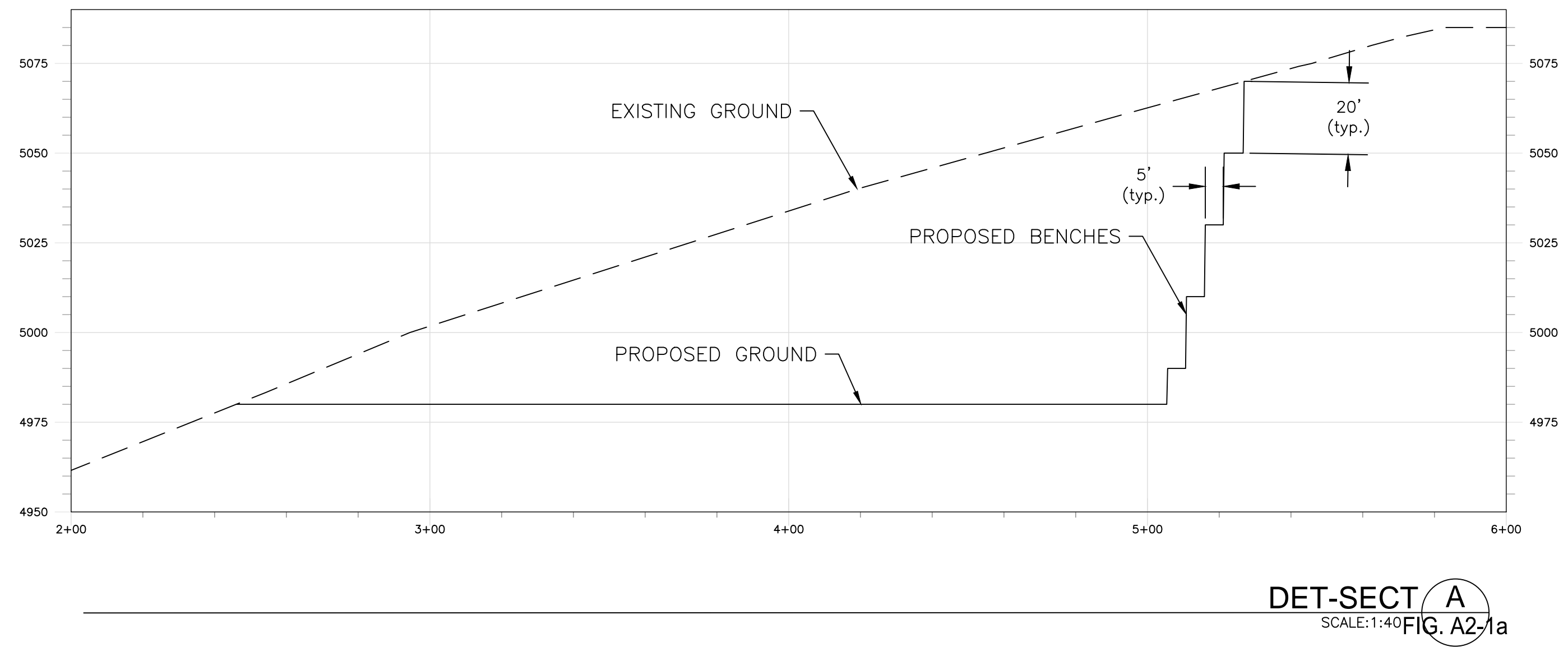
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2. CLAIM BOUNDARY
3. EXISTING TOPO
4. DESIGN TOPO



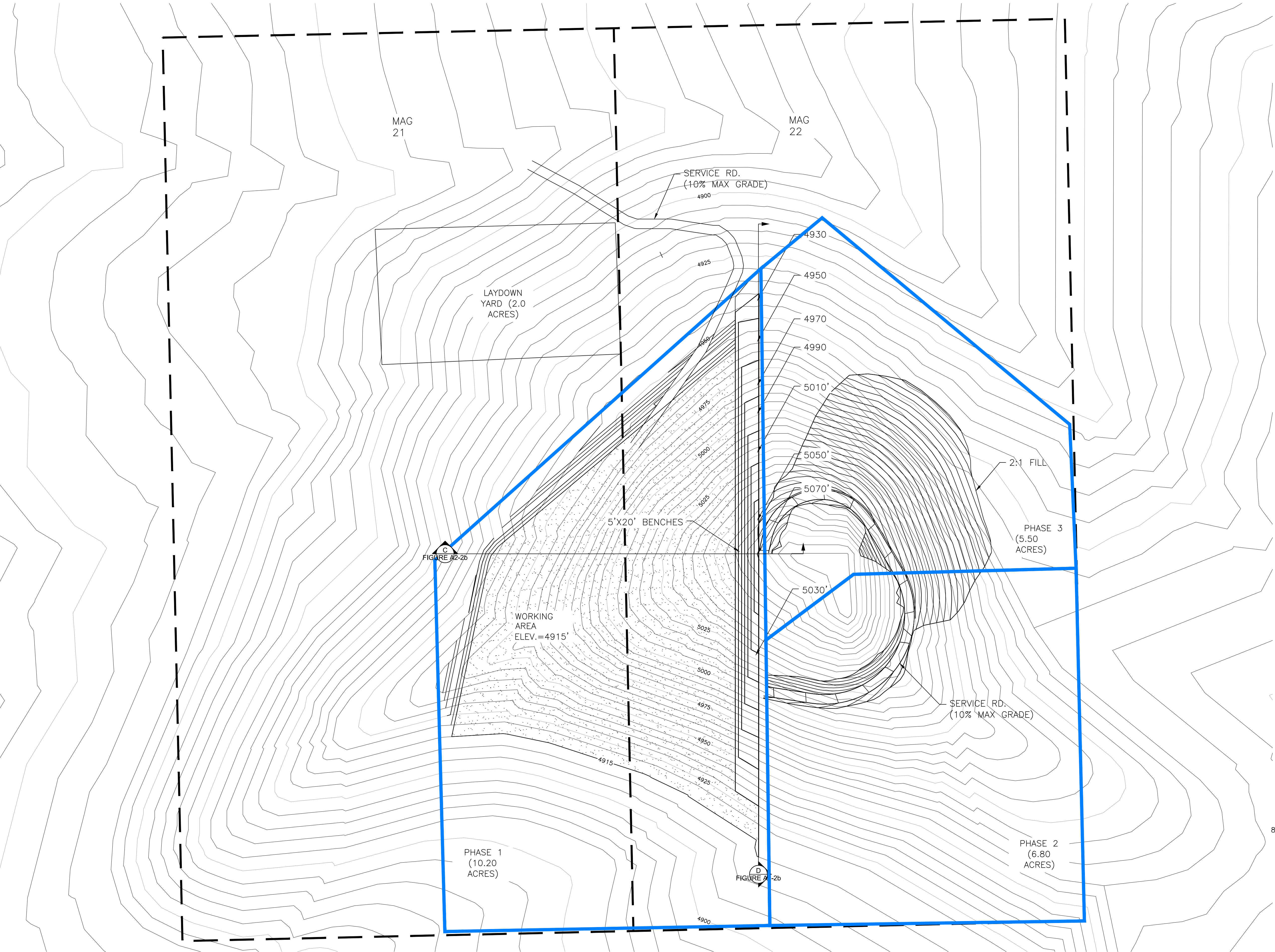


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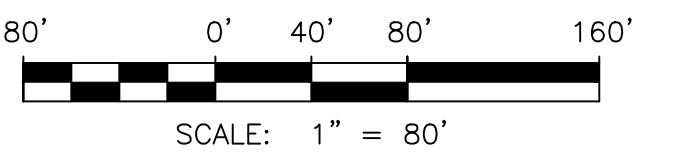
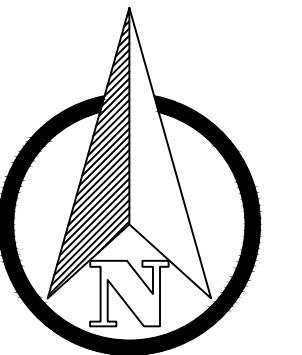


**GENERAL NOTES:**

1. THE DRAWINGS ARE PRELIMINARY AND SUBJECT TO CHANGE BASED ON RESOURCE VERIFICATION DRILLING.
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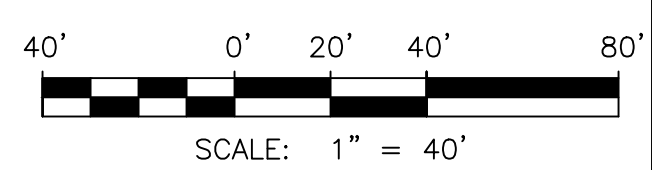
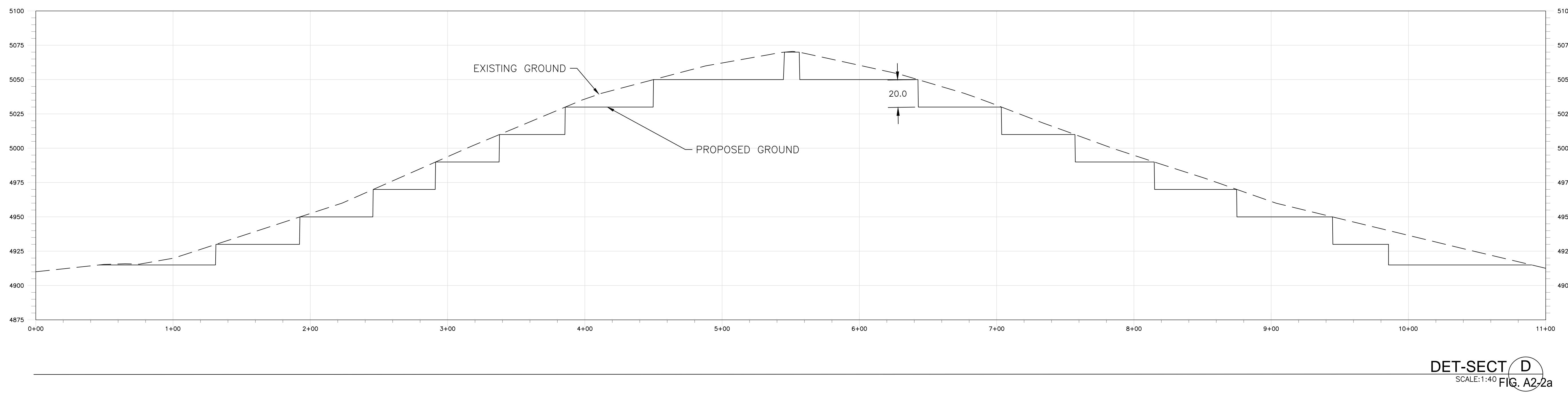
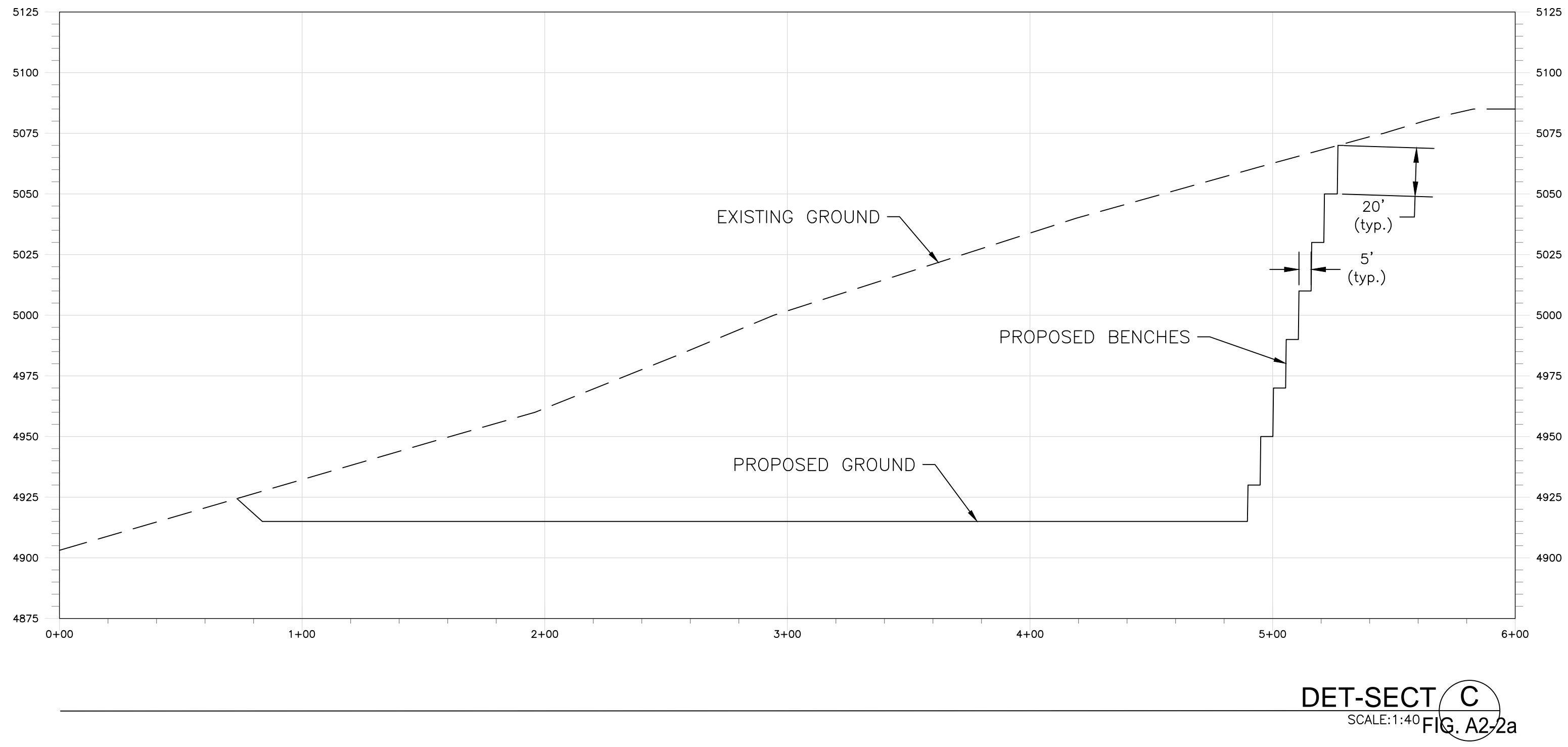
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2. CLAIM BOUNDARY
3. EXISTING TOPO
4. DESIGN TOPO



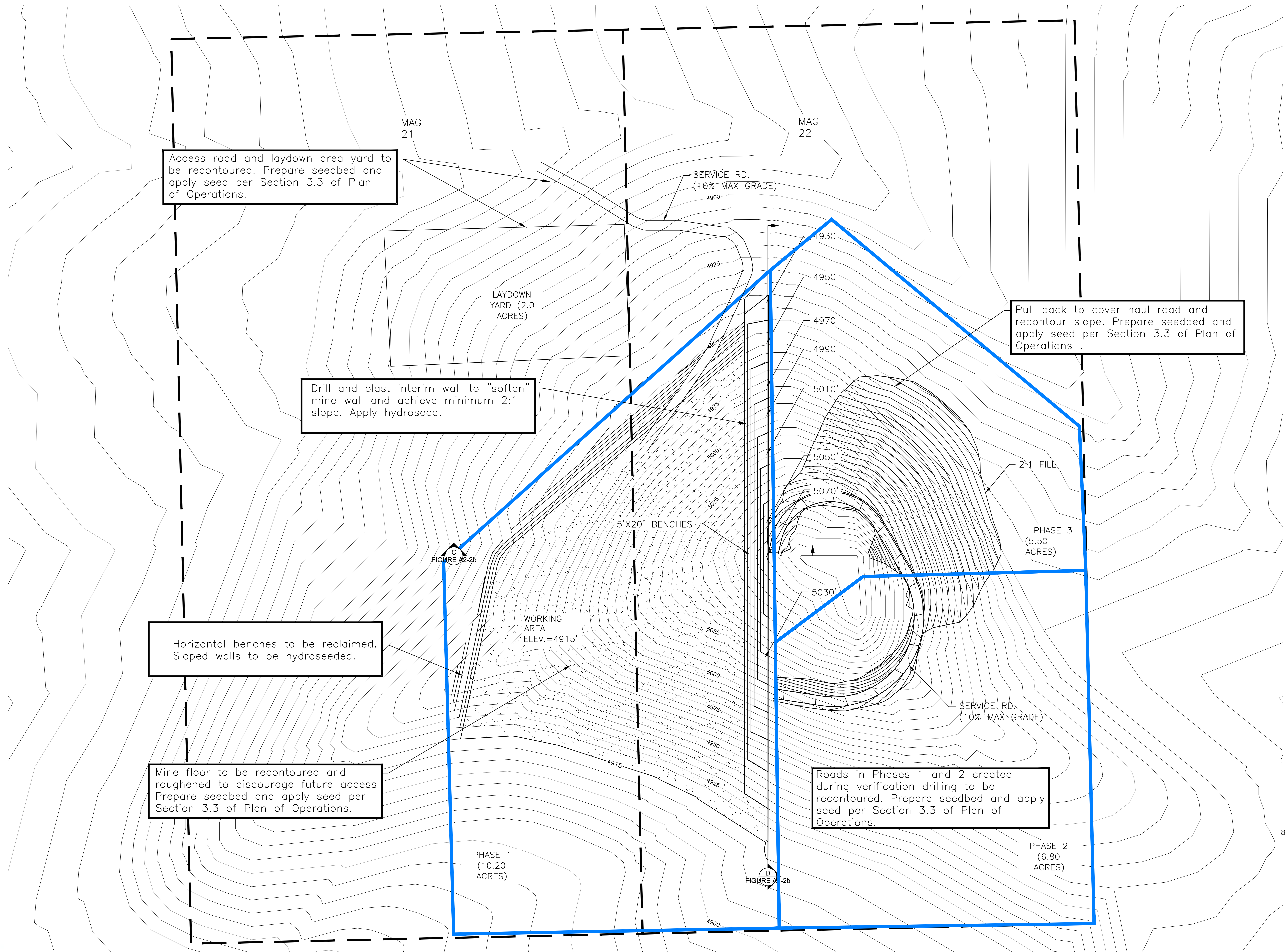


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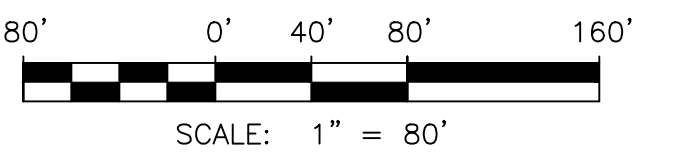
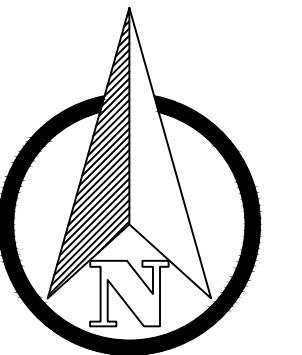


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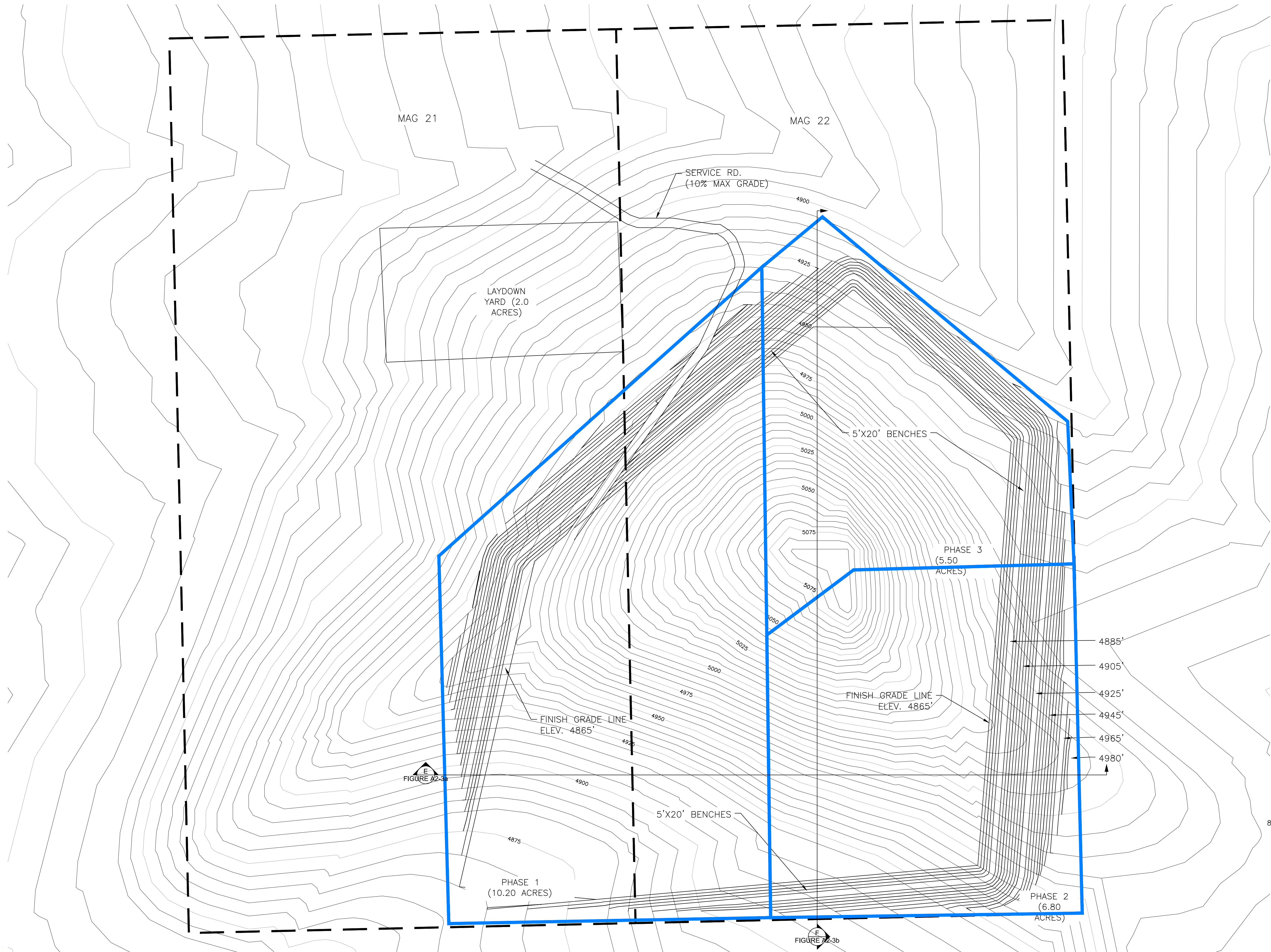
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4. DESIGN TOPO





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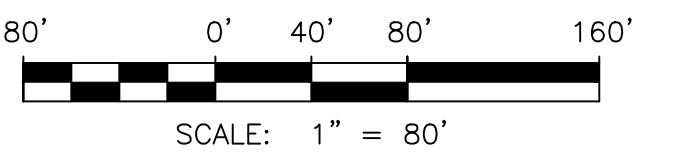
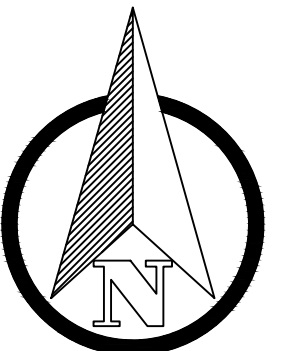


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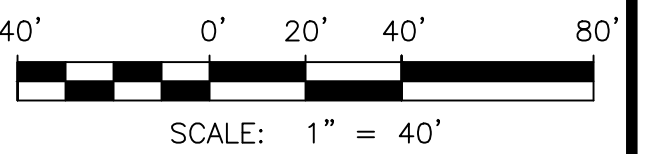
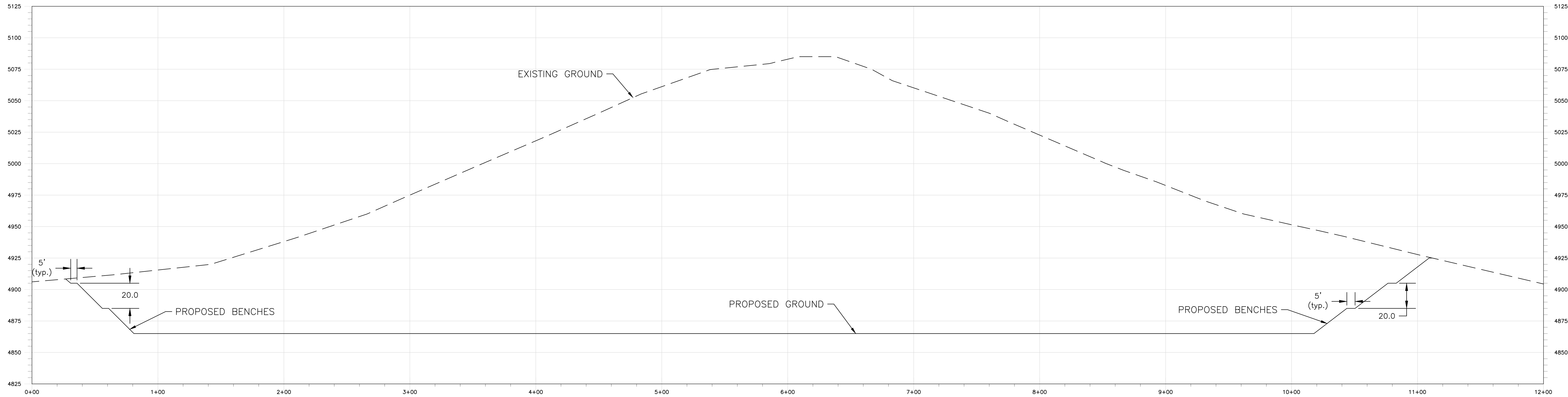
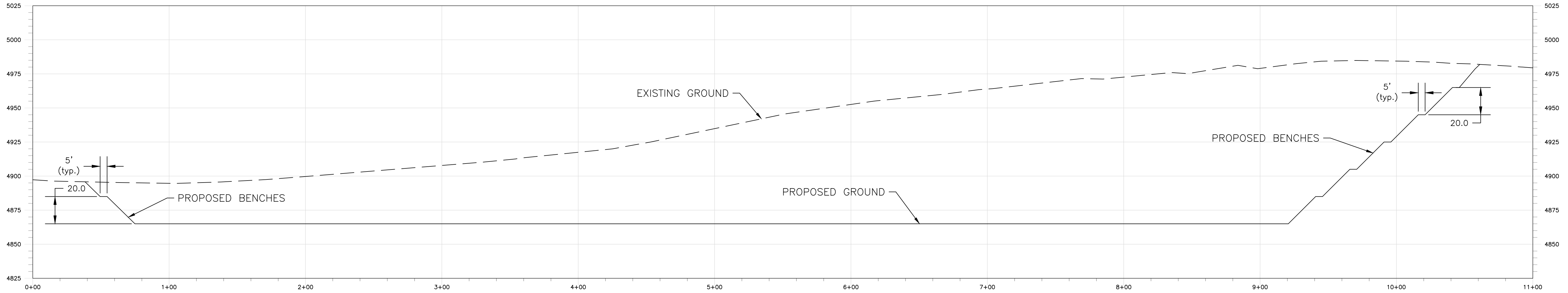
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2. CLAIM BOUNDARY
3. EXISTING TOPO
4. DESIGN TOPO





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04-5-19 DB19.1011





## **Appendix B**

### **Blasting Plan**



June 20, 2018

## BLASTING PLAN FOR LITTLE MAG HILL QUARRY

The following blasting plan for the American Magnesium LLC quarry. This plan will cover the aspects of explosive applications and the concerns that may arise. The following plan will discuss the procedure for a " typical" blast. Explosive products, initiation systems, site security and vibration issues will all be part of design.

### PRODUCTION BLASTING:

Production shots will be drilled with either a 3 ½ or 4.5 inch bit. It is our understanding that the material depth is 12 to 50 ft.in depth. The starting pattern that will be used is a 9x9 foot pattern. The stemming will probably be in the 8-10 foot range. Explosive selection will include the following products; ANFO or possible a HANFO (heavy ANFO, a light blend of emulsion and ANFO), cast boosters or an ammonium gel dynamite and non electric detonators as the primer. The above described scenario should yield a powder factor in the 0.90 to 1.28 range depending on depth. The NONEL 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 from 15,000 lbs. to 45,000 lbs. of explosives products. The shots will be loaded and shot by certified blasters and MSHA certified personnel.

### NOTE:

It should be noted that the above described plans are designed for a " typical" shot. Geology, pit geometry and vibration concerns will dictate modifications that will have to be made by WESCO's blaster in charge as he deems 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 that production is expected, the blasting crew must have flexibility in time of blast, which should be sun up to sun down, unless there is 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 guideline.

## BLAST AREA AND BLAST SITE SECURITY

It is imperative that all parties involved in this project understand and agree that once the loading of explosive materials commences that the blaster in charge has complete and total control of the blast site and the blasting area. This would include the stopping of all traffic in the event that explosives are loaded and thunderstorm approaches. The blaster in charge will also be involved in the placement and instructions to road guards prior the blasting.

Respectfully submitted

Tim Hine  
New Mexico, Arizona General Manager

## **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



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Appendix B. Safety Data Sheets
Appendix C. Equipment Inspection Forms



## 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)]

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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 breach 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)]

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### 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)]

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### 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)]

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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.





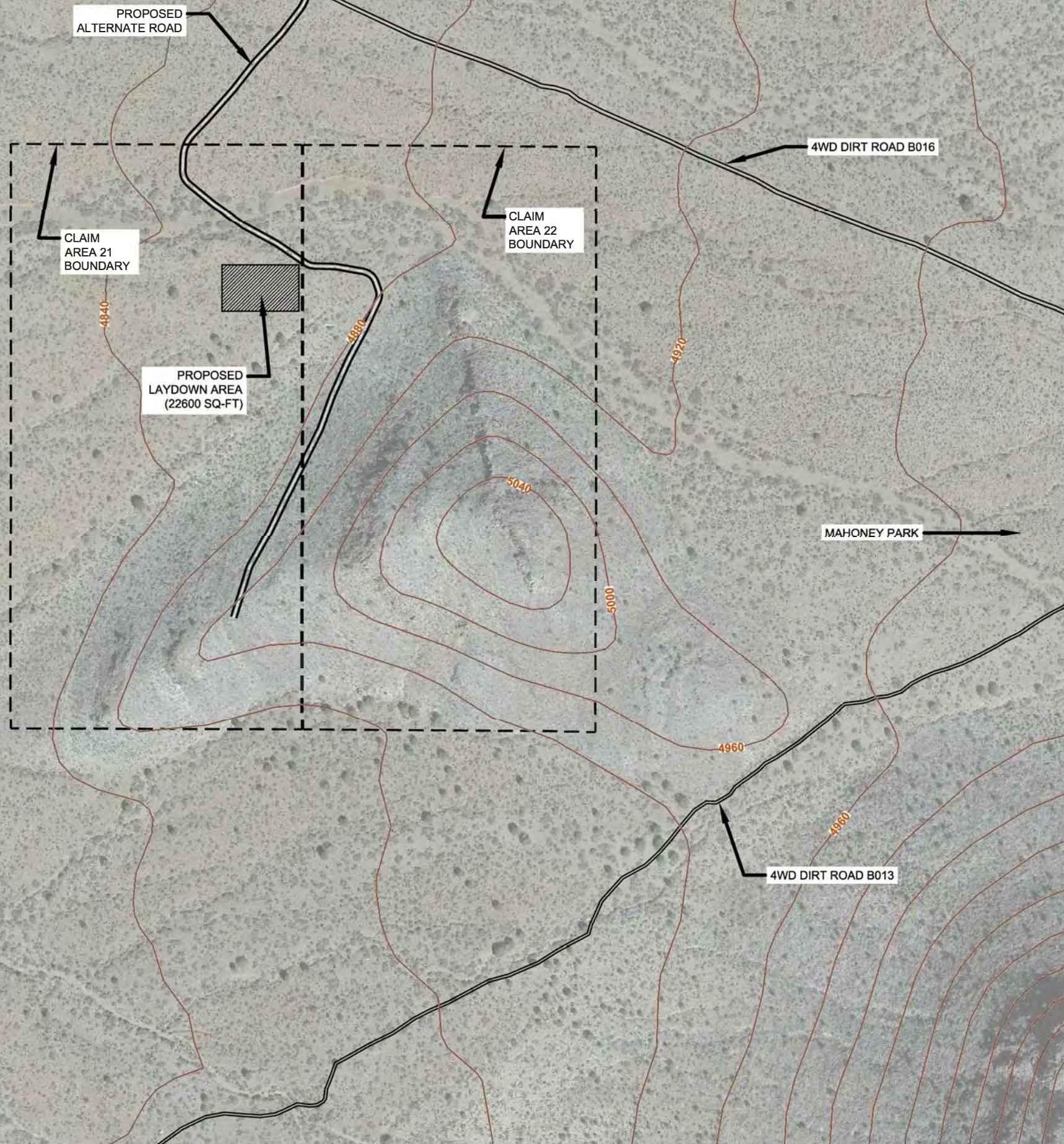
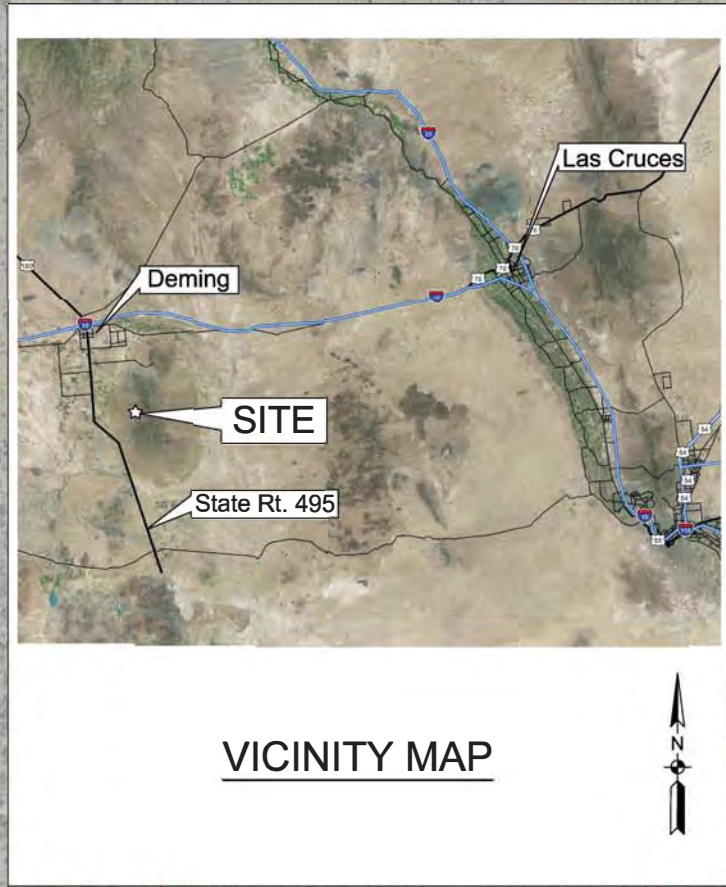
## APPENDICES



## **Appendix A**

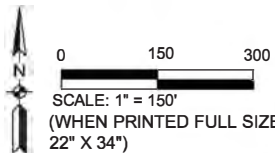
### **Site Map**





**LEGEND**

- CLAIM BOUNDARY
- ROADWAY
- PROPOSED LAYDOWN AREA



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.

<b>Eye Contact:</b>	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.
<b>Ingestion:</b>	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**

<b>Adverse Effects:</b>	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.
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**Indication of any immediate medical attention and special treatment needed**

<b>Notes To Physician:</b>	<p>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.</p> <p>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.</p> <p>INGESTION: This material represents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended.</p>
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## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**

For small fires, Class B fire extinguishing media such as CO<sub>2</sub>, 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

<b>Personal precautions:</b>	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.
<b>Protective equipment:</b>	Use personal protection measures as recommended in Section 8.
<b>Emergency procedures:</b>	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.
<b>Environmental precautions:</b>	Avoid release to the environment. Avoid subsoil penetration.
<b>Methods and materials for containment:</b>	Contain liquid with sand or soil. Prevent spilled material from entering storm drains, sewers, and open waterways.
<b>Methods and materials for cleaning up:</b>	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/m <sup>3</sup> TWA Skin - potential significant contribution to overall exposure by the cutaneous route	-	-	-
Kerosine (petroleum) 8008-20-6	200 mg/m <sup>3</sup> 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/m <sup>3</sup>	10 ppm TWA 50 mg/m <sup>3</sup> TWA 15 ppm STEL 75 mg/m <sup>3</sup> 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

<b>Eye protection:</b>	Use goggles or face-shield if the potential for splashing exists.
<b>Skin and body protection:</b>	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.
<b>Respiratory protection:</b>	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.
<b>Hygiene measures:</b>	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

<b>Physical State</b>	Liquid
<b>Appearance</b>	Yellow to Red Liquid
<b>Color</b>	Yellow to Red
<b>Odor</b>	Hydrocarbon
<b>Odor Threshold</b>	No data available.

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

## 10. STABILITY AND REACTIVITY

<b><u>Reactivity</u></b>	The product is non-reactive under normal conditions.
<b><u>Chemical stability</u></b>	The material is stable at 70°F (21°C ), 760 mmHg pressure.
<b><u>Possibility of hazardous reactions</u></b>	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 <sup>3</sup> (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 (isoparaaffins) 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**

<b>Signs and Symptoms</b>	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.
<b>Skin corrosion/irritation</b>	Causes skin irritation.
<b>Serious eye damage/eye irritation</b>	None known.
<b>Sensitization</b>	None known.
<b>Mutagenic effects</b>	None known.
<b>Carcinogenicity</b>	Suspected of causing cancer.

Cancer designations are listed in the table below

<b>Name</b>	<b>ACGIH (Class)</b>	<b>IARC (Class)</b>	<b>NTP</b>	<b>OSHA</b>
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
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**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):**

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

**TDG (Canada):**

<b>UN Proper Shipping Name:</b>	Diesel Fuel
<b>UN/Identification No:</b>	UN 1202
<b>Transport Hazard Class(es):</b>	3
<b>Packing Group:</b>	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/NDL 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 CO<sub>2</sub>, 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

<b>Personal precautions:</b>	Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.
<b>Protective equipment:</b>	Use personal protection measures as recommended in Section 8.
<b>Emergency procedures:</b>	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.
<b>Environmental precautions:</b>	Avoid release to the environment. Avoid subsoil penetration. Ethanol in gasoline phase separates in contact with water. Monitor downstream for dissolved ethanol or other appropriate indicators.
<b>Methods and materials for containment:</b>	Contain liquid with sand or soil. Prevent spilled material from entering storm drains, sewers, and open waterways.
<b>Methods and materials for cleaning up:</b>	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

<b>Safe Handling Precautions:</b>	<p>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.</p> <p>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.</p> <p>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</p>
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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/m <sup>3</sup> TWA 500 ppm STEL 1500 mg/m <sup>3</sup> STEL	-
Heptane (mixed isomers) 142-82-5	400 ppm TWA 500 ppm STEL	TWA: 500 ppm TWA: 2000 mg/m <sup>3</sup>	400 ppm TWA 1600 mg/m <sup>3</sup> TWA 500 ppm STEL 2000 mg/m <sup>3</sup> STEL	750 ppm
Butane (mixed isomers) 106-97-8	1000 ppm STEL	-	800 ppm TWA 1900 mg/m <sup>3</sup> 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/m <sup>3</sup> TWA 1000 ppm STEL 3600 mg/m <sup>3</sup> STEL	-
Toluene 108-88-3	20 ppm TWA	TWA: 200 ppm Ceiling: 300 ppm	100 ppm TWA 375 mg/m <sup>3</sup> TWA 150 ppm STEL 560 mg/m <sup>3</sup> STEL	500 ppm
Xylene (mixed isomers) 1330-20-7	100 ppm TWA 150 ppm STEL	TWA: 100 ppm TWA: 435 mg/m <sup>3</sup>	100 ppm TWA 435 mg/m <sup>3</sup> TWA 150 ppm STEL 655 mg/m <sup>3</sup> 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/m <sup>3</sup>	50 ppm TWA 180 mg/m <sup>3</sup> TWA	1100 ppm
Cumene 98-82-8	50 ppm TWA	TWA: 50 ppm TWA: 245 mg/m <sup>3</sup> Skin	50 ppm TWA 245 mg/m <sup>3</sup> TWA Limit applies to skin	900 ppm
1,2,4 Trimethylbenzene	25 ppm TWA	-	25 ppm TWA	-

95-63-6			125 mg/m <sup>3</sup> TWA	
Ethylbenzene 100-41-4	20 ppm TWA	TWA: 100 ppm TWA: 435 mg/m <sup>3</sup>	100 ppm TWA 435 mg/m <sup>3</sup> TWA 125 ppm STEL 545 mg/m <sup>3</sup> 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/m <sup>3</sup>	300 ppm TWA 1050 mg/m <sup>3</sup> TWA	1300 ppm
Octane 111-65-9	300 ppm TWA	TWA: 500 ppm TWA: 2350 mg/m <sup>3</sup>	300 ppm TWA 1450 mg/m <sup>3</sup> TWA 375 ppm STEL 1800 mg/m <sup>3</sup> STEL	1000 ppm
1,2,3-Trimethylbenzene 526-73-8	25 ppm TWA	-	25 ppm TWA 125 mg/m <sup>3</sup> 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/m <sup>3</sup>	10 ppm TWA 50 mg/m <sup>3</sup> TWA 15 ppm STEL 75 mg/m <sup>3</sup> 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

<u>Reactivity</u>	The product is non-reactive under normal conditions.
<u>Chemical stability</u>	The material is stable at 70°F (21°C ), 760 mmHg pressure.
<u>Possibility of hazardous reactions</u>	None under normal processing.
<u>Hazardous polymerization</u>	Will not occur.
<u>Conditions to avoid</u>	Excessive heat, sources of ignition, open flame.
<u>Incompatible Materials</u>	Strong oxidizing agents.
<u>Hazardous decomposition products</u>	None known under normal conditions of use.

## 11. TOXICOLOGICAL INFORMATION

### Potential short-term adverse effects from overexposures

<b>Inhalation</b>	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.
<b>Eye contact</b>	Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.
<b>Skin contact</b>	Irritating to skin. Effects may become more serious with repeated or prolonged contact. May be absorbed through the skin in harmful amounts.
<b>Ingestion</b>	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/m <sup>3</sup> (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/m <sup>3</sup> (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/m <sup>3</sup> (Rat) 4 h
1,2,3-Trimethylbenzene 526-73-8	-	-	-
Naphthalene 91-20-3	490 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 340 mg/m <sup>3</sup> (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 (isoparaaffins) 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 consciousness, 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  $\alpha$ -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
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	(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
<b>Toluene</b>	
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)
<b>Xylene (mixed isomers)</b>	
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)
<b>n-Hexane</b>	
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)
<b>Benzene</b>	
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)
<b>Cyclohexane</b>	
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)
<b>Octane</b>	
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/NDL 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 CO<sub>2</sub>, 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.

<b>NFPA</b>	Health 1	Flammability 1	Instability 0	Special Hazard -
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## 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.

<b><u>Property</u></b>	<b><u>Values (Method)</u></b>
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 mm <sup>2</sup> /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

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

## 11. TOXICOLOGICAL INFORMATION

**Potential short-term adverse effects from overexposures**

<b>Inhalation</b>	Overheating may produce vapors which may cause respiratory irritation, dizziness and nausea.
<b>Eye contact</b>	Irritating to eyes. May cause reddening and tearing.
<b>Skin contact</b>	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



<b>Reproductive toxicity</b>	None known.
<b>Specific Target Organ Toxicity (STOT) - single exposure</b>	Not classified.
<b>Specific Target Organ Toxicity (STOT) - repeated exposure</b>	Not classified.
<b>Aspiration hazard</b>	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**

<b>General Advice:</b>	In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).
<b>Inhalation:</b>	Remove to fresh air and keep at rest in a position comfortable for breathing. If symptoms occur get medical attention.
<b>Skin Contact:</b>	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.
<b>Eye Contact:</b>	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.
<b>Ingestion:</b>	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**

<b>Adverse Effects:</b>	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.
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**Indication of any immediate medical attention and special treatment needed**

<b>Notes To Physician:</b>	Treat symptomatically.
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### 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**For small fires, Class B fire extinguishing media such as CO<sub>2</sub>, 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

<b>Personal precautions:</b>	Keep public away. Isolate and evacuate area. Shut off source if safe to do so. All contaminated surfaces will be slippery.
<b>Protective equipment:</b>	Use personal protection measures as recommended in Section 8.
<b>Emergency procedures:</b>	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.
<b>Environmental precautions:</b>	Avoid release to the environment.
<b>Methods and materials for containment:</b>	Prevent further leakage or spillage if safe to do so.
<b>Methods and materials for cleaning up:</b>	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

<b>Safe Handling Precautions:</b>	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.
<b>Storage Conditions:</b>	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.
<b>Incompatible Materials</b>	Strong oxidizing agents.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<b>Notes:</b>	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.
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<b>Engineering measures:</b>	Local or general exhaust required when using at elevated temperatures that generate vapors or mists.
<b><u>Personal protective equipment</u></b>	
<b>Eye protection:</b>	Use goggles or face-shield if the potential for splashing exists.
<b>Skin and body protection:</b>	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.
<b>Respiratory protection:</b>	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.
<b>Hygiene measures:</b>	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

<b>Physical State</b>	Semi-Solid
<b>Appearance</b>	Gray semi-solid
<b>Color</b>	Gray
<b>Odor</b>	Petroleum
<b>Odor Threshold</b>	No data available.

<u>Property</u>	<u>Values (Method)</u>
<b>Melting Point / Freezing Point</b>	> 260 °C / > 500 °F
<b>Initial Boiling Point / Boiling Range</b>	> 316 °C / > 600 °F
<b>Flash Point</b>	> 204 °C / > 400 °F Pensky-Martens Closed Cup (PMCC)
<b>Evaporation Rate</b>	< 1 (ether (anhydrous) = 1)
<b>Flammability (solid, gas)</b>	Not applicable.
<b>Flammability Limit in Air (%):</b>	
Upper Flammability Limit:	No data available.
Lower Flammability Limit:	No data available.
<b>Explosion limits:</b>	No data available.
<b>Vapor Pressure</b>	<0.13 kPa (<1 mm Hg) [room temperature]
<b>Vapor Density</b>	> 1 (Air = 1)
<b>Specific Gravity / Relative Density</b>	0.92
<b>Water Solubility</b>	Partially soluble in water
<b>Solubility in other solvents</b>	No data available.
<b>Partition Coefficient</b>	No data available.
<b>Decomposition temperature</b>	No data available.
<b>pH:</b>	No available data.
<b>Autoignition Temperature</b>	371 °C / 700 °F
<b>Kinematic Viscosity</b>	No data available.
<b>Dynamic Viscosity</b>	No data available.
<b>Explosive Properties</b>	No data available.
<b>VOC Content (%)</b>	No data available.
<b>Density</b>	No data available.
<b>Bulk Density</b>	Not applicable.

## 10. STABILITY AND REACTIVITY

<b><u>Reactivity</u></b>	The product is non-reactive under normal conditions.
<b><u>Chemical stability</u></b>	Stable under recommended storage conditions.

<u>Possibility of hazardous reactions</u>	None under normal processing.
<u>Hazardous polymerization</u>	Will not occur.
<u>Conditions to avoid</u>	Sources of heat or ignition.
<u>Incompatible Materials</u>	Strong oxidizing agents.
<u>Hazardous decomposition products</u>	None known under normal conditions of use.

## 11. TOXICOLOGICAL INFORMATION

### Potential short-term adverse effects from overexposures

<b>Inhalation</b>	Overheating may produce vapors which may cause respiratory irritation, dizziness and nausea.
<b>Eye contact</b>	Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.
<b>Skin contact</b>	May cause skin irritation. Prolonged or repeated exposure may cause dermatitis, folliculitis or oil acne.
<b>Ingestion</b>	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

<b>Signs and Symptoms</b>	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.
<b>Sensitization</b>	Not expected to be a skin or respiratory sensitizer.
<b>Mutagenic effects</b>	None known.
<b>Carcinogenicity</b>	None known.
<b>Reproductive toxicity</b>	None known.
<b>Specific Target Organ Toxicity (STOT) - single exposure</b>	Not classified.
<b>Specific Target Organ Toxicity (STOT) - repeated exposure</b>	Not classified.
<b>Aspiration hazard</b>	Not classified.

## 12. ECOLOGICAL INFORMATION

<u>Ecotoxicity</u>	No information available.
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**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**

<b>CHEMICAL</b>	<b>EXPOSURE LIMIT</b>
Ethylene Glycol (as aerosol)	100 mg/m <sup>3</sup> Ceiling ACGIH TLV
2-Ethyl Hexanoic Acid, Sodium Salt	None Established
Neodecanoic Acid, Sodium Salt	None Established
Diethylene Glycol	10 mg/m <sup>3</sup> 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/m<sup>3</sup> 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/m<sup>3</sup>) and developmental toxicity in with minimal evidence of teratogenicity (2,500 mg/m<sup>3</sup>). The no-effects concentration (based on maternal toxicity) was 500 mg/m<sup>3</sup>. 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 quadricauda*) : >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%
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**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).

<b>16. Other Information</b>
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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.





**SDS501**  
**PRESTONE ® ANTIFREEZE/COOLANT**  
**Date Prepared: 09/24/2015**

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

Project Name: <u>AmMg – Deming Mining Project</u> Location: <u>Deming, New Mexico</u> Completed by: _____ Manufacturer: _____	Date: _____ Project Number: _____ Project Manager: _____ Reviewed by: _____ 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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Ground engaging attachments in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Frame, ladders, access point free of debris and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 Hand grabs and steps free of debris and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 Power cables and/or hoist cables free of damage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 Braking system and steering components operational?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7 Tire and/or tracks in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8 Horn tested and operational?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.9 Mirrors in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.10 Gauges/turn signals/backup lights operational?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.11 Fire extinguisher maintained and within inspection date?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.0 Spill Prevention and Control	Yes	No	N/A
2.1 Verified no visible signs of leaking hydraulic oil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Hydraulic oil level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Verified no visible signs of leaking motor oil/transmission fluid?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Motor oil/transmission level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Verified no visible signs of brake fluid/transfer case fluids?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Brake fluid level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7 Verified no visible signs of leaking coolant/cooling system fluid?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.8 Verified no staining on ground surface, no visible signs of leaking fuel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.9 Fuel level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.0 Other Comments

Corrective Action		
Item	Corrective Action Planned	Date Corrected

## DRILLING RIG – Inspection Form

Project Name: <u>AmMg – Deming Mining Project</u> Location: <u>Deming, New Mexico</u> Completed by: _____ Manufacturer: _____	Date: _____ Project Number: _____ Project Manager: _____ Reviewed by: _____ 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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Ground engaging attachments in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Rig ropes not wrapped around body parts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 Pressurized lines and hoses secured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 Cathead in clean, sound condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 Drill rig ropes in clean, sound condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7 Augers/bits in clean, sound condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8 Stabilization and leveling mechanisms operational?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.9 Fire extinguisher maintained and within inspection date?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.0 Spill Prevention and Control	Yes	No	N/A
2.1 Verified no visible signs of leaking hydraulic oil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Hydraulic oil level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Verified no visible signs of leaking motor oil/transmission fluid?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Motor oil/transmission level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Verified no visible signs of brake fluid/transfer case fluids?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Brake fluid level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7 Verified no visible signs of leaking coolant/cooling system fluid?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.8 Verified no staining on ground surface, no visible signs of leaking fuel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.9 Fuel level verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

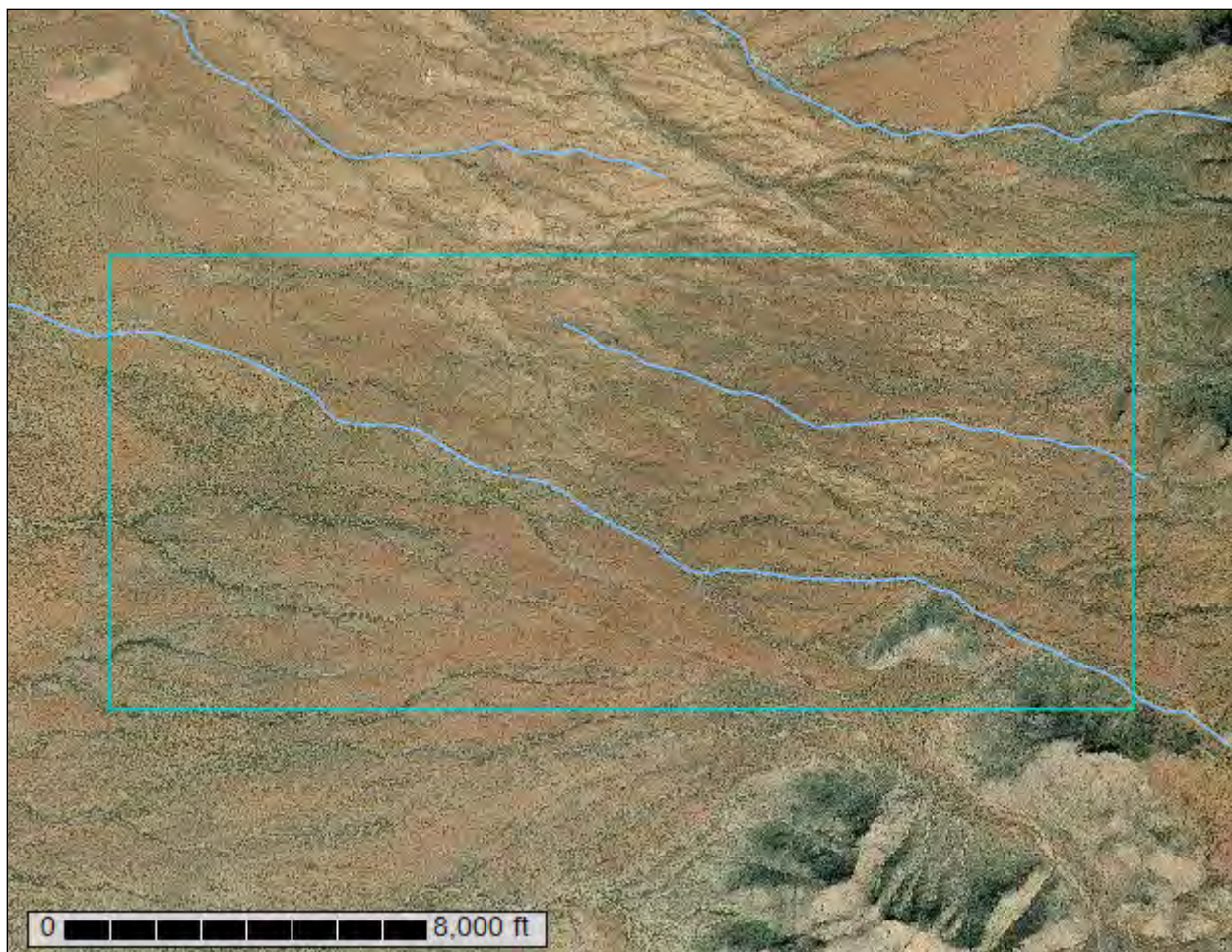
**NRCS**

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**





# Preface

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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](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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# How Soil Surveys Are Made

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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

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

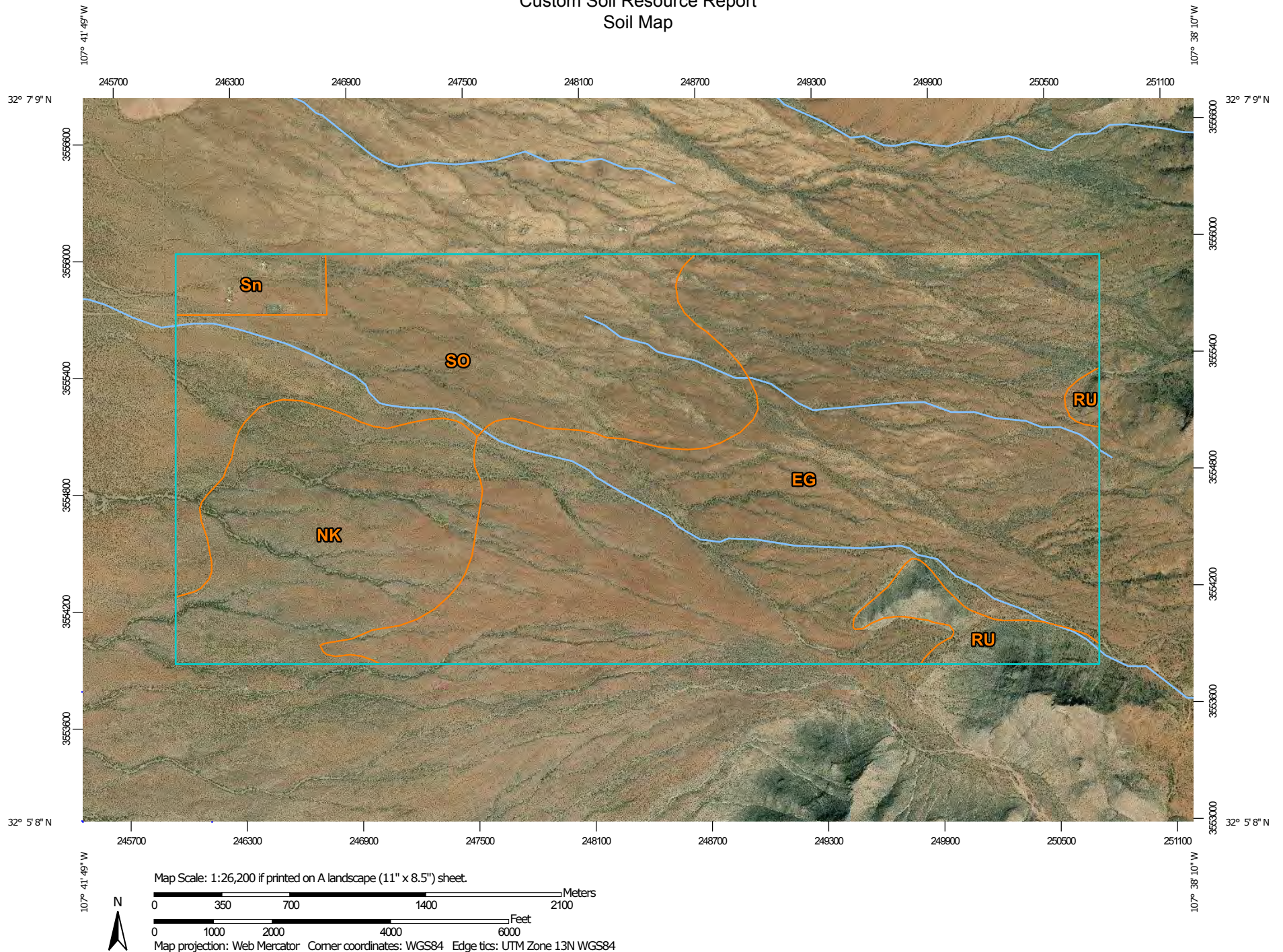


# Soil Map

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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



## Custom Soil Resource Report


### 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%
<b>Totals for Area of Interest</b>		<b>2,488.1</b>	<b>100.0%</b>

## 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

## Custom Soil Resource Report

### 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**

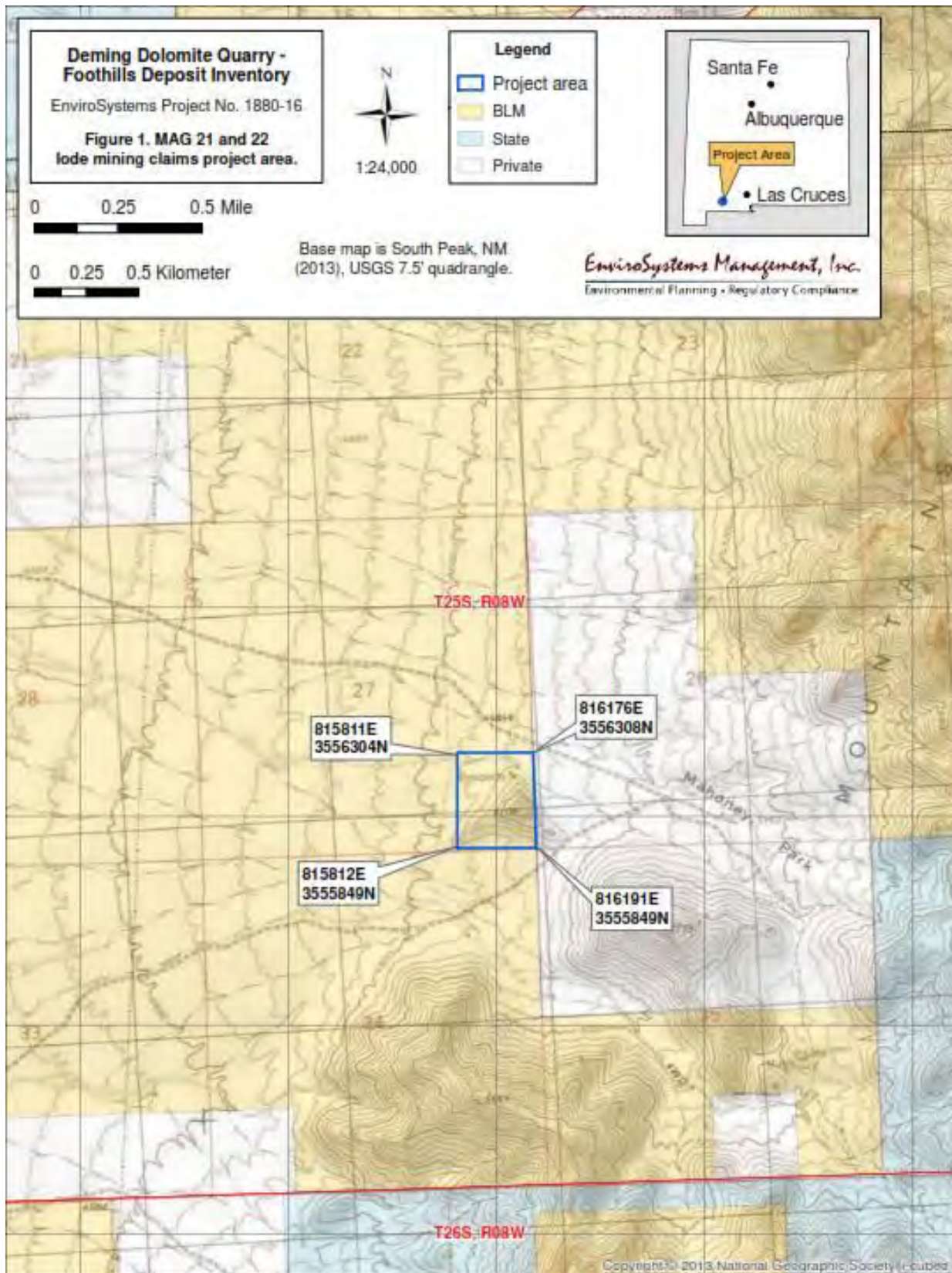
The project area is located in a desert scrub community, with a sparse vegetation cover of cacti, agave, and grasses and dotted with occasional shrubs or small trees including saltbush, snakeweed, juniper, and honey mesquite. The area proposed for the quarry is currently undeveloped and does not appear 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 (*Dasyllirion 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	<i>Juniperus arizonica</i>
singleneedle pinyon	<i>Pinus monophylla</i>
honey mesquite	<i>Prosopis glandulosa</i>
Shrubs/Sub-shrubs	
saltbush	<i>Atriplex</i> sp.
broom snakeweed	<i>Gutierrezia sarothrae</i>
yellow trumpetbush	<i>Tecoma stans</i>
Forbs	
Cochise scaly cloakfern	<i>Astroblepis cochisensis</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>
Cacti, Agave, & Succulents	
Palmer's century plant	<i>Agave palmeri</i>
cholla	<i>Cylindropuntia</i> sp.
sotol	<i>Dasyllirion wheeleri</i>
candy barrelcactus	<i>Ferocactus wislizeni</i>

Common Name	Scientific Name
ocotillo	<i>Fouquieria splendens</i>
Graham's nipple cactus	<i>Mammillaria grahamii</i>
prickly pear cactus	<i>Opuntia</i> sp.
soaptree yucca	<i>Yucca elata</i>
Grasses	
threeawn	<i>Aristida</i> sp.
matted grama	<i>Bouteloua simplex</i>

### 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 (*Psaltiriparus 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	<i>Spizella atrogularis</i>
bushtit	<i>Psaltiriparus minimus</i>
cactus wren	<i>Campylorhynchus brunneicapillus</i>
Gambel's quail	<i>Callipepla gambelii</i>
greater roadrunner	<i>Geococcyx californianus</i>
northern mockingbird	<i>Mimus polyglottos</i>
thrasher	<i>Toxostoma</i> sp.
Reptiles	
whiptail lizard	<i>Aspidoscelis</i> 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
<b>AMPHIBIANS (1)</b>					
<i>Lithobates chiricahuensis</i> <b>Chiricahua leopard frog</b>	<b>Threatened</b>  <b>2002</b>	<b>NO</b>	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.	<b>NO EFFECT</b>
<b>BIRDS (2)</b>					
<i>Falco femoralis</i> <b>northern aplomado falcon</b>	<b>Experimental Population, Non-Essential</b>  <b>2006</b>	<b>NO</b>	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.	<b>NOT LIKELY TO JEOPARDIZE</b>
<i>Coccyzus americanus occidentalis</i> <b>western yellow-billed cuckoo</b>	<b>Threatened</b>  <b>2014</b>	<b>NO</b>	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.	<b>NO EFFECT</b>
<b>FISHES (1)</b>					
<i>Cyprinella formosa</i> <b>beautiful shiner</b>	<b>Threatened</b>  <b>1984</b>	<b>NO</b>	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.	<b>NO EFFECT</b>

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
<b>AMPHIBIANS (1)</b>				
<i>Gastrophryne olivacea</i> <b>Great Plains narrowmouth toad</b>	<b>NM Endangered</b>	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.	<b>NO IMPACT</b>
<b>BIRDS (4)</b>				
<i>Falco peregrinus tundrius</i> <b>Arctic peregrine falcon</b>	<b>NM Threatened</b>	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.	<b>NO IMPACT</b>
<i>Columbina passerina</i> <b>common ground-dove</b>	<b>NM Endangered</b>	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.	<b>NO IMPACT</b>
<i>Falco peregrinus</i> <b>peregrine falcon</b>	<b>NM Threatened</b>	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.	<b>NO IMPACT</b>
<i>Passerina versicolor</i> <b>varied bunting</b>	<b>NM Threatened</b>	In New Mexico the species seems to prefer dense stands of mesquite ( <i>Prosopis</i> 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.	<b>NO IMPACT</b>
<b>REPTILES (1)</b>				
<i>Heloderma suspectum suspectum</i> <b>Reticulate gila monster</b>	<b>NM Endangered</b>	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.	<b>MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT</b>



**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
<b>BIRDS (7)</b>				
<i>Athene cunicularia hypugaea</i> <b>western burrowing owl</b>	<b>Sensitive</b>	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.	<b>MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT</b>
<i>Gymnorhinus cyanocephalus</i> <b>pinyon jay</b>	<b>Sensitive</b>	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.	<b>MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT</b>
<i>Toxostoma bendirei</i> <b>Bendire's thrasher</b>	<b>Sensitive</b>	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.	<b>MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT</b>
<i>Anthus spragueii</i> <b>Sprague's pipit</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<i>Ammodramus savannarum ammodramus</i> <b>Arizona grasshopper sparrow</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<i>Ammodramus bairdii</i> <b>Baird's sparrow</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>

Species	Status	Key Habitat Elements	Status within Action Area of Project	Determination of Impact
<i>Passerina ciris</i> <b>Painted Bunting</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<b>MAMMALS (4)</b>				
<i>Choeronycteris mexicana</i> <b>Mexican long-tongued bat</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<i>Idionycteris phyllotis</i> <b>Allen's lappet-browed bat</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<i>Corynorhinus townsendii</i> <b>Townsend's big-eared bat</b>	<b>Sensitive</b>	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. In summer 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.	<b>MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT</b>
<i>Lepus callotis</i> <b>White-sided jack rabbit</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<b>PLANTS (4)</b>				

Species	Status	Key Habitat Elements	Status within Action Area of Project	Determination of Impact
<i>Escobaria duncanii</i> <b>Duncan pincushion cactus</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>
<i>Pediomelum pentaphyllum</i> <b>Chihuahua scurfpea</b>	<b>Sensitive</b>	Desert grassland or desert scrub 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.	<b>NO IMPACT</b>
<i>Peniocereus greggii</i> var. <i>greggii</i> <b>night-blooming cereus</b>	<b>Sensitive</b>	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 <i>Larrea divaricata</i> and <i>Prosopis glandulosa</i> (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.	<b>MAY IMPACT INDIVIDUALS, NOT LIKELY TO ADVERSELY IMPACT SPECIES OR ITS HABITAT</b>
<i>Sclerocactus papyracanthus</i> <b>grama grass cactus</b>	<b>Sensitive</b>	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.	<b>NO IMPACT</b>

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, coppermine milkvetch, Guadalupe mesquite, 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 thelypod;
- 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
<i>Columba fasciata</i> 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.
<i>Oreothlypis luciae</i> 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.
<i>Phainopepla nitens</i> 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.
<i>Zenaida macroura</i> 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



Mark Daniels, M.S., M.Eng.  
Senior Ecologist/Environmental Engineer  
EnviroSystems Management, Inc.

09/07/2016

Date

### Reviewer of this Document



Keith Pohs, M.S., CPM  
Project Manager  
EnviroSystems Management, Inc.

09/07/2016

Date

### Bureau of Land Management Approval

Steven Torrez,  
Wildlife Biologist  
Las Cruces District Office

Date

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## **APPENDIX A**

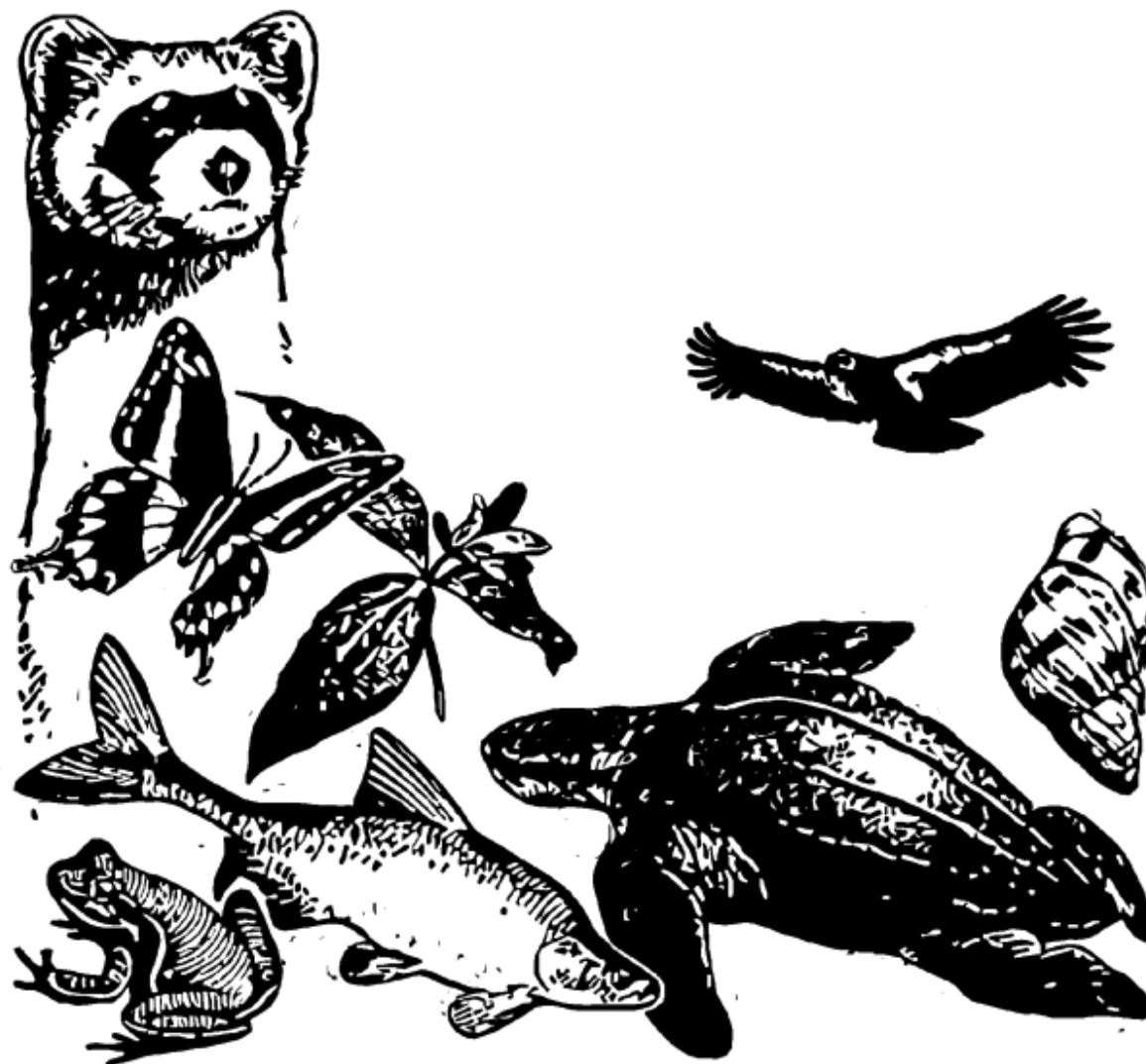
USFWS Trust Resources List of Threatened, Endangered, Proposed Threatened or Endangered,  
and Candidate species (T & E species) for the project area

# 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.



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Project Description .....	<a href="#"><u>1</u></a>
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Migratory Birds .....	<a href="#"><u>4</u></a>
Refuges & Hatcheries .....	<a href="#"><u>7</u></a>
Wetlands .....	<a href="#"><u>8</u></a>



U.S. Fish & Wildlife Service

# IPaC Trust Resources Report

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NAME

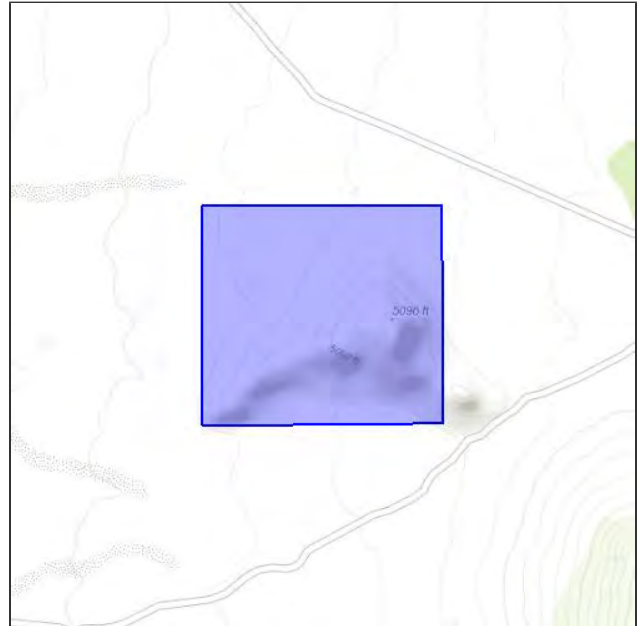
Proposed Deming Mine

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=D02E](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D02E)

## 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](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](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](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.<sup>[1]</sup> 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](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](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](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](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IR)

**Brewer's Sparrow** *Spizella breweri*

Season: Wintering

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0HA](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HA)

Bird of conservation concern

**Burrowing Owl** *Athene cunicularia*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0NC](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0NC)

Bird of conservation concern

**Cassin's Sparrow** *Aimophila cassinii*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0K2](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0K2)

Bird of conservation concern

**Chestnut-collared Longspur** *Calcarius ornatus*

Season: Wintering

Bird of conservation concern

**Golden Eagle** *Aquila chrysaetos*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0DV](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DV)

Bird of conservation concern

**Gray Vireo** *Vireo vicinior*

Season: Breeding

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0G5](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G5)

Bird of conservation concern

**Lark Bunting** *Calamospiza melanocorys*

Season: Wintering

Bird of conservation concern

**Lawrence's Goldfinch** *Carduelis lawrencei*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0J8](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J8)

Bird of conservation concern

**Loggerhead Shrike** *Lanius ludovicianus*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0FY](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY)

Bird of conservation concern

**Long-billed Curlew** *Numenius americanus*

Season: Wintering

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B06S](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S)

Bird of conservation concern

**Lucy's Warbler** *Vermivora luciae*

Season: Breeding

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0DL](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DL)

Bird of conservation concern

**Mccown's Longspur** *Calcarius mccownii*

Season: Wintering

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0HB](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HB)

Bird of conservation concern

**Peregrine Falcon** *Falco peregrinus*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=B0FU](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU)

Bird of conservation concern

**Red-faced Warbler** *Cardellina rubrifrons*

Season: Breeding

Bird of conservation concern

**Rufous-crowned Sparrow** *Aimophila ruficeps*

Season: Year-round

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0MX](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0MX)

Bird of conservation concern

**Short-eared Owl** *Asio flammeus*

Season: Wintering

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0HD](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0HD)

Bird of conservation concern

**Sonoran Yellow Warbler** *Dendroica petechia* ssp. *sonorana*

Season: Breeding

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0F7](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0F7)

Bird of conservation concern

**Sprague's Pipit** *Anthus spragueii*

Season: Wintering

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0GD](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0GD)

Bird of conservation concern

**Swainson's Hawk** *Buteo swainsoni*

Season: Breeding

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B070](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B070)

Bird of conservation concern

**Virginia's Warbler** *Vermivora virginiae*

Season: Breeding

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0IL](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0IL)

Bird of conservation concern

**Williamson's Sapsucker** *Sphyrapicus thyroideus*

Season: Wintering

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0FX](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0FX)

Bird of conservation concern



## 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 tubercid 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:



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## Database Query

Your **search terms** were as follows:

### County Name

Luna

### Status

State NM: Endangered  
State NM: Threatened

### Habitat

TERRESTRIAL

### Gap Veg

CHIH DESERT creosotebush  
CHIH DESERT tarbush/mesquite  
/ocotillo

**7 species returned.**

### Taxonomic Group

Amphibians  
Reptiles

**# Species**

1  
1



### Taxonomic Group








Birds

**# Species**

5

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Species ID	Common Name	Scientific Name	Photo	USGS Distribution Map	County	Status	Habitat	GapVeg
040380	<b>Aplomado Falcon</b>	Falco femoralis		no map	Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT tarbush/mesquite/ocotillo
040384	<b>Peregrine Falcon</b>	Falco peregrinus		no map	Luna	State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
040385	<b>Arctic Peregrine Falcon</b>	Falco peregrinus tundrius	no photo	no map	Luna	State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush

040690	<b>Common Ground-dove</b>	Columbina passerina			Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
040125	<b>Varied Bunting</b>	Passerina versicolor			Luna	State NM: Threatened	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
030135	<b>Reticulate Gila Monster</b>	Heloderma suspectum suspectum			Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo
020110	<b>Great Plains Narrowmouth Toad</b>	Gastrophryne olivacea		no map	Luna	State NM: Endangered	TERRESTRIAL	CHIH DESERT creosotebush CHIH DESERT tarbush/mesquite/ocotillo

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## **APPENDIX C**

BLM Las Cruces District sensitive animal and plant species lists



# BLM Sensitive Species List

## Las Cruces District Office

Mammals	
<i>Choeronycteris mexicana</i>	Mexican long-tongued bat
<i>Lasiurus xanthinus</i>	Western yellow bat
<i>Euderma maculatum</i>	Spotted bat
<i>Idionycteris phyllotis</i>	Allen's lappet-browed bat
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat
<i>Lepus callotis</i>	White-sided jack rabbit
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog
<i>Zapus hudsonius luteus</i>	Meadow (New Mexico) jumping mouse
<i>Nasua narica</i>	White-nosed coati

Birds	
<i>Haliaeetus leucocephalus</i>	Bald Eagle
<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo
<i>Athene cunicularia hypugaea</i>	Western Burrowing Owl
<i>Gymnorhinus cyanocephalus</i>	Piñon Jay
<i>Toxostoma bendirei</i>	Bendire's Thrasher
<i>Vireo bellii arizonae</i>	Bell's Vireo
<i>Anthus spragueii</i>	Sprague's Pipit
<i>Ammodramus savannarum ammolegus</i>	Arizona Grasshopper Sparrow
<i>Ammodramus bairdii</i>	Baird's Sparrow
<i>Passerina ciris</i>	Painted Bunting

Amphibians	
<i>Anaxyrus (Bufo) microscaphus</i>	Southwestern toad
<i>Lithobates (Rana) yavapaiensis</i>	Lowland leopard frog

Reptiles	
<i>Thamnophis rufipunctatus</i>	Narrow-headed Garter Snake
<i>Trachemys gaigeae gaigeae</i>	Big Bend Slider

Molluscs, Crustaceans, & other Arthropods	
<i>Streptocephalus moorei</i>	Moore's Fairy Shrimp
<i>Phallocryptus (Branchinella) sublettei</i>	Sublette's fairy shrimp
<i>Lepidurus lemmoni</i>	Lynch's tadpole shrimp
<i>Lytta mirifica</i>	Anthony Blister Beetle

NM - BLM SPECIAL STATUS PLANT SPECIES LIST

UPDATED WITH ESA STATUS SPECIES 1/4/12

FIELD OFFICE OCCURRENCE - VERIFIED, HYPOTHETICAL, PERIPHERAL (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	NATURES ERVE GLOBAL RANK	NATURES ERVE 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 FINDING	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 FINDING	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**



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## TECHNICAL MEMORANDUM

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**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).

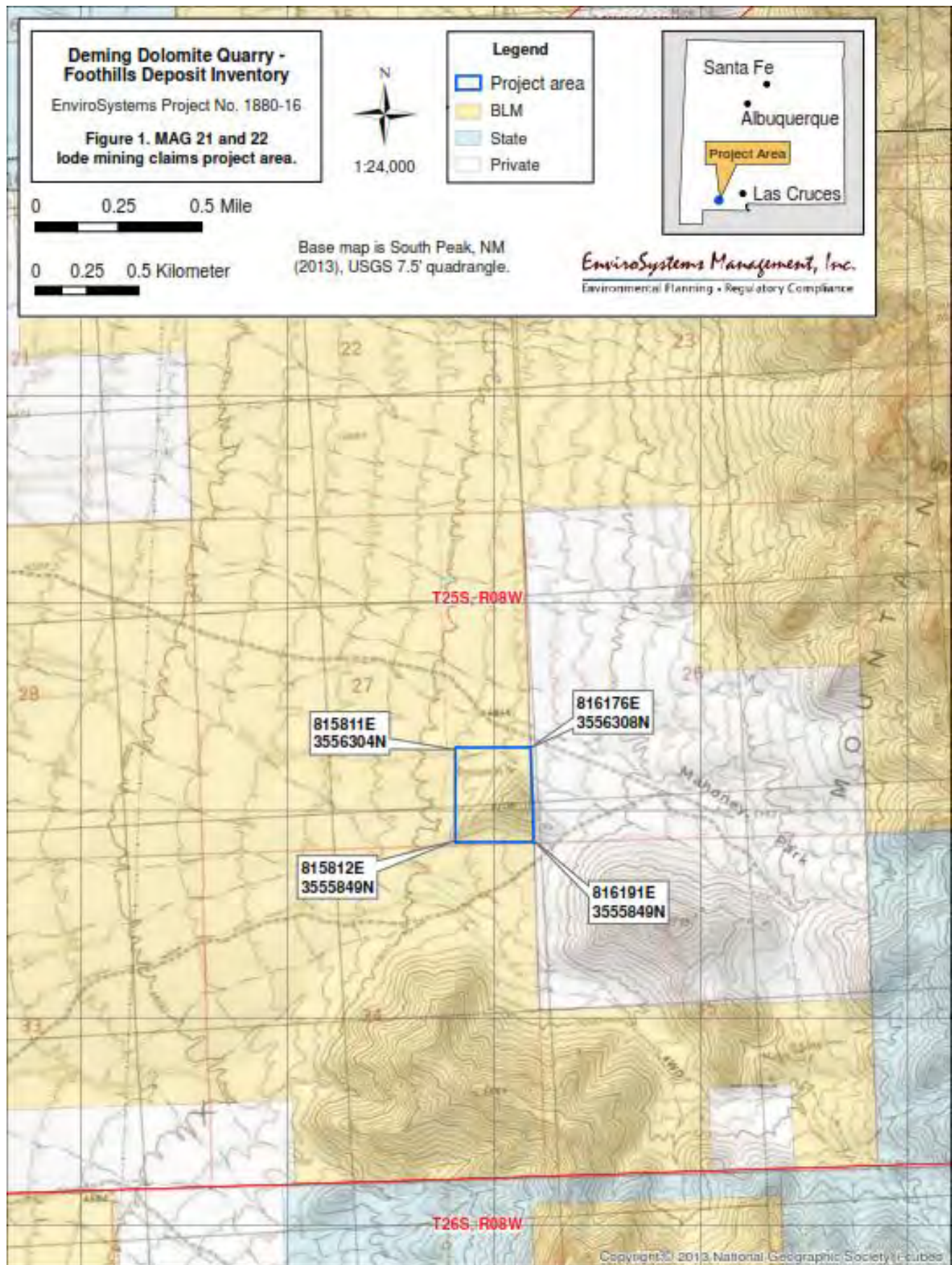
### *Proposed Action*

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.

<b>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)</b>					
<b>Common Name</b>	<b>Scientific Name</b>	<b>Federal Status</b>	<b>State Status</b>	<b>Suitable Habitat Present?</b>	<b>Individuals Observed?</b>
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>		Threatened	No	No
Beautiful shiner	<i>Cyprinella formosa</i>	Threatened		No	No
Chiricahua leopard frog	<i>Lithobates (=Rana) chiricahuensis</i>	Threatened		No	No
Common ground-dove	<i>Columbina passerina</i>		Endangered	No	No
Great Plains narrowmouth toad	<i>Gastrophryne olivacea</i>		Endangered	No	No
Northern aplomado falcon	<i>Falco femoralis</i>	Experimental Pop'n, Non-Essential	Endangered	Yes	No
Peregrine falcon	<i>Falco peregrinus</i>		Threatened	No	No
Reticulate gila monster	<i>Heloderma suspectum suspectum</i>		Endangered	Yes	No
Varied bunting	<i>Passerina versicolor</i>		Threatened	No	No
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	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 (*Dasyllirion 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 (*Psaltiriparus 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 (Bureau 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 - LLNMF01000	TAOS - LLNMF02000	RIO PUERCO - LLNMA01000	SOCORRO - LLNMA02000	LAS CRUCES - LLNML00000	ROSWELL - LLNMP01000	CARLSBAD - LLNMP02000			
AMPHIBIANS (3)											
<i>Anaxyrus (Bufo) microscaphus</i>	Southwestern Toad	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	NONE	NONE			
<i>Lithobates (Rana) yavapaiensis</i>	Lowland Leopard Frog	NONE	NONE	NONE	HYPOTHETICAL	VERIFIED	NONE	NONE			
<i>Lithobates (Rana) pipiens</i>	Northern Leopard Frog	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL	NONE	NONE	NONE			
ARTHROPODS (2)											
<i>Lytta mirifica</i>	Anthony Blister Beetle	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
<i>Ochlodes yuma anasazi</i>	Yuma Skipper	NONE	VERIFIED	NONE	NONE	NONE	NONE	NONE			
BIRDS (12)											
<i>Haliaeetus leucocephalus</i>	Bald Eagle	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED			
<i>Tympanuchus pallidicinctus</i>	Lesser Prairie-chicken	NONE	PERIPHERAL	NONE	NONE	NONE	VERIFIED	VERIFIED			
<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED			
<i>Athene cunicularia hypugaea</i>	Western Burrowing Owl	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED			
<i>Gymnorhinus cyanocephalus</i>	Piñon Jay	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL			
<i>Toxostoma bendirei</i>	Bendire's Thrasher	VERIFIED	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL	NONE			
<i>Vireo bellii arizonae</i>	Bell's Vireo	NONE	NONE	NONE	NONE	VERIFIED	PERIPHERAL	VERIFIED			
<i>Anthus spragueii</i>	Sprague's Pipit	NONE	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED			
<i>Ammodramus savannarum ammoregus</i>	Arizona Grasshopper Sparrow	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
<i>Ammodramus bairdii</i>	Baird's Sparrow	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
<i>Passerina ciris</i>	Painted Bunting	NONE	NONE	NONE	NONE	VERIFIED	PERIPHERAL	VERIFIED			
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	PERIPHERAL	VERIFIED	NONE	VERIFIED	VERIFIED	VERIFIED	VERIFIED			
CRUSTACEANS (5)											
<i>Streptocephalus thomasbowmani</i>	Thomas Bowman's Fairy Shrimp	NONE	NONE	NONE	NONE	NONE	NONE	NONE			
<i>Streptocephalus moorei</i>	Moore's Fairy Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
<i>Phallocryptus (Branchinella) sublettei</i>	Sublette's Fairy Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
<i>Eulimnadia follisimilis</i>	Clam Shrimp	NONE	NONE	NONE	VERIFIED	NONE	VERIFIED	NONE			
<i>Lepidurus lemmoni</i>	Lynch's Tadpole Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
FISH (17)											
<i>Oncorhynchus clarki virginalis</i>	Rio Grande Cutthroat Trout	NONE	PERIPHERAL	PERIPHERAL	PERIPHERAL	PERIPHERAL	PERIPHERAL	NONE			
<i>Agosia chrysogaster</i>	Longfin Dace	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE			



[illegible]

[illegible]

## **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, PERIPHERAL (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	NATURES ERVE GLOBAL RANK	NATURES ERVE STATE RANK	FWS STATUS	STATE STATUS	USFS STATUS	BLM SPECIAL STATUS LIST
NYCTAGINACEAE	<i>ABRONIA BIGELOVII</i>	SAND VERBENA, GALISTEO	VERIFIED			PERIPHERAL				G3	S3	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
ACAROSPORACEAE	<i>ACAROSPORA CLAUZADEANA</i>	LICHEN, ACAROSPORA CLAUZADEANA						VERIFIED		G1G2		PETITIONED / NEGATIVE 90 DAY FINDING			BLM SENSITIVE
POLEMONIACEAE	<i>ALICIELLA FORMOSA</i>	GILIA, AZTEC			VERIFIED					G2	S2	PETITIONED / NEGATIVE 90 DAY FINDING	ENDANGERED	NONE	BLM SENSITIVE
APOCYNACEAE	<i>AMSONIA FUGATEI</i>	AMSONIA, FUGATE'S		VERIFIED						G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
APOCYNACEAE	<i>AMSONIA THARPII</i>	BLUESTAR, THARP'S							VERIFIED	G1	S1	SPECIES OF CONCERN + PETITIONED POSITIVE 90 DAY FINDING	ENDANGERED	NONE	BLM SENSITIVE
NYCTAGINACEAE	<i>ANULOCAULIS LEIOSOLENUS</i> VAR. <i>HOWARDII</i>	RINGSTEM, HOWARD'S GYP					VERIFIED			G2T2	SNR	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
RANUNCULACEAE	<i>AQUILEGIA CHRYSANTHA</i> VAR. <i>CHAPLINEI</i>	COLUMBINE, CHAPLINE'S					VERIFIED		VERIFIED	G4T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
ASCLEPIADACEAE	<i>ASCLEPIAS SANJUANENSIS</i>	MILKWEED, SAN JUAN			VERIFIED					GUQ	S3	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
FABACEAE	<i>ASTRAGALUS COBRENSIS</i> VAR. <i>MAGUIREI</i>	MILKVETCH, COPPERMINE					VERIFIED			G4T2	S2,S1?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
FABACEAE	<i>ASTRAGALUS GYPSODES</i>	MILKVETCH, GYPSUM							VERIFIED	G3	S3	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
FABACEAE	<i>ASTRAGALUS KNIGHTII</i>	MILKVETCH, KNIGHT'S	VERIFIED							NONE	NONE	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
FABACEAE	<i>ASTRAGALUS RIPLEYI</i>	MILKVETCH, RIPLEY	HYPOTHETICAL			VERIFIED				G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
FABACEAE	<i>DERMATOPHYLLUM GUADALUPENSE</i>	MESCALBEAN, GUADALUPE					VERIFIED		VERIFIED	G1		PETITIONED / NEGATIVE 90 FINDING	SPECIES OF CONCERN		BLM SENSITIVE
CACTACEAE	<i>ECHINOCEREUS X ROETTERI</i> VAR. <i>ROETTERI</i>	CACTUS, ROETTER'S HEDGEHOG					VERIFIED			NONE	NONE	NONE	NONE	NONE	BLM SENSITIVE
ASTERACEAE	<i>ERIGERON ACOMANUS</i>	FLEABANE, ACOMA	VERIFIED		HYPOTHETICAL					GNR	SNR	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
CACTACEAE	<i>ESCOBARIA DUNCANII</i>	CACTUS, DUNCAN'S PINCUSHION					VERIFIED			G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
CACTACEAE	<i>ESCOBARIA VILLARDII</i>	CACTUS, VILLARD'S PINCUSHION					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	BLM SENSITIVE
ASTERACEAE	<i>LEPIDOSPARTUM BURGESSII</i>	SCALEBROOM, GYPSUM					VERIFIED			G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
LINACEAE	<i>LINUM ALLREDII</i>	FLAX, ALLRED'S							VERIFIED	NONE	NONE	NONE	NONE	NONE	BLM SENSITIVE
LOASACEAE	<i>MENTZELIA HUMILIS</i> VAR. <i>GUADALUPENSIS</i>	STICKLEAF, GUADALUPE					VERIFIED			G4T2	SNR	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
CACTACEAE	<i>OPUNTIA ARENARIA</i>	PRICKLYPEAR, SAND					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
CACTACEAE	<i>OPUNTIA X VIRIDIFLORA</i>	CHOLLA, SANTA FE				VERIFIED				G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
FABACEAE	<i>PEDIOMELUM PENTAPHYLLUM</i>	SCURFPEA, CHIHUAHUA					VERIFIED			G1	SH,S1	SPECIES OF CONCERN + PETITIONED POSITIVE 90 DAY FINDING	ENDANGERED	SENSITIVE	BLM SENSITIVE
CACTACEAE	<i>PENIOCEREUS GREGGII</i> VAR. <i>GREGGII</i>	CEREUS, NIGHT BLOOMING					VERIFIED			G3G4T2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
SCROPHULARIACEAE	<i>PENSTEMON ALAMOSSENSIS</i>	BEARDTONGUE, ALAMO					VERIFIED			G3	S3	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
SCROPHULARIACEAE	<i>PENSTEMON CARDINALIS</i> SSP. <i>REGALIS</i>	PENSTEMON, GUADALUPE							VERIFIED	G3T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
ASTERACEAE	<i>PERITYLE CERNUA</i>	CLIFF DAISY, NODDING					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
CHENOPODIACEAE	<i>PROATRIPLEX PLEIANTHA</i>	SALTBUSH, MANCOS			VERIFIED					G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE
POACEAE	<i>PUCCINELLIA PARISHII</i>	ALKALIGRASS, PARISH'S	VERIFIED	HYPOTHETICAL	HYPOTHETICAL		VERIFIED			G2	S2,S1	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	BLM SENSITIVE
CACTACEAE	<i>SCLEROCACTUS CLOVERAE</i> SSP. <i>BRACKII</i>	CACTUS, BRACK'S HARDWALL			VERIFIED					G3T1	S1	SPECIES OF CONCERN	ENDANGERED	NONE	BLM SENSITIVE
CACTACEAE	<i>SCLEROCACTUS PAPYRACANTHUS</i>	CACTUS, GRAMA GRASS	VERIFIED	HYPOTHETICAL	HYPOTHETICAL	VERIFIED	VERIFIED	HYPOTHETICAL		G4	S2S3,S4	SPECIES OF CONCERN	NONE	NONE	BLM SENSITIVE
SCROPHULARIACEAE	<i>SCROPHULARIA MACRANTHA</i>	FIGWORT, MIMBRES					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	BLM SENSITIVE
BRASSICACEAE	<i>SIBARA GRISEA</i>	THELYPODY, TEXAS; SIBARA, GRAY					VERIFIED			G3	S3?	NONE	SPECIES OF CONCERN	NONE	BLM SENSITIVE
BRASSICACEAE	<i>STREPTANTHUS PLATYCARPUS</i>	JEWELFLOWER, BROADPOD							VERIFIED	G1?Q	S1?	PETITIONED / NEGATIVE 90 DAY FINDING	SPECIES OF CONCERN	NONE	BLM SENSITIVE
ASTERACEAE	<i>TOWNSENDIA GYPSOPHILA</i>	TOWNSEND DAISY, GYPSUM	VERIFIED							G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	BLM SENSITIVE



## **Appendix E3**

### **Updated Sensitive Species Lists**

Plant Species Data

<i>Species</i>	<b>Common Name</b>	<b>Farmington</b>	<b>Taos</b>	<b>Rio Puerco</b>	<b>Socorro</b>	<b>Las Cruces</b>	<b>Roswell</b>	<b>Carlsbad</b>	<b>NatureServe Global rank</b>	<b>NHNM State rank</b>	<b>FWS Status</b>	<b>NM Status</b>	<b>BLM Status</b>
<b>Plants</b>													
<i>Abronia bigelovii</i>	Sand verbena, Galisteo		Potential	Verified					G3	S2	None	Species of Concern	BLM SENSITIVE
<i>Acarospora clauzadeana</i>	Lichen, acarospora clauzadeana						Verified		G1G2	S1	Petitioned/ negative 90 day finding	None	BLM SENSITIVE
<i>Agastache pringlei</i> var. <i>verticillata</i>	Giant hyssop, Organ Mountains					Verified			G3G4T2	S2	None	Species of Concern	BLM SENSITIVE *New*
<i>Aliciella formosa</i>	Gilia, Aztec	Verified							G2	S2	Petitioned/ negative 90 day finding	Endangered	BLM SENSITIVE
<i>Amsonia fugatei</i>	Amsonia, Fugate's				Verified				G2	S2	None	Species of Concern	BLM SENSITIVE
<i>Amsonia tharpii</i>	Bluestar, Tharp's							Verified	G1	S1	Petitioned/ positive 90 day finding	Endangered	BLM SENSITIVE
<i>Anulocaulis leiosolenus</i> var. <i>howardii</i>	Ringstem, Howard's gyp					Verified			G2T1	S1	None	Species of Concern	BLM SENSITIVE
<i>Aquilegia chrysantha</i> var. <i>chaplinei</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Asclepias sanjuanensis</i>	Milkweed, San Juan	Verified							G2G3	S2S3	None	Species of Concern	BLM SENSITIVE
<i>Astragalus cobrensis</i> var. <i>maguirei</i>	Milkvetch, coppermine					Verified			G4T1	S1	None	Species of Concern	BLM SENSITIVE
<i>Astragalus Gypsodes</i>	Milkvetch, Gypsum							Verified	G2	S2	None	Species of Concern	BLM SENSITIVE
<i>Astragalus Knightii</i>	Milkvetch, Knight's			Verified					G2	S2	None	Species of Concern	BLM SENSITIVE
<i>Astragalus Ripleyi</i>	Milkvetch, Ripley		Verified	Potential					G3	S3?	None	Species of Concern	BLM SENSITIVE
<i>Boechera zephyra</i>	Wind Mountain Rockcress					Verified		Potential	G1	S1	None	None	BLM SENSITIVE *New*
<i>Castilleja organorum</i>	Paintbrush, Organ Mountains					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE *New*
<i>Cirsium wrightii</i>	Thistle, wright's Marsh				Potential	Potential	Potential	Potential	G2	S2	Candidate	Endangered	BLM SENSITIVE
<i>Coryphantha robustispina</i> ssp. <i>scheeri</i>	Cactus, scheer's beehive					Verified		Verified	G4T3	S2	None	Endangered	BLM SENSITIVE *New*
<i>Cymopterus spellenbergii</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Dermatophyllum guadalupense</i>	Mescalbean, Guadalupe					Verified		Verified	G1T1	S1	Petitioned/ negative 90 day finding	Species of Concern	BLM SENSITIVE
<i>Erigeron acomanus</i>	Fleabane, Acoma	Potential		Verified					G1G2	S1S2	None	Species of Concern	BLM SENSITIVE
<i>Eriogonum lachnogynum var.colobum</i>	Wildbuckwheat, clipped	Potential	Verified	Potential					G4?T2	S2	None	Species of Concern	BLM SENSITIVE
<i>Escobaria duncanii</i>	Cactus, Duncan's Pincushion					Verified			G3T1T2	S1	None	Endangered	BLM SENSITIVE
<i>Escobaria villardii</i>	Cactus, Villard's Pincushion					Verified			G2Q	S2	None	Endangered	BLM SENSITIVE
<i>Hymenoxys ambigens var. Neomexicana</i>	Bitterweed, New Mexico					Verified			G3?T2	S2	None	Species of Concern	BLM SENSITIVE *New*
<i>Justicia wrightii</i>	Water- Willow, Wright's							Verified	G2	S1	None	Species of Concern	BLM SENSITIVE *New*
<i>Lepidospartum burgessii</i>	Scalebroom, gypsum					Verified			G2	S1	None	Endangered	BLM SENSITIVE
<i>Linum allredii</i>	Flax, Allred's							Verified	G1G2	S1S2	None	Species of Concern	BLM SENSITIVE
<i>Mentzelia conspicua</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Mentzelia humilus</i> var. <i>Guadalupensis</i>	Stickleaf, Guadalupe					Verified			G4T1T2	S1S2	None	Species of Concern	BLM SENSITIVE
<i>Mentzelia sivinskii</i>	Sivinski's BlazingstaR	Verified							G3	S3	None	Species of Concern	BLM SENSITIVE *New*
<i>Mentzelia todiltoensis</i>	Stickleaf,Todilito		Potential	Verified	Potential				G1?Q	S3	None	Species of Concern	BLM SENSITIVE *New*
<i>Nerisyrenia hypercorax</i>	Greggia, Crow Flat					Verified			G1G2	S1S2	None	Species of Concern	BLM SENSITIVE
<i>Opuntia Arenaria</i>	Pricklypear, Sand					Verified			G2	S2	None	Endangered	BLM SENSITIVE
<i>Opuntia x viridiflora</i>	Cholla, Santa Fe		Verified						G1Q	S1	None	Endangered	BLM SENSITIVE
<i>Paronychia wilkinsonii</i>	Nailwort, Wilkinson's					Verified			G2	S1	None	Species of Concern	BLM SENSITIVE *New*
<i>Pediomelum pentaphyllum</i>	Scurfpea, Chihuahua					Verified			G1G2	S1	Petitioned/ positive 90 day finding	Endangered	BLM SENSITIVE
<i>Peniocereus greggii</i> var <i>greggii</i>	Cereus, Night-Blooming					Verified			G3G4T2	S3	None	Endangered	BLM SENSITIVE
<i>Penstemon alamosensis</i>	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
<i>Penstemon cardinalis</i> ssp. <i>regalis</i>	Penstemon, Guadalupe							Verified	G3T2T3	S2	None	Species of Concern	BLM SENSITIVE
<i>Perityle Cernua</i>	Cliff Daisy, Nodding					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE
<i>Physaria newberryi</i> var. <i>yesicola</i>	Twinpod, Yeso			Verified	Potential				G3G4T2	S2	None	Species of Concern	BLM SENSITIVE *New*
<i>Proatrisple x pleiantha</i>	Saltbush, Mancos	Verified							G3	S3?	None	Species of Concern	BLM SENSITIVE
<i>Puccinellia Parishii</i>	Alkaligrass, Parish's	Potential		Verified	Potential	Verified			G2G3	S1	None	Endangered	BLM SENSITIVE
<i>Sclerocactus cloverae</i>	Cactus, Clover's	Verified		Potential					G3T3	S3	None	None	BLM SENSITIVE *New*
<i>Sclerocactus cloverae</i> ssp. <i>brackii</i>	Cactus, Brack's Hardwall	Verified		Potential					G3T1	S2	None	Endangered	BLM SENSITIVE
<i>Scrophularia laevis</i>	Figwort, Organ Mountain					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE *New*
<i>Scrophularia macrantha</i>	Figwort, Mimbres					Verified			G2	S2	None	Species of Concern	BLM SENSITIVE
<i>Sibara grisea</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Spermolepis organensis</i>	Scaleseed, Organ Mountains					Verified			G1	S1	None	Species of Concern	BLM SENSITIVE *New*
<i>Streptanthus sparsiflorus</i>	Jewelflower, Sparseflower							Verified	G2Q	S2	Petitioned/ negative 90 day finding	Species of Concern	BLM SENSITIVE
<i>Townsendia gypsophila</i>	Townsend Daisy, Gypsum			Verified					G2	S2	None	Species of Concern	BLM SENSITIVE
Plants - Watch													
<i>Adenophyllum wrightii</i> var. <i>Wrightii</i>	Dogweed, Wright's					Verified			G1?	SNR,S1	Petitioned/ negative 90 day finding	None	WATCH
<i>Agalinis calycina</i>	False Foxglove, Leoncita						Potential	Potential	G1	S1	Petitioned/ negative 90 day finding	None	WATCH
<i>Agastache cana</i>	Giant Hyssop, Grayish-White					Verified			G4	S3	None	Species of Concern	WATCH
<i>Anulocaulis leiosolenus</i> var. <i>gypsogenus</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Arida blepharophylla</i>	Aster, Gypsum Hotspring					Potential			G1	SH	Petitioned/ negative 90 day finding	Species of Concern	WATCH
<i>Asclepias uncialis</i> ssp. <i>ruthiae</i>	Milkweed, Ruth's	Potential							GNR	S1	None	None	WATCH
<i>Astragalus accumbens</i>	Milkvetch, Zuni			Verified					G3	S3	None	Species of Concern	WATCH
<i>Astragalus castetteri</i>	Milkvetch, Castetter's					Verified			G3	S3	None	Species of Concern	WATCH
<i>Astragalus cliffordii</i>	Milkvetch, Clifford's	Potential							GNR	S1	None	Species of Concern	WATCH
<i>Astragalus cyaneus</i>	Milkvetch, Cyanic		Verified	Potential					G4	S4	None	Species of Concern	WATCH
<i>Astragalus feensis</i>	Milkvetch, Santa Fe			Verified		Verified			G3	S3	None	Species of Concern	WATCH
<i>Astragalus heilii</i>	Milkvetch, Heil's	Potential							G1?	S1	None	Species of Concern	WATCH
<i>Astragalus humistratus</i> var. <i>crispulus</i>	Milkvetch, Villous Groundcover				Potential				G4G5T3?	S2	None	None	WATCH
<i>Astragalus kerrii</i>	Milkvetch, Kerr's						Potential		G2	S2	None	Species of Concern	WATCH
<i>Astragalus micromerius</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Astragalus missouriensis</i> var. <i>humistratus</i>	Milkvetch, Pagosa	Potential	Potential						G5T1	S1	None	None	WATCH
<i>Astragalus monumentalis</i> var. <i>cottamii</i>	Milkvetch, Cottam's	Verified							G4T4	S3	None	Species of Concern	WATCH
<i>Astragalus naturitensis</i>	Milkvetch, Naturita	Potential							G2G3	S2	None	Species of Concern	WATCH
<i>Astragalus neomexicanus</i>	Milkvetch, New Mexico						Potential		G3	S3	None	Species of Concern	WATCH
<i>Astragalus nutriosensis</i>	Milkvetch, Apache				Verified				G3?	SNR	None	None	WATCH *New*
<i>Astragalus oocalycis</i>	Milkvetch, Arboles	Verified							G4	S3	None	Species of Concern	WATCH
<i>Astragalus puniceus</i> var. <i>gertrudis</i>	Milkvetch, Taos	Potential	Verified						G4T3?Q	S3?	None	Species of Concern	WATCH
<i>Astragalus siliceus</i>	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
<i>Astragalus waterfallii</i>	Milkvetch, Waterfall's					Verified		Verified	G3?	S2	None	None	WATCH *New*
<i>Astragalus wittmannii</i>	Milkvetch, One-Flowered		Potential						G3	S3	None	Species of Concern	WATCH
<i>Atriplex griffithsii</i>	Saltbush, Griffith's					Verified			G2G3	S2	None	Species of Concern	WATCH
<i>Castilleja ornata</i>	Paintbrush, Swale					Potential			G1	S1	Petitioned/ positive 90 day finding	Species of Concern	WATCH
<i>Castilleja tomentosa</i>	Hairy Indian Paintbrush					Potential			G1Q	S1	None	None	WATCH *New*
<i>Chaetopappa hersheyi</i>	Leastdaisy, Guadalupe							Verified	G3	S3	None	Species of Concern	WATCH
<i>Cleome multicaulis</i>	Spiderflower, Slender		Potential			Potential			G2G3	SH	None	Endangered	WATCH
<i>Cuscuta warneri</i>	Dodder, Warner's					Potential	Potential		GH	S1	None	Species of Concern	WATCH
<i>Dalea scariosa</i>	Prairie Clover, La Jolla			Potential	Potential				G4	S3	None	Species of Concern	WATCH
<i>Delphinium robustum</i>	Larkspur, Robust		Potential						G2G3	S2	None	Species of Concern	WATCH
<i>Draba smithii</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>texensis</i>	Rabbitbrush, Guadalupe					Verified		Potential	G5T2	S2	None	Species of Concern	WATCH
<i>Erigeron bistiensis</i>	Fleabane, Bisti	Verified							G1	S1	Petitioned/ negative 90 day finding	None	WATCH
<i>Eriogonum aliquantum</i>	Wild Buckwheat, Cimarron		Potential						G3	S3	None	Species of Concern	WATCH
<i>Eriogonum lachnogynum</i> var. <i>sarhiae</i>	Buckwheat, Sarah's	Potential							G4?T1	S1	None	Species of Concern	WATCH
<i>Escobaria guadalupensis</i>	Cactus, Guadalupe Pincushion							Potential	G1	S1	Petitioned/ negative 90 day finding	Species of Concern	WATCH
<i>Escobaria organensis</i>	Cactus, Organ Mountains Pincushion					Verified			G2	S2	None	Endangered	WATCH
<i>Euphorbia rayturneri</i>	Spurge, Ray Turner's					Verified			G1	S1	None	None	WATCH
<i>Fissidens littlei</i>	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
<i>Grindelia arizonica</i> var. <i>neomexicana</i>	Gumweed, New Mexico					Potential			G4T3?	SNR	None	Species of Concern	WATCH
<i>Hedeoma apiculata</i>	Pennyroyal, Mckittrick							Verified	G3	S3	None	Species of Concern	WATCH
<i>Helianthus arizonensis</i>	Sunflower, Arizona				Potential				G2G4	SNR	None	Species of Concern	WATCH
<i>Helianthus neglectus</i>	Sunflower, Neglected							Potential	G2Q	SNR	None	None	WATCH
<i>Hexalectris nitida</i>	Coralroot, Shining					Potential		Potential	G3	S1	None	Endangered	WATCH
<i>Hexalectris revoluta</i>	Coralroot, Chisos Mtn					Potential		Potential	G1	S1	Petitioned/ positive 90 day finding	None	WATCH
<i>Hexalectris spicata</i> var. <i>arizonica</i>	Coralroot, Arizona					Potential		Potential	G5T2T4	S2	None	Endangered	WATCH
<i>Hymenoxys vaseyi</i>	Bitterweed, Vasey's					Verified			G2	S2	None	Species of Concern	WATCH
<i>Limosella pubiflora</i>	Mudwort, Chiricahua					Potential			G1Q	S1	None	Species of Concern	WATCH
<i>Mentzelia filifolia</i>	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	Naturese rve Global rank	NHNM State rank	FWS Status	NM Status	BLM Status
<i>Mentzelia springeri</i>	Blazingstar, Springer's		Potential	Potential					G3	S3	None	Species of Concern	WATCH
<i>Nama xylopodum</i>	Nama, Cliff					Verified		Verified	G4?	S4?	None	Species of Concern	WATCH
<i>Oenothera organensis</i>	Evening Primrose, Organ Mountains					Verified			G2	S2	None	Species of Concern	WATCH
<i>Packera spellenbergii</i>	Groundsel, Spellenberg's		Potential						G2	S2	None	Species of Concern	WATCH
<i>Panicum mohavense</i>	Panicum, Mohave				Potential	Potential			G1	S1	Petitioned/ negative 90 day finding	Species of Concern	WATCH
<i>Perityle quinqueflora</i>	Rockdaisy, Five-Flowered					Potential		Potential	G4	S3	None	Species of Concern	WATCH
<i>Perityle staurophylla</i> var. <i>staurophylla</i>	Rockdaisy, New Mexico					Verified			G4T3T4	S3	None	Species of Concern	WATCH
<i>Phacelia cloudcroftensis</i>	Cloudcroft Phacelia					Potential			G1	S1	None	Species of Concern	WATCH *New*
<i>Phacelia serrata</i>	Phacelia, Cinder			Potential					G3	S2	None	Species of Concern	WATCH
<i>Phacelia sivinskii</i>	Scorpionweed, Sivinski's			Verified	Verified	Verified			G3	S3	None	Species of Concern	WATCH



Plant Species Data

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<i>Phemeranthus humilis</i>	Flameflower, Pinos Altos					Potential			G2	S2	None	Species of Concern	WATCH
<i>Phlox caryophylla</i>	Phlox, Pagosa	Potential	Potential						G4	S2	None	Species of Concern	WATCH
<i>Physaria navajoensis</i>	Bladderpod, Navajo	Potential							G2	S1	Petitioned/ positive 90 day finding	Species of Concern	WATCH
<i>Physaria pruinosa</i>	Bladderpod, Pagosa Springs	Potential	Potential						G2	S1	None	Species of Concern	WATCH
<i>Polygala rimulicola</i> var. <i>Rimulicola</i>	Milkwort, Guadalupe							Verified	G3T3	S2	None	Species of Concern	WATCH
<i>Sclerocactus papyracanthus</i>	Cactus, Grama Grass	Potential	Verified	Verified	Potential	Verified	Potential		G4	S4	None	None	WATCH (downlisted)
<i>Senecio Cliffordii</i>	Groundsel, Clifford's	Potential							GNR	S2	None	Species of Concern	WATCH
<i>Senecio Warnockii</i>	Ragwort, Warnock's					Verified		Verified	G3Q	S2	Species of Concern	Species of Concern	WATCH *New*
<i>Sicyos glaber</i>	Cucumber, Smooth Bur					Verified			G3	S1S2	None	Species of Concern	WATCH *New*
<i>Silene Plankii</i>	Catchfly, Plank's				Verified	Potential			G2	S2	None	Species of Concern	WATCH
<i>Silene Thurberi</i>	Campion, Thurber's					Potential			G4	S3?	None	Species of Concern	WATCH

Plant Species Data

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<i>Silene Wrightii</i>	Catchfly, Wright's				Potential	Verified			G3	S2	None	Species of Concern	WATCH
<i>Stellaria porsildii</i>	Starwort, Porsild's					Potential			G1	S1	Petitioned/ negative 90 day finding	Species of Concern	WATCH
<i>Talinum brachypodum</i>	Fameflower, Laguna			Potential	Potential				GNRQ	S1	None	Species of Concern	WATCH
<i>Valeriana texana</i>	Valerian, Guadalupe							Verified	G3	S3	None	Species of Concern	WATCH
<i>Viola calcicola</i>	Limestone Violet					Potential		Verified	G3	S3	None	Species of Concern	WATCH *New*

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<b>Amphibians</b>													
<i>Anaxyrus (Bufo) microscaphus</i>	Southwestern (Arizona) toad	None	None	Potential	Verified	Verified	None	None	G3G4	S3	Under Review	SGCN	<b>BLM Sensitive</b>
<i>Lithobates (Rana) pipiens</i>	Northern leopard frog	Verified	Verified	Verified	Verified	None	None	None	G5	S3	None	SGCN	<b>BLM Sensitive</b>
<b>Amphibians - Watch</b>													
<i>Craugastor (Eleutherodactylus) augusti latrans</i>	Eastern barking frog	None	None	None	None	Verified	Verified	Verified	G5T4	S2S3	None	SGCN	<b>Watch</b>
<i>Gastrophryne olivacea</i>	Western narrowmouth toad	None	Potential	None	None	Verified	None	Verified	G5	S1	None	Endangered, SGCN	<b>Watch</b>
<i>Lithobates (Rana) blairi</i>	Plains leopard frog	Verified	Verified	None	None	Verified	Verified	Verified	G5	S4	Former FWS Species	SGCN	<b>Watch</b>
<i>Lithobates yavapaiensis</i>	Lowland Leopard Frog	None	None	None	Potential	Potential	None	None	G4	S1	None	SCGN	<b>Watch *New*</b>
<b>Arthropods</b>													
<i>Danaus plexippus plexippus</i>	Monarch Butterfly	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	SNR	Under Review	None	<b>BLM Sensitive *New*</b>
<i>Lytta mirifica</i>	Anthony Blister Beetle	None	None	None	None	Verified	None	None	G2	SH	Former Category 2	Former (2006)	<b>BLM Sensitive</b>
<i>Ochlodes yuma anasazi</i>	Yuma Skipper	None	Verified	None	None	None	None	None	G5	SNR	None	None	<b>BLM Sensitive</b>
<b>Arthropods - Watch</b>													
<i>Bombus occidentalis</i>	Western Bumble Bee	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	SNR	None	None	<b>Watch *New*</b>
<i>Deronectes (Stictotarsus)</i>	Bonita Diving Beetle	None	None	None	None	None	Potential	None	G2	SNR	Former Category 2	Former (2006)	<b>Watch *New*</b>
<b>Birds</b>													
<i>Aimophila boterii</i>	Botteri's Sparrow	None	None	None	None	Verified	None	None	G4	S1B,S1N	None	SGCN	<b>BLM Sensitive *New*</b>
<i>Ammodramus bairdii</i>	Baird's Sparrow	None	None	None	None	Verified	None	None	G4	S1N	None	Threatened	<b>BLM Sensitive</b>
<i>Ammodramus savannarum</i>	Arizona Grasshopper	None	None	None	None	Verified	None	None	G5TU	S1B,S1N	None	Endangered	<b>BLM Sensitive</b>
<i>Athene cunicularia</i>	Western Burrowing Owl	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4T4	S3	None	SGCN	<b>BLM Sensitive</b>
<i>Anthus spragueii</i>	Sprague's Pipit	None	None	None	Potential	Verified	Verified	Verified	G3G4	S2N	None	SGCN	<b>BLM Sensitive</b>
<i>Antrostomus arizonae</i>	Mexican Whip-poor-will	Potential	Verified	Verified	Verified	Verified	Potential	Potential	GNR	SNR	None	SGCN	<b>BLM Sensitive *New*</b>
<i>Calcarius mccownii</i>	McCown's Longspur	None	Potential	None	Potential	Verified	Verified	Verified	G4	S3N	None	SGCN	<b>BLM Sensitive *New*</b>
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	Potential	Verified	None	Verified	Verified	Verified	Verified	G5	S3N	None	SGCN	<b>BLM Sensitive</b>
<i>Gymnorhinus</i>	Pinyon Jay	Verified	Verified	Verified	Verified	Verified	Verified	Potential	G3	S2S3	None	SGCN	<b>BLM Sensitive</b>
<i>Toxostoma bendirei</i>	Bendire's Thrasher	Verified	Potential	Verified	Verified	Verified	Potential	None	G4	S3B,S3N	None	SGCN	<b>BLM Sensitive</b>

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<i>Tympanuchus pallidicinctus</i>	Lesser Prairie-chicken	None	None	None	None	None	Verified	Verified	G3	S2B,S2N	Under Review	SGCN	BLM Sensitive
<i>Vireo bellii arizonae</i>	Bell's Vireo	None	Verified	None	Verified	Verified	Verified	Verified	G5	S2B,S3N	None	Threatened SGCN	BLM Sensitive
<i>Vermivora virginiae</i>	Virginia's Warbler	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S3B,S4N	None	SGCN	BLM Sensitive *New*
Birds - Watch													
<i>Aphelocoma woodhouseii</i>	Woodhouse's Scrub- Jay	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S5B, S5N	None	None	Watch *New*
<i>Aquila chrysaetos</i>	Golden Eagle	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	SB3, S4N	None	None	Watch
<i>Baeolophus ridgwayi</i>	Juniper Titmouse	Verified	Verified	Verified	Verified	Verified	Potential	Potential	G5	S4B	None	SGCN	Watch *New*
<i>Botaurus lentiginosus</i>	American Bittern	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S2	None	SGCN	Watch
<i>Buteogallus anthracinus</i>	Common Black-Hawk	Potential	Potential	Verified	Verified	Verified	Verified	Verified	G4G5	S2B,S3N	None	Threatened SGCN	Watch
<i>Callipepla squamata</i>	Scaled Quail	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S3	None	None	Watch *New*
<i>Camptostoma imberbe</i>	Northern Beardless-	None	None	None	None	Verified	None	None	G5	S1B,S1N	None	Endangered	Watch
<i>Carpodacus cassinii</i>	Cassin's Finch	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S3B,S5N	None	SGCN	Watch
<i>Charadrius montanus</i>	Mountain Plover	Verified	Verified	Verified	Verified	None	None	None	G3	S2B,S4N	None	SGCN	Watch
<i>Columbina passerina</i>	Common Ground Dove	None	None	None	Potential	Verified	Potential	Verified	G5	S1B,S1N	None	Endangered	Watch
<i>Falco peregrinus</i>	Peregrine Falcon								G4T4	S2B, S3N	Delisted in 1999	SGCN	Watch *New*
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S3	None	SGCN	Watch
<i>Melanerpes lewis</i>	Lewis's Woodpecker	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S3B,S3N	None	SGCN	Watch *New*
<i>Meleagris gallopavo mexicana</i>	Gould's Wild Turkey	None	None	None	None	Verified	None	None	G5T3	S2B S2N	None	Threatened SGCN	Watch
<i>Micrathene whitneyi</i>	Elf Owl	None	None	Verified	Verified	Verified	None	None	G5	S3B,S3N	None	SGCN	Watch
<i>Numenius americanus</i>	Long- billed Curlew	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	SB3, S4N	None	SGCN	Watch
<i>Oreoscoptes montanus</i>	Sage Thrasher	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G4	S3B,S4N	None	None	Watch
<i>Passerina ciris</i>	Painted Bunting	None	None	None	None	Verified	Potential	Verified	G5	S4B,S4N	None	None	Watch
<i>Psiloscoops flammeolus</i>	Flammulated Owl								G4	S3B, S3N	None	SGCN	Watch *New*
<i>Setophaga graciae</i>	Grace's Warbler	Verified	Verified	Verified	Verified	Verified	Verified	None	G5	S3B, S4N	None	SGCN	Watch *New*
<i>Setophaga nigrescens</i>	Black-throated Gray	Verified	Verified	Verified	Verified	Verified	Verified	None	G5	S3B,S4N	None	SGCN	Watch *New*
<i>Spizella atrogularis evura</i>	Black-chinned Sparrow	None	None	Verified	Verified	Verified	Verified	Verified	G5	S3B,S3N	None	SGCN	Watch

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<i>Vermivora luciae</i>	Lucy's Warbler	None	None	None	Verified	Verified	None	None	G5	S3B,S4N	None	SGCN	Watch
<i>Vireo vicinior</i>	Gray Vireo	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G5	S4B S3N	None	Threatened SGCN	Watch
Crustaceans													
<i>Eulimnadia follisimilis</i>	Clam Shrimp	None	None	None	Verified	None	Verified	None	GNR	SNR	None	SGCN	BLM Sensitive
<i>Phallocryptus sublettei</i>	Salt Playa (Sublette's) Fairy Shrimp	None	None	None	None	Verified	None	None	G2	SNR	None	SGCN	BLM Sensitive
<i>Streptocephalus moorei</i>	Moore's Fairy Shrimp	None	None	None	None	Verified	None	None	G1	SNR	None	SGCN	BLM Sensitive
<i>Streptocephalus</i>	Bowman's Fairy Shrimp	None	None	None	None	Verified	None	None	G1	SNR	None	SGCN	BLM Sensitive
Crustaceans - Watch													
<i>Eocyzicus concavus</i>	Sway-backed Clam Shrimp	None	None	None	None	None	Potential	None	G1G3Q	SNR	None	SGCN	Watch *New*
<i>Lepidurus lemmoni</i>	Lynch's Tadpole	None	None	None	None	Verified	None	None	G4	SNR	None	SGCN	Watch *New*
<i>Thamnocephalus mexicanus</i>	Mexican Beavertail	None	None	None	None	Potential	None	None	G3	SNR	None	SGCN	Watch *New*
Fish													
<i>Astyanax mexicanus</i>	Mexican Tetra	None	None	None	None	None	Verified	Verified	G5	S2	None	SGCN	BLM Sensitive
<i>Catostomus clarkii</i>	Desert Sucker	None	None	None	Potential	Verified	None	None	G3G4	S2	Former species of concern	SGCN	BLM Sensitive
<i>Catostomus insignis</i>	Sonora Sucker	None	None	None	Potential	Verified	None	None	G3G4	S2	Former species of concern	SGCN	BLM Sensitive
<i>Catostomus plebeius</i>	Rio Grande Sucker	None	Verified	Potential	Potential	Verified	Potential	Potential	G3G4	S2	None	SGCN	BLM Sensitive
<i>Cycleptus elongatus</i>	Blue Sucker	None	None	None	None	None	Potential	Verified	G3G4	S1	None	Endangered SGCN	BLM Sensitive
<i>Cyprinodon pecosensis</i>	Pecos Pupfish	None	None	None	None	None	Verified	Verified	G2	S1	Former species of concern	SGCN	BLM Sensitive
<i>Etheostoma lepidum</i>	Greenthroat Darter	None	None	None	None	None	Verified	Verified	G3G4	S2	Former species of concern	Threatened SGCN	BLM Sensitive
<i>Gila pandora</i>	Rio Grande Chub	None	Verified	Potential	Potential	Potential	Verified	Verified	G3	S3	None	SGCN	BLM Sensitive
<i>Gila robusta</i>	Roundtail Chub	Potential	Potential	Potential	Potential	Verified	None	None	G3	S2	None	Endangered SGCN	BLM Sensitive
<i>Macrhybopsis tetranema</i>	Peppered Chub	None	Potential	None	None	None	None	None	G1	S1	Former species of concern	SGCN	BLM Sensitive
<i>Moxostoma congestum</i>	Gray Redhorse	None	None	None	None	None	None	Verified	G4	S1	Former species of concern	Endangered SGCN	BLM Sensitive
<i>Percina macrolepida</i>	Bigscale Logperch	None	Introduced	None	None	None	Verified	Verified	G5	S2	None	Threatened SGCN	BLM Sensitive
<i>Phenacobius mirabilis</i>	Suckermouth Minnow	None	Verified	None	None	None	Verified	None	G5	S2	None	SGCN	BLM Sensitive

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<b>Fish - Watch</b>													
<i>Agosia chrysogaster</i>	Longfin Dace	None	None	None	Potential	Verified	Verified	None	G4	S3S4	Former FWS Species of Concern	None	Watch *New*
<i>Ictiobus bubalus</i>	Smallmouth Buffalo	None	None	None	Potential	Verified	Verified	Verified	G5	S3S4	None	None	Watch *New*
<i>Catostomus discobolus discobolus</i>	Bluehead Sucker	Verified	None	None	None	None	None	None	G4T4	S2	None	None	Watch *New*
<i>Catostomus latipinnis</i>	Flannelmouth Sucker	Verified	Potential	None	None	Potential	None	None	G3G4	S1	Former Category 2 Candidate	None	Watch *New*
<i>Ictalurus lupus</i>	Headwater Catfish	None	None	None	None	None	Verified	Verified	G3	S1	Former species of concern	None	Watch *New*
<i>Macrhybopsis aestivalis</i>	Speckled Chub	None	Potential	None	None	None	Verified	Verified	G3G4	S2	None	None	Watch *New*
<i>Notropis jemezanus</i>	Rio Grande Shiner	None	None	None	Potential	None	Verified	Verified	G3	S2	Former species of concern	None	Watch *New*
<i>Oncorhynchus clarki virginalis</i>	Rio Grande Cutthroat Trout	None	Potential	Potential	Potential	Potential	Potential	None	G5	S2	Former Candidate	None	Watch *New*
<b>Mammals</b>													
<i>Choeronycteris mexicana</i>	Mexican long-tongued bat	None	None	None	None	Verified	None	Potential	G3G4	S2S3	None	SGCN	BLM Sensitive
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	Verified	Verified	Verified	Verified	Verified	Verified	Verified	G3G4T3T4	S3S4	None	SGCN	BLM Sensitive
<i>Cynomys gunnisoni</i>	Gunnison's prairie dog	Verified	Verified	Verified	Verified	None	None	None	G5	S2	None	SGCN	BLM Sensitive
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	None	Verified	Potential	Potential	Verified	Verified	Verified	G4	S2	None	SGCN	BLM Sensitive
<i>Euderma maculatum</i>	Spotted bat	Verified	Verified	Verified	Verified	Verified	Verified	Potential	G4	S3	None	Threatened, SGCN	BLM Sensitive
<i>Lasiurus xanthinus</i>	Western yellow bat	None	None	None	None	Verified	None	None	G5	S1	None	Threatened, SGCN	BLM Sensitive
<i>Leptonycteris yerbabuenae</i>	Lesser long-nosed bat	None	None	None	None	Verified	None	None	G3	S3	Delisted 2018	Threatened, SGCN	BLM Sensitive
<i>Lepus callotis</i>	White-sided jack rabbit	None	None	None	None	Verified	None	None	G4T3	S1	None	Threatened,	BLM Sensitive
<i>Sorex arizonae</i>	Arizona shrew	None	None	None	None	Verified	None	None	G3	S1	None	Endangered	BLM Sensitive *New*
<b>Mammals - Watch</b>													
<i>Cratogeomys castanops</i>	Yellow-faced pocket	None	Verified	Verified	Verified	Verified	Verified	Verified	G5	S2	None	None	Watch
<i>Cryptotis parva</i>	Least shrew	None	Potential	None	None	None	Verified	Verified	G5	S2	None	Threatened,	Watch *New*
<i>Idionycteris phyllotis</i>	Allen's lappet-browed	None	None	Potential	Verified	Verified	None	None	G4	S3	None	None	Watch *New*
<i>Lasiurus blossevillii</i>	Western red bat	None	None	None	Verified	Verified	Potential	None	G4	S3	None	None	Watch *New*



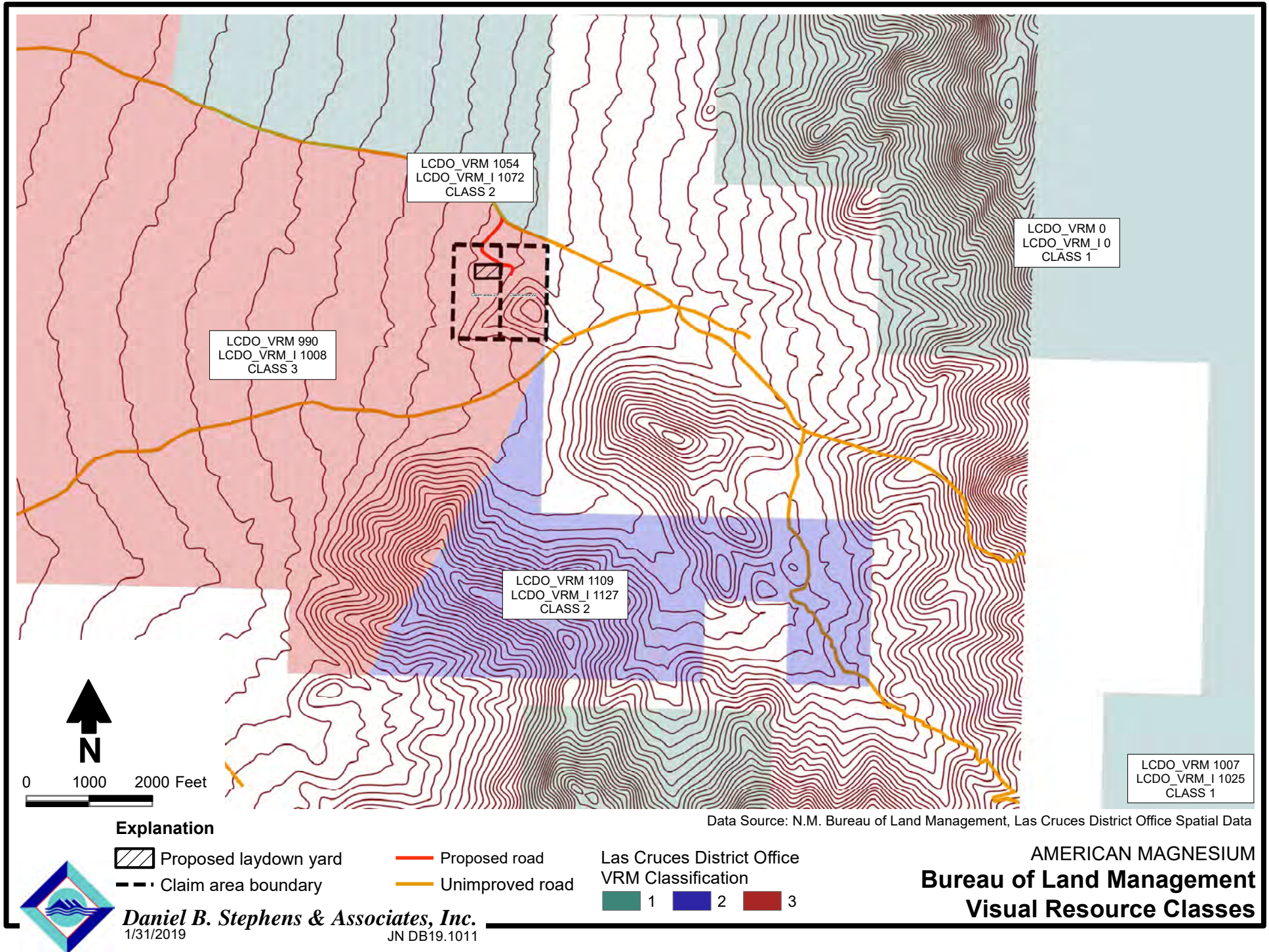
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<i>Lepus townsendii</i>	White-tailed jack rabbit	Potential	Verified	None	None	None	None	None	G5	S3	None	None	Watch
<i>Nasua narica</i>	White-nosed coati	None	None	None	Verified	Verified	None	None	G5	S2	None	None	Watch *New*
<i>Nyctinomops femorosaccus</i>	Pocketed free-tailed	None	None	None	None	Verified	None	Verified	G4	S1	None	None	Watch
<i>Ovis canadensis mexicana</i>	Desert bighorn sheep	None	None	None	Verified	Verified	None	None	G3	S1	None	Threatened	Watch
<i>Reithrodontomys fulvescens canus</i>	Fulvous harvest mouse	None	None	None	None	Verified	None	None	G5	S1	None	None	Watch
<i>Sigmodon ochrognathus</i>	Yellow-nosed cotton rat	None	None	None	None	Verified	None	None	G4	S2	None	None	Watch
<i>Thomomys umbrinus</i>	Southern pocket	None	None	None	Potential	Verified	None	None	G5T2	S2	None	Threatened,	Watch *New*
Mollusks													
<i>Ashmunella hebardii</i>	Hacheta Grande Woodlandsnail	None	None	None	None	Verified	None	None	G1	S1	None	SGCN	BLM Sensitive *New*
<i>Ashmunella macromphala</i>	Cooke's Peak	None	None	None	None	Verified	None	None	G1	S1	None	SGCN	BLM Sensitive *New*
<i>Gastrocopta dalliana dalliana</i>	Shortneck Snaggletooth Snail	None	None	None	None	Potential	None	None	G2G4	S3S4	None	SGCN	BLM Sensitive *New*
<i>Holospira crosseii</i>	Cross Holospira Snail	None	None	None	None	Verified	None	None	G2	S1	None	SGCN	BLM Sensitive *New*
<i>Holospira metcalfi</i>	Metcalf Holospira Snail	None	None	None	None	Verified	None	None	G1	S1	None	SGCN	BLM Sensitive *New*
<i>Pyrgulopsis pecosensis</i>	Pecos Springsnail	None	None	None	None	None	None	Potential	G1	S1	None	SGCN	BLM Sensitive *New*
<i>Radiocentrum ferrissi</i>	Fringed Mountainsnail	None	None	None	None	Potential	None	None	G1	S1	None	SGCN	BLM Sensitive *New*
<i>Sonorella hachitana</i>	New Mexico Talussnail	None	None	None	None	Verified	None	None	G2	S2	None	SGCN	BLM Sensitive *New*
<i>Sonorella hachitana flora</i>	New Mexico Talussnail	None	None	None	None	Verified	None	None	G2T1	S1	None	SGCN	BLM Sensitive *New*
<i>Sonorella todseni</i>	Doña Ana Talussnail	None	None	None	None	Verified	None	None	G1	S1	Former Category 2	SGCN	BLM Sensitive *New*
Mollusks -Watch													
<i>Ashmunella amblya cornudasensis</i>	Woodlandsnail	None	None	None	None	Potential	None	None	G3T3	S3	None	SGCN	Watch *New*
<i>Holospira animasensis</i>	Animas Mountains Holospira Snail	None	None	None	None	Potential	None	None	G1G2	S1	None	SGCN	Watch *New*
Reptiles													
<i>Aspidoscelis dixonii</i>	Gray-checked 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
<i>Heloderma suspectum</i>	Gila Monster	None	None	None	None	Verified	None	None	G4	S2	None	Endangered, SGCN	BLM Sensitive
<i>Pseudemys gorzugi</i>	Western River (Rio Grande) Cooter	None	None	None	None	None	Verified	Verified	G3G4	S2	Under Review	Threatened, SGCN	BLM Sensitive
<i>Sceloporus arenicolus</i>	Dunes Sagebrush Lizard	None	None	None	None	None	Verified	Verified	G2G3	S2	Formerly proposed, withdrawn following	Endangered SGCN	BLM Sensitive
<i>Sistrurus tergeminus</i>	Desert massasauga	None	None	Verified	Verified	Verified	Verified	Verified	G3G4T3T4	S3	Under Review	SGCN	BLM Sensitive *New*
<i>Trachemys gaigeae</i>	Big Bend Slider	None	None	None	Verified	Verified	None	None	G3	S2	None	SGCN	BLM Sensitive
Reptiles - Watch													
<i>Aspidoscelis stictogramma</i>	Giant Spotted Whiptail	None	None	None	None	Verified	None	None	G4	S1	None	Threatened, SGCN	Watch
<i>Crotalus cerberus</i>	Arizona black rattlesnake	None	None	None	Verified	Verified	None	None	G5	SNR	None	SGCN	Watch *New*
<i>Crotalus lepidus lepidus</i>	Mottled Rock Rattlesnake	None	None	None	None	Verified	Potential	Verified	G5T4T5	S2	None	Threatened, SGCN	Watch
<i>Lampropeltis alterna</i>	Gray-banded Kingsnake	None	None	None	None	None	None	Verified	G5	S1	None	Endangered, SGCN	Watch
<i>Sceloporus slevini</i>	Slevin's Bunchgrass Lizard	None	None	None	None	Verified	None	None	G4	S1	None	Threatened, SGCN	Watch

**Appendix F**

**Visual Contrast  
Rating Forms**





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

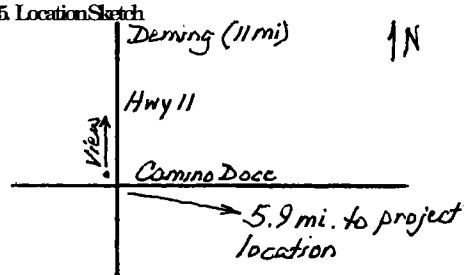
Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name American Magnesium Foothill Dolomite Mine	4. Location Township 25S Range 8W Section 27	5. Location Sketch 
2. Key Observation Point NM State Rd 11 and Camino Doce (view to the north)		
3. VRM Class Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat forms in the fore and middle ground. Pointed landforms in the very far background	Short, globular forms (mesquites) away from the NM Rd 11 roadsides, which have been largely cleared of their vegetation	Flat and wide form represented by NM Rd 11. Rectangular forms on the northeastern corner of the road intersection (fiber optic equipment boxes)
LINE	Nearly flat skyline (other than where distant mountains are visible)	Multiple short, broken lines in the foreground represented by mesquite branches	Tall, vertical lines (power poles) along the eastern side of the road. Buried optic fiber markers (vertical lines) on the northeastern corner of the road intersection in the foreground
COLOR	Grayish tones along road corridor in the foreground	Yellowish to brown (winter); mix of greens and browns during the growing season	Mix of green, orange and gray in the foreground (road sign and fiber optic boxes and markers)
TEXTURE	Smooth to indistinct	Coarse in the foreground; indistinct in the middle ground and background	Smooth (signs, markers and boxes in the foreground)

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No changes	No changes	No changes
LINE	No changes	No changes	Possible additional road signs along NM State Rd 11 would represent additional vertical lines
COLOR	No changes	No changes	No changes, except where additional road signs might be added (if haul trucks use NM Rd 11)
TEXTURE	No changes	No changes	No changes

**SECTION D. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

<b>1.</b>		<b>DEGREE OF CONSTRAST</b>	<b>FEATURES</b>												<b>2.</b> Does project design meet visual resource management objectives?   ■ Yes   □ No (Explain on reverse side)
			<b>LAND/WATER BODY (1)</b>				<b>VEGETATION (2)</b>				<b>STRUCTURES (3)</b>				
			<b>Strong</b>	<b>Moderate</b>	<b>Weak</b>	<b>None</b>	<b>Strong</b>	<b>Moderate</b>	<b>Weak</b>	<b>None</b>	<b>Strong</b>	<b>Moderate</b>	<b>Weak</b>	<b>None</b>	
<b>ELEMENTS</b>	<b>Form</b>				<b>x</b>				<b>x</b>					<b>x</b>	<b>3.</b> Additional mitigating measures recommended? □ Yes   ■ No (Explain on reverse side)
	<b>Line</b>				<b>x</b>				<b>x</b>				<b>x</b>		
	<b>Color</b>				<b>x</b>				<b>x</b>				<b>x</b>		
	<b>Texture</b>				<b>x</b>				<b>x</b>				<b>x</b>		
<b>Evaluator's Names:</b> Jean-Luc E. Cartron, Ph.D. <b>Date :</b> January 28, 2019															

**SECTION D. (Continued)**

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. Haul trucks will likely use Highway 11 north from Camino Doce. However, mining operations would not require road improvement along the NM State Road 11 corridor.

Additional Mitigating Measures (See item 3)

Visual resources in this direction will not be affected by the mining project.



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name American Magnesium Foothill Dolomite Mine	4. Location Township 25S Range 8W Section 27	5. Location Sketch 
2. Key Observation Point Highway 11 and Camino Doce (view to the east)		
3. VRM Class Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	Flat form in the foreground. Mix of pointed and more undulated landforms created by the Florida Mtns and their foothills;	Globular forms in the foreground all representing shrubby vegetation dominated by mesquite. The vegetation in the background is indistinct	Flat and wide form represented by paved road. Diamond-shape road sign on south side of the road in the foreground. In the middle ground: low rectangular forms (buildings) and cylindrical forms (silos?) on south side of the road
LINE	Strong horizontal, irregular skyline at the top of the Florida Mtns.	Multiple short, broken lines in foreground represented by branches of mesquites	Tall, bold vertical lines associated with the presence of power poles along the road
COLOR	Tans to dark browns and grays (Florida Mtns are made of igneous rock; dolomite foothills are a gray color); or bluish due to light scattering	Largely yellowish to dark brown in winter; mix of greens and browns during the growing season	Paved road grayer than surrounding vegetation. Road sign (yellow) and silos (white) contrast with surrounding vegetation and mountains in the background
TEXTURE	See vegetation texture for the foreground. Indistinct in the middle ground and finer texture in the background	Coarse in the foreground; indistinct in the middle ground and background.	Some texture in the foreground due to rocks and gravels. Fine in the middle ground and background

SECTION C. PROPOSED ACTIVITY DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	No changes in the foreground. Hilltop removal would make the hill look more like a mesa, but visual impact dampened by the backdrop of the much larger and taller Florida Mtns. Stockpile area for waste rock and topsoil would not be visible from this distance.	Linear forms created in the background by clearing at the mining site	Initially a mobile office and equipment storage, in addition to sanitation facilities and later road access improvements at the site would all be invisible from this distance
LINE	No changes in the foreground. Lines created by five-foot benches and 20-foot highwalls but visual impact dampened by the much taller, larger backdrop of the Florida Mountains	Benches and stair steps along the hill	New or improved roads may appear as lines in the background, but the lines would likely be (nearly) invisible at this distance.
COLOR	No changes in the foreground. Lighter value of gray color would contrast with native soil color on the project hillside.	Clearing of vegetation may reveal the lighter grayish color of the dolomite, which may be dampened by the glare of the sun at some times of the day leading to a lower chroma value or strength of contrast.	In terms of colors, structures will be designed to blend in with the surrounding landscape; new roads lighter-colored than surrounding landscape
TEXTURE	No changes in the foreground. Indistinct texture in the project area.	No changes in the foreground. Indistinct texture in the project area.	No changes in the foreground. Indistinct texture in the project area.

**SECTION D. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ■ Yes   □ No (Explain on reverse side)	
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None		
<b>ELEMENTS</b>	Form			x				x						x	3. Additional mitigating measures recommended? ■ Yes   □ No (Explain on reverse side)  Evaluator's Names:  Jean-Luc E. Cartron, Ph.D.  Date : January 28, 2019
	Line			x					x				x		
	Color			x				x					x		
	Texture			x				x					x		

**SECTION D. (Continued)**

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. No construction of permanent structures for mining operations or ancillary facilities will be required. The mining operation does not require support structures to be constructed. AmMg will have a mobile office trailer and portable out-house and sanitation facilities for workers on the site, all of which will be removed following mining. From the intersection between NM Rd 11 and Camino Doce, the proposed project area appears small and blends in against the backdrop of the Florida Mountains. Even with vegetation clearing and the physical alteration of the hill (removal of hilltop, construction of benches and stair steps), the project area would be unlikely to stand out from this much distance.

**Additional Mitigating Measures (See item 3)**

To mitigate the contrast of landforms, lines, color, and texture, mitigation measures will involve the following:

- 1) Recontouring of the slopes of the terraces to match adjacent slopes.
- 2) Changing the contour of the top of the terrace/benches to be curvilinear or undulating.
- 3) The area will be seeded with a mixture of native plants seeds which will include native shrubs, grasses and forbs that match the adjacent area.
- 4) Choose neutral tones for the office trailer and portable out-houses

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

<b>1. Project Name</b> American Magnesium Foothill Dolomite Mine	<b>4. Location</b> Township 25S	<b>5. Location Sketch</b> 
<b>2. Key Observation Point</b> Camino Doce/Mahoney Park Road and McCan Road (view to the north)	Range 8W Section 27	
<b>3. VRM Class</b> Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat forms in the fore and middle ground. Pointed landforms in the very far background (Cooke's Peak)	Short and globular forms where mesquites grow along the road.	Flat and wide form represented by McCan Rd. Diamond-shaped road sign in the foreground on the eastern side of the road. Low, rectangular forms in the middle ground (buildings)
LINE	Pointed lines in the far background (Cooke's Peak)	Short, broken lines in the foreground represented by mesquite branches and grass stems. Line of trees (vertical lines) in the middle ground	Tall, vertical lines (power poles) along the western side of the road.
COLOR	Grayish tones along road corridor in the foreground	Yellowish to brown (winter); mix of greens and browns during the growing season	Power poles are brown, cattle sign on the eastern side of the road is yellow and black
TEXTURE	Small rocks (granular texture) along the west side of the road	Coarse in the foreground; indistinct in the middle ground and background	Coarse to indistinct (power poles); smooth (road sign)

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No changes	No changes	No changes
LINE	No changes	No changes	Possible additional road signs along McCan Rd would represent additional vertical lines
COLOR	No changes	No changes	No changes, except where additional road signs might be added (if haul trucks use McCan Rd)
TEXTURE	No changes	No changes	No changes

**SECTIOND. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

1.  DEGREE  OF  CONSTRAT		FEATURES												2. Does project design meet visual resource management objectives?   ■ Yes   □ No (Explain on reverse side)
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
ELEMENTS	Form				x				x				x	3. Additional mitigating measures recommended? □ Yes   ■ No (Explain on reverse side)
	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 reverse side)														
3. Additional mitigating measures recommended? □ Yes   ■ No (Explain on reverse side)														
Evaluator's Names:  Jean-Luc E. Cartron, Ph.D.  Date : January 28, 2019														

**SECTIOND. (Continued)**

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. Haul trucks may use McCan Rd north from Camino Doce. However, mining operations would likely not require road improvement or widening along that road.

Additional Mitigating Measures (See item 3)

Visual resources in this direction will not be affected by the mining project.

UNITED STATES  
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VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

<b>1 Project Name</b> American Magnesium Foothill Dolomite Mine	<b>4 Location</b> Township 25S Range 8W Section 27	<b>5 Location Sketch</b> 
<b>2 Key Observation Point</b> Camino Doce/Mahoney Park Road and McCan Road (view to the east)		
<b>3 VRM Class</b> Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	Flat form in the foreground. Mix of pointed and more undulated landforms created by the Florida Mtns and their foothills	Globular forms in the foreground all representing shrubby vegetation dominated by mesquite. The vegetation in the background is indistinct	Flat and wide forms represented by dirt roads
LINE	Strong horizontal, irregular skyline at the top of the Florida Mtns.	Multiple short, broken lines in foreground represented by branches of mesquites	Short, vertical lines associated with the presence of power poles along the road
COLOR	Tans to dark browns and grays (Florida Mtns are made of igneous rock; dolomite foothills are a gray color)	Largely yellowish to dark brown in winter; mix of greens and browns during the growing season	Unpaved road lighter-colored than surrounding vegetation
TEXTURE	See vegetation texture for the foreground. Indistinct in the middle ground and finer texture in the background	Coarse in the foreground; indistinct in the middle ground and background.	Some texture in the foreground due to rocks and gravels. Fine in the middle ground and background

SECTION C. PROPOSED ACTIVITY DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	No changes in the foreground. Hilltop removal would make the hill look more like a mesa, but visual impact dampened by the backdrop of the much larger and taller Florida Mtns.	Linear forms created in the background by clearing at the mining site	Initially a mobile office, equipment storage, and explosive storage silo, in addition to sanitation facilities and stockpile areas for waste rock and topsoil; later road access improvements
LINE	No changes in the foreground. Lines created by five-foot benches and 20-foot highwalls but visual impact dampened by the much taller, larger backdrop of the Florida Mountains	Benches and stair steps along the hill	New or more distinct lines created where road construction or improvement will take place. The new road (only 2000 linear feet) is unlikely to be visible in the distance as a result of the surrounding vegetation.
COLOR	No changes in the foreground. Lighter value of gray color would contrast with native soil color on the project hillside.	Clearing of vegetation may reveal the lighter grayish color of the dolomite, which may be dampened by the glare of the sun at some times of the day.	In terms of colors, structures will be designed to blend in with the surrounding landscape; new roads lighter-colored than surrounding landscape
TEXTURE	No changes in the foreground. Indistinct texture in the project area.	No changes in the foreground. Indistinct texture in the project area.	No changes in the foreground. Indistinct texture in the project area.

**SECTION D. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

<b>1. DEGREE OF CONTRAST</b>		<b>FEATURES</b>												<b>2. Does project design meet visual resource management objectives?   ■ Yes   □ No (Explain on reverse side)</b>
		<b>LANDWATER BODY (1)</b>				<b>VEGETATION (2)</b>				<b>STRUCTURES (3)</b>				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
<b>ELEMENTS</b>	Form			x				x					x	<b>3. Additional mitigating measures recommended?   ■ Yes   □ No (Explain on reverse side)</b>  <b>Evaluator's Names:</b>  Jean-Luc E. Cartron, Ph.D.  <b>Date :</b> January 28, 2019
	Line			x					x			x		
	Color			x				x				x		
	Texture			x				x				x		

**SECTION D. (Continued)**

Comments from item 2.

AmMg proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. No construction of permanent structures for mining operations or ancillary facilities will be required. The mining operation does not require support structures to be constructed. AmMg will have a mobile office trailer and portable out-house and sanitation facilities for workers on the site, all of which will be removed following mining.

Additional Mitigating Measures (See item 3)

To mitigate the contrast of landforms, lines, color, and texture, mitigation measures will involve the following:

- 1) Once the project is completed: recontouring of the slopes of the terraces to match adjacent slopes.
- 2) Once the project is completed: changing the contour of the top of the terrace/benches to be curvilinear or undulating.
- 3) Once the project is completed: the area will be seeded with a mixture of native plants seeds which will include native shrubs, grasses and forbs that match the adjacent area.
- 4) Choose neutral tones for the office trailer and the out-houses



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

<b>1 Project Name</b> American Magnesium Foothill Dolomite Mine	<b>4 Location</b> Township 25S	<b>5 Location Sketch</b> 
<b>2 Key Observation Point</b> Mahoney Park Road and unimproved BLM road (view to the east)	Range 8W	
<b>3 VRM Class</b> Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a> .	Section 27	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	Flat form in the foreground. Mix of pointed and more undulated landforms created by the Florida Mtns and their foothills	Globular forms in the foreground all representing shrubby vegetation dominated by mesquite and yuccas. The vegetation in the background is indistinct	Flat and wide form represented by the dirt road to the mine site.
LINE	Irregular, horizontal skyline at the top of the Florida Mtns.	Multiple short, broken lines in the middle ground represented by branches of mesquites, Radiating lines from yucca leaves	Multiple lines in the road (tire tracks); horizontal, vertical, and diagonal lines associated with fencing around the work site
COLOR	Tans to dark browns and grays (Florida Mtns are made of igneous rock; dolomite foothills are a gray color); may appear bluish due to light scattering	Largely yellowish (grass) to dark brown (mesquite) and green (yuccas) in winter; mix of greens and browns during the growing season	Unpaved road grayer than surrounding landscape
TEXTURE	See vegetation texture for the foreground. Indistinct in the middle ground and finer texture in the background	Coarse in the foreground and middle ground; indistinct in the background.	Some texture in the foreground due to rocks and gravels. Finer-textured or indistinct in the middle ground and background

SECTION C. PROPOSED ACTIVITY DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	Flat form in the foreground. Mix of pointed and more undulated landforms created by the Florida Mtns and their foothills	Globular forms in the foreground all representing shrubby vegetation dominated by mesquite and yuccas. The vegetation in the background is indistinct	Flat and wide form represented by the dirt road to the mine site.
LINE	Irregular, horizontal skyline at the top of the Florida Mtns.	Multiple short, broken lines in the middle ground represented by branches of mesquites, Radiating lines from yucca leaves	Multiple lines in the road (tire tracks)
COLOR	Tans to dark browns and grays (Florida Mtns are made of igneous rock; dolomite foothills are a gray color); may appear bluish due to light scattering	Largely yellowish (grass) to dark brown (mesquite) and green (yuccas) in winter; mix of greens and browns during the growing season	Unpaved road grayer than surrounding landscape
TEXTURE	See vegetation texture for the foreground. Indistinct in the middle ground and finer texture in the background	Coarse in the foreground and middle ground; indistinct in the background.	Some texture in the foreground due to rocks and gravels. Finer-textured or indistinct in the middle ground and background

**SECTION D. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives?   ■ Yes   □ No (Explain on reverse side)
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
<b>ELEMENTS</b>	Form		x				x				x			3. Additional mitigating measures recommended? ■ Yes   □ No (Explain on reverse side)  Evaluator's Names:  Jean-Luc E. Cartron, Ph.D.  Date : January 28, 2019
	Line		x				x				x			
	Color		x				x				x			
	Texture		x				x					x		

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. No construction of permanent structures for mining operations or ancillary facilities will be required. Even if primary crushing onsite is needed, the crushing facility will be removed at the end of the mining operations. The mining operation does not require support structures to be constructed. AmMg will have a mobile office trailer and portable out-house and sanitation facilities for workers on the site, all of which will be removed following mining.

Additional Mitigating Measures (See item 3)

To mitigate the contrast of landforms, lines, color, and texture, mitigation measures will involve the following:

- 1) Once the project is completed: recontouring of the slopes of the terraces to match adjacent slopes.
- 2) Once the project is completed: changing the contour of the top of the terrace/benches to be curvilinear or undulating.
- 3) Once the project is completed: the area will be seeded with a mixture of native plants seeds which will include native shrubs, grasses and forbs that match the adjacent area.
- 4) Choose neutral tones for office trailer and portable out-house

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

<b>1 Project Name</b> American Magnesium Foothill Dolomite Mine	<b>4 Location</b> Township 25S Range 8W Section 27	<b>5 Location Sketch</b> 
<b>2 Key Observation Point</b> Mahoney Park Road and unimproved BLM road (view to the west)		
<b>3 VRM Class</b> Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	Flat forms in the foreground and middle ground. Pointed forms in the far background (mountains)	Globular forms in the foreground (mesquites and yuccas)	Flat and wide form represented by Mahoney Park Rd. Rectangular forms in the middle ground on the northern side of the road (buildings and cars)
LINE	Nearly flat skyline	Short broken, or radiating lines in the foreground (mesquite branches and thickened leaves of yuccas)	Tall, vertical lines along the northern side of the road (power poles).
COLOR	Grayish tones along road corridor in the foreground	Yellowish (grass), green (yuccas), and brown (mesquites) during the winter; mix of greens and browns during the growing season	Brown (power poles); white and brown buildings/cars in the middle ground. One green rooftop also in the middle ground
TEXTURE	Smooth to indistinct	Smooth to indistinct	Coarse (power pole in the foreground); otherwise smooth to indistinct

SECTION C. PROPOSED ACTIVITY DESCRIPTION

1. LANDWATER		2. VEGETATION	3. STRUCTURES
FORM	No changes	No changes	No changes
LINE	No changes	No changes	Lines might be added if road signs are installed for haul truck traffic
COLOR	No changes	No changes	Color might be added if road signs are installed for haul truck traffic
TEXTURE	No changes	No changes	No changes

**SECTION D. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

1.  DEGREE  OF  CONSTRAST		FEATURES												2. Does project design meet visual resource management objectives?   ■ Yes   □ No (Explain on reverse side)
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
<b>ELEMENTS</b>	Form				x				x				x	3. Additional mitigating measures recommended? □ Yes   ■ No (Explain on reverse side)  Evaluator's Names:  Jean-Luc E. Cartron, Ph.D.  Date : January 28, 2019
	Line				x				x			x		
	Color				x				x			x		
	Texture				x				x				x	

**SECTION D. (Continued)**

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. Road improvement/widening unlikely along Mahoney Park Rd.

Additional Mitigating Measures (See item 3)

Visual resources in this direction will not be affected by the mining project.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

<b>1 Project Name</b> American Magnesium Foothill Dolomite Mine	<b>4 Location</b> Township 25S Range 8W Section 27	<b>5 Location Sketch</b> 
<b>2 Key Observation Point</b> BLM road and access road onto mine site (view to the southeast)		
<b>3 VRM Class</b> Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat form in the foreground. Mix of pointed and more undulated landforms created by the Florida Mtns and their foothills	Globular forms in the foreground all representing shrubby vegetation dominated by mesquite and yuccas. The vegetation in the background is indistinct	Flat and wide form represented by the dirt road to the mine site.
LINE	Irregular, horizontal skyline at the top of the Florida Mtns.	Multiple short, broken lines in the middle ground represented by branches of mesquites, Radiating lines from yucca leaves	Multiple lines in the road (tire tracks)
COLOR	Tans to dark browns and grays (Florida Mtns are made of igneous rock; dolomite foothills are a gray color); may appear bluish due to light scattering	Largely yellowish (grass) to dark brown (mesquite) and green (yuccas) in winter; mix of greens and browns during the growing season	Unpaved road grayer than surrounding landscape
TEXTURE	See vegetation texture for the foreground. Indistinct in the middle ground and finer texture in the background	Coarse in the foreground and middle ground; indistinct in the background.	Some texture in the foreground due to rocks and gravels. Finer-textured or indistinct in the middle ground and background

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No changes in the foreground. Hilltop removal would make the hill look more like a mesa, but visual impact dampened by the backdrop of the larger and taller Florida Mtns. Topsoil and waste pile would create a pyramidal shape against the backdrop of the mountains, leaving a less natural form.	Linear forms created in the middle ground by clearing at the mining site	Rectangular forms where office trailer and portable out-houses are installed.
LINE	No changes in the foreground. Lines created by five-foot benches and 20-foot highwalls but visual impact dampened by the taller, larger backdrop of the Florida Mountains.		New or more distinct lines created where road construction or straightening occurs; horizontal, vertical, and diagonal lines associated with fencing around the work site.
COLOR	No changes in the foreground. Project area may appear lighter value of gray than surrounding landscape, but visual impact may be dampened by light scattering.	Clearing of vegetation may reveal grayish color of dolomite, which may be dampened by light scattering and the backdrop of the mountains	New colors introduced in the landscape depending on the choice of trailer and portable out-house. New or widened roads will also add more gray to the surrounding landscape.
TEXTURE	No changes in the foreground. Indistinct texture in the project area.	No changes in the foreground. Indistinct texture in the project area.	No changes in the foreground. Smooth texture (trailer and portable out-house) in the project area, rougher texture for road.

**SECTION D. CONTRAST RATING   ■ SHORT TERM   □ LONG TERM**

1.  DEGREE  OF  CONTRAST		FEATURES												2. Does project design meet visual resource management objectives?   ■ Yes   □ No (Explain on reverse side)
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
ELEMENTS	Form		x				x				x			3. Additional mitigating measures recommended? ■ Yes   □ No (Explain on reverse side)
	Line		x				x				x			
	Color		x				x				x			
	Texture			x			x				x			
<div style="display: flex; justify-content: space-between;"> <div> <b>Evaluator's Names:</b>   Jean-Luc E. Cartron, Ph.D.   <b>Date :</b> January 28, 2019 </div> </div>														

**SECTION D. (Continued)**

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. No construction of permanent structures for mining operations or ancillary facilities will be required. The topsoil pile is expected to be small and the mining operation does not require support structures to be constructed. AmMg will have a mobile office trailer and portable out-house and sanitation facilities for workers on the site, all of which will be removed following mining. Fencing may be temporarily installed around the work site.

Additional Mitigating Measures (See item 3)

To mitigate the contrast of landforms, lines, color, and texture, mitigation measures will involve the following:

- 1) Once the project is completed: recontouring of the slopes of the terraces to match adjacent slopes.
- 2) Once the project is completed: changing the contour of the top of the terrace/benches to be curvilinear or undulating.
- 3) Once the project is completed: the area will be seeded with a mixture of native plants seeds which will include native shrubs, grasses and forbs that match the adjacent area.
- 4) Choose neutral tones for the office trailer and the out-houses



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

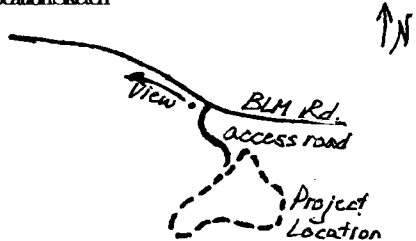
Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name American Magnesium Foothill Dolomite Mine	4. Location Township 25S Range 8W Section 27	5. Location Sketch 
2. Key Observation Point BLM road and access road onto mine site (view to the west)		
3. VRM Class Class III: based on Visual Resource Management GIS shape file downloaded from <a href="https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html">https://www.nm.blm.gov/shapeFiles/lcdo/las_cruces_spatial.html</a>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat forms in the foreground and middle ground. Pointed forms in the far background (mountains)	Globular forms (yuucas and mesquites) in the foreground and middle ground	Flat and wide form represented by the BLM access road
LINE	Nearly flat skyline	Radiating lines (yuca leaves) in the foreground; small broken lines (mesquite branches) in the middle ground	Tire tracks form lines in the road
COLOR	Grayish tones along road	Yellowish (grass), green (yuccas), and brown (mesquites) during the winter; mix of greens and browns during the growing season	Gray (road)
TEXTURE	Smooth to indistinct	Smooth and patchy to indistinct	Rough texture (road surface)

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No changes	No changes	Road could be straightened (linear form extending farther in the background) and widened
LINE	No changes	No changes	No changes
COLOR	No changes	No changes	No changes
TEXTURE	No changes	No changes	No changes

**SECTION D. CONTRAST RATING    ☒ SHORT TERM    ☐ LONG TERM**

1.  DEGREE  OF  CONSTRAST		FEATURES												2. Does project design meet visual resource management objectives? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
ELEMENTS	Form				x				x		x			3. Additional mitigating measures recommended? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)  Evaluator's Names:  Jean-Luc E. Cartron, Ph.D.  Date : January 28, 2019
	Line				x				x				x	
	Color				x				x				x	
	Texture				x				x				x	

**SECTION D. (Continued)**

Comments from item 2.

American Magnesium (AmMg) proposes to create, over the life of the project, a total of 44 acres of surface disturbance. The proposed disturbance under Phase I will create a total of approximately 15 acres of new surface disturbance. The remaining surface disturbance acreage (29 acres) will be utilized through resource verification under subsequent phases over approximately five years. No construction of permanent structures for mining operations or ancillary facilities will be required. The topsoil pile is expected to be small and the mining operation does not require support structures to be constructed. AmMg will have a mobile office trailer and portable out-house and sanitation facilities for workers on the site, all of which will be removed following mining. Fencing may be temporarily installed around the work site.

**Additional Mitigating Measures (See item 3)**

To mitigate the contrast of landforms, lines, color, and texture, mitigation measures will involve the following:

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- 4) Choose neutral tones for the office trailer and the out-houses

## **Appendix G**

### **Laboratory Reports**

**Appendix G1**  
**Whole-Rock Analysis**



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To: **TOGNONI, DAVID**  
**P.O. BOX 684**  
**ELEPHANT BUTTE NM 87935**

Page:  
Total # Pages: 4 (A -  
Plus Appendix Page  
Finalized Date: 30- MAR- 2016  
Account: TOGVI

**CERTIFICATE RE16038329**

O. No.: 16038329

This report is for 90 Rock samples submitted to our lab in Reno, NV, USA on 5- MAR- 2016.

The 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 invest should be made only after the potential investment value of the claim or deposit has been determined based on the results of assays of multiple samples of geological materials collected by the prospective investor or by a qualified person selected by him/her and based on an evaluation of all engineering data which is available concerning any proposed project. Statement required by Nevada State Law NRS 519

To: **TOGNONI, DAVID**  
**P.O. BOX 684**  
**ELEPHANT BUTTE NM 87935**

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. 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 Manager



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Page: 2 -  
Total # Pages: 4 (A -  
Plus Appendix Pag  
Finalized Date: 30- MAR- 20  
Account: TOGV

# CERTIFICATE OF ANALYSIS RE16038329

Sample Description	Method Analyte Units LOR	WEI- 21 Recvd Wt. kg 0.02	ME- XRF26 Al2O3 % 0.01	ME- XRF26 BaO % 0.01	ME- XRF26 CaO % 0.01	ME- XRF26 Cr2O3 % 0.01	ME- XRF26 Fe2O3 % 0.01	ME- XRF26 K2O % 0.01	ME- XRF26 MgO % 0.01	ME- XRF26 MnO % 0.01	ME- XRF26 Na2O % 0.01	ME- XRF26 P2O5 % 0.01	ME- XRF26 SO3 % 0.01	ME- XRF26 SiO2 % 0.01	ME- XRF26 SrO % 0.01	ME- XRF26 TiO2 % 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





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Page: 2 -  
 Total # Pages: 4 (A -  
 Plus Appendix Pag  
 Finalized Date: 30- MAR- 20  
 Account: TOGV

# CERTIFICATE OF ANALYSIS RE16038329

Sample Description	Method Analyte Units LOR	ME- XRF26	OA- GRA05x
		Total %	LOI 1000 %
		0.01	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



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Page: 3 -  
Total # Pages: 4 (A -  
Plus Appendix Pag  
Finalized Date: 30- MAR- 20  
Account: TOGV

# CERTIFICATE OF ANALYSIS RE16038329

Sample Description	Method Analyte Units LOR	WEI- 21 Recvd Wt. kg 0.02	ME- XRF26 Al2O3 % 0.01	ME- XRF26 BaO % 0.01	ME- XRF26 CaO % 0.01	ME- XRF26 Cr2O3 % 0.01	ME- XRF26 Fe2O3 % 0.01	ME- XRF26 K2O % 0.01	ME- XRF26 MgO % 0.01	ME- XRF26 MnO % 0.01	ME- XRF26 Na2O % 0.01	ME- XRF26 P2O5 % 0.01	ME- XRF26 SO3 % 0.01	ME- XRF26 SiO2 % 0.01	ME- XRF26 SrO % 0.01	ME- XRF26 TiO2 % 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



ALS USA Inc.  
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 ELEPHANT BUTTE NM 87935

Page: 3 -  
 Total # Pages: 4 (A -  
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 Finalized Date: 30- MAR- 20  
 Account: TOGV

# CERTIFICATE OF ANALYSIS RE16038329

Sample Description	Method Analyte Units LOR	ME- XRF26	OA- GRA05x
		Total % 0.01	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



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# CERTIFICATE OF ANALYSIS RE16038329

Sample Description	Method Analyte Units LOR	WEI- 21 Recvd Wt. kg	ME- XRF26 Al2O3 %	ME- XRF26 BaO %	ME- XRF26 CaO %	ME- XRF26 Cr2O3 %	ME- XRF26 Fe2O3 %	ME- XRF26 K2O %	ME- XRF26 MgO %	ME- XRF26 MnO %	ME- XRF26 Na2O %	ME- XRF26 P2O5 %	ME- XRF26 SO3 %	ME- XRF26 SiO2 %	ME- XRF26 SrO %	ME- XRF26 TiO2 %
		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



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Account: TOGV

**CERTIFICATE OF ANALYSIS RE16038329**

Sample Description	Method Analyte Units LOR	ME- XRF26	OA- GRA05x
		Total %	LOI 1000 %
		0.01	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



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**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- QC	SPL- 21	WEI- 21
			PUL- 31
Applies to Method:	Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.		
	ME- XRF26	OA- GRA05x	



## **Appendix G2**

### **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, 3<sup>rd</sup> 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:

<u>Analyte</u>	<u>Sample ID</u>
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.

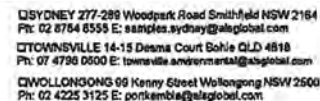
**Client Project Name:** American Magnesium

**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



CLIENT: <u>Amer Foster Wheeler</u>		TURNAROUND REQUIREMENTS : <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)	
OFFICE: <u>Albuquerque</u>		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes No N/A	
PROJECT: <u>American Magnesium</u>		ALS QUOTE NO.:		Fire Ice / frozen ice bricks present upon receipt? Yes No N/A	
ORDER NUMBER: <u>1651700037</u>				Random Sample Temperature on Receipt: °C	
PROJECT MANAGER: <u>Saul Alanis</u>		CONTACT PH:		Other comment:	
SAMPLER: <u>Dave Tagnoni</u>		SAMPLER MOBILE:		RECEIVED BY: <u>Erin D. Penney</u>	
COC emailed to ALS? ((YES) / NO)		EDD FORMAT (or default):		DATE/TIME: <u>8/25/17 9:40</u>	
Email Reports to (will default to PM if no other addresses are listed): <u>Saul.alanis@amerfwh</u>		Email Invoice to (will default to PM if no other addresses are listed): <u>Rosanne.klaus@amerfwh</u>		DATE/TIME: <u>8/25/17 14:00</u>	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: <u>...</u>					

[illegible]

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 Bisulfate 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 Subhalate Solis; B = Unpreserved Bag.





ALS Environmental - Fort Collins  
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Amec  
Project Manager: LS

Workorder No: 1708586  
Initials: COS Date: 8-28-17

1. Does this project require any special handling in addition to standard ALS procedures?		YES	<u>NO</u>
2. Are custody seals on shipping containers intact?	<u>NONE</u>	YES	<u>NO</u>
3. Are Custody seals on sample containers intact?	<u>NONE</u>	YES	<u>NO</u>
4. Is there a COC (Chain-of-Custody) present or other representative documents?		<u>YES</u>	<u>NO</u>
5. Are the COC and bottle labels complete and legible?		<u>YES</u>	<u>NO</u>
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		<u>YES</u>	<u>NO</u>
7. Were airbills / shipping documents present and/or removable?	<u>DROP OFF</u>	<u>YES</u>	<u>NO</u>
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	<u>N/A</u>	YES	<u>NO</u>
9. Are all aqueous non-preserved samples pH 4-9?	<u>N/A</u>	YES	<u>NO</u>
10. Is there sufficient sample for the requested analyses?		<u>YES</u>	<u>NO</u>
11. Were all samples placed in the proper containers for the requested analyses?		<u>YES</u>	<u>NO</u>
12. Are all samples within holding times for the requested analyses?		<u>YES</u>	<u>NO</u>
13. Were all sample containers received intact? (not broken or leaking, etc.)		<u>YES</u>	<u>NO</u>
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: <u>    </u> < green pea <u>    </u> > green pea	<u>N/A</u>	YES	<u>NO</u>
15. Do any water samples contain sediment? Amount of sediment: <u>    </u> dusting <u>    </u> moderate <u>    </u> heavy	<u>N/A</u>	YES	<u>NO</u>
16. Were the samples shipped on ice?		YES	<u>NO</u>
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4 RAD ONLY		YES	<u>NO</u>
Cooler #: <u>1</u>			
Temperature (°C): <u>Amb</u>			
No. of custody seals on cooler: <u>2</u>			
External µR/hr reading: <u>9</u>			
Background µR/hr reading: <u>10</u>			
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: *JS* 8/29/17

1708584

ORIGIN: DABOA (505) 821-1801  
 BILL TO: JENNIFER J. JENNIFERSON ST NE  
 ALBUQUERQUE, NM 87113  
 UNITED STATES US

SHIP DATE: 25 AUG 17  
 ACT WT: 2.25 LB  
 CAD: 2420349/NET 3920

BILL SENDER

TO: **SAMPLE RECEIVING**  
 ALS  
 225 COMMERCE DR.  
 FORT COLLINS CO 80524

REF: 16517200037  
 PO: 5120 573-1061  
 DEPT: 90

549J1577E104C

317281762501uv

**FedEx**  
 Business

MON - 28 AUG 3:00P  
 STANDARD OVERNIGHT

TRK# 7701 1643 0527  
 0201

**XH FTCA**  
 80524  
 CO-US DEN


**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](http://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 Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Client: AMEC Environment &amp; 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
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## ALS -- Fort Collins

## SAMPLE SUMMARY REPORT

Client: AMEC Environment & Infrastructure, Inc.  
 Project: 1651700037 American Magnesium  
 Sample ID: 87  
 Legal Location:  
 Collection Date: 8/24/2017 15:46

Date: 18-Sep-17

Work Order: 1708586

Lab ID: 1708586-2

Matrix: LEACHATE

Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>SPLP ICP Metals</b>			<b>SW6010</b>		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
<b>SPLP ICPMS Metals</b>			<b>SW6020</b>		Prep Date: 9/12/2017	PrepBy: JML
URANIUM	ND		0.001	MG/L	10	9/14/2017 01:07
<b>SPLP Mercury</b>			<b>SW7470</b>		Prep Date: 9/6/2017	PrepBy: CHW
MERCURY	ND		0.0002	MG/L	1	9/6/2017 16:51

**Client:** AMEC Environment & Infrastructure, Inc.  
**Project:** 1651700037 American Magnesium  
**Sample ID:** 87  
**Legal Location:**  
**Collection Date:** 8/24/2017 15:46

**Date:** 18-Sep-17  
**Work Order:** 1708586  
**Lab ID:** 1708586-2  
**Matrix:** LEACHATE  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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### 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

# ALS -- Fort Collins

Date: 9/18/2017 11:48

Client: AMEC Environment & Infrastructure, Inc.  
 Work Order: 1708586  
 Project: 1651700037 American Magnesium

## QC BATCH REPORT

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



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: 9/13/2017 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](mailto: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)  
**Project:** American Magnesium/16-517-00037

**Service Request:** T1800235

**SAMPLE CROSS-REFERENCE**

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
T1800235-001	87	2/12/2018	0000



**WOLLONGONG** 2 Kenny Street Wollongong NSW 2500  
Ph. 02 4225 3125 E. [northkembla@alsglobal.com](mailto:northkembla@alsglobal.com)

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: *No special handling* Note that expedited TAT is being requested to achieve the \$150 minimum

[illegible]

**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; BV = 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 E81 (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.