July 31, 2018

Mr. William Childress
District Manager
Bureau of Land Management, Las Cruces District
1800 Marquess Street
Las Cruces, New Mexico 88005

Mr. William Auby
Project Manager
Bureau of Land Management
301 Dinosaur Trail
Santa Fe, New Mexico 87508

Mr. Douglas Haywood
Manager
Bureau of Land Management, Las Cruces District
1800 Marquess Street
Las Cruces, New Mexico 88005

Re: American Magnesium, LLC Application and Amended Plan of Operations

Dear Messrs. Childress, Auby, and Haywood:

Enclosed please find American Magnesium, LLC's Amended Plan of Operations (PoO) to address all items listed in 43 CFR 3809 and all comments received to date by the Bureau of Land Management, Las Cruces District (BLM). It is the intent of the Amended PoO (July 2018) to be considered administratively complete under the BLM's surface management regulations located at 43 CFR Part 3809.401(b) and Part 3809.411(a).

We look forward to receiving a response from the BLM regarding the Amended PoO. We are available to meet to discuss the Amended PoO at the BLM's convenience and look forward to discussing final steps that may be required for the approval of the application and Amended PoO document.

American Magnesium, LLC appreciates the BLM's cooperation and patience. We sincerely hope that we are entering the final stage in the application and PoO being considered administratively complete. Thank you for your time and consideration.

Respectfully,

David Q. Tognoni, Manager
American Magnesium, LLC

DQT/sat

Enclosure: Amended PoO, July 2018

cc: James Hollen, James.hollen@state.nm.us
Holland Shepherd, Holland.shepherd@state.nm.us
Timothy Williams, timothy_williams@ios.doi.gov
Robert MacGregor, robert.macgregor@mail.house.gov
Mark Van Dyke, Mark.vandyke@state.nm.us
Kathy Benedetto, kbenedetto@blm.gov

PLAN OF OPERATIONS

for Dolomite Mining
Deming, New Mexico

March 2017 (Revised July 2018)

Prepared for:

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

– Las Cruces Field Office

Submitted by:

American Magnesium, LLC
104 Rinconada
P.O. Box 684
Elephant Butte, New Mexico 87935

Prepared by:

EnviroSystems Management, Inc.
Environmental Planning • Regulatory Compliance

23 East Fine Avenue
Flagstaff, AZ 86001

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 (EMNRD) Mining and Minerals Division (MMD) by American Magnesium, LLC (AmMg) for a proposed Dolomite mining project (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 43 Code of Federal Regulations (CFR) 3809, as amended, and New Mexico Mining Act Reclamation Program regulations at New Mexico Administrative Code (NMAC) 19.10.3. 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 is located on public lands administered by the BLM in part or all of Sections 26 & 27, Township 25 South, Range 8 West, NMPM, in the Little Florida Mountains Mining District, Luna County, New Mexico (Project Area). The Project Area includes approximately 34.8 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, explosive storage silo, sanitation facilities and stockpile areas for waste rock and topsoil will be constructed for the Project. Once the laydown area is constructed, resource verification will occur in mining Phase areas 1 and 2 in the Project Area followed by Dolomite mining which will occur in all three phases sequentially as described below. Phase 1 consists of 10.2 acres, Phase 2 consists of 6.8 acres and Phase 3 consists of 5.5 acres. There are 13.1 miles of existing BLM roads. The existing access roads will be widened to 16 feet from their current 10-foot width (an additional 9.5 acres of new disturbance) and the new access road will be 16 feet wide by 2,127 feet in length for an additional 0.8 acre.

AmMg proposes to create, over the life of the Project, a total of approximately 34.8 acres of new surface disturbance to BLM managed lands under this PoO. The planned mining activities covered under this PoO consist of the following: core hole drilling for mine planning, Dolomite mining activities, blasting operations (using the mine planning drill holes), geologic and geophysical mapping, construction of resource verification roads, drill sites, maintenance/improvement of the existing roads within the Project Area and the Project access roads, and reclamation of Project-related surface disturbance.

These phased activities with locations of disturbance identified will be submitted in work plans to the BLM prior to initiation. The locations of mining activities will be based on the success of previously completed resource verification activities. The work plans will include

maps that show the location of the proposed surface disturbance to ensure that sensitive resources protected under federal and state regulations are documented and either avoided or otherwise acceptably mitigated. 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.

TABLE OF CONTENTS

Page

1.0 APPLICANT INFORMATION [3809.401(B)(1)] 1
- 1.1 Operator Information 1
- 1.2 Claims Information 1
- 1.3 Individual Completing Application 2
- 1.4 Business Information 2
- 1.5 Corporation Information 2
- 1.6 Partnership Information 2

2.0 DESCRIPTION OF OPERATIONS – PROPOSED ACTION [3809.401(B)(2)] 4
- 2.1 Legal Description [3809.401(b)(2)(i)] 4
- 2.2 Project Access 4
- 2.3 Site Ownership (Acres) and Land Status within Proposed Project Area 4
- 2.4 Description of Proposed Action & Site Conceptual Design [3809.401(b)(2)(ii)] 4
- 2.5 Proposed Equipment [38.09.401(b)(2)ii)] 10
- 2.6 Operating Practices [3809.401(b)(2)ii)] 12
- 2.7 Mining Operations and Ancillary Facilities 12
- 2.8 Site Access and Proposed Constructed Roads 13
- 2.9 Occupancy 17
  - 2.9.1 Proposed Temporary and Permanent Structures 17
  - 2.9.2 Access Restrictions to Mining Site 17
  - 2.9.3 Estimated Duration for Use of On-site Structures 18
- 2.10 Hazardous Materials (Hazmat) 18
- 2.11 Spill Prevention Plan [3809.401(b)(2)(vi)] 19
- 2.12 Project-specific Quality Assurance Plan [3809.401(b)(2)(v)] 19
- 2.13 Water Use and Management [3809.401(b)(2)(iii)] 19
- 2.14 Environmental Protection Measures 20
  - 2.14.1 Water Quality 20
  - 2.14.2 Air Quality 20
- 2.15 Site Conditions 21
  - 2.15.1 Geology 21
  - 2.15.2 Hydrology 21
  - 2.15.3 Soils 22
  - 2.15.4 Vegetation 22
    - 2.15.4.1 Noxious Weeds 23
  - 2.15.5 Cultural and Paleontological Resources 23
  - 2.15.6 Wildlife 25
  - 2.15.7 Migratory Birds 25
  - 2.15.8 Public Safety and Site Access 26
  - 2.15.9 Socioeconomic Conditions of the Proposed Project Area 26
    - 2.15.9.1 Population 27
    - 2.15.9.2 Housing 27

2.16 Proposed Preliminary Schedule of Operations (Concept to Closure) 28
2.17 Other Plans and Requirements 29
3.0 RECLAMATION PLAN [3809.41(B)(3)] 30
3.1 Mine Reclamation [3809.401(b)(3)(ii)] 30
3.2 Regrading and Reshaping of Disturbed Area [3809.401(b)(3)(ii)] 32
3.3 Revegetation [3809.401(b)(3)(vii)] 32
3.4 Wildlife Rehabilitation [3809.401(b)(3)(v)] 33
3.5 Removal of Building and Associated Structures [3809.401(b)(3)(ix)] 33
3.6 Post-Closure Management [3809.401(b)(3)(x)] 33
3.7 Proposed Productive Post-Mining Land Use 33
4.0 MONITORING PLAN [3809.401(B)(4)] 35
4.1 Monitoring Devices 35
4.2 Sampling Parameters and Frequency 36
4.3 Analytical Methods 36
4.4 Reporting Procedures 36
5.0 INTERIM MANAGEMENT PLAN [3809.401(B)(5) 37
5.1 Schedule of Anticipated Periods of Temporary Closure [3809.401(b)(5)(vi)] 37
5.2 Plans for Monitoring Site Conditions during Periods of Non-Operation [3809.401(b)(5)(v)] 37
5.3 Measures to Stabilize Excavations and Workings [3809.401(b)(5)(i)] 37
5.4 Measures to Isolate or Control Toxic or Deleterious Materials [3809.401(b)(5)(ii)] 38
5.5 Provisions for Storage or Removal of Equipment, Supplies, & Structures [3809.401(b)(5)(iii)] 38
5.6 Measures to Maintain the Project Area in a Safe and Clean Condition [3809.401(b)(5)(iv)] 38
6.0 ROCK CHARACTERIZATION AND HANDLING PLAN 39
6.1 Location and Access 39
6.2 Regional Geology 39
6.3 Local and Property Geology 40
6.4 Rock Characteristics 46
6.5 Rock Handling 46
7.0 RECLAMATION COST ESTIMATE [3809.401(D)] 48
7.1 Proposed Reclamation Activities 48
8.0 LIST OF CONTRIBUTORS 49
9.0 REFERENCES 50

LIST OF TABLES

Table 1. Claim Descriptions....1
Table 2. Acreage of Proposed Project Disturbance....9
Table 3. Equipment Type (Potential)....11
Table 4. Complete List of Plant Species Observed in Project Area....22
Table 5. Complete List of Wildlife Species Observed in the Project Area....25
Table 6. Population Change, 2000-2010....27
Table 7. Population Under 18 Years of Age, 2010....27
Table 8. Distribution of Population by Age, 2010....27
Table 9. Preliminary Reclamation Cost Estimate....48

LIST OF FIGURES

Figure 1. Project vicinity map....5
Figure 2. Claim area, proposed laydown yard, and access route locations....6
Figure 3. Proposed mining phases and drilling locations....8
Figure 4. Proposed laydown yard and associated features....14
Figure 5. Typical wash crossing....16
Figure 6. Exploration in the Florida Mountains....42
Figure 7. Dolomite sample site on claims....42
Figure 8. Geology overview....44
Figure 9. Dolomite Mountain cross section....45

LIST OF APPENDICES

APPENDIX A - Blasting Plan
APPENDIX B - Spill Prevention, Control and Counter-Measures Plan
APPENDIX C - Natural Resources Conservation Service Soil Report
APPENDIX D - Biological Survey
APPENDIX E - Site Visit Report Of Florida Mountains (RPA 2014)
APPENDIX F - ALS Sample Report

ACRONYMS AND ABBREVIATIONS

AmMg	American Magnesium, LLC
ASU	Arizona State University
ATF	Bureau of Alcohol, Tobacco, and Firearms
BGS	Below Ground Surface
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
Census	U.S. Census Bureau
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CFR	Code of Federal Regulations
EMNRD	New Mexico Energy, Minerals and Natural Resources Department
IO	Isolated Occurrence
MMD	New Mexico Mining and Minerals Division
MSHA	Mining Safety and Health Administration
MSL	Mean Sea Level
NEPA	National Environmental Policy Act
NIAF	NMCRIS Investigation Abstract Form
NMAC	New Mexico Administrative Code
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)
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
SRCE	Standardized Reclamation Cost Estimator
SMIO	State Mine Inspector's Office
SWPPP	Storm Water Pollution Prevention Plan
USDA	United States Department of Agriculture
WRCS	Waste Rock Characterization Study
WSA	Wilderness Study Area

1.0 APPLICANT INFORMATION [3809.401(b)(1)]

1.1 Operator Information

Operator Name:	American Magnesium, LLC
Mailing Address:	104 Rinconada PO Box 684 Elephant Butte, NM 87935-0684
Phone Number:	(575) 741-1527
Tax Payer Identification Number:	EIN #46-2831543
Point of Contact:	David Q. Tognoni, PE 104 Rinconada PO Box 684 Elephant Butte, NM 87935-0684
Office:	(575) 741-1527
Emergency Contact Information:	David Q. Tognoni, PE 104 Rinconada PO Box 684 Elephant Butte, NM 87935-0684 Office: (575) 741-1527

1.2 Claims Information

Owner(s):	David Q. Tognoni
Address:	PO Box 684 Elephant Butte, NM 87935-0684
Primary Commodity:	Magnesium
Claim Name(s):	MAG 21 Lode Claim MAG 22 Lode Claim
Claim Type(s):	Lode

Table 1. Claim Descriptions

MAG 21 Lode Claim				
1/4	Section	Township	Range	Meridian
SE	27	25 South	8 West	NMB&M
NE	34	25 South	8 West	NMB&M

MAG 22 Lode Claim				
1/4	Section	Township	Range	Meridian
SE	27	25 South	8 West	NMB&M
NE	34	25 South	8 West	NMB&M

1.3 Individual Completing Application

This PoO application was initiated by AMEC Wheeler Foster and completed by EnviroSystems Management, Inc. with assistance from the Modrall Sperling Roehl Harris & Sisk, PA law firm, on behalf of American Magnesium, LLC (AmMg). 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.

In May 2013, 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 Minerals Management LLC (Manager) was formed to act as manager for AmMg and to continue the research and development of the Project. Manager will provide technical expertise, project management, community and government relations, and financial reporting and accountability to this Project. Manager will also facilitate the recruitment of investors for this Project.

1.5 Corporation Information

The principal executive offices of AmMg are located at 104 Rinconada, Box 684, Elephant Butte, New Mexico 87935. The primary business telephone number is 575-741-1527. Email correspondence should be directed to dqtognoni@gmail.com.

1.6 Partnership Information

AmMg 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. They are, as of January 31, 2016, as follows:

David Q. Tognoni P.E. – Mr. Tognoni graduated from Arizona State University (ASU) with a Bachelor of Science degree in Geological Engineering and a minor in Industrial Engineering. He completed post-graduate studies in business, finance, and mining engineering at the University of Arizona (Tucson) and ASU. Mr. Tognoni has been a Professional Engineer in good standing for over 35 years. He has worked primarily on special assignment consulting projects for major and junior resource companies in oil, gas, and minerals. Mr. Tognoni was raised around resource/land law, resource verification and resource development. In 2005, Mr. Tognoni founded BE Resources, Inc., an international publicly traded resource company, and served as its and Chief Executive Officer from 2005 to 2012.

Robert Lufkin - Mr. Lufkin attended ASU, College of Construction Engineering, and received certification as a Construction Contract Administrator by the Construction Specifications Institute. This experience has provided him with a full understanding of construction projects from inception to completion. Mr. Lufkin has 40 years of experience in the construction industry. This experience includes project management and field supervision for commercial general contractors and construction contract administration for an international architecture firm. In cooperation with David Tognoni, he has also participated in numerous mineral resource verification projects across the western U.S., recently serving as a board member of BE Resources, Inc., an international beryllium resource verification company. He is also a United States Marine Corps veteran.

2.0 DESCRIPTION OF OPERATIONS – PROPOSED ACTION [3809.401(b)(2)]

2.1 Legal Description [3809.401(b)(2)(i)]

The Project is located on the southeast quarter of the southeast quarter of Section 27, Township 25 South, Range 8 West in Luna County, NM, and is on BLM-administered land. The Project location is depicted in Figure 1.

2.2 Project Access

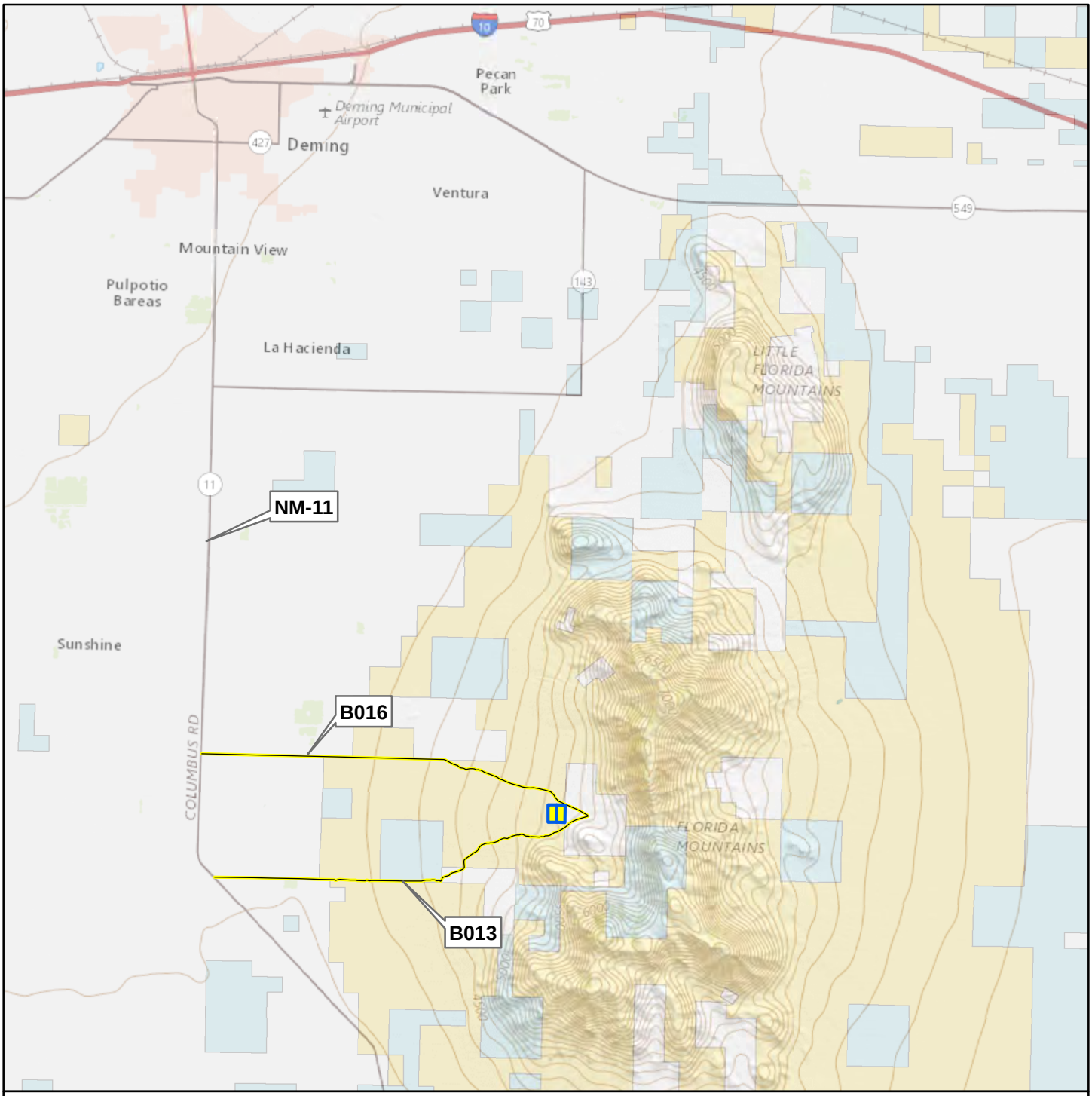
The Project Area is located within the Tres Hermanas Mining District of Luna County, New Mexico in the western foothills of the Florida Mountains, centered on a relatively small hill just west of Mahoney Park. The Project is accessed by traveling on State Road 11 south from Deming for a distance of 12 miles, then turning left on road B016 or slightly further a left can be taken on road B013 for a distance of four miles to the Dolomite Hill Project Area. AmMg intends to construct a new access road to the proposed laydown yard. The claim area, proposed laydown yard, and access routes are shown in Figure 2.

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

The Project Area is situated on approximately 34.8 acres of BLM-administered land. The target Dolomite deposit is encompassed within the boundaries of unpatented mining claims (named Mag 21 & 22 lode mining claims) perfected and maintained under the General Mining Law of 1872, and since 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 also shown in Figure 2.

2.4 Description of Proposed Action & Site Conceptual Design [3809.401(b)(2)(ii)]

The anticipated total surface disturbance for the Project will be 34.8 acres, which includes construction of resource verification drill sites, excavation, removal of Dolomite resources, use of a laydown yard, temporary structures, overland travel, road improvements, new access road construction, and reclamation activities. The surface disturbance would occur in phases and the final mine plan would be subject to refinement based on the results of the additional resource verification activities which are planned to be conducted as the initial activity of mine development.



American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

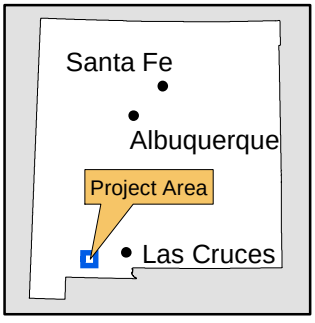
Figure 1. Project vicinity map.

N

1:150,000

Legend

- Claim
- Existing access road
- BLM
- State land
- Private



0 1.5 3 Miles

0 2 4 Kilometers

Base map is USGS The National Map (2018).

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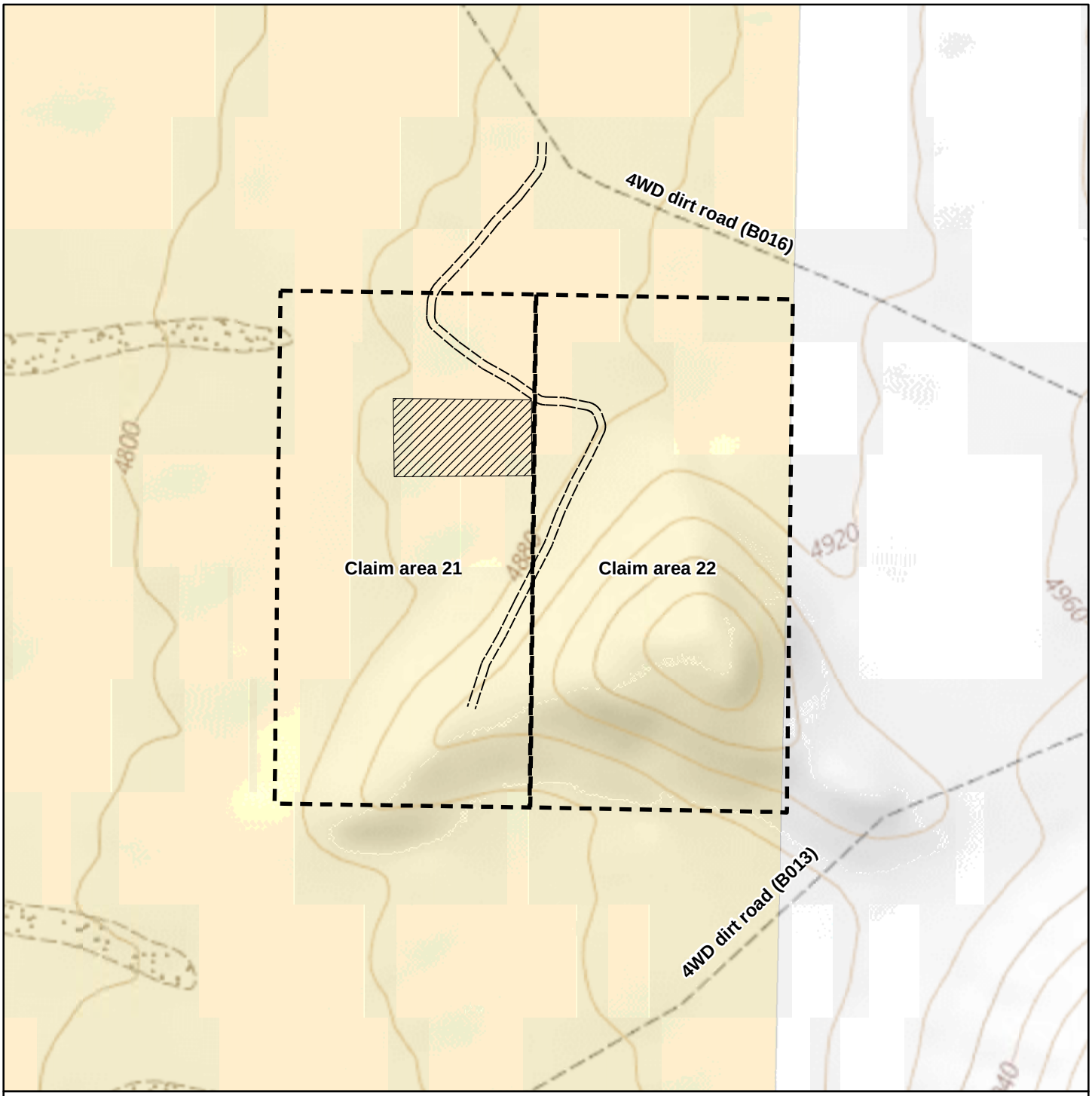

American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

Figure 2. Claim area, proposed laydown yard, and access route locations.

N

1:5,000

Legend

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

Santa Fe
Albuquerque
Project Area
Las Cruces

0 100 200 Meters

0 250 500 Feet

Base map is USGS The National Map (2018).

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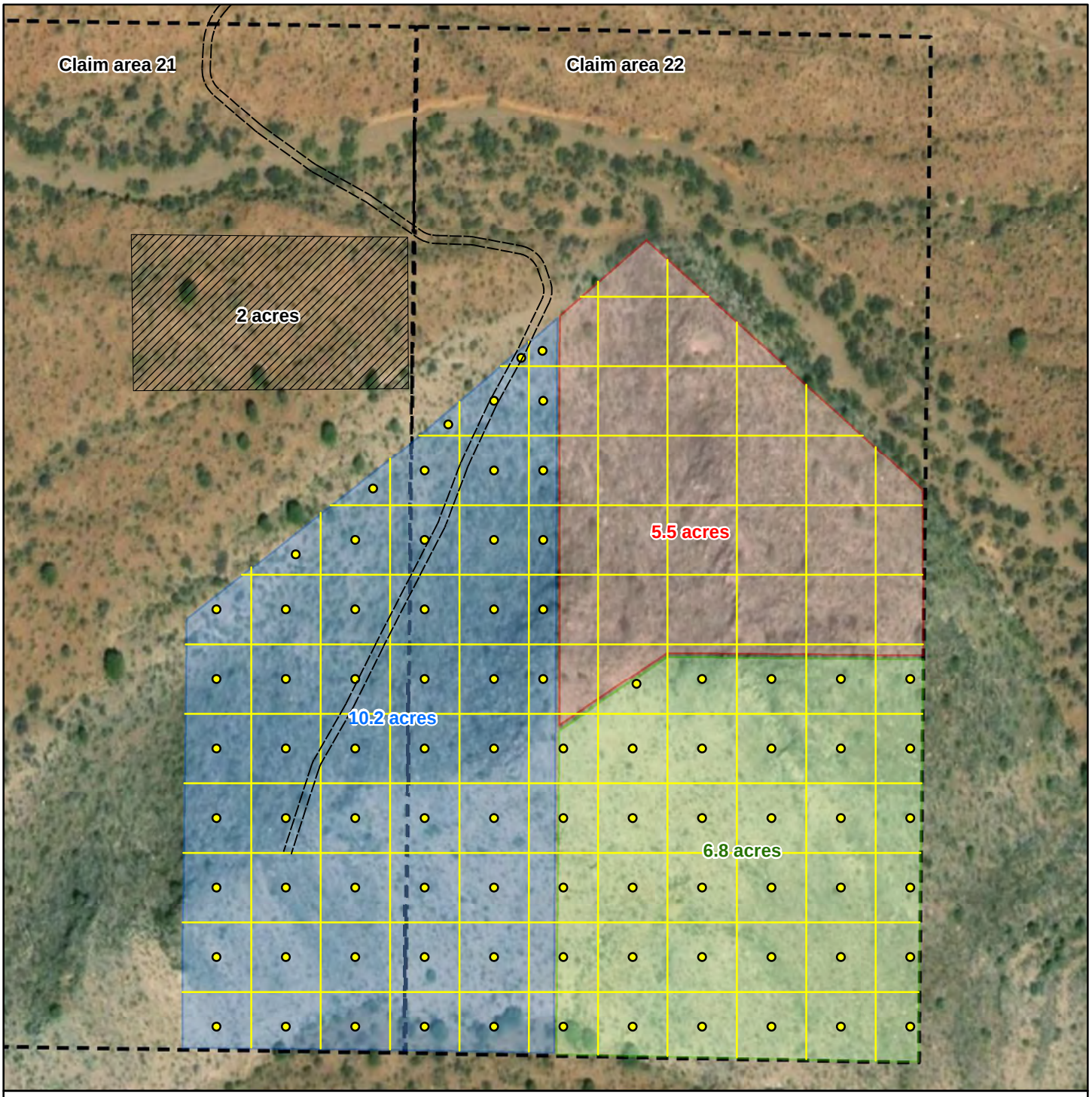
Drilling is proposed to verify the resource and confirm the mine PoO. The proposed verification drill holes will be used as blast holes during active mining. Drill holes and subsequent blast holes will not exceed 100 feet in depth from the current surface.

For the initial phase of mine development, limited resource verification will be conducted using diamond-bit core rigs (designed for drilling to depths up to 100 feet) or a dual-tube, reverse-circulation (RC) air rotary rigs (designed for drilling depths up to 2,000 feet). Exploration holes are planned for up to 100 feet utilizing diamond-bit core rigs. The RC rigs are discussed in the event the diamond-bit rig cannot achieve the 100-foot depth, but is not anticipated to be necessary, and would not be used for drilling depths greater than 100 feet. The purpose of the verification is to assist in possible refinement of mine planning. 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 core 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. Core rigs may be truck-mounted or skid-mounted and moved on site with a bulldozer.
- The RC air rig may be utilized in the event the diamond-bit core drill cannot achieve a depth of 100 feet. Drilling not to exceed 100 feet below current ground surface. At shallow depths, dry air is the working fluid with water injected for dust suppression. Typical RC drills are truck mounted with optional auxiliary booster compressors to enable deeper penetration.

Some existing, BLM primitive roads, generally the ones closest to the target deposit, will require improvement with a bulldozer using cut-fill balance methods and one new short road will be constructed to connect the Project Area to existing BLM roads. The cut-fill balance method results in level surfaces that are essential for movement of the relatively top-heavy, truck-mounted drilling equipment. In areas of relatively low traffic levels with reasonably level terrain, construction of bladed roads would be avoided, and drilling equipment would be driven overland to the drill locations, but only within the proposed areas of disturbance as identified in Figure 3. Berms will also be constructed, where necessary, as safety precautions.



American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

Figure 3. Proposed mining phases and drilling locations.

0 50 100 Meters

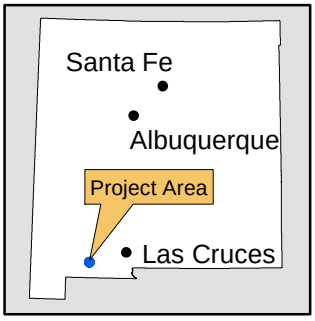
0 150 300 Feet

N

1:2,500

Legend

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



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Resource verification drilling activities are to confirm geologic materials observed at the surface and conceptual geologic models. Resource verification drilling will occur in mining Phase areas 1 and 2. Topography in Phase 3 mining area is too steep and rugged for drill equipment access. Phases 1 and 2 will include 29.3 acres of disturbance (including the resource verification drill holes/mining area Phases 1 and 2, laydown yard, road improvements and new access road to laydown yard). Implementation of Phase 3 will result in an additional 5.5 acres of disturbance. At this time, AmMg plans to mine the resource from the highest elevation of the claimed Dolomite hill to the valley floor.

AmMg's proposed resource verification activities will verify the amount of overburden present at the site. Overburden (minimally topsoil and subsoils) will be stockpiled for future reclamation use in the laydown area. The AmMg Project Area will be mined from the top of the Dolomite hill, and the excavated ore will undergo primary crushing on site as needed so that it can be transported off-site.

Table 2 outlines the total acreage of proposed surface disturbance, by type of disturbance. The proposed disturbance under Phases 1 and 2 will create a total of approximately 29.3 acres of new surface disturbance. The remaining surface disturbance acreage (5.5 acres) will occur in Phase 3.

Table 2. Acreage of Proposed Project Disturbance

Activity	Disturbance		
	Phase 1 & 2 (acres)	Phase 3 (acres)	Total (acres)
Laydown Area	2.0	0.0	2.0
Constructed Roads	0.8	0.0	0.8
Drill Sites (Pads) / Mining Area	17	5.5	22.5
Existing Access Roads Needing Improvements	9.5	0.0	9.5
TOTAL	29.3	5.5	34.8

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). Ore is not planned to be stockpiled, rather excavated and loaded for off-site processing, though temporary storage would occur if there was a delay in trucking. Any temporary storage of ore would be located immediately adjacent to the active excavation area and within the area of disturbance already anticipated in this PoO.

Following drilling resource verification activities, each drill hole will be backfilled with exploration rock fragments and temporarily capped with cement for later use as potential blasting holes. If the Project is interrupted for greater than 120 days, drills holes will be permanently capped with cement-bentonite as required by BLM and the State of New Mexico as described in the Interim Management Plan, Section 5.0 of this PoO.

2.5 Proposed Equipment [38.09.401(b)(2)ii)]

One core 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. A Wesco track-mounted rig is currently proposed. 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 work force during resource verification activities will include one two-man crew per shift for the core rig and one three-man crew per shift for each RC rig. One to two geologists will supervise drilling operations. One D7 dozer will be required for rehabilitation of an existing access road and for resource verification road construction. One tracked excavator hoe will be required to aid in existing road rehab, 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 and crushing it for transport off-site:

- 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.

The exact equipment sizes and models are not known at this time, and proposed equipment may change. Below is a list of potential equipment (Table 3).

Table 3. Equipment Type (Potential).

Air tool, quarry drill, track mounted, 6" diam
Motor grader, self-propelled, 40,000 lb
Smooth drum vibratory roller, 125 H.P.
Water truck, off highway, 10,000 gallon capacity
Dozer, crawler, torque converter, diesel 700 HP
Excavator diesel hydraulic crawler mounted 3.5 CY capacity
Excavator diesel hydraulic crawler mounted 4.5 CY capacity
Excavator diesel hydraulic crawler mounted 6 CY capacity
Excavator attachment, hydraulic hammer, 12,000 ft lbs
Excavator attachment, grapple
Front end loader, 4WD, art. frame, diesel, 4.00 - 4.50 CY 270 HP
Forklift, for rough terrain, 42' lift, 35' reach, 9000 lb., 110 H.P.

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.

Blasting will be conducted under an approved blasting plan (Appendix A). Once the material is blasted, it will be loaded into road haul trucks for transportation off-site. Primary crushing may occur onsite, within designated areas of disturbance outlined in the PoO, if it is deemed necessary prior to loading the haul trucks. It is anticipated that the blasting operation will achieve the required size of material to directly load it into the haul vehicles. The blast and haul operation that is currently planned will be to blast and excavate material starting at the top of the Dolomite hill, until reaching the valley floor approximately 220 feet below.

Needs for on-site crushing will be evaluated as operations proceed. Based on the production rate, mined material may need to be temporarily stored on-site prior to transport. Blasted material would be stored temporarily at the active excavation area, be kept to within areas

already planned for disturbance and, to the extent possible, would not be double-handled or transported within the site boundary. The maximum amount of ore that would need to be stored at any one time in this fashion while awaiting the arrival of a truck is estimated to be 15 cubic yards of material.

2.6 Operating Practices [3809.401(b)(2)ii)]

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. The company representative and geologist will travel to and from the drill site in separate four-wheel drive pickup trucks.

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 mine will involve the blasting and methodical removal of the existing foothill comprising the Dolomite deposit from the top of the deposit to the valley floor, matching the contour of the surrounding valley floor. However, no crushing, screens or conveyers are currently planned for use. The Dolomite will be blasted, in accordance with the approved blasting plan and loaded into haul trucks for off-site transportation. 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.

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. Even if primary crushing onsite is needed, the crushing facility will be demobilized and removed at the end of the mining operations. The mining operation does not require support structures or infrastructure 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. These structures are temporary and mobile. A laydown area for mining equipment, trailers, portable sanitation facilities, a water tank, and temporary storage for explosives, will be developed adjacent to footprint of the mining operations. The laydown area (2 acres) is

included within AmMg's disturbance calculations. Storage for explosives in temporary storage buildings (two buildings approximately 8 feet by 8 feet) and one temporary explosive silo are also planned for the storage of explosives expected to be used during mining operations Figure 4.

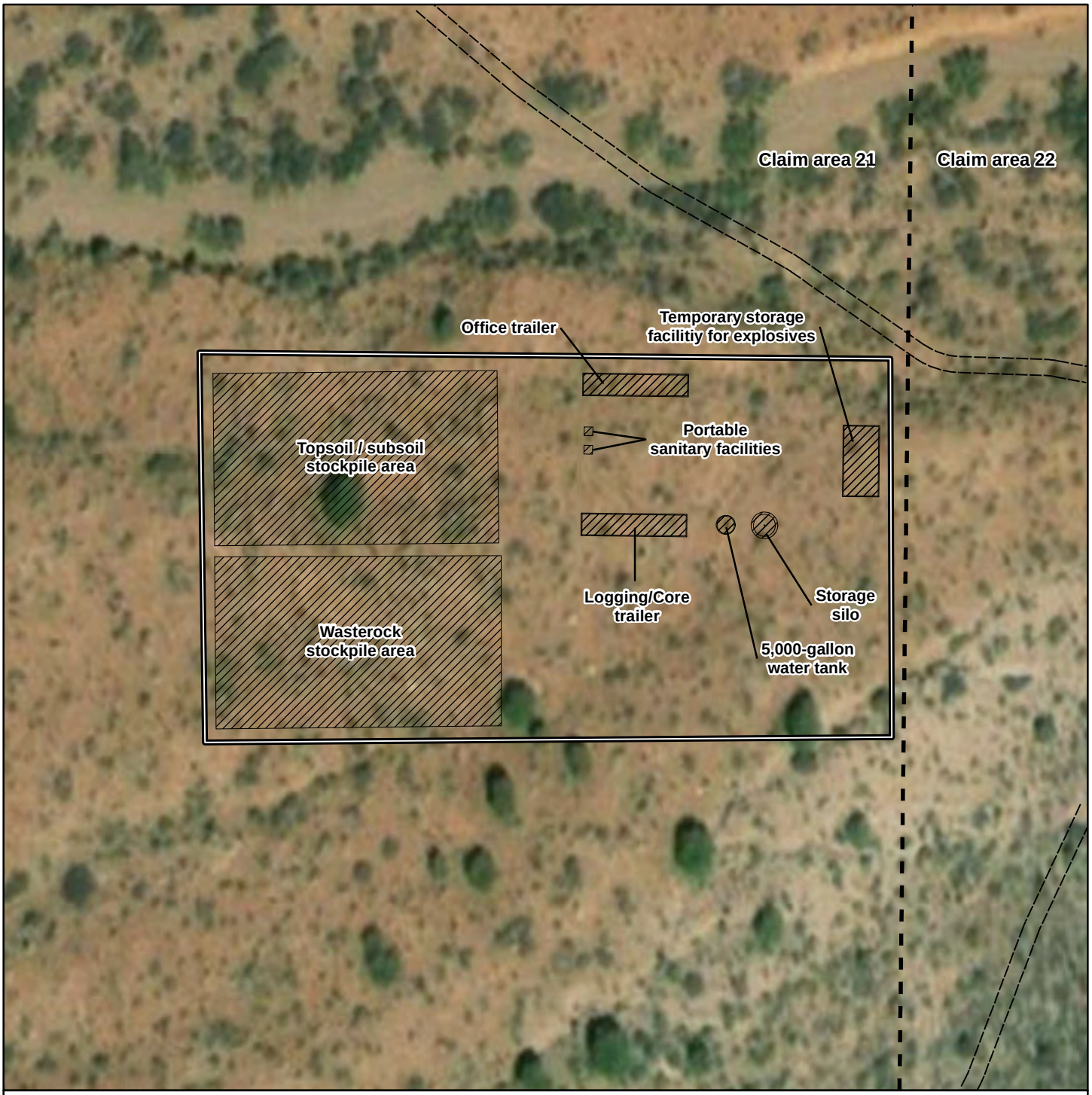
2.8 Site Access and Proposed Constructed Roads

The Project consists of expanding and maintaining certain existing BLM roads 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 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 its 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.

Two existing routes to the mine site are being considered, road B016, referred to as the North Route and road B013, referred to as the South Route. The North Route is 6.8 miles long, and the South Route is 6.2 miles long. Based on available information regarding the resource, the estimated duration of mining operations is 30 years. The roads would be used year-round. Road improvements would occur during daylight hours.

Existing roads proposed for use during this Project will be improved by blading or otherwise resurfacing existing road surfaces. The existing roads will be widened to allow for one-way movement of heavy equipment and the average width will be expanded to 16 feet. The total estimated disturbance is 9.5 acres for all existing roads that will be improved and widened. Access to the laydown yard area would be gained with a new access road that would be 2,127 feet in length and 16 feet wide for a total of 0.8 acre of new disturbance. Construction of this road would require earth-moving using typical construction practices to minimize surface disturbance, erosion, and visual contrast, as well as to facilitate reclamation. 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.



American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

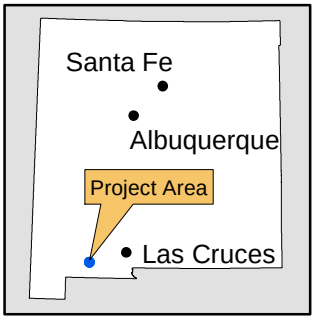
Figure 4. Proposed laydown yard and associated features.

N

1:1,000

Legend

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



0 25 50 Meters

0 75 150 Feet

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Road improvements will be implemented using a Caterpillar dozer, backhoe, or equivalent equipment. Road grades will be no steeper than ten 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, Best Management Practices (BMPs), established by MMD and the Luna County Soil Conservation District, will be followed in order to minimize the surface disturbance and erosion potential. If necessary, culverts may be placed to maintain existing drainage patterns.

Balanced cut and fill construction will be used to the extent practicable to minimize the exposed cut slopes and the volume of fill material. Since the depth of the cut will be kept to a minimum, growth media removed during construction will be stockpiled as the fill slope to be used during reclamation. Road construction within drainages will be avoided where possible. However, when drainages must be crossed by a road, BMPs established by MMD and the Luna County Soil Conservation District will be followed to minimize the surface disturbance and erosion potential.

In addition, culverts may be required in various areas along the proposed existing and new access roads. Culverts will be installed as required by BLM. Figure 5 depicts a typical cross-section of culverting that may be required for the new access road to the laydown yard and potentially some of the existing access roads. Engineering design of existing and the new access roads indicating locations of types of improvements required, a road maintenance plan and an evacuation plan will be developed when all routes are confirmed. It is not anticipated that blasting will be necessary to construct roadbeds. If drilling and blasting of roads should become necessary, prior to blasting the operator will submit a blasting plan to the MMD.

Routine road maintenance may be required and will consist of smoothing ruts, filling holes with fill material, grading, and re-establishing waterbars when necessary. In addition, AmMg may need to blade and emplace gravel surfacing on the roads to minimize excess disturbance and dust. The gravel will be obtained from outside the Project Area from a commercial gravel source.

American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

Figure 5. Typical wash crossing.

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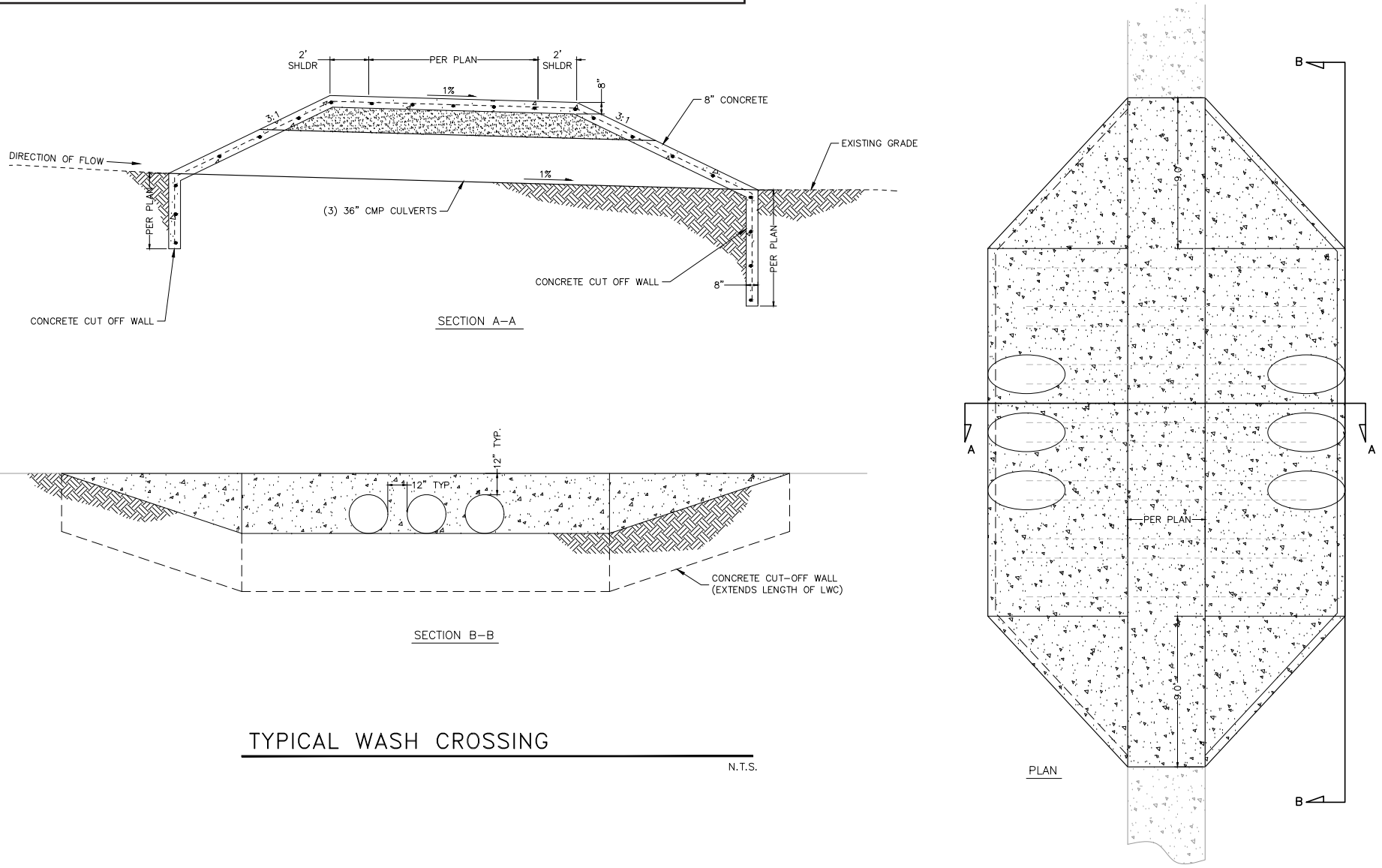
Map taken from Shepherd Wesnitzer (2018).



TYPICAL WASH CROSSING

N.T.S.

2.9 Occupancy

Under 43 CFR 3715.01, occupancy means full or part-time residence on the public lands. It also means activities that involve residence; the construction, presence, or maintenance of temporary or permanent structures that may be used for such purposes; or 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 crushing facility, which may be needed to facilitate hauling of ore;
- A temporary job trailer for employees to gather for health and safety briefings, store personnel belongings during working hours, shelter during inclement weather, and serve as a meeting and break facility;
- A trailer for logging core and cuttings;
- A portable out-house and sanitation facility for workers; and
- A temporary, 5,000-gallon water tank for resource verification, dust suppression, and reclamation activities.

2.9.2 Access Restrictions to Mining Site

If necessary, AmMg will construct BLM-approved barbed wire fencing to prevent livestock from entering disturbed areas. In areas where a higher level of security or safety is needed, for example in the mobile trailer area and laydown yard, temporary chain-link fences would be erected. Gates or cattle guards would be installed along roadways within the proposed Project Area, as appropriate.

AmMg will monitor any constructed fences on a regular basis and repairs would 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 would be contacted immediately. AmMg would assist as requested in moving these animals out of the proposed Project Area.

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. In addition, no ponds will be constructed. Water will be needed for dust suppression, site reclamation activities, and may be required for resource verification activities, and a water truck and on-site storage tank (enclosed) will be used for these activities.

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 permanent structures will remain after reclamation activities are complete.

2.10 Hazardous Materials (Hazmat)

Hazardous materials utilized 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, 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 MSHA. In the event that hazardous or regulated materials are spilled, immediate measures will be taken to control and address the spill as described below and as detailed in Appendix B, Spill Prevention, Control and Counter-Measures Plan (SPCC), and the BLM, New Mexico Environment Department (NMED), and the Emergency Response Hotline will be notified. If any hazardous materials are spilled during operations, they will be cleaned up in a timely manner. After clean up, any contaminated material will be removed from the site and disposed of at an approved disposal facility.

Blasting components, including ammonium nitrate and diesel fuel, would be stored on-site in bins and tanks during mining operations. In compliance with ATF regulations, there will be a minimum separation distance between the ammonium nitrate and the blasting agents if there is no barricade. AmMg currently anticipates utilizing two explosives magazines (one for boosters and one for blasting caps), each no larger than 8 feet by 8 feet, with 1,000-pound capacities. In addition, one 15-ton capacity silo will be used for storage of ammonium nitrate. All explosive materials would be stored in compliance with MSHA, New Mexico State Mine Inspector's Office (SMIO)'s regulations, and U.S. Department of Homeland Security requirements.

Management of hazardous materials would comply with all applicable Federal, State, and local requirements, including the inventory and reporting requirements of Title III of 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 would be stored in the temporary storage for explosives within the laydown area in aboveground tanks capable of holding 110 percent of the volume of the largest vessel in the area.

2.11 Spill Prevention Plan [3809.401(b)(2)(vi)]

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 would most likely be small, and localized. Equipment will be regularly inspected and properly maintained to limit adverse impacts from any unintentional release. Impacts of such minor spills could include contamination of surface soils. Formal safety data sheets for hazardous materials would be posted and readily available, in accordance with MSHA's Hazard Communication for the Mining Industry (30 CFR Part 47).

The potential for spills of both hazardous and non-hazardous materials would be further mitigated with the implementation of a spill prevention plan. The SPCC for the Project 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 plan will be posted and distributed 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, the 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 [3809.401(b)(2)(v)]

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 [3809.401(b)(2)(iii)]

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 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 Mining Act Reclamation Program rules administered by MMD.

2.14.1 Water Quality

- Drill holes will be surveyed and plugged as an operational procedure immediately after completion of drilling in accordance with 19.10.4 NMAC. The drill holes will be plugged by placing drill cuttings into the total depth of the hole and capped with a cement plug temporarily. 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. There is a limited chance that groundwater will be encountered during drilling, given the proposed 100-foot depth of the drill holes and the depth of the water table.
- Storm water pollution prevention BMPs will be used at construction sites to minimize erosion from storm water. A Storm Water Pollution Prevention Plan (SWPPP), including a Sediment Control Plan, will be implemented once final engineering of layout of facilities and road improvement requirements have been confirmed.
- Drill cuttings will be contained on-site and in the unlikely event the RC drill is utilized, the fluids will be managed utilizing appropriate control measures. Sediment traps will be used as necessary and filled at the end of the drill program.
- The SPCC will be followed.
- Only nontoxic fluids will be used in the drilling process.

2.14.2 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.
- In addition, gravel may be placed on some existing roads to minimize excess disturbance 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 on-site crushing is deemed necessary to facilitate hauling of ore, AmMg will likely use a qualified contractor that has a temporary crushing facility that is already

appropriately permitted for air emissions, or else it will determine air permitting or suppression requirements and assure any necessary air quality permit is obtained prior to operating the temporary crushing facility.

2.15 Site Conditions

2.15.1 Geology

The proposed site for the Project encompasses a foothill that rises 200-300 feet above the western alluvial fans of the Florida Mountains, west of Mahoney Park. Rock formations that entirely make up the site are the Fusselman and the Montoya Formations. These strata are Ordovician and early Silurian in age and are part of a regionally extensive carbonate platform that stretches into Texas and Oklahoma. The platform was part of a shallow sea that once formed the southwest continental margin of Laurentia. Broad exposures of these rocks occur wherever there is significant mountain block faulting of Paleozoic rocks in southern New Mexico and western Texas, including the San Andres, Sacramento and Franklin mountain ranges. On the western flank of the Florida Mountains, these rocks are highly faulted and brecciated by high angle Laramide thrust faulting and tilted to the east and southeast, complicating their stratigraphy.

The Fusselman and Montoya formations contain primarily dolomitized limestones and dolomitic sandstones. Fossils in these formations are primarily shallow marine invertebrates such as corals and crinoids. Dolomitization has destroyed much of the internal structure of the fossils that are not replaced by silica, due to recrystallization.

2.15.2 Hydrology

The proposed mine 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 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. Modeled potentiometric surfaces near the western flank of the Florida Mountains are approximately 4500 feet above mean sea level (MSL) or about 300 feet below ground surface (BGS) at the base of the mining site foothill.

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.

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

2.15.3 Soils

The rocky prominence that is the primary interest at the site is entirely composed of bedrock, virtually devoid of soil exposures, and is mapped by the U.S. Department of Agriculture Natural (USDA) Natural Resources Conservation Service (NRCS) as Rough and Broken Rock Land (see Appendix C). The alluvial fan from which it rises is mapped as the Eba Very Gravelly Clay Loam. This latter soil unit appears on alluvial fans and fan remnants with slopes of zero- to ten 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:

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

2.15.4 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 dominate the vegetation of the Project Area and include honey mesquite (*Prosopis glandulosa*), broom snakeweed (*Gutierrezia sarothrae*), ocotillo (*Fouquieria splendens*), sotol (*Dasylirion wheeleri*), redberry juniper (*Juniperus arizonica*), and yellow trumpetbush (*Tecoma stans*). Cactus species and other succulents such as candy barrelcactus (*Ferocactus wislizeni*), cholla (*Cylindropuntia* sp.), prickly pear cactus (*Opuntia* sp.), Graham's nipple cactus (*Mammillaria grahamii*), and Palmer's century plant (*Agave palmeri*) are also common. Grasses and forbs are less common in the rocky, shrubby terrain, including threeawn (*Aristida* sp.), matted grama (*Bouteloua simplex*), and silverleaf nightshade (*Solanum elaeagnifolium*). Table 4 contains a list of all plant species identified in the Project Area during the biological field survey on July 28, 2016. Copies of the field survey, conducted by EnviroSystems, is provided in Appendix D with the Biological Survey. No federally listed plant species protected under the Endangered Species Act (ESA) were encountered during surveys.

Table 4. Complete List of Plant Species Observed in Project Area.

Common Name	Scientific Name
Trees	
redberry juniper	*Juniperus arizonica*
singleneedle pinyon	*Pinus monophylla*
honey mesquite	*Prosopis glandulosa*
Shrubs/Sub-shrubs	
saltbush	*Atriplex* sp.

Common Name	Scientific Name
broom snakeweed	*Gutierrezia sarothrae*
yellow trumpetbush	*Tecoma stans*
Forbs	
Cochise scaly cloakfern	*Astrolepis cochisensis*
silverleaf nightshade	*Solanum elaeagnifolium*
Cacti, Agave, & Succulents	
Palmer's century plant	*Agave palmeri*
cholla	*Cylindropuntia* sp.
sotol	*Dasylirion wheeleri*
candy barrelcactus	*Ferocactus wislizeni*
ocotillo	*Fouquieria splendens*
Graham's nipple cactus	*Mammillaria grahamii*
prickly pear cactus	*Opuntia* sp.
soaptree yucca	*Yucca elata*
Grasses	
threeawn	*Aristida* sp.
matted grama	*Bouteloua simplex*

2.15.4.1 Noxious Weeds

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

- concurrent reclamation efforts to the extent feasible;
- operator control;
- removal of invasive, nonnative, and noxious weeds on reclaimed areas;
- washing heavy equipment prior to entering the Project Area;
- and avoiding areas of known invasive, nonnative, and noxious weeds during periods when the weeds could be spread by vehicles.

2.15.5 Cultural and Paleontological Resources

Dos Rios Consultants, Inc. performed a Class III archaeological survey of the proposed mining site from August 5 through August 8, 2016. Seventeen isolated occurrences (IOs) were found within the survey area. An isolated occurrence (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. No archaeological sites, determined eligible for inclusion to the National Register of Historic Places by the BLM, were discovered during the survey. Due to the sensitive nature of the information contained therein, a copy of this report is not included in this PoO but is on file at the Las Cruces District Office of the BLM.

Amec Foster Wheeler has extensively reviewed geologic literature pertaining to fossil fauna in the locality and stratigraphic intervals present at the proposed mining site and proposed to AmMg that the site should be given a classification of Class 2, i.e., *Low*, under the BLM Potential Fossil Yield Classification (PFYC) System.

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:

- 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.

- 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 the appropriate official vested with such authorization authority under the applicable law.

2.15.6 Wildlife

The Project Area provides habitat for a variety of mammals, reptiles, and birds. Wildlife species encountered during the biological survey included a whiptail lizard (*Aspidoscelis* sp.) and various species of birds, including cactus wren (*Campylorhynchus brunneicapillus*), Gambel's quail (*Callipepla gambelii*), northern mockingbird (*Mimus polyglottos*), black-chinned sparrow (*Spizella atrogularis*), bushtit (*Psaltriparus minimus*), thrasher (*Toxostoma* sp.), and greater roadrunner (*Geococcyx californianus*). See Table 5 for a list of all wildlife species identified during the biological field survey. No federally listed wildlife species protected by the ESA were observed during surveys.

Table 5. Complete List of Wildlife Species Observed in the Project Area.

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

2.15.7 Migratory Birds

Some migratory birds were observed in the project vicinity during field surveys however no nesting migratory birds were located on the Project Area. In the event nesting migratory birds are discovered in the Project Area, potential impacts to and unintentional takes of migratory bird species can be mitigated by limiting ground-disturbing activities to 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.

2.15.8 Public Safety and Site Access

- Public safety will be maintained throughout the duration of the Project. All equipment and other 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.

2.15.9 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 Action. Since 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, since these are located within Luna County.

2.15.9.1 Population

The 2010 estimated population of Deming is 14,855, a net increase of 739 or 5 percent from the 2000 estimated population. The State population grew by 13.2 percent from 2000-2010. Luna County grew negatively by 0.1 percent and 11.2, respectively (see Table 6).

Table 6. Population Change, 2000-2010

Location	2000	2010	Numeric Change 2000-2010	Percent Change 2000-2010
Deming	14,116	14,855	739	5
Luna County	25,016	25,095	79	>0.01
New Mexico	1,819,046	2,059,179	240,133	13.2

Source: U.S. Census Bureau 2000, 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 below in Table 7.

Table 7. 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%	19.6%	27.6%
Luna County	25,095	7.3%	19.2%	26.5%
New Mexico	2,059,179	7%	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 below in Table 8. 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 8. Distribution of Population by Age, 2010

Location	Percent Under 18 Years	Percent 20-44 Years	Percent 45-64 Years	Percent 65 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

2.15.9.2 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 construct the access road and laydown yard within six months of permit approval. Exploration drilling of Phase 1 and 2 will be initiated after construction of laydown yard and access road and will last approximately one to two months. Within nine months to a year, Phase 1 mining will begin and occur over a period of approximately 12 years. Phase 2 mining will begin following completion of Phase 1 and is expected to last approximately 3 years. Reclamation of Phase 1 will occur during development of Phase 2. Phase 3 will be initiated after mining activities are complete in Phase 2 and will 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 will take approximately six months to a year to complete. Post-mining monitoring of reclamation will 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 30 years, although this estimate likely will be refined as the Project progresses.

The mining activities will be conducted and are anticipated to take up to 30 years and employ up to 10 on-site personnel. This PoO provides a top down approach that incorporates blasting and excavation techniques that qualify under the New Mexico Mining and Minerals Division (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 will occur to the resource verification activities of the Project, and blasting will occur during mining phases of the Project. 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 is will present 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 would 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 34.8-acre disturbance footprint estimate and after all mining activities in each Phase is completed.

Southwestern New Mexico and Luna County have a history of mining and agriculture, and AmMg would provide employment opportunities to individuals living in the immediate area of the Project. It is likely that personnel from outside the local area would 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.

2.17 Other Plans and Requirements

The following plans and requirements are anticipated for this Project:

- SWPPP
- Engineer designs for access road and drainage crossings
- Geologic cross-section of project area
- MMD Minimal Impact New Mining Permit (application submitted to MMD and deemed administratively and technically complete, subject only to BLM approval under its 3809 regulations)

3.0 RECLAMATION PLAN [3809.41(B)(3)]

All disturbed areas in the Project Area will undergo reclamation. These areas include the final surface once the deposit is mined to the valley floor, the laydown yard, and new/existing access roads. In addition, any unexcavated 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 re-contouring so that the remaining ground surface approximates the surrounding topography, stockpiled topsoil will be replaced, and all disturbed surfaces will be re-vegetated. Disturbed areas shall be maintained to control dust and minimize erosion through such time as the site becomes eligible for release of financial assurance.

Topsoils and subsoils shall be replaced to their original relative positions and contoured or terraced so as to achieve safe slopes, erosion control, long-term stability, and preservation of surface water flow patterns. The disturbed area then shall be reseeded with a certified weed-free native seed mix including a tackifier that enhances 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. When possible, reclamation of mined areas will be implemented in a phased approach. Phase 1 reclamation will occur as soon as possible following mining followed by Phase 2 and so on. Reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds. Seeding will be conducted as outlined in New Mexico State University Cooperative Extension Service Circular 525. Notification shall be provided when reclamation and re-vegetation are complete.

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

Reclamation will be completed to the standards described in 43 CFR 3809.420(3) and New Mexico Mining and Minerals 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), Surface Management of Mining Operations Handbook H-3809-1 (BLM 1989), and revegetation success standards per BLM/NDEP "Revised Guidelines for Successful Mining and Resource Verification

Revegetation" (BLM 1999). All drill sites, excavation disturbances, pits, laydown yard and newly constructed road segments, and road improvements will be re-contoured and reseeded unless BLM wishes for the new road segment and existing road improvements to remain in place.

Reclamation will be designed to achieve land uses consistent with the BLM and New Mexico Mining and Minerals-approved Post Mine Land Uses (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 cuttings and water, monitoring road conditions, and keeping sites clean and safe. During seasonal closure of the Project Area and periods of inactivity between drilling phases, reclamation will 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 greater than 120 days.

After Project activities are completed, reclamation will involve regrading disturbed areas related to this Project to adjacent contours. The Project will then be seeded using the approved reclamation seed mixture and application rates furnished by the BLM. Hydro-seeding will likely be the most effective and cost-efficient plus has the added advantage of being sprayed on with tackifiers and mulch. 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. Re-application of seed in areas where success levels (70% of pre-mining vegetation cover, minimally) are not being met will be conducted.

AmMg will further detail these reclamation plans as the Project is undertaken and site-specific mining conditions are evaluated but notes that MMD has already deemed AmMg's application for a minimal impact mining operation based largely on the PoO document to be administratively and technically complete subject only to BLM's approval.

Drill cuttings will be used to temporarily fill the drill holes, which are planned to be used as blast holes at a later time in the Project. The drills holes will be temporarily capped with cement or similar material designed for such use. Should an interruption in the Project occur, or the plans change during implementation and the drill holes are no longer planned to be used as blast holes, the drill holes will be back filled with exploration drilling materials and plugged with cement bentonite grout in accordance with New Mexico Office of the State

Engineer requirements, and a plugging plan of operations will be prepared and submitted in advance of plugging operations.

Since groundwater is not planned to be encountered, there is no environmental impact to fill the holes with native material pending blasting. Grouting holes that will be re-entered is not cost efficient. In addition, the holes will be used as blasting sites and native fill would be temporary to prevent health and safety hazards. AmMg will plug the holes in accordance with the requirements of the Office of the State Engineer, who will necessarily need to issue permits to drill these exploratory drill holes.

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

Upon closure of the operations, disturbance locations will be reclaimed according to BLM standards and New Mexico Mining and Minerals Division's standards. The slope of the valley floor will be maintained and recontouring will be performed as appropriate to blend with the surrounding topography. Two sides of the Project Area will, upon cessation of mining, result in "pit-like" walls where mining ceased within the hill. During reclamation, however, these walls will be terraced to a slope comparable to the surrounding hill slope. Terrace contour intervals will be determined once mining in the area ceases and appropriate terrace intervals can be determined to minimize run-off and the potential for erosion. Sediment control features may also be placed on the terraces until revegetation is established. All mine-related roads that were not in existence at the commencement of operations contemplated by this PoO would be reclaimed, and existing roads that were widened may be reclaimed to previous widths, as directed by BLM.

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

Where salvageable soil exists in areas that are to be newly disturbed, AmMg will salvage as much material as can be safely and practically recovered. The lack of reclamation cover material available from disturbed areas and the poor development of topsoil (top dressing) at the site may require the evaluation of and augmentation with alternative sources and types of materials for use as reclamation cover and suitable growing media.

Where possible, the near-surface alluvial materials from within the limits of ground-disturbing operations will be salvaged to cover the identified soil deficit to meet reclamation cover requirements. Diversion ditches will be constructed and maintained around the reclamation material stockpiles to prevent run-on erosion. Salvage material stockpiles will be seeded with an interim, certified weed-free seed mix as directed by the BLM. Seeding is typically done once, right before the monsoon season. Prior to and during soil salvage, woody plants and vegetation will be removed. Except to the extent any plants may be recovered and salvaged or transplanted by AmMg or others who may be permitted to do so,

the vegetation will be combined with the growth media to increase the organic matter content of the growth media.

3.4 Wildlife Rehabilitation [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, and access to the site will be restricted for protection of the public and animals. The Project will result in the reclamation of land disturbed by mining activities.

3.5 Removal of Building and Associated Structures [3809.401(b)(3)(ix)]

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

3.6 Post-Closure Management [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 70% establishment of pre-mine vegetation levels have been met, as well as achieving Part 3 requirements under the New Mexico Mining Act for release of financial assurance. In accordance with Paragraph (2) of Subsection S of 19.10.1 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 planned.

3.7 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 re-establish 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.

4.0 MONITORING PLAN [3809.401(b)(4)]

The operation is designed to produce no discharge. As such, sediment control is 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 areas and any 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 would 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 nor cause an exceedance of applicable water quality standards. AmMg would use water from the City of Deming for dust control, site reclamation activities, and potentially for resource verification activities. AmMg would not release pollutants to groundwater, and small localized spills of hazardous materials are not likely to contaminate groundwater.

Sediment control will be achieved by 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 structures, will divert run-on away from disturbed areas. All sediment control structures will be monitored and maintained on a regular basis. During operations, all runoff from the plant site will be directed into impacted storm water impoundments and other ponds, as discussed below. During reclamation, all areas where water ponds will be re-contoured and graded, surfaces covered with top dressing, 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 utilized to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures will be inspected periodically, and repairs 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 this Project will be in the form of sediment run-off. However, non-point sources will be managed via recommendations contained in the SWPPP to the extent they may occur during resource verification, mining development, mining or reclamation with the use of BMPs including such things as seeding and mulching of disturbed areas, silt fences, straw bale check dams, diversion ditches with energy dissipaters, and rock check dams, as necessary. The SWPPP may require Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) sampling of run-off following large rain producing storm events (typically, following periods of rainfall exceeding 0.25 inches in a 24-hour period), as defined in the SWPPP.

4.3 Analytical Methods

If storm water run-off analysis is required per the SWPPP, samples will be collected at the locations designated and sent to a certified laboratory for analysis.

4.4 Reporting Procedures

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

5.0 INTERIM MANAGEMENT PLAN [3809.401(b)(5)

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

No temporary closures (defined as greater than 120 days) are anticipated during the execution of this 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;
- Project Area will be monitored to maintain a safe and clean condition; and,
- Site conditions will be inspected every 14 days or following periods of rainfall exceeding 0.25 inches in a 24-hour period.

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

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

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

When possible, final and interim reclamation would 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 re-contoured, the disturbed areas will be graded to promote non-erosive runoff and would be vegetated. To the extent feasible, any remaining disturbed areas will be shaped to blend with the surrounding topography and seeded.

Reclamation will consist of re-contouring and seeding. Regrading will consist of redistributing fill slopes back onto the cut portion of roads to return the area to near pre-disturbance topography. If culverts are placed in access roads, removal any culverts during re-contouring of the roads will be necessary. Regrading would, to the extent practical, re-establish pre-disturbance topography and drainage, and provide slopes that would, in conjunction with revegetation, control erosion. The re-contoured surface will be seeded with an approved certified-weed free, native seed mix at the rate required by the BLM and the State.

5.4 Measures to Isolate or Control Toxic or Deleterious Materials [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, polyplus, and super plug, will be utilized as necessary during drilling and will be stored at the Project Area.

Hazardous and regulated materials utilized 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 hazardous or regulated materials, such as diesel fuel, are spilled, measures will be taken to control the spill, and they will be cleaned up in a timely manner. After clean up, the oil, toxic fluids, or chemicals and 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, & Structures [3809.401(b)(5)(iii)]

Equipment and supplies would be removed from the Site or secured on adjacent privately-owned lands, 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 [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 will consist of smoothing ruts, filling holes with fill material, grading, and re-establishing waterbars when necessary. Periods of non-operation greater that 120 days are not anticipated; however, if temporary closures are required, the drill rig will vacate 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, fill ruts, and to perform general clean up. No core samples will be left on-site after completion of Project activities.

6.0 ROCK CHARACTERIZATION AND HANDLING PLAN

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. This section describes the rock characteristics.

6.1 Location and Access

AmMg has two Federal unpatented mining claims covering a small hill at the base of the Florida Mountains composed principally of Dolomite belonging to the Fusselman Dolomite of Silurian age. The unpatented claims are on Public Lands administered by the BLM, and the Federal Government holds all mineral rights.

6.2 Regional Geology

The Project Area (small hill at the base of the Florida Mountains and Little Florida Mountains), is southeast of Deming in south-central Luna County, New Mexico. The Florida Mountains are an 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 and sediments conceal the range-bounding faults except at the northwest end.

The oldest rocks exposed in the Florida Mountains are Precambrian hornblende and granitic gneisses exposed only north of Capitol Dome. An Upper Cambrian pluton intruded an andesitic to basaltic volcanic sequence producing the hornblende and pyroxene hornfels common in the western and southern parts of the mountains. The alkali-feldspar plutonic rocks are granite at the northern and southern ends of the range and syenite and quartz syenite in the central part. These shallow plutonic rocks and hornfels were unroofed before deposition of a diamictite that, in turn, was mostly eroded preceding deposition of the Bliss Sandstone in early Ordovician time (approximately 500 million years ago). Approximately 4,100 feet of Paleozoic rocks that crop out in the southeastern Florida Mountains include in ascending order: Bliss Sandstone, El Paso Formation, Montoya Formation, Fusselman Dolomite, Percha Shale, Rancheria Formation, and Hueco Formation. No Mesozoic rocks are present except possibly the basal beds of the Lobo Formation, the bulk of which was deposited contemporaneously with Laramide deformation during Paleocene and early to middle Eocene times. Extensive andesitic to rhyolitic volcanism from middle Eocene to early Miocene times accounted for the thick Rubio Peak volcaniclastic section forming Florida Peak, as well as the ash-flow tuff, air-fall tuffs, flow-banded rhyolite, basaltic andesite, and dacite in the Little Florida Mountains. Thick rhyolite fanglomerates in the Little Florida Mountains and alluvial conglomerates forming an apron around the mountains

have been deposited as the mountain block was uplifted approximately 7,000 feet since early Miocene time.

The south Florida Mountains fault is a northwest-trending, high-angle reverse fault that places Upper Cambrian granite against rocks as young as basal Lobo Formation (Miocene age). Multiple, small thrust faults cut the Paleozoic rocks northeast of the south Florida Mountains fault. 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.

6.3 Local and Property Geology

AmMg's primary interest in the area is the magnesium mineralization in the Fusselman Dolomite, a well sampled and productive oil-bearing unit in the Permian Basin of Texas but apparently not oil-bearing in the AmMg claim area. The single hill comprising the two AmMg claims is located immediately adjacent to Mahoney Park.

The Fusselman Dolomite on some portions of the Florida Mountains has a stratigraphic thickness of 975 feet, however, this is an incomplete section, because on the southeast slope of Gym Peak, a complete section of Fusselman Dolomite is well exposed, measuring 1,480 feet thick. The Dolomite is primarily dense, compact with multiple alternating grey and dark grey horizons of limey Dolomite and pure Dolomite. Breccia zones along some of the thrust faults are up to 100 feet thick and contain chaotic mixtures of several Fusselman and Montoya rock types. Two slabs of the Cutter Member up to 60 feet thick and several hundred feet long appear to be interbedded with the Fusselman Dolomite due of tectonic emplacement.

Dolomite is a common rock-forming mineral with the chemical composition of CaMg [CO3]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% MgO.

The Dolomite mineralization in the Florida Mountains was identified by Frank E. Kottlowski for the New Mexico Institute of Mining and Technology State Bureau of Mines and Mineral

Resources in Circular 47, “High-Purity Dolomite Deposits of South-Central New Mexico” published in August 1957.

Kottlowski noted that there are two types of Dolomite deposits in New Mexico, bedded Dolomite and replacement Dolomite. Almost all of the Paleozoic formations contain at least thin beds of Dolomite or dolomitic limestone, and in places limestone beds are replaced by irregular lenses and odd-shaped masses of Dolomite.

According to Kottlowski, the Silurian Fusselman Dolomite is massive bedded and ranges from light gray to dark gray, and weathering 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 feet to 150 feet containing appreciable amounts of chert. Clemons (1998), for the New Mexico Bureau of Mines & Mineral Resources, notes that the Fusselman Dolomite consists of six alternating dark-light Dolomite units in the vicinity of the Project Area.

Typical units of Dolomite in the vicinity of the Project Area, units in ascending order with approximate thicknesses, are as follows:

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; and
6) upper light-gray member, 80 feet.

RPA Mining and Geological Consultants (2014; Appendix E) completed a Site Visit Report of Florida Mountains, New Mexico claims of American Magnesium LLLP for a rock characterization study of the Dolomite in/near the Project Area and observed these characteristics and color patterns during the site visit. The following pictures by RPA illustrate these color features and stratigraphic intervals in the Dolomite deposits (Figure 6 and Figure 7). AmMg’s two claims within the Project Area contain outcropping Fusselman Dolomite.

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Figure 6. Exploration in the Florida Mountains.

Figure 7. Dolomite sample site on claims.

There is not sufficient 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 (2014). The actual thickness of the 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 and cannot be used to verify the vertical and lateral continuity and grade. Once resource verification activities begin, composition and thickness will be confirmed and a cross-section analysis of the geology of the Project Area will be performed and prepared for submission to the BLM. RPA (2014) did a geological cross-section of a hill adjacent to the Project Area and Figure 8 and Figure 9 depict the geological overview of the Project vicinity and geologic cross-section of an adjacent hill to Project Area. Since this location is part of the same formation as the Project Area, they have been included for informational purposes. An actual geological cross-section of the Project Area can be completed once resource verification drilling has been performed.

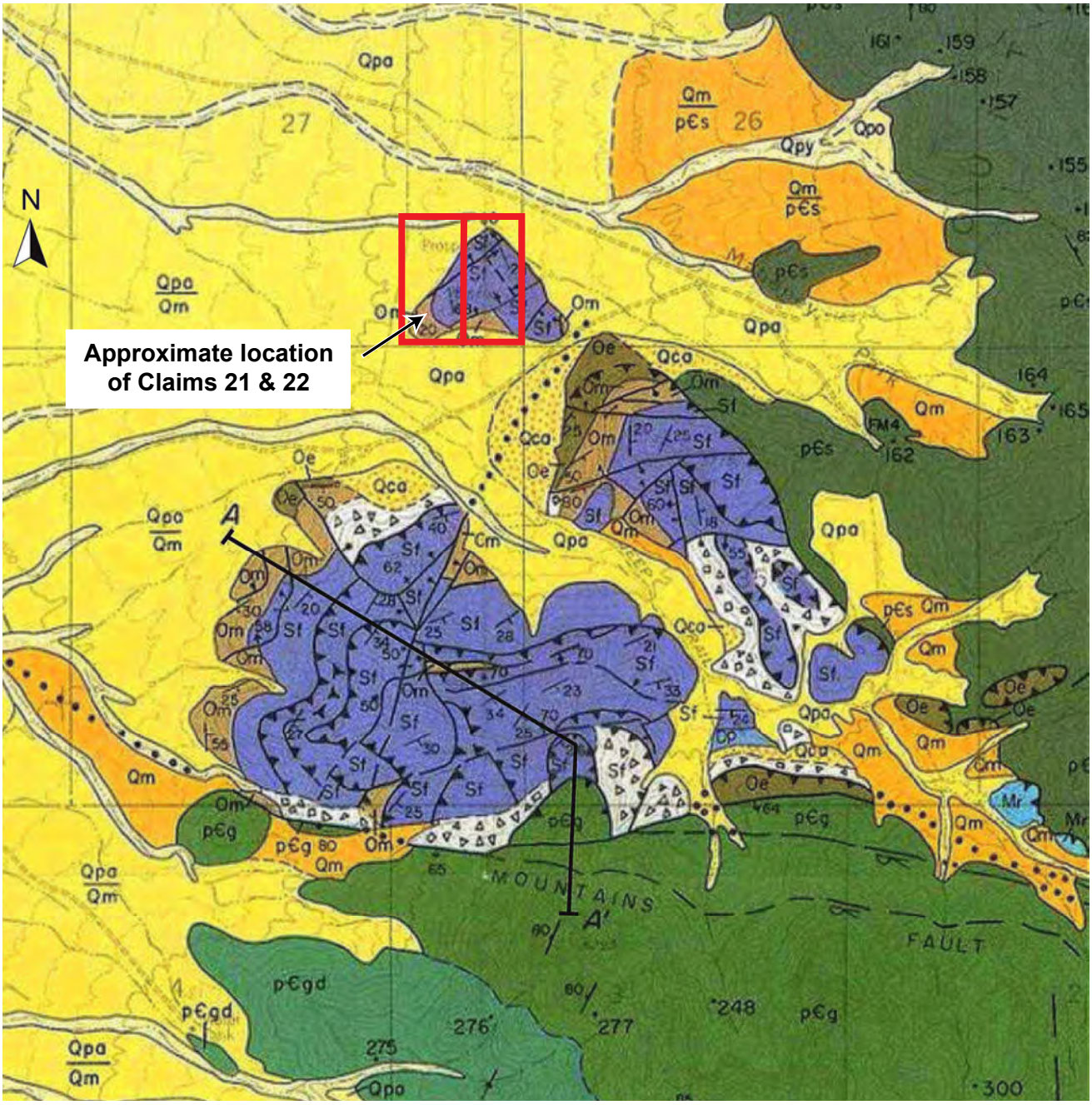
American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

Figure 8. Geology overview.

EnviroSystems Management, Inc.
Environmental Planning • Regulatory Compliance

Map adapted from American Magnesium LLP (2014).



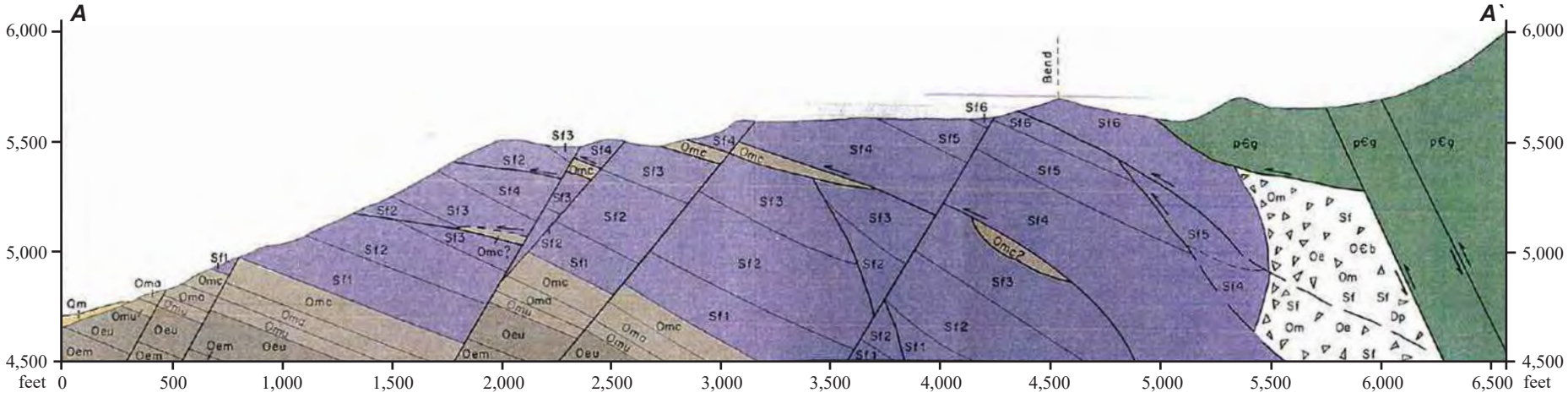
American Magnesium Dolomite Mining

EnviroSystems Project No. 1966-18

Figure 9. Dolomite Mountain cross section.

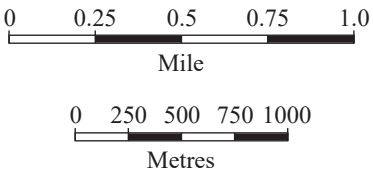
EnviroSystems Management, Inc.
Environmental Planning • Regulatory Compliance

Map adapted from American Magnesium LLP (2014).



Enlarged, true-scale, northwest-southeast cross section (A-A`).

Symbols not used on geologic map are: Oem - middle El Paso Formation, Oeu - upper El Paso, Oem - Upham Member of Montaya Formation, Oma - Aleman Member, Omc - Cutter Member, Sf1 - lower dark-gray Fusselman Dolomite, Sf2 - lower light-gray Fusselman, Sf3 - middle dark-gray Fusselman, Sf5 - upper dark-gray Fusselman, Sf6 - upper light-gray Fusselman



6.4 Rock Characteristics

All sampling to date has been chip and chip channel both by the New Mexico Bureau of Mines in 1957 and AmMg in 2014. The historic sampling data was based upon approximately one sample per 44 acres. AmMg took one sample per four acres, and this provides a better estimate because of an order of magnitude larger sample population. .

One soil sample, performed by ALS Environmental was received by AMEC Environment & Infrastructure Inc. on August 28, 2017, to be analyzed for metals. The sample was analyzed following SW-846, 3rd Edition procedures. Analysis by Trace ICP followed method 6010B and the current revision of SOP 834. Analysis by ICPMS followed method 6020A and the current revision of SOP 827. Mercury analysis by CVAA followed method 7470A and the current revision of SOP 812.

- All initial and continuing calibration blanks were below the reporting limit for the requested analytes with the exception of CCB1 for selenium. None of the samples associated with this order number were bracketed by this CCB.
- All initial and continuing calibration verifications were within the acceptance criteria for the requested analytes with the exception of CCV9 for uranium. None of the samples associated with this order number were bracketed by this CCV.
- A matrix spike and matrix spike duplicate were digested and analyzed with each batch. All acceptance criteria for accuracy were met with the following exceptions:

Analyte	Sample ID
Aluminum	-2MS/MSD
Boron	-2M/MSD

The associated sample results are flagged for matrix spike failure and an analytical spike test was performed. The results of the spike were acceptable, indicating that the matrix was not significantly affecting quantitation of this analysis. No acid runoff or significant leaching is anticipated to result from the proposed Project. In the unlikely event some extremely minor acid leaching did occur, the abundant presence of calcium carbonate (CaCo3) would act as a buffering agent. ALS sample results from the Dolomite is found in Appendix F.

6.5 Rock Handling

Following resource verification and approval of the PoO, a qualified mine or geological engineer will design widths and slopes of high walls, to match the surrounding slopes, for optimal safety and reclamation activities. All rock will be handled and disposed of in a manner consistent with BLM 43 CFR 3809 regulations. Very little waste rock is anticipated to be generated during mining activities, and no acid forming compounds from sampling have been indicated. A Waste Rock Characterization Study (WRCS) will support

conclusions above and no further rock characterization would likely result in the same conclusion; therefore a separate study and plan is not anticipated to be required in order to consider this Section of the PoO administratively complete.

7.0 RECLAMATION COST ESTIMATE [3809.401(D)]

A preliminary reclamation cost estimate is included here, and a final reclamation cost estimate will be submitted once mining commences and assessment of reclamation requirements on a site- specific basis can be calculated. As required by 43 CFR 3809.552, a complete reclamation cost estimate will be prepared for the entire mine Project during evaluation or upon completion of the requirements of the National Environmental Policy Act (NEPA). The planned cost estimating effort will be developed utilizing Standardized Reclamation Cost Estimator (SRCE) software to facilitate accuracy, completeness, and consistency in the calculation of costs for mine site reclamation.

The total reclamation cost estimate for the 34.8 acres of proposed disturbance within the Project Area will be calculated and submitted. AmMg anticipates that the total reclamation cost estimate will be submitted in coordination with BLM and MMD, and in connection with determining the appropriate financial assurance mechanism to be submitted for the Project. 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 primary closure and reclamation activities to be undertaken for this Project include:

- Re-contouring disturbed areas to blend with the surrounding topography;
- Using topsoils, subsoils, and soil amendments, as necessary
- Drill hole plugging and abandonment; and
- Hydroseeding disturbed areas to establish vegetation
- Monitoring of Reclamation success and identification of additional efforts if required to achieve success.

Reclamation costs have been estimated for the activities described in the Reclamation Plan (Table 9). The estimated costs will be based on Davis-Bacon Act labor wage rates and local equipment rental rates for the estimated time to complete the tasks and the anticipated costs of materials that would be required for hydroseeding. Per BLM guidelines, these separate cost categories (manpower, equipment, and materials) will be provided as separate line items for each reclamation disturbance category. The costs will be based on reclamation of 34.8 acres and 40-hour work weeks.

Table 9. Preliminary Reclamation Cost Estimate

Project Component	Manpower	Equipment	Material	Total
Mine Planning, including Resource verification Roads and Drill Pads	$50,000	$50,000	$400,000	$500,000

8.0 LIST OF CONTRIBUTORS

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9.0 REFERENCES

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APPENDIX A

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 B

Spill Prevention, Control and Counter-Measures Plan

DRAFT

SPILL PREVENTION, CONTROL, AND COUNTERMEASURE PLAN

For Magnesium Mining

Deming, New Mexico

February 2018

Prepared for:

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

Prepared and Submitted by:

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

Table of Contents

Professional Engineer Certification [40 CFR 112.3(d)] 3
SPCC Management Approval [40 CFR 112.7] 3
1. Introduction 5
2. Facility Information [40 CFR 112.7(a)] 6
2.1 Location 6
2.2 Project Description and Onsite Equipment 6
2.3 Contact Information 7
2.4 Past Spill Experience 7
3. Potential Equipment Failures [40 CFR 112.7(b)] 8
4. Containment and Diversionary Structures [40 CFR 112.7(c)] 9
5. Potential Spill Volumes and Rates [40 CFR 112.7(d)] 10
5.1 Demonstration of Practicability 10
6. Inspections and Record Keeping [40 CFR 112.7(e)] 11
6.1 Routine Inspections 11
6.2 Annual Inspections 11
6.3 Record Keeping 11
7. Personnel Training and Spill Control Procedures [40 CFR 112.7(f)] 12
7.1 Personnel Training 12
7.2 Spill Control Procedures 12
8. Security [40 CFR 112.7(g)] 14

List of Tables

Table 1. Project Contact Information
Table 2. Past Spill Experience
Table 3. Potential Minor Incidental Failures
Table 4. Potential Major Incidental Failures

Appendices

Appendix A. Site Map
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)]

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

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

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

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

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

Table 3. Potential Minor Incidental Failures

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

Table 4. Potential Major Incidental Failures

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

5.1 Demonstration of Practicability

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

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

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

6.1 Routine Daily Inspections

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

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

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

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

6.2 Annual Inspections

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

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

6.3 Record Keeping

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

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

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

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

7.1 Personnel Training

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

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

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

7.2 Spill Control Procedures

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

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

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

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

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

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

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

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

8. Security [40 CFR 112.7(g)]

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

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

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

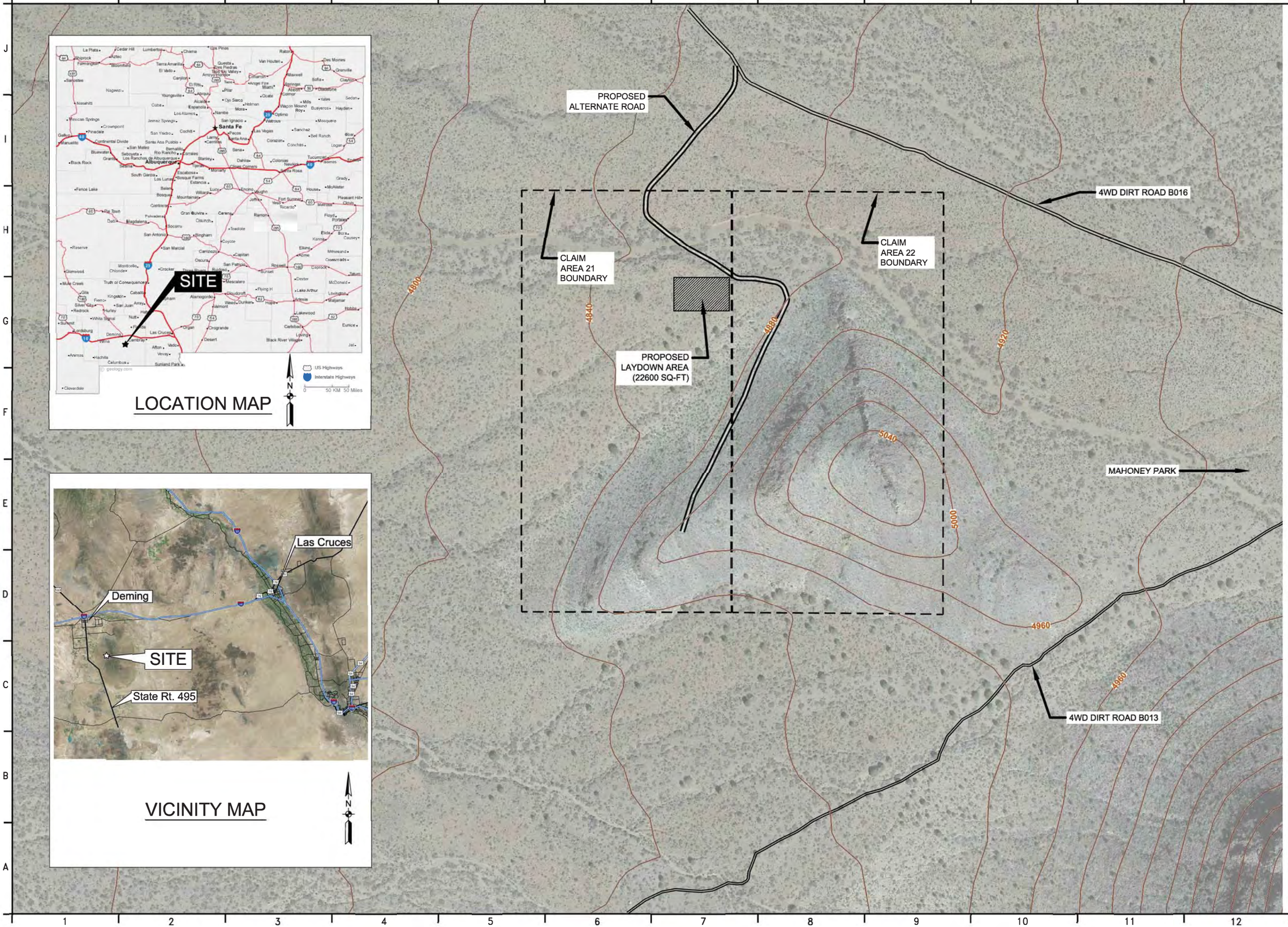
APPENDICES

Appendix A

Site Map

LOCATION MAP

VICINITY MAP



LEGEND

- CLAIM BOUNDARY
- ROADWAY
- PROPOSED LAYDOWN AREA

N

0 150 300

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

PROJECT:

AMERICAN MAGNESIUM- SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN

REVISIONS

NO.	DATE	BY	APPROVED

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

SHEET TITLE:

SITE MAP

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

Appendix B

Safety Data Sheets

SAFETY DATA SHEET

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

1. IDENTIFICATION

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

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

Product Code: 0290MAR019
Chemical Family: Complex Hydrocarbon Substance

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

Manufacturer, Importer, or Responsible Party Name and Address:

MARATHON CANADA MARKETING, Ltd.
Canadian Address Here

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

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

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

Hazards Not Otherwise Classified (HNOC)
Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

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

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

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

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

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

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

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

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

Composition Information:

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

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

4. FIRST AID MEASURES

First Aid Measures

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

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

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

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

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

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

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

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

Indication of any immediate medical attention and special treatment needed

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

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

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

5. FIRE-FIGHTING MEASURES

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

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

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

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

Explosion data
Sensitivity to Mechanical Impact No.

Sensitivity to Static Discharge Yes.

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

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

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

NFPA Health 1 Flammability 2 Instability 0 Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

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

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

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

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

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

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

7. HANDLING AND STORAGE

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

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

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

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

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

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

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

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

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

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

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

Personal protective equipment

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

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

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

10. STABILITY AND REACTIVITY

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

Hazardous polymerization Will not occur.

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

Incompatible Materials Strong oxidizing agents.

Hazardous decomposition products None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

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

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

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

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

Acute toxicological data

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

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

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

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

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

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

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

Adverse effects related to the physical, chemical and toxicological characteristics

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

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

Mutagenic effects None known.

Carcinogenicity Suspected of causing cancer.

Cancer designations are listed in the table below

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

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

Reproductive toxicity None known.

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

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

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

12. ECOLOGICAL INFORMATION

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

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

Persistence and degradability Expected to be inherently biodegradable.

Bioaccumulation Has the potential to bioaccumulate.

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

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

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

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

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

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

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

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

TDG (Canada):

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

15. REGULATORY INFORMATION

US Federal Regulatory Information:

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

EPA Superfund Amendment & Reauthorization Act (SARA):

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

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

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

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

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

Acute Health Hazard
Fire Hazard
Chronic Health Hazard

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

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

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

No. 2 Diesel Fuel

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

Kerosine (petroleum)

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

Alkanes, C10-C20 branched and linear

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

Naphthalene

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

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

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

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

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

Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Issue Date 10/31/2016

Revision Notes

Revision Date 06/01/2016

Disclaimer

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

SAFETY DATA SHEET

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

1. IDENTIFICATION

Product Name: Marathon Petroleum Gasoline - All Grades

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

Product Code: 0127MAR019
Chemical Family: Complex Hydrocarbon Substance

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

Manufacturer, Importer, or Responsible Party Name and Address:

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

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

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

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

Hazards Not Otherwise Classified (HNOC)
Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

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

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

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

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

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

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

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

Composition Information:

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

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

4. FIRST AID MEASURES

First Aid Measures

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

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

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

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

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

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

person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

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

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

Indication of any immediate medical attention and special treatment needed

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

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

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

5. FIRE-FIGHTING MEASURES

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

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

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

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

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

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

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

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

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

NFPA	Health 1	Flammability 3	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

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

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

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

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

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

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

7. HANDLING AND STORAGE

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

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

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

approved containers.

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

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

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

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

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

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

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

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

Personal protective equipment

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

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

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

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

10. STABILITY AND REACTIVITY

Reactivity The product is non-reactive under normal conditions.

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

Possibility of hazardous reactions None under normal processing.

Hazardous polymerization Will not occur.

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

Incompatible Materials Strong oxidizing agents.

Hazardous decomposition products None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

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

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

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

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

Acute toxicological data

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Adverse effects related to the physical, chemical and toxicological characteristics

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

Sensitization Not expected to be a skin or respiratory sensitizer.

Mutagenic effects May cause genetic defects.

Carcinogenicity May cause cancer.

Cancer designations are listed in the table below

Name	ACGIH	IARC	NTP	OSHA

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

Reproductive toxicity Suspected of damaging fertility or the unborn child.

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

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

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

12. ECOLOGICAL INFORMATION

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

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

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

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

Bioaccumulation Has the potential to bioaccumulate.

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

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

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

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

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

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

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

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

TDG (Canada):

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

15. REGULATORY INFORMATION

US Federal Regulatory Information:

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

EPA Superfund Amendment & Reauthorization Act (SARA):

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

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

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

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

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

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

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

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

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

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

Gasoline

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

Heptane (mixed isomers)

Louisiana Right-To-Know:	Not Listed

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

Butane (mixed isomers)

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

Pentane (mixed isomers)

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

Hexane Isomers (other than n-Hexane)

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

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

Toluene

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

Xylene (mixed isomers)

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

n-Hexane

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

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

Cumene

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

1,2,4 Trimethylbenzene

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

Ethylbenzene

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

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

Benzene

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

Cyclohexane

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

Octane

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

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

1,2,3-Trimethylbenzene

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

Naphthalene

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

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

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

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

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

Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 06/01/2016

Disclaimer

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

SAFETY DATA SHEET

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

1. IDENTIFICATION

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

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

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

Manufacturer, Importer, or Responsible Party Name and Address:

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

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

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

Serious eye damage/eye irritation	Category 2A

Hazards Not Otherwise Classified (HNOC)
Not applicable.

Label elements

EMERGENCY OVERVIEW

Warning

Causes serious eye irritation

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

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

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

Precautionary Statements - Storage
Not applicable.

Precautionary Statements - Disposal
Not applicable.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

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

Composition Information:

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

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

4. FIRST AID MEASURES

First Aid Measures

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

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

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

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

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

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

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

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

Indication of any immediate medical attention and special treatment needed

Notes To Physician: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

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

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

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

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

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

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

Additional firefighting tactics
Not applicable.

NFPA	Health 1	Flammability 1	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

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

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

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

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

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

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

7. HANDLING AND STORAGE

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

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

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

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

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

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

Personal protective equipment

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

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

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

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

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

or oil acne.

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

Acute toxicological data

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

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

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

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

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

Adverse effects related to the physical, chemical and toxicological characteristics

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

Sensitization Not expected to be a skin or respiratory sensitizer.

Mutagenic effects None known.

Carcinogenicity Cancer designations are listed in the table below

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

Reproductive toxicity None known.

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

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

Aspiration hazard Not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity

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

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

Persistence and degradability Not expected to be readily biodegradable.

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

Mobility in soil No information available.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
No information available.

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

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

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

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

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

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

15. REGULATORY INFORMATION

US Federal Regulatory Information:

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

EPA Superfund Amendment & Reauthorization Act (SARA):

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

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

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

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

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

Acute Health Hazard

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

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

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

Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts

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

Dinonyl diphenylamine

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

Butene, homopolymer

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

Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed

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

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

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

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Phosphorodithioic acid, mixed O,O-bis(sec-Bu and isooctyl) esters, zinc salts	D2B	1%
Butene, homopolymer	Uncontrolled product according to WHMIS classification criteria	

Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 05/22/2015

Disclaimer

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

SAFETY DATA SHEET

SDS ID NO.: 0196MAR019
Revision Date 05/22/2015

1. IDENTIFICATION

Product Name: Marathon Petroleum Maratrac Grease

Synonym: Maratrac™ Grease; Maratrac Construction Farm Grease; Maratrac CF Grease; Maratrac No. 2 Grease
Product Code: 0196MAR019
Chemical Family: Petroleum Based Grease

Recommended Use: Lubricating Grease.
Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:

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

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Hazards Not Otherwise Classified (HNOC)
Not applicable.

Label elements

EMERGENCY OVERVIEW

No known significant effects or critical hazards.

Appearance Gray semi-solid **Physical State** Semi-Solid **Odor** Petroleum

Precautionary Statements - Prevention
Not applicable.

Precautionary Statements - Response
Not applicable.

Precautionary Statements - Storage
Not applicable.

Precautionary Statements - Disposal
Not applicable.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Maratrac™ Grease is a mixture of high viscosity, highly refined lubricating oil base stock with a lithium complex soap thickener.

Composition Information:

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. FIRST AID MEASURES

First Aid Measures

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

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

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

Eye Contact: Immediately flush eyes with plenty of water. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

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

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

Adverse Effects: May cause eye irritation May cause skin irritation and/or dermatitis Symptoms may include redness, itching, and inflammation. Preexisting skin conditions and/or respiratory disorders may be aggravated by exposure to this product.

Indication of any immediate medical attention and special treatment needed

Notes To Physician: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

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

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

Specific hazards arising from the chemical

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

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

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

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

Additional firefighting tactics
Not applicable.

NFPA	Health 1	Flammability 1	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

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

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

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

Environmental precautions: Avoid release to the environment.

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

Methods and materials for cleaning up: Cover with absorbent materials such as sand or clay. Shovel or sweep up material and place in a designated, labeled waste container.

7. HANDLING AND STORAGE

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

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

Incompatible Materials Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

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

Personal protective equipment

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

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

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

10. STABILITY AND REACTIVITY

Reactivity The product is non-reactive under normal conditions.

Chemical stability Stable under recommended storage conditions.

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

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation	Overheating may produce vapors which may cause respiratory irritation, dizziness and nausea.
Eye contact	Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.
Skin contact	May cause skin irritation. Prolonged or repeated exposure may cause dermatitis, folliculitis or oil acne.
Ingestion	May cause irritation of the mouth, throat and gastrointestinal tract.

Acute toxicological data

No information available.

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

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

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms	May cause eye irritation Contact may cause skin dermatitis and/or irritation. Symptoms may include redness, itching, and inflammation. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.
Sensitization	Not expected to be a skin or respiratory sensitizer.
Mutagenic effects	None known.
Carcinogenicity	None known.
Reproductive toxicity	None known.
Specific Target Organ Toxicity (STOT) - single exposure	Not classified.
Specific Target Organ Toxicity (STOT) - repeated exposure	Not classified.
Aspiration hazard	Not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity	No information available.

Persistence and degradability	No information available.
Bioaccumulation	No information available.
Mobility in soil	No information available.
Other adverse effects	No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
No information available.

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

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

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

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

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

TDG (Canada):

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

15. REGULATORY INFORMATION

US Federal Regulatory Information:

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

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302:	This product may contain component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:
SARA Section 304:	This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:
SARA Section 311/312:	The following EPA hazard categories apply to this product:
	None
SARA Section 313:	This product may contain component(s), which if in exceedance of the de minimus

threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

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

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

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

Note: Uncontrolled product according to WHMIS classification criteria.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 05/22/2015

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

SAFETY DATA SHEET

1. Product And Company Identification

SDS ID: SDS 501
PRODUCT NAME: Prestone ® Antifreeze/Coolant
PRODUCT NUMBER: AF2000X, AF2000L, AF2050, AF2055, 72025, 71605, 71621, PRES04C, AF2000UK, AF2000PL. AF2000-1KL, AF2000LRU, AF2000RU, 65069, AF2000/GF, AF2000/GFC, AF2055/GF, AF2000-1KL/GF, AF2000/GXF, AF2000/GXF-HT, 71621/GF, 71621/GFC, 71621/GFC3
FORMULA NUMBER: YA956BY, YA956BY-B, YA956BY-ED, YA956BY-ED-B, YA-956BY-GLY, YA-992

MANUFACTURER:
Prestone Products Corporation
Danbury, CT 06810-5109

CANADIAN OFFICE:
FRAM Group (Canada), Inc.
Mississauga, Ontario L5L 3S6

MEDICAL EMERGENCIES AND ALL OTHER INFORMATION PHONE NUMBER:
(800)890-2075 (in the US)
(800)668-9349 (in Canada)
TRANSPORTATION EMERGENCY PHONE NUMBER (Chemical Spills and Transport Accidents only):
CHEMTREC 1-800-424-9300 (in the US)
CANUTEC (613)996-6666 (in Canada)
SDS DATE OF PREPARATION/REVISION: 09/24/15

PRODUCT USE: Automobile Antifreeze – consumer product
RESTRICTIONS ON USE: None identified

2. Hazards Identification

GHS/HAZCOM 2012 Classification:

Health	Physical
Acute Toxicity Category 4 (oral) Specific Target Organ Toxicity – Repeated Exposure Category 2 Toxic to Reproduction Category 2	Not Hazardous

Label Elements

WARNING!
H302 Harmful if swallowed.
H361d Suspected of damaging the unborn child.
H373 May cause damage to kidneys through prolonged or repeated exposure.

Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe mist or vapors.
P264 Wash exposed skin thoroughly after handling.
P270 Do not eat, drink, or smoke when using this product.

P280 Wear protective gloves.
Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell.
P330 Rinse mouth.
P308 + P313 IF exposed or concerned: Get medical advice.
Disposal:
P405 Store locked up.
P501 Dispose of contents and container in accordance with local and national regulations.

3. Composition/Information On Ingredients

Component	CAS No.	Amount
Ethylene Glycol	107-21-1	75-95%
2-Ethyl Hexanoic Acid, Sodium Salt	19766-89-3	1-5%
Neodecanoic Acid, Sodium Salt	31548-27-3	1-5%
Diethylene Glycol	111-46-6	0-5%

The exact concentrations are a trade secret.

4. First Aid Measures

INHALATION: Remove the victim to fresh air. If breathing has stopped administer artificial respiration. If breathing is difficult, have medical personnel administer oxygen. Get medical attention.

SKIN CONTACT: Remove contaminated clothing. Immediately wash contacted area thoroughly with soap and water. If irritation persists, get medical attention.

EYE CONTACT: Immediately flush eyes with large amounts of water for 15 minutes. Get medical attention if irritation persists.

INGESTION: Seek immediate medical attention. Immediately call local poison control center or go to an emergency department. Never give anything by mouth to or induce vomiting in an unconscious or drowsy person.

MOST IMPORTANT SYMPTOMS: May cause eye irritation. Inhalation of mists may cause nose and throat irritation and nervous system effects. Ingestion may cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, back pain, decrease in urine output, kidney failure, and central nervous system effects.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT, IF NEEDED: Seek immediate medical attention for large ingestions.

NOTES TO PHYSICIAN: The principal toxic effects of ethylene glycol, when swallowed, are kidney damage and metabolic acidosis. The combination of metabolic acidosis, an osmol gap and oxalate crystals in the urine is evidence of ethylene glycol poisoning. Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. Respiratory support with mechanical ventilation may be required. There may be cranial nerve involvement in the late stages of toxicity from swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth, and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing and dysphagia.

Ethanol is antidotal and its early administration may block the formation of nephrotoxic metabolites of ethylene glycol in the liver. The objective is to rapidly achieve and maintain a blood ethanol level of approximately 100 mg/dl by giving a loading dose of ethanol followed by a maintenance dose. Intravenous administration of ethanol is the preferred route. Ethanol blood levels should be checked frequently. Hemodialysis may be required. 4-Methyl pyrazole (Fomepizole®), a potent inhibitor of alcohol dehydrogenase, has been used therapeutically to decrease the metabolic consequences of ethylene glycol poisoning. Fomepizole® is easier to use clinically than ethanol, does not cause CNS depression or hypoglycemia and requires less

monitoring than ethanol. Additional therapeutic modalities which may decrease the adverse consequences of ethylene glycol metabolism are the administration of both thiamine and pyridoxine. As there are complicated and serious overdoses, we recommend you consult with the toxicologists at your poison control center.

5. Firefighting Measures

SUITABLE EXTINGUISHING MEDIA: For large fires, use alcohol type or all-purpose foams. For small fires, use water spray, carbon dioxide or dry chemical.

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: A solid stream of water or foam directed into hot, burning liquid can cause frothing. Burning may produce carbon monoxide and carbon dioxide.

SPECIAL FIRE FIGHTING PROCEDURES: Do not spray pool fires directly. Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing for fires in areas where chemicals are used or stored.

6: Accidental Release Measures

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Wear appropriate protective clothing and equipment (See Section 8).

METHODS AND MATERIALS FOR CONTAINMENT/CLEANUP: Collect with absorbent material and place in appropriate, labeled container for disposal or, if permitted flush spill area with water.

7. Handling and Storage

PRECAUTIONS FOR SAFE HANDLING:

Harmful or Fatal if Swallowed. Do not drink antifreeze or solution. Avoid eye and prolonged or repeated skin contact. Avoid breathing vapors or mists. Wash exposed skin thoroughly with soap and water after use. Do not store in opened or unlabeled containers. Keep container away from open flames and excessive heat. Do not reuse empty containers unless properly cleaned. Empty containers retain product residue and may be dangerous. Do not cut, weld, drill, etc. containers, even empty.

Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without any obvious ignition sources. Published "autoignition" or "ignition" temperatures cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Use of this product in elevated temperature applications should be thoroughly evaluated to assure safe operating conditions.

CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES: Store away from excessive heat and oxidizers.

NFPA CLASSIFICATION: IIIB

8. Exposure Controls / Personal Protection

EXPOSURE GUIDELINES

CHEMICAL	EXPOSURE LIMIT
Ethylene Glycol (as aerosol)	100 mg/m^3 Ceiling ACGIH TLV
2-Ethyl Hexanoic Acid, Sodium Salt	None Established
Neodecanoic Acid, Sodium Salt	None Established
Diethylene Glycol	10 mg/m^3 TWA AIHA WEEL

VENTILATION: Use general ventilation or local exhaust as required to maintain exposures below the occupational exposure limits.

RESPIRATORY PROTECTION: For operations where the TLV is exceeded a NIOSH approved respirator with organic vapor cartridges and dust/mist prefilters or supplied air respirator is recommended. Equipment selection depends on contaminant type and concentration. Select and use in accordance with 29 CFR 1910.134 and good industrial hygiene practice. For firefighting, use self-contained breathing apparatus.

GLOVES: Chemical resistant gloves such as neoprene or PVC where contact is possible.

EYE PROTECTION: Splash-proof goggles.

OTHER PROTECTIVE EQUIPMENT/CLOTHING: Appropriate protective clothing as needed to minimize skin contact.

9. Physical and Chemical Properties

APPEARANCE:	Yellow liquid	ODOR:	Characteristic odor
ODOR THRESHOLD:	None	pH:	8.7-9.2
MELTING/FREEZING POINT:	-34°F (-36.6°C) – -36°F (-37.7°C)	BOILING POINT/RANGE:	327°F (164°C) – 340°F (171.1°C)
FLASH POINT:	254 °F (123 °C) TOC >230 °F (>110 °C) Setaflash	EVAPORATION RATE:	Not determined
FLAMMABILITY (SOLID, GAS)	Not Applicable	FLAMMABILITY LIMITS:	LEL: Not determined UEL: Not determined
VAPOR PRESSURE:	<0.06 mm Hg @20°C	VAPOR DENSITY:	2.1
RELATIVE DENSITY:	1.07-1.14	SOLUBILITIES	Water: Complete
PARTITION COEFFICIENT (n-octanol/water)	Not determined	AUTOIGNITION TEMPERATURE:	Not determined
DECOMPOSITION TEMPERATURE:	Not determined	VISCOSITY:	Not determined

10. Stability and Reactivity

REACTIVITY: Normally unreactive

CHEMICAL STABILITY: Stable

POSSIBILITY OF HAZARDOUS REACTIONS: Reaction with strong oxidizers will generate heat.

CONDITIONS TO AVOID: None known

INCOMPATIBLE MATERIALS: Avoid strong bases at high temperatures, strong acids, strong oxidizing agents, and materials reactive with hydroxyl compounds.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide.

11. Toxicological Information

POTENTIAL HEALTH EFFECTS:

ACUTE HAZARDS:
INHALATION: May cause irritation of the nose and throat with headache, particularly from mists. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting,

headache, dizziness and irregular eye movements.

SKIN CONTACT: No evidence of adverse effects from available information.

EYE CONTACT: Liquid, vapors or mist may cause discomfort in the eye with persistent conjunctivitis, seen as slight excess redness or conjunctiva. Serious corneal injury is not anticipated.

INGESTION: May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, back pain, decrease in urine output, kidney failure, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure and pulmonary edema may develop. Severe kidney damage which may be fatal may follow the swallowing of ethylene glycol. A few reports have been published describing the development of weakness of the facial muscles, diminishing hearing, and difficulty with swallowing, during the late stages of severe poisoning.

CHRONIC EFFECTS: Prolonged or repeated inhalation exposure may produce signs of central nervous system involvement, particularly dizziness and jerking eye movements. Prolonged or repeated skin contact may cause skin sensitization and an associated dermatitis in some individuals. Ethylene glycol has been found to cause birth defects in laboratory animals. The significance of this finding to humans has not been determined. 2-Ethyl Hexanoic Acid, Sodium Salt is suspected of causing developmental effects based on animal data.

CARCINOGENICITY LISTING: None of the components of these products is listed as a carcinogen or suspected carcinogen by IARC, NTP, ACGIH or OSHA.

ACUTE TOXICITY VALUES:
Ethylene Glycol: LD50 Oral Rat: 4700 mg/kg
LD50 Skin Rabbit: 9530 mg/kg

Diethylene Glycol: LD50 Oral Rat: 12,565 mg/kg
LD50 Skin Rabbit: 11,890 mg/kg

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH: Ethylene glycol has been shown to produce dose-related teratogenic effects in rats and mice when given by gavage or in drinking water at high concentrations or doses. Also, in a preliminary study to assess the effects of exposure of pregnant rats and mice to aerosols at concentrations 150, 1,000 and 2,500 mg/m3 for 6 hours a day throughout the period of organogenesis, teratogenic effects were produced at the highest concentrations, but only in mice. The conditions of these latter experiments did not allow a conclusion as to whether the developmental toxicity was mediated by inhalation of aerosol, percutaneous absorption of ethylene glycol from contaminated skin, or swallowing of ethylene glycol as a result of grooming the wetted coat. In a further study, comparing effects from high aerosol concentration by whole-body or nose-only exposure, it was shown that nose-only exposure resulted in maternal toxicity (1,000 and 2,500 mg/m3) and developmental toxicity in with minimal evidence of teratogenicity (2,500 mg/m3). The no-effects concentration (based on maternal toxicity) was 500 mg/m3. In a further study in mice, no teratogenic effects could be produced when ethylene glycol was applied to the skin of pregnant mice over the period of organogenesis. The above observations suggest that ethylene glycol is to be regarded as an animal teratogen; there is currently no available information to suggest that ethylene glycol caused birth defects in humans. Cutaneous application of ethylene glycol is ineffective in producing developmental toxicity; exposure to high aerosol concentration is only minimally effective in producing developmental toxicity; the major route for producing developmental toxicity is perorally.

Two chronic feeding studies, using rats and mice, have not produced any evidence that ethylene glycol causes dose-related increases in tumor incidence or a different pattern of tumors compared with untreated controls. The absence of carcinogenic potential for ethylene glycol has been supported by numerous invitro genotoxicity studies showing that it does not produce mutagenic or clastogenic effects. This product contains less than 0.3% tolytriazole which has demonstrates mutagenic activity in a bacterial test system. A correlation has been established between mutagenic activity and carcinogenic activity for many chemicals. Tolytriazole has not been identified as a carcinogen or probable carcinogen by NTP, IARC or OSHA.

In a study of Wistar rats, adverse developmental results were reported at a dose of 100 mg / kg of body weight for 2-Ethyl Hexanoic Acid, Sodium Salt.

12. Ecological Information

ECOTOXICITY:

Ethylene Glycol: LC50 Fathead Minnow <10,000 mg/L/96 hr.
EC50 Daphnia Magna 100,000 mg/L/48 hr.
Bacterial (Pseudomonas putida): 10,000 mg/l
Protozoa (Entosiphon sulcatum and Uronema parduczi; Chatton-Lwoff) : >10,000 mg/l
Algae (Microcystis aeruginosa): 2,000 mg/l
Green algae (Scenedesmus quandricauda) : >10,000 mg/l

Diethylene Glycol: LC50 western mosquitofish >32,000 mg/L/96 hr.

PERSISTENCE AND DEGRADABILITY:

Ethylene Glycol is readily biodegradable (97-100% in 2-12 days). Diethylene glycol is readily biodegradable (>70% in 19 days).

BIOACCUMULATIVE POTENTIAL:

Ethylene glycol: A BCF of 10, reported for ethylene glycol in fish, Golden ide (Leuciscus idus melanotus), after 3 days of exposure suggests the potential for bio concentration in aquatic organisms is low.
Diethylene glycol: An estimated BCF of 3 suggests the potential for bio concentration in aquatic organisms is low.

MOBILITY IN SOIL: Ethylene glycol and diethylene glycol are highly mobile in soil.

OTHER ADVERSE EFFECTS: None known

13. Disposal Considerations

Dispose of product in accordance with all local, state/provincial and federal regulations.

14. Transport Information

U.S. DOT HAZARD CLASSIFICATION: Not Regulated (unless package contains a reportable quantity)

Note: IF A SHIPMENT OF A REPORTABLE QUANTITY (5,260 LBS/553 GAL.) IN A SINGLE PACKAGE IS INVOLVED, THE FOLLOWING INFORMATION APPLIES:

PROPER SHIPPING NAME: RQ, Environmentally hazardous substance, liquid, n.o.s. (Ethylene glycol)
UN NUMBER: UN3082
PACKING GROUP: III
LABELS REQUIRED: Class 9

DOT MARINE POLLUTANTS: This product does not contain Marine Pollutants as defined in 49 CFR 171.8.

IMDG CODE SHIPPING CLASSIFICATION: Not Regulated

CANADIAN TDG CLASSIFICATION: Not Regulated

15. Regulatory Information

EPA SARA 311/312 HAZARD CLASSIFICATION: Acute health, chronic health

EPA SARA 313: This Product Contains the Following Chemicals Subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372):

Ethylene Glycol	107-21-1	75-95%

PROTECTION OF STRATOSPHERIC OZONE: This product is not known to contain or to have been manufactured with ozone depleting substances as defined in 40 CFR Part 82, Appendix A to Subpart A.

CERCLA SECTION 103: Spills of this product over the RQ (reportable quantity) must be reported to the National Response Center. The RQ for this product, based on the RQ for Ethylene Glycol (95% maximum) of 5,000 lbs, is 5,260 lbs. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

CALIFORNIA PROPOSITION 65: This product contains the following chemicals known to the State of California to cause cancer or reproductive toxicity (birth defects):

Ethylene Glycol	107-21-1	75-95%	Developmental

EPA TSCA INVENTORY: All of the components of this material are listed on or exempt from the Toxic Substances Control Act (TSCA) Chemical Substances Inventory.

CANADIAN ENVIRONMENTAL PROTECTION ACT: All of the ingredients are listed on or exempt from the Canadian Domestic Substances List.

EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS): All of the ingredients are listed on or exempt from the EINECS inventory.

JAPAN: All of the ingredients of this product are listed on or exempt from the Japanese Existing and New Chemical Substances (MITI) List.

AUSTRALIA: All of the ingredients of this product are listed on or exempt from the Australian Inventory of Chemical Substances.

KOREA: All of the ingredients of this product are listed on or exempt from the Korean Existing Chemical List (KECL).

PHILIPPINES: All of the ingredients of this product are listed on or exempt from the Philippine Inventory of Chemical and Chemical Substance (PICCS)

CHINA: All of the ingredients of this product are listed on or exempt from the Inventory of Existing Chemical Substance in China (IECSC).

16. Other Information

NFPA RATING (NFPA 704) - FIRE: 1 HEALTH: 2 INSTABILITY: 0

REVISION SUMMARY: Section 15: Chemical inventories, California Proposition 65.

SDS Date of Preparation/Revision: September 24, 2015

This SDS is directed to professional users and bulk handlers of the product. Consumer products are labeled in accordance with Federal Hazardous Substances Act regulations.

While Prestone Products Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which Prestone Products Corporation assumes legal responsibility. They are offered solely for your consideration, investigation and verification. Any use of these data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.

If more information is needed, please contact:

Prestone Products Corporation
69 Eagle Road
Danbury CT 06810
(800) 890-2075

Appendix C

Equipment Inspection Forms

HEAVY EQUIPMENT – Inspection Form

		Date:	
Project Name:	AmMg – Deming Mining Project	Project Number:	
Location:	Deming, New Mexico	Project Manager:	
Completed by:		Reviewed by:	
Manufacturer:		Equipment ID:	

- Check “Yes” if an assessment item is complete or is determined to be correct.
- Check “No” if an item is deficient for determined to be incorrect. Items determined to be deficiencies shall be brought to the immediate attention of the Site Supervisor or Safety Officer. Corrective Action must be completed for assessment items marked “No”.
- Check “N/A” if the item is not applicable.

1.0 General Equipment Inspection	Yes	No	N/A
1.1 Boom/Blade/Ripper in good condition?	☐	☐	☐
1.2 Ground engaging attachments in good condition?	☐	☐	☐
1.3 Frame, ladders, access point free of debris and in good condition?	☐	☐	☐
1.4 Hand grabs and steps free of debris and in good condition?	☐	☐	☐
1.5 Power cables and/or hoist cables free of damage?	☐	☐	☐
1.6 Braking system and steering components operational?	☐	☐	☐
1.7 Tire and/or tracks in good condition?	☐	☐	☐
1.8 Horn tested and operational?	☐	☐	☐
1.9 Mirrors in good condition?	☐	☐	☐
1.10 Gauges/turn signals/backup lights operational?	☐	☐	☐
1.11 Fire extinguisher maintained and within inspection date?	☐	☐	☐

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

3.0 Other Comments

Corrective Action		
Item	Corrective Action Planned	Date Corrected

DRILLING RIG – Inspection Form

		Date:	
Project Name:	AmMg – Deming Mining Project	Project Number:	
Location:	Deming, New Mexico	Project Manager:	
Completed by:		Reviewed by:	
Manufacturer:		Equipment ID:	

- Check “Yes” if an assessment item is complete or is determined to be correct.
- Check “No” if an item is deficient for determined to be incorrect. Items determined to be deficiencies shall be brought to the immediate attention of the Site Supervisor or Safety Officer. Corrective Action must be completed for assessment items marked “No”.
- Check “N/A” if the item is not applicable.

1.0 General Equipment Inspection	Yes	No	N/A
1.1 Kill switch clearly identified and operational?	☐	☐	☐
1.2 Ground engaging attachments in good condition?	☐	☐	☐
1.3 Rig ropes not wrapped around body parts?	☐	☐	☐
1.4 Pressurized lines and hoses secured?	☐	☐	☐
1.5 Cathead in clean, sound condition?	☐	☐	☐
1.6 Drill rig ropes in clean, sound condition?	☐	☐	☐
1.7 Augers/bits in clean, sound condition?	☐	☐	☐
1.8 Stabilization and leveling mechanisms operational?	☐	☐	☐
1.9 Fire extinguisher maintained and within inspection date?	☐	☐	☐

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

3.0 Other comments

Corrective Action		
Item	Corrective Action Planned	Date Corrected

APPENDIX C

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

AM Little Dolomite Hill Soil Report

July 23, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Luna County, New Mexico.....13
EG—Eba very gravelly clay loam, 0 to 10 percent slopes.....13
RU—Rough broken and Rock land.....14
References.....16

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

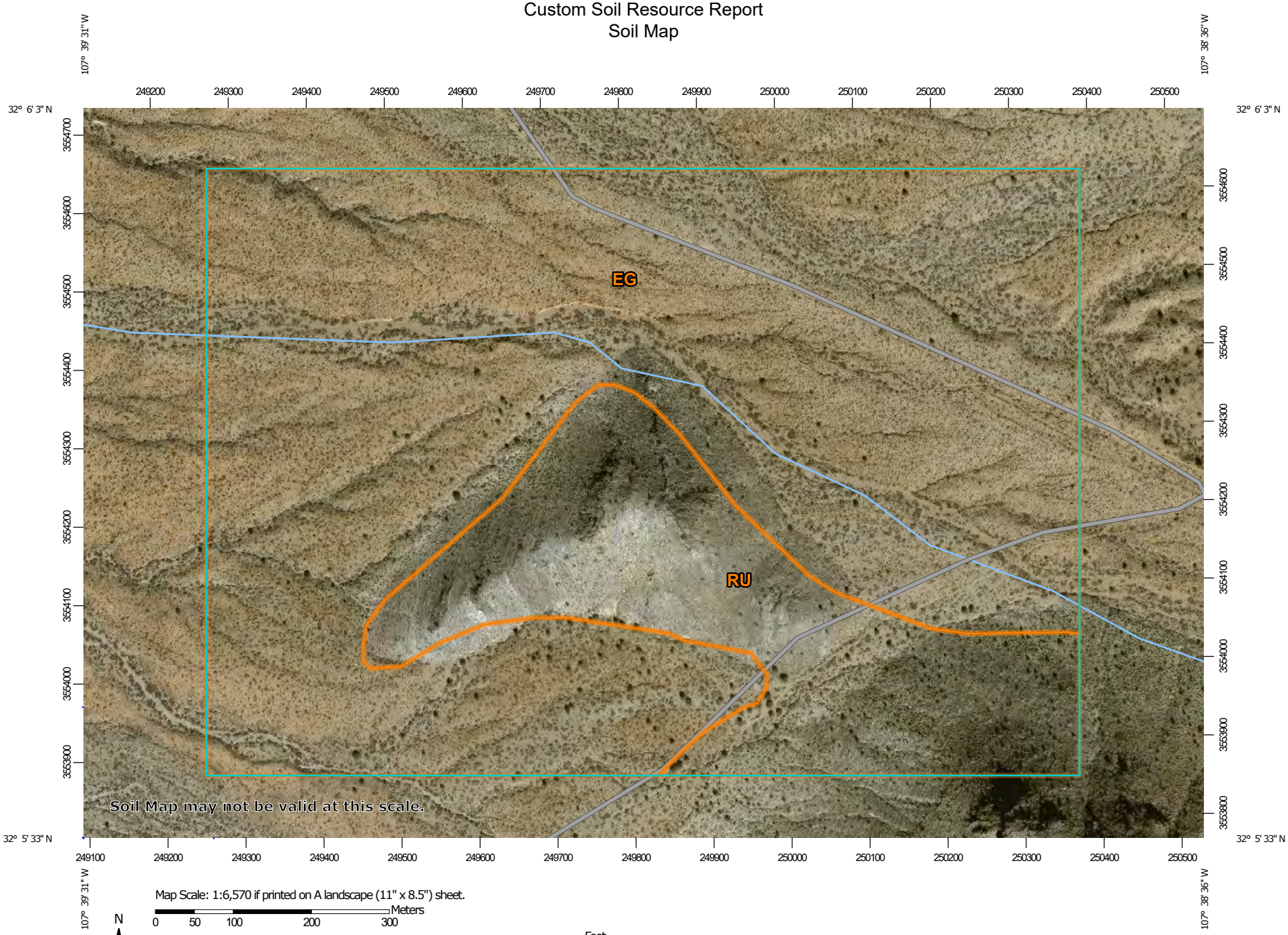
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,570 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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 13, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 5, 2012—Feb 2, 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	166.7	77.6%
RU	Rough broken and Rock land	48.1	22.4%
Totals for Area of Interest		**214.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Luna County, New Mexico

EG—Eba very gravelly clay loam, 0 to 10 percent slopes

Map Unit Setting

National map unit symbol: 1w94
Elevation: 1,800 to 6,000 feet
Mean annual precipitation: 7 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 170 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Eba and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eba

Setting

Landform: Alluvial fans, fan remnants
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

Nickel

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

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

Graham

Percent of map unit:
Ecological site: Malpais (R042XB037NM)
Hydric soil rating: No

Lehmans

Percent of map unit:
Ecological site: Hills (R042XB027NM)
Hydric soil rating: No

Lozier

Percent of map unit:
Ecological site: Limestone Hills (R042XB021NM)
Hydric soil rating: No

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APPENDIX D

Biological Survey

ENVIROSYSTEMS
ENVIRONMENTAL PLANNING, COMPLIANCE, AND PERMITTING

TECHNICAL MEMORANDUM

TO: David Tognoni, American Magnesium, LLC; Vickie Maranville, Amec Foster Wheeler
FROM: Mark Daniels, Senior Ecologist/Environmental Engineer, EnviroSystems Management, Inc.
SUBJECT: Biological Resources Evaluation of Proposed Mag Hill Dolomite Mine South of Deming, Luna County, New Mexico
DATE: August 10, 2016

Introduction

On July 28, 2016, EnviroSystems conducted a biological resources evaluation for a proposed dolomite mine on Bureau of Land Management (BLM) Las Cruces District Office (LCDO) land south-southeast of Deming, Luna County, New Mexico. The evaluation was conducted on behalf of American Magnesium, LLC, who has initiated the environmental permit process for the proposed mine. The proposed mine is comprised of two claims situated on a 40-acre parcel on the western edge of the Florida Mountains. The parcel was surveyed to determine the presence or absence of threatened, endangered, and sensitive species (TES) and/or their habitats.

Consultation to Date

Information obtained from the U.S. Fish and Wildlife Service (USFWS), New Mexico Department of Game and Fish (NMDGF), and the Bureau of Land Management (BLM) regarding TES was used to inform the field survey. Specifically, the USFWS website was checked for those species occurring in the project area (USFWS 2016), the Biota Information System of New Mexico (BISON-M) online database query (BISON-M 2016) was consulted for a list of state-listed species with potential habitat near the project area, and the BLM sensitive species lists were consulted for species verified in the LCDO which could occur in the project area (BLM 2016).

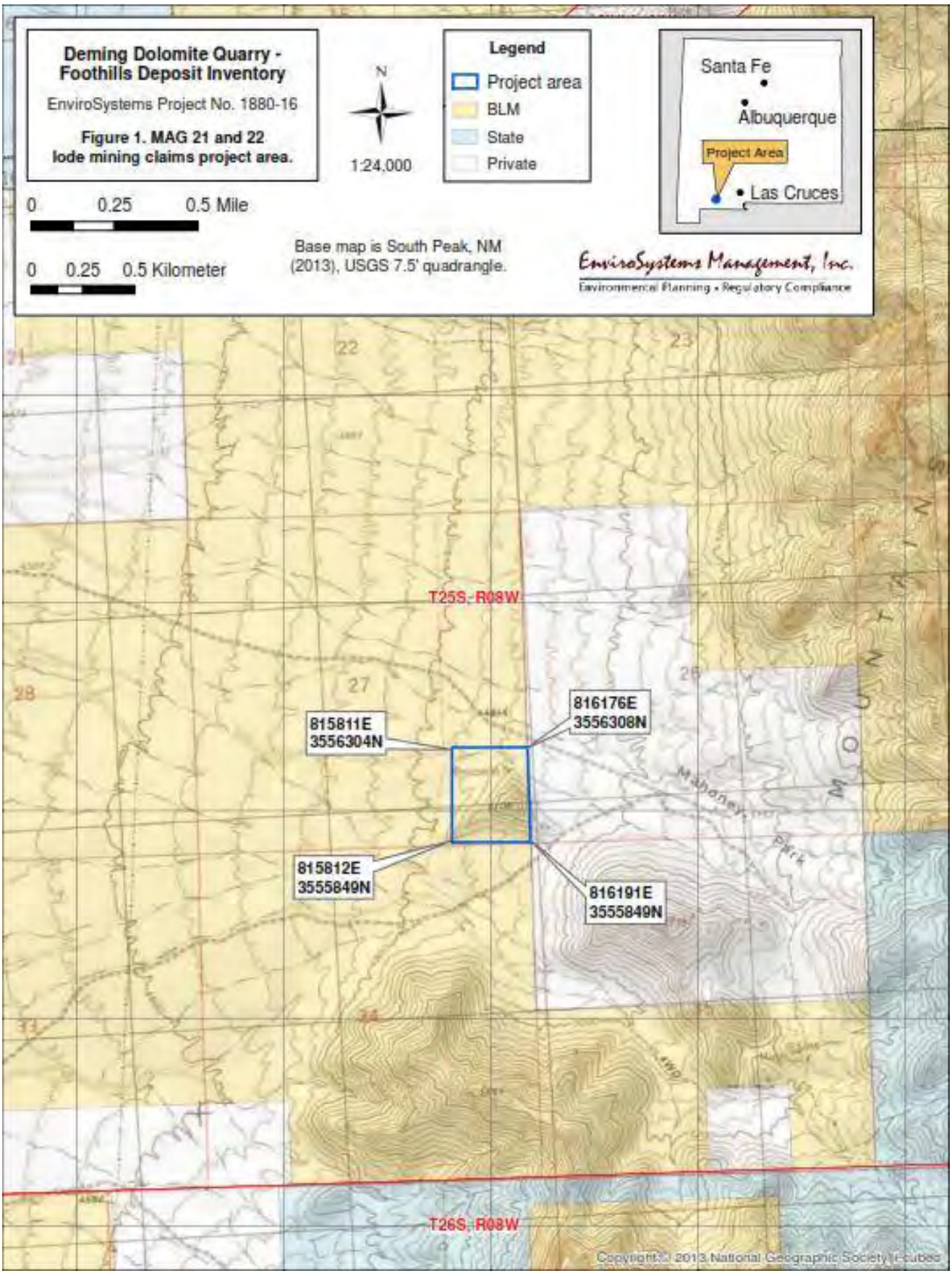
Proposed Action

American Magnesium proposes to construct a dolomite mine on 40 acres of land in the western foothills of the Florida Mountains, centered on a small hill just west of Mahoney Park. The exceptionally pure dolomite would be mined in a quarry, trucked or conveyed via conveyor belt to a processing facility at Peru Mill Industrial Park in Deming, and shipped via rail to market.

Project Area Description

The two claims which comprise the proposed mine are centered on a small, unnamed hill in the western foothills of the Florida Mountains, approximately 14 miles south-southeast of Deming, New Mexico (Figure 1). The claims are located in the SE ¼ of Section 27, T25S, R8W, New Mexico Baseline & Meridian.

Figure 1. Project Location.



Species Analyses

A habitat evaluation and TES survey of the project area was conducted on July 28, 2016 (see Appendix A for photos from the survey). BLM, USFWS, and NMDGF lists were consulted regarding those special-status species potentially occurring in the project area (Table 1 and Appendices B and C). The 40-acre project area was surveyed for the presence/absence of TES and their habitats.

Table 1. USFWS Threatened, Endangered, Candidate, and New Mexico Threatened or Endangered Species Potentially Occurring in the Project Area (see Appendices B and C for BLM Sensitive Species)

Common Name	Scientific Name	Federal Status	State Status	Suitable Habitat Present?	Individuals Observed?
Arctic peregrine falcon	*Falco peregrinus tundrius*		Threatened	No	No
Beautiful shiner	*Cyprinella formosa*	Threatened		No	No
Chiricahua leopard frog	*Lithobates (=Rana) chiricahuensis*	Threatened		No	No
Common ground-dove	*Columbina passerina*		Endangered	No	No
Great Plains narrowmouth toad	*Gastrophryne olivacea*		Endangered	No	No
Northern aplomado falcon	*Falco femoralis*	Experimental Pop'n, Non-Essential	Endangered	Yes	No
Peregrine falcon	*Falco peregrinus*		Threatened	No	No
Reticulate gila monster	*Heloderma suspectum suspectum*		Endangered	Yes	No
Varied bunting	*Passerina versicolor*		Threatened	No	No
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened		No	No

Threatened, Endangered, and Special-Status Species (TES)

The entire project area was surveyed for the presence/absence of special-status species and their habitats. Suitable habitat for the northern aplomado falcon and reticulate gila monster was found in the project area. The northern aplomado falcon is considered an experimental, non-essential population by the USFWS, and is listed as endangered by the State of New Mexico. The reticulate gila monster is listed as threatened by the State of New Mexico. However, neither species, nor any other species on the federal or state lists, was observed during the field evaluation. BLM sensitive species lists (see Appendix B) were also consulted for species which are verified to occur in the LCDO. Although suitable habitat may exist for some of the wildlife and plant species, none were observed in the project area.

Biological Resources Evaluation

General Habitat

The project area lies in the Chihuahuan Desert within the Basin and Range physiographic province, a region characterized by rugged mountain ranges alternating with valleys. Mountains tend to rise sharply from the basin floors, with gravel fans extending from the bases of the mountain ranges. The region is underlain by sand and gravel and by thick layers of salt and other evaporites (Chronic 1983). Soils in the project area consist of sand and gravel with multiple outcrops of the dolomitic limestone bedrock of the area. Small, sandy washes are present on both

the north and south sides of the project area. Both washes are ephemeral in nature and were dry during the field survey.

The plant community in the project area and vicinity lies in a complex matrix of Chihuahuan Desert Broadleaf Evergreen Scrub and Chihuahuan Desert Broadleaf Deciduous Desert Scrub vegetation classes (BISON-M 2016). Shrubby species dominated the vegetation of the project area, including honey mesquite (*Prosopis glandulosa*), broom snakeweed (*Gutierrezia sarothrae*), ocotillo (*Fouquieria splendens*), stool (*Dasylirion wheeleri*), redberry juniper (*Juniperus arizonica*), and yellow trumpetbush (*Tecoma stans*). Cactus species and other succulents such as candy barrelcactus (*Ferocactus wislizeni*), cholla (*Cylindropuntia* sp.), prickly pear cactus (*Opuntia* sp.), Graham's nipple cactus (*Mammillaria grahamii*), and Palmer's century plant (*Agave palmeri*) were also common. Grasses and forbs were less common in the rocky, shrubby terrain, including threeawn (*Aristida* sp.), matted grama (*Bouteloua simplex*), and silverleaf nightshade (*Solanum elaeagnifolium*).

Wildlife species encountered during the biological survey included a whiptail lizard (*Aspidoscelis* sp.) and various species of birds, including cactus wren (*Campylorhynchus brunneicapillus*), Gambel's quail (*Callipepla gambelii*), northern mockingbird (*Mimus polyglottos*), black-chinned sparrow (*Spizella atrogularis*), bushtit (*Psaltriparus minimus*), thrasher (*Toxostoma* sp.), and greater roadrunner (*Geococcyx californianus*).

Conclusion

The site of a proposed dolomite mine on BLM land south of Deming, New Mexico was the subject of a desktop and field evaluation for biological resources and special status species. The project area was surveyed, and an inventory made of all plant and animal species encountered. No USFWS, state, or BLM special status species were detected at the site.

References

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USFWS (United States Fish and Wildlife Service). 2016. IPaC Trust Resources Report. Website: https://ecos.fws.gov/ipac/. Accessed July 15, 2016.

APPENDIX A

Photos of the Proposed Mine Site
(taken July 28, 2016)

Photo 1. Looking west from a wash near the southeast corner of the project area.

Photo 2. Looking west from the eastern boundary of the project area.

Photo 3. Small wash on the south side of the project area with the crest of the Florida Mountains behind.

Photo 4. Top of the hill in the center of the project area.

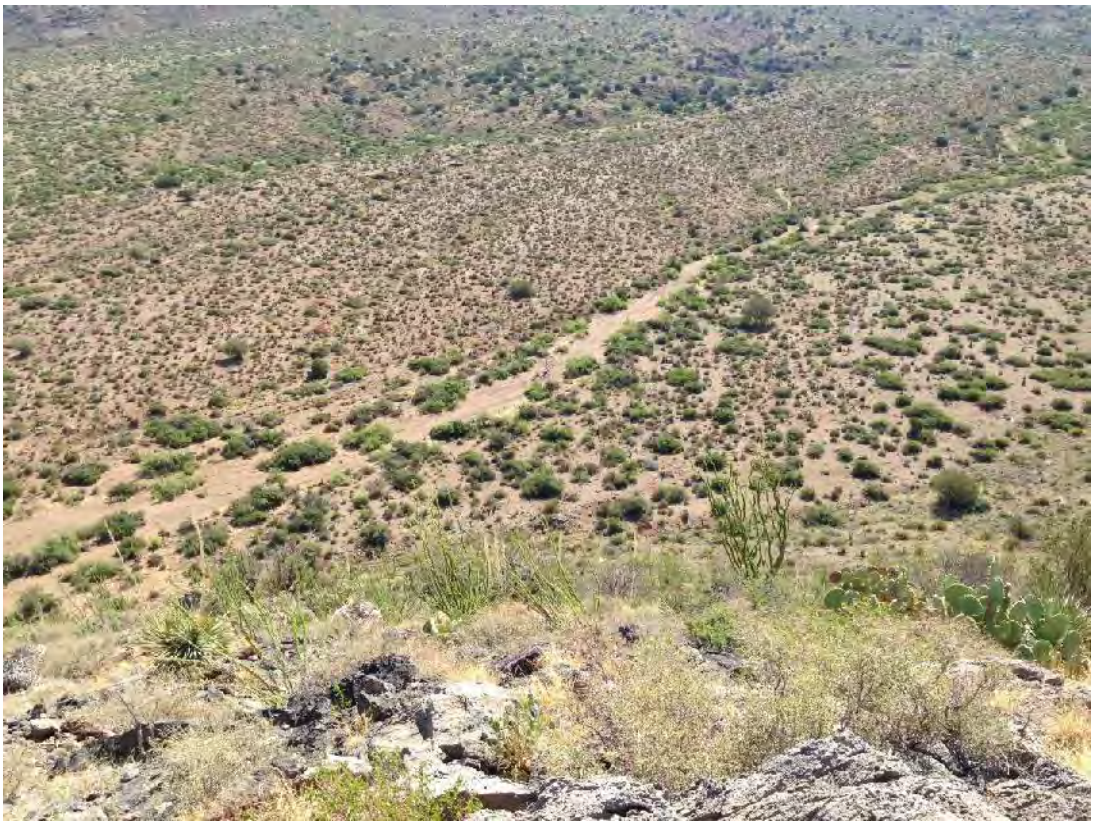

Photo 5. Small wash on the north side of the project area.

Photo 6. View northwest from the hill in the center of the project area.

APPENDIX B

New Mexico BLM Sensitive Animal Species List

New Mexico BLM Sensitive Animal Species List (Final) - August 2011

SPECIES	COMMON NAME	FARMINGTON - LLNMFO1000	TAOS - LLNMF02000	RIO PUERCO - LLNMA01000	SOCORRO - LLNMA02000	LAS CRUCES - LLNML00000	ROSWELL - LLNMP01000	CARLSBAD - LLNMP02000
AMPHIBIANS (3)								
Anaxyrus (Bufo) microscaphus	Southwestern Toad	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	NONE	NONE
Lithobates (Rana) yavapaiensis	Lowland Leopard Frog	NONE	NONE	NONE	HYPOTHETICAL	VERIFIED	NONE	NONE
Lithobates (Rana) pipiens	Northern Leopard Frog	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL	NONE	NONE	NONE
ARTHROPODS (2)								
Lytta mirifica	Anthony Blister Beetle	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Ochlodes yuma anasazi	Yuma Skipper	NONE	VERIFIED	NONE	NONE	NONE	NONE	NONE
BIRDS (12)								
Haliaeetus leucocephalus	Bald Eagle	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
Tympanuchus pallidicinctus	Lesser Prairie-chicken	NONE	PERIPHERAL	NONE	NONE	NONE	VERIFIED	VERIFIED
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
Athene cunicularia hypugaea	Western Burrowing Owl	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED
Gymnorhinus cyanocephalus	Piñon Jay	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL
Toxostoma bendirei	Bendire's Thrasher	VERIFIED	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL	NONE
Vireo bellii arizonae	Bell's Vireo	NONE	NONE	NONE	NONE	VERIFIED	PERIPHERAL	VERIFIED
Anthus spragueii	Sprague's Pipit	NONE	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED
Ammodramus savannarum ammolegus	Arizona Grasshopper Sparrow	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Ammodramus bairdii	Baird's Sparrow	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Passerina ciris	Painted Bunting	NONE	NONE	NONE	NONE	VERIFIED	PERIPHERAL	VERIFIED
Calcarius ornatus	Chestnut-collared Longspur	PERIPHERAL	VERIFIED	NONE	VERIFIED	VERIFIED	VERIFIED	VERIFIED
CRUSTACEANS (5)								
Streptocephalus thomasbowmani	Thomas Bowman's Fairy Shrimp	NONE	NONE	NONE	NONE	NONE	NONE	NONE
Streptocephalus moorei	Moore's Fairy Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Phallocryptus (Branchinella) sublettei	Sublette's Fairy Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
Eulimnadia follisimilis	Clam Shrimp	NONE	NONE	NONE	VERIFIED	NONE	VERIFIED	NONE
Lepidurus lemmoni	Lynch's Tadpole Shrimp	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE
FISH (17)								
Oncorhynchus clarki virginalis	Rio Grande Cutthroat Trout	NONE	PERIPHERAL	PERIPHERAL	PERIPHERAL	PERIPHERAL	PERIPHERAL	NONE
Agosia chrysogaster	Longfin Dace	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE

Astyanax mexicanus	Mexican Tetra	NONE	NONE	NONE	EXTIRPATED	EXTIRPATED	VERIFIED	VERIFIED			
Catostomus discobolus discobolus	Bluehead Sucker	VERIFIED	HYPOTHETHICAL	PERIPHERAL	PERIPHERAL	NONE	NONE	NONE			
Catostomus latipinnis	Flannelmouth Sucker	VERIFIED	HYPOTHETHICAL	NONE	NONE	HYPOTHETHICAL	NONE	NONE			
Catostomus plebeius	Rio Grande Sucker	NONE	VERIFIED	PERIPHERAL	PERIPHERAL	VERIFIED	PERIPHERAL	PERIPHERAL			
Gila pandora	Rio Grande Chub	NONE	VERIFIED	PERIPHERAL	PERIPHERAL	PERIPHERAL	VERIFIED	VERIFIED			
Ictiobus bubalus	Smallmouth Buffalo	NONE	HYPOTHETHICAL	HISTORICAL	HISTORICAL	VERIFIED	HISTORICAL	VERIFIED			
Macrhybopsis aestivalis aestivalis	Speckled Chub	NONE	PERIPHERAL	EXTIRPATED	EXTIRPATED	EXTIRPATED	VERIFIED	VERIFIED			
Percina macrolepida	Bigscale Logperch	NONE	INTRODUCED	NONE	NONE	NONE	VERIFIED	VERIFIED			
Phenacobius mirabilis	Suckermouth Minnow	NONE	VERIFIED	NONE	NONE	NONE	VERIFIED	NONE			
Catostomus clarki	Desert Sucker	NONE	NONE	NONE	PERIPHERAL	NONE	NONE	NONE			
Catostomus insignis	Sonora Sucker	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE			
Cycleptus elongatus	Blue Sucker	NONE	EXTIRPATED	EXTIRPATED	EXTIRPATED	EXTIRPATED	PERIPHERAL	VERIFIED			
Cyprinodon pecosensis	Pecos Pupfish	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Etheostoma lepidum	Greenthroat Darter	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Gila robusta	Roundtail Chub	HYPOTHETHICAL	HYPOTHETHICAL	PERIPHERAL	PERIPHERAL	VERIFIED	NONE	NONE			
Ictalurus lupus	Headwater Catfish	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Macrhybopsis tetranema	Peppered Chub	NONE	PERIPHERAL	NONE	NONE	NONE	NONE	NONE			
Moxostoma congestum	Gray Redhorse	NONE	HISTORICAL	HISTORICAL	HISTORICAL	PERIPHERAL	HISTORICAL	VERIFIED			
Notropis jemezanus	Rio Grande Shiner	NONE	EXTIRPATED	PERIPHERAL	EXTIRPATED	EXTIRPATED	VERIFIED	VERIFIED			
MAMMALS (12)											
Choeronycteris mexicana	Mexican Long-tongued Bat	NONE	NONE	NONE	NONE	VERIFIED	NONE	PERIPHERAL			
Lasiurus xanthinus	Western Yellow Bat	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Lasiurus blossevillii	Western Red Bat	NONE	NONE	NONE	VERIFIED	VERIFIED	PERIPHERAL	NONE			
Euderma maculatum	Spotted Bat	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	PERIPHERAL			
Idionycteris phyllotis	Allen's Lappet-browed Bat	NONE	NONE	PERIPHERAL	VERIFIED	VERIFIED	NONE	NONE			
Corynorhinus townsendii	Townsend's Big-eared Bat	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED	VERIFIED			
Lepus callotis	White-sided Jack Rabbit	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Cynomys ludovicianus	Black-tailed Prairie Dog	NONE	VERIFIED	PERIPHERAL	PERIPHERAL	VERIFIED	VERIFIED	VERIFIED			
Cynomys gunnisoni	Gunnison's Prairie Dog	VERIFIED	VERIFIED	VERIFIED	VERIFIED	NONE	NONE	NONE			
Thomomys bottae (umbrinus) paguatae	Cebolleta Pocket Gopher	PERIPHERAL	NONE	VERIFIED	PERIPHERAL	NONE	NONE	NONE			
Zapus hudsonius luteus	Meadow (New Mexico) Jumping Mouse	PERIPHERAL	HYPOTHETHICAL	HYPOTHETHICAL	HYPOTHETHICAL	HYPOTHETHICAL	NONE	NONE			
Nasua narica	White-nosed Coati	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
MOLLUSCS (1)											

Popenaias popeii	Texas Hornshell	NONE	NONE	NONE	NONE	NONE	NONE	VERIFIED			
REPTILES (7)											
Heloderma suspectum suspectum	Reticulate Gila Monster	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Sceloporus arenicolus	Sand Dune Lizard	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			
Aspidoscelis dixoni	Gray-checkered Whiptail	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Thamnophis eques megalops	Mexican Garter Snake	NONE	NONE	NONE	NONE	VERIFIED	NONE	NONE			
Thamnophis rufipunctatus	Narrow-headed Garter Snake	NONE	NONE	NONE	PERIPHERAL	VERIFIED	NONE	NONE			
Trachemys gaigeae gaigeae	Big Bend Slider	NONE	NONE	NONE	VERIFIED	VERIFIED	NONE	NONE			
Pseudemys gorzugi	Western River Cooter	NONE	NONE	NONE	NONE	NONE	VERIFIED	VERIFIED			

APPENDIX C

New Mexico BLM Sensitive Plant Species List

NM - BLM SPECIAL STATUS PLANT SPECIES LIST

UPDATED WITH ESA STATUS SPECIES 1/4/12

FIELD OFFICE OCCURRENCE - VERIFIED, HYPOTHETICAL, PERIPERAL (WITHIN OFFICE BDRY BUT NOT ON BLM)

STATUS

FAMILY	SPECIES	COMMON NAME	RIO PUERCO - NM110	SOCORRO - NM120	FARMINGTON - NM210	TAOS - NM220	LAS CRUCES - NM030	ROSWELL - NM510	CARLSBAD - NM520	NATURESERVE GLOBAL RANK	NATURESERVE STATE RANK	FWS STATUS	STATE STATUS	USFS STATUS	BLM SPECIAL STATUS LIST
NYCTAGINACEAE	*ABRONIA BIGELOVII*	SAND VERBENA, GALISTEO	VERIFIED			PERIPHERAL				G3	S3	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
ACAROSPORACEAE	*ACAROSPORA CLAUZADEANA*	LICHEN, ACAROSPORA CLAUZADEANA						VERIFIED		G1G2		PETITIONED / NEGATIVE 90 DAY FINDING			**BLM SENSITIVE**
POLEMONIACEAE	*ALICIELLA FORMOSA*	GILIA, AZTEC			VERIFIED					G2	S2	PETITIONED / NEGATIVE 90 DAY FINDIN	ENDANGERED	NONE	**BLM SENSITIVE**
APOCYNACEAE	*AMSONIA FUGATEI*	AMSONIA, FUGATE'S		VERIFIED						G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
APOCYNACEAE	*AMSONIA THARPII*	BLUESTAR, THARP'S							VERIFIED	G1	S1	SPECIES OF CONCERN + PETITIONED - POSITIVE 90 DAY FINDING	ENDANGERED	NONE	**BLM SENSITIVE**
NYCTAGINACEAE	*ANULOCAULIS LEIOSOLENUS VAR. HOWARDII*	RINGSTEM, HOWARD'S GYP					VERIFIED			G2T2	SNR	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
RANUNCULACEAE	*AQUILEGIA CHRYSANTHA VAR. CHAPLINEI*	COLUMBINE, CHAPLINE'S					VERIFIED		VERIFIED	G4T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
ASCLEPIADACEAE	*ASCLEPIAS SANJUANENSIS*	MILKWEED, SAN JUAN			VERIFIED					GUQ	S3	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS COBRENSIS VAR. MAGUIREI*	MILKVETCH, COPPERMINE					VERIFIED			G4T2	S2,S1?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS GYPSODES*	MILKVETCH, GYPSUM							VERIFIED	G3	S3	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS KNIGHTII*	MILKVETCH, KNIGHT'S	VERIFIED							NONE	NONE	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
FABACEAE	*ASTRAGALUS RIPLEYI*	MILKVETCH, RIPLEY	HYPOTHETICAL			VERIFIED				G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
FABACEAE	*DERMATOPHYLLUM GUADALUPENSE*	MESCALBEAN, GUADALUPE					VERIFIED		VERIFIED	G1		PETITIONED / NEGATIVE 90 FINDING	SPECIES OF CONCERN		**BLM SENSITIVE**
CACTACEAE	*ECHINOCEREUS X ROETTERI VAR. ROETTERI*	CACTUS, ROETTER'S HEDGEHOG					VERIFIED			NONE	NONE	NONE	NONE	NONE	**BLM SENSITIVE**
ASTERACEAE	*ERIGERON ACOMANUS*	FLEABANE, ACOMA	VERIFIED		HYPOTHETICAL					GNR	SNR	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
CACTACEAE	*ESCOBARIA DUNCANII*	CACTUS, DUNCAN'S PINCUSHION					VERIFIED			G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
CACTACEAE	*ESCOBARIA VILLARDII*	CACTUS, VILLARD'S PINCUSHION					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	**BLM SENSITIVE**
ASTERACEAE	*LEPIDOSPARTUM BURGESSII*	SCALEBROOM, GYPSUM					VERIFIED			G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
LINACEAE	*LINUM ALLREDII*	FLAX, ALLRED'S							VERIFIED	NONE	NONE	NONE	NONE	NONE	**BLM SENSITIVE**
LOASACEAE	*MENTZELIA HUMILUS VAR. GUADALUPENSIS*	STICKLEAF, GUADALUPE					VERIFIED			G4T2	SNR	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
CACTACEAE	*OPUNTIA ARENARIA*	PRICKLYPEAR, SAND					VERIFIED			G2	S2	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
CACTACEAE	*OPUNTIA X VIRIDIFLORA*	CHOLLA, SANTA FE				VERIFIED				G1G2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
FABACEAE	*PEDIOMELUM PENTAPHYLLUM*	SCURFPEA, CHIHUAHUA					VERIFIED			G1	SH,S1	SPECIES OF CONCERN + PETITIONED - POSITIVE 90 DAY FINDING	ENDANGERED	SENSITIVE	**BLM SENSITIVE**
CACTACEAE	*PENIOCEREUS GREGGII VAR GREGGII*	CEREUS, NIGHT-BLOOMING					VERIFIED			G3G4T2	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
SCROPHULARIACEAE	*PENSTEMON ALAMOSENSIS*	BEARDTONGUE, ALAMO					VERIFIED			G3	S3	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
SCROPHULARIACEAE	*PENSTEMON CARDINALIS SSP. REGALIS*	PENSTEMON, GUADALUPE							VERIFIED	G3T2	S2	NONE	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
ASTERACEAE	*PERITYLE CERNUA*	CLIFF DAISY, NODDING					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
CHENOPODIACEAE	*PROATRIPLEX PLEIANTHA*	SALTBUSH, MANCOS			VERIFIED					G3	S3?	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
POACEAE	*PUCCINELLIA PARISHII*	ALKALIGRASS, PARISH'S	VERIFIED	HYPOTHETICAL	HYPOTHETICAL		VERIFIED			G2	S2,S1	SPECIES OF CONCERN	ENDANGERED	SENSITIVE	**BLM SENSITIVE**
CACTACEAE	*SCLEROCACTUS CLOVERAE SSP. BRACKII*	CACTUS, BRACK'S HARDWALL			VERIFIED					G3T1	S1	SPECIES OF CONCERN	ENDANGERED	NONE	**BLM SENSITIVE**
CACTACEAE	*SCLEROCACTUS PAPYRACANTHUS*	CACTUS, GRAMA GRASS	VERIFIED	HYPOTHETICAL	HYPOTHETICAL	VERIFIED	VERIFIED	HYPOTHETICAL		G4	S2S3,S4	SPECIES OF CONCERN	NONE	NONE	**BLM SENSITIVE**
SCROPHULARIACEAE	*SCROPHULARIA MACRANTHA*	FIGWORT, MIMBRES					VERIFIED			G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	SENSITIVE	**BLM SENSITIVE**
BRASSICACEAE	*SIBARA GRISEA*	THELYPODY, TEXAS; SIBARA, GRAY					VERIFIED			G3	S3?	NONE	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
BRASSICACEAE	*STREPTANTHUS PLATYCARPUS*	JEWELFLOWER, BROADPOD							VERIFIED	G1?Q	S1?	PETITIONED / NEGATIVE 90 DAY FINDIN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**
ASTERACEAE	*TOWNSENDIA GYPSOPHILA*	TOWNSEND DAISY, GYPSUM	VERIFIED							G2	S2	SPECIES OF CONCERN	SPECIES OF CONCERN	NONE	**BLM SENSITIVE**

APPENDIX E

Site Visit Report of Florida Mountains
RPA 2014

Rock solid resources.
Proven advice.™

DRAFT

Mr. David Tognoni, PE
Managing Partner
American Magnesium LLLP
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Elephant Butte, NM
USA 87935

Date: November 17, 2014

Via e-mail: dqtognoni@gmail.com

Dear David:

Site Visit Report of Florida Mountains, New Mexico claims of American Magnesium LLLP

RPA (USA) Ltd. (RPA) is pleased to submit this site visit report to American Magnesium LLLP (American Magnesium) based on RPA's initial site visit to American Magnesium's New Mexico Dolomite Mountain Project on October 27 and 28, 2014. During the site visit, RPA examined the geology, structure, and logistics associated with the deposit.

DISCLAIMER

This report has been prepared by Roscoe Postle Associates USA Ltd. ("RPA") at the request of American Magnesium LLP (the "Client"). Conditions and limitations of use apply to this report as provided in the proposal (and specifically the "Term of Business" portion of the proposal) to which Client agreed and acknowledged to be bound on 10/06/2014 (the "Proposal"). In the event this Disclaimer conflicts with the Proposal, the terms of the Proposal shall prevail. The report may be used by the Client in connection with its review of the Dolomite Mountain Project and shall not be used nor relied upon by any other party, nor for any other purpose, without the written consent of RPA.

The information, conclusions, opinions, and estimates contained herein are based on:

a. information available to RPA at the time of preparation of this report,
b. assumptions, conditions, and qualifications as set forth in this report, and
c. data, reports, and opinions supplied by the Client and other third party sources.

While it is believed that the information contained herein is reliable under the conditions and subject to the limitations set forth herein, this report is based in part on information not within the control of RPA and RPA does not guarantee the validity or accuracy of conclusions or recommendations based upon that information. While RPA has taken all reasonable care in producing this report, it may still contain inaccuracies, omissions, or typographical errors.

The report is intended to be read as a whole, including the Executive Summary and Appendices and sections should not be read or relied upon out of context.

The information contained in this technical report may not be modified or reproduced in any form, electronic or otherwise except for the Client's own use unless the Client has obtained RPA's written authorization to do the same.

LOCATION AND ACCESS

American Magnesium has recorded 20 contiguous Federal Mining claims covering an approximately 1,200 foot (ft) high mountain composed principally of dolomite belonging to the Fusselman Dolomite of Silurian age. The "Dolomite Mountain" is centered on Latitude 32°5'0.61"N and Longitude 107°39'10.90" West. The mountain is 13.5 airline miles (mi) south of the I-10 exit overpass into Deming and 20.8 mi north of the Columbus, New Mexico Border Control station with Mexico. Figure 1 illustrates the Project site location in New Mexico.

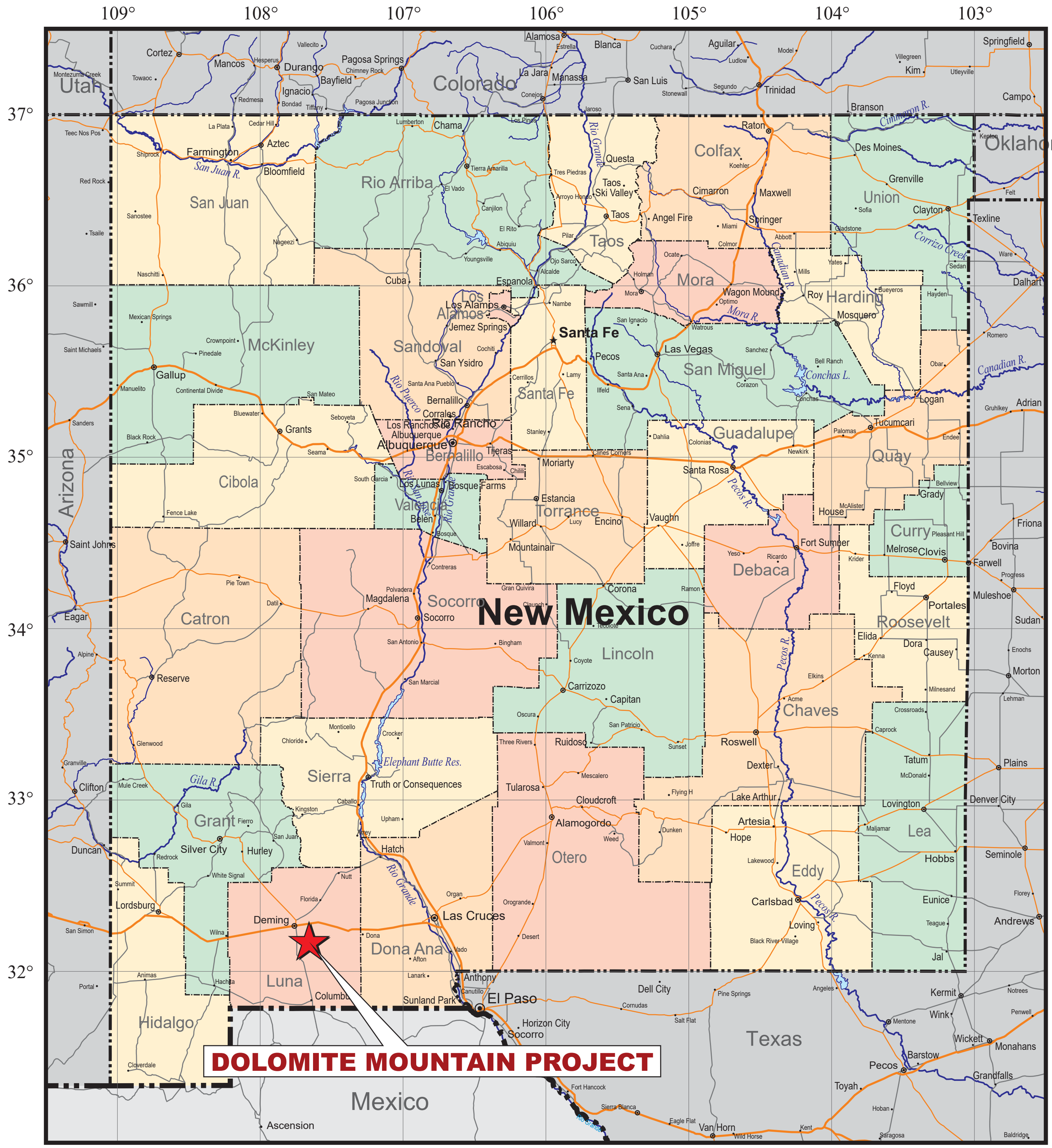
The regional reference map is the BLM 2007 1:100,000 Scale, Deming Topographic Surface and Minerals Management Status Map. The 20 claims are on Public Lands administered by the Bureau of Land Management (BLM), and the Federal Government holds all mineral rights. The State of New Mexico controls a small section of land in Sections 3 and 4, Range 8 W and Township 26 S, which is immediately adjacent to and south of American Magnesium's claims.

Access to the Dolomite Mountain is via State Road 11 south from Deming for a distance of 12 miles, then turning left on County Road 1286 for a distance of four miles until a road fork, and then, after turning right, traveling another 2.4 mi to Mahoney Park (a level area of the valley). Turning right at this point, a four-wheel track continues approximately one mile southwesterly to a location near the base of the Dolomite Mountain. Access around the base of the mountain is best done using ATV lightweight vehicles.

Deming is the capital and county seat of Luna County, New Mexico. The city was founded in 1881, is located at an elevation of 4,335 ft, and has a current population of 15,296. The total population of Luna County is 27,227.

Luna County is located in the high Chihuahua Desert along the Mexican border in southwestern New Mexico. The average annual precipitation is nine inches with average winter temperatures ranging from 27°F to 59°F and average summer temperatures ranging from 62°F to 94°F.

Agriculture is the main industry, with the growth of chiles, pecans, and alfalfa. The community is serviced by Interstate 10 which goes east-west, by the Santa Fe railway, the Deming Municipal Airport, and the relatively close El Paso International Airport (102 mi).



Legend:

State Capitals	Interstate Highways
County Seat	U.S. Highways
Cities	State Roads
International Boundaries	
State Boundaries	
County Boundaries	

0 10 25 50 Miles

0 10 25 50 Kilometres

N

American Magnesium LLP

Dolomite Mountain Project

State of New Mexico, U.S.A.

Location Map

November 2014

GEOLOGY

REGIONAL GEOLOGY

The Florida Mountains and Little Florida Mountains, southeast of Deming in south-central Luna County, have a combined area of approximately 100 mi^2. They occupy portions of the four 7-1/2 minute USGS quadrangles: Capitol Dome, Florida Gap, Gym Peak, and South Peak. Dolomite Mountain is located in the South Peak quadrangle.

The Florida Mountains are an eastward-tilted Basin and Range fault block about 15 mi southeast of Deming. The mountains are surrounded by a broad bajada (sloping surface) that slopes gently into the Mimbres Basin and 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 Ma).

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

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

The south Florida Mountains fault is a northwest-trending, high-angle reverse fault that places Upper Cambrian granite against rocks as young as basal Lobo Formation (Miocene age). Multiple, small thrust faults cut the Paleozoic rocks northeast of the south Florida Mountains fault. 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. RPA did not observe any mine workings or dumps on American Magnesium claims during the site visit to the Dolomite Mountain Project.

LOCAL AND PROPERTY GEOLOGY

American Magnesium's primary interest in the area is the magnesium mineralization in the Fusselman Dolomite, a well sampled and productive oil-bearing unit in the Permian Basin of Texas but apparently not oil-bearing in the American Magnesium claim area. The single mountain comprising the American Magnesium claims is located immediately adjacent on the south side of Mahoney Park (a geographic term for a relatively flat valley between mountains). Figure 2 shows the Dolomite Mountain, with Gym Peak, the more rugged volcanic rocks in background. Mahoney Park is the valley immediately to the left of the dolomite mountain in the foreground. Figure 3 shows stratigraphic layers in the Fusselman Dolomite.

FIGURE 2 THE DOLOMITE MOUNTAIN (FOREGROUND)

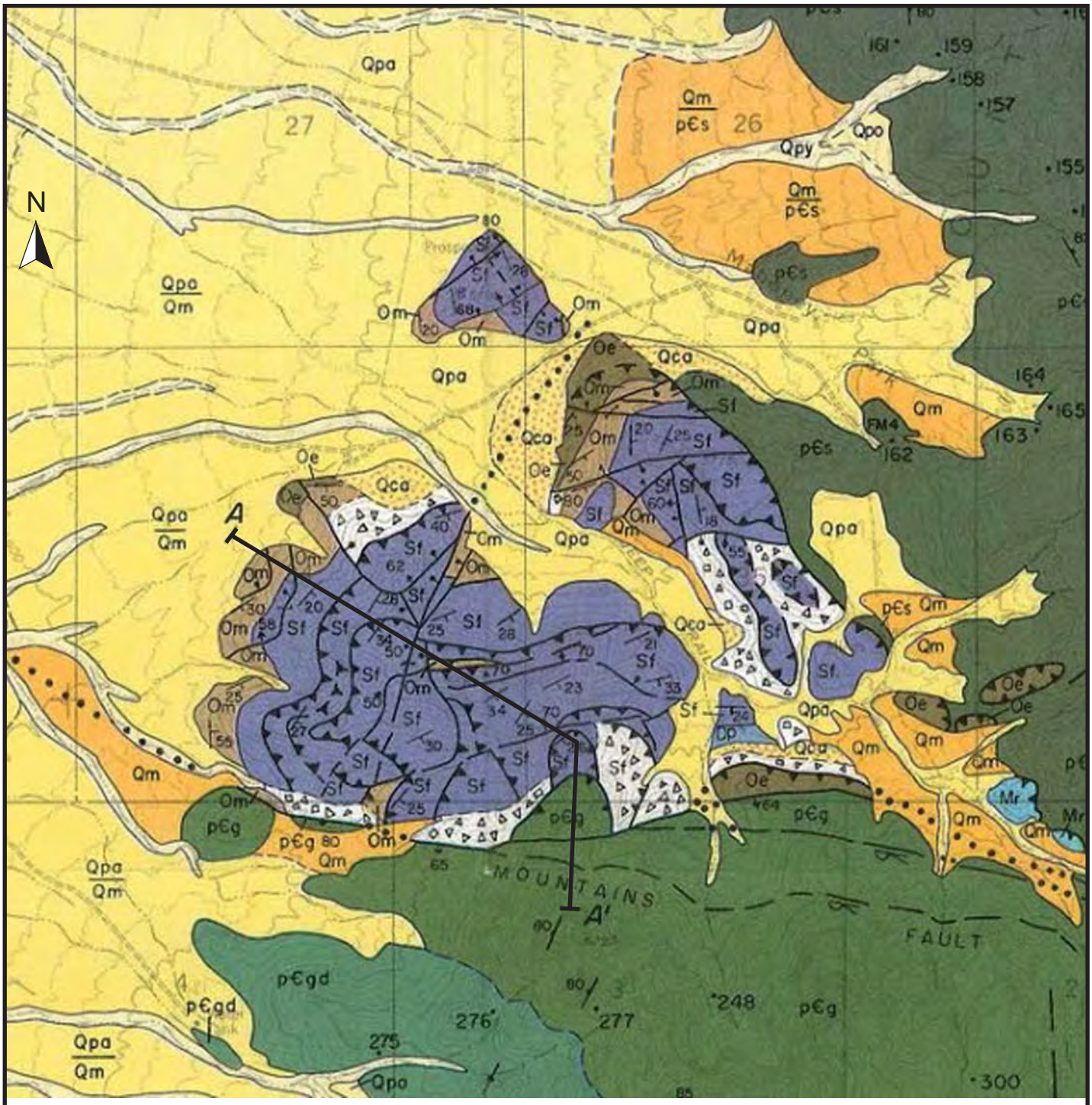
Looking southeast. Photo taken 10/28/2014.

FIGURE 3 STRATIGRAPHIC LAYERS IN FUSSELMAN DOLOMITE

View looking northeast. Photo taken 10/28/2014.

The Fusselman Dolomite on American Magnesium's claims has a stratigraphic thickness of 975 ft, however, this is an incomplete section, because three miles to the southeast, on the southeast slope of Gym Peak, a complete section of Fusselman Dolomite is well exposed, measuring 1,480 ft thick (Figure 4). The dolomite is primarily dense, compact, and fossiliferous, with multiple alternating grey and dark grey horizons of limey dolomite and pure dolomite.

Breccia zones along some of the thrust faults are up to 100 ft thick and contain chaotic mixtures of several Fusselman and Montoya rock types (Figure 5). Two slabs of the Cutter Member up to 60 ft thick and several hundred feet long appear to be interbedded with the Fusselman Dolomite due of tectonic emplacement.



0 0.25 0.5 0.75 1.0

Mile

Source: New Mexico Bureau of Mines & Mineral Resources, 1998.

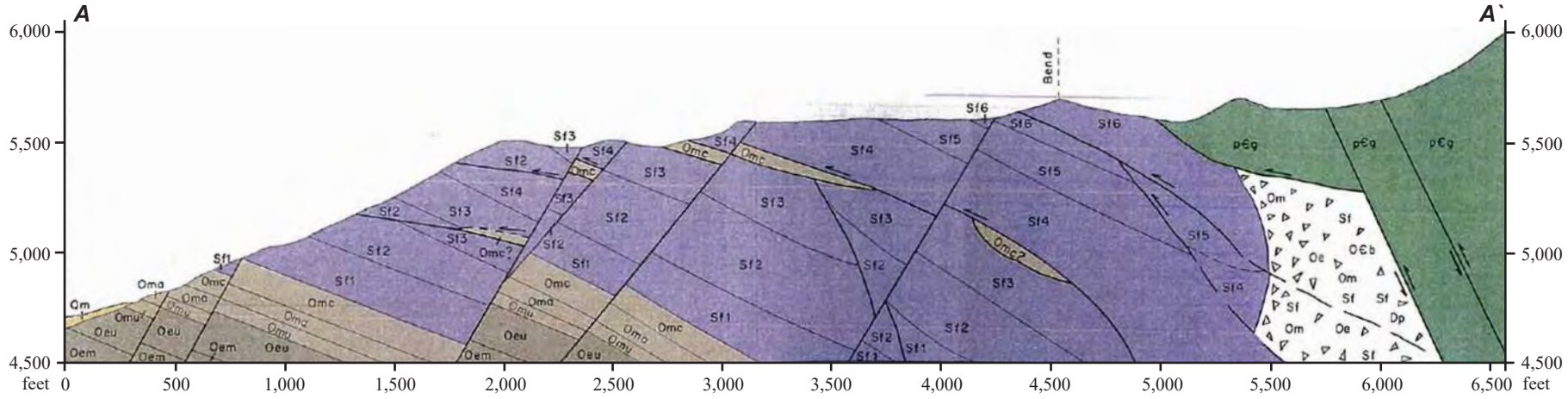
American Magnesium LLP

Dolomite Mountain Project

New Mexico, U.S.A.

Plan View

November 2014



Enlarged, true-scale, northwest-southeast cross section (A-A`).
Symbols not used on geologic map are: Oem - middle El Paso Formation, Oeu - upper El Paso, Oem - Upham Member of Montaya Formation, Oma - Aleman Member, Omc - Cutter Member, Sf1 - lower dark-gray Fusselman Dolomite, Sf2 - lower light-gray Fusselman, Sf3 - middle dark-gray Fusselman, Sf5 - upper dark-gray Fusselman, Sf6 - upper light-gray Fusselman

0 0.25 0.5 0.75 1.0
Mile

0 250 500 750 1000
Metres

American Magnesium LLP

Dolomite Mountain Project

New Mexico, U.S.A.

Dolomite Mtn Cross Section

November 2014

Dolomite is a common rock-forming mineral with the chemical composition of CaMg $[CO_3]_2$. It is less common than calcite in typical hydrothermal vein deposits, however, the bulk of dolomite is genetically 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% MgO.

The dolomite mineralization in the Florida Mountains was identified by Frank E. Kottlowski for the New Mexico Institute of Mining and Technology State Bureau of Mines and Mineral Resources in Circular 47, "*High-Purity Dolomite Deposits of South-Central New Mexico*" published in August 1957.

Kottlowski noted that there are two types of dolomite deposits in New Mexico, bedded dolomite and replacement dolomite. Almost all of the Paleozoic formations contain at least thin beds of dolomite or dolomitic limestone, and in places limestone beds are replaced by irregular lenses and odd-shaped masses of dolomite.

According to Kottlowski, the Silurian Fusselman Dolomite is massive bedded and ranges from light gray to dark gray, and weathering 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 ft of Fusselman Dolomite, with only the lower 100 ft to 150 ft containing appreciable amounts of chert.

Clemons (1998), for the New Mexico Bureau of Mines & Mineral Resources, notes that the Fusselman Dolomite is 1,480 ft thick on Gym Peak, but 975 ft of an incomplete section south of Mahoney Park (American Magnesium claims) and consists of six alternating dark-light dolomite units. The informal units in ascending order with approximate thicknesses are as follows:

1) lower dark gray member, 160 ft;
2) lower light gray member, 305 ft;
3) middle dark-gray member, 160 ft;
4) middle light-gray member, 610 ft;
5) upper dark-gray member, 165 ft; and
6) upper light-gray member, 80 ft.

RPA observed these characteristics and color patterns during the site visit. The following pictures by RPA (Figures 6 and 7) illustrate these color features and stratigraphic intervals in the Dolomite Mountain.

FIGURE 6 STRONG COLOR BANDING WITHIN THE FUSSELMAN DOLOMITE

View looking north. Photo taken 10/28/2014.

FIGURE 7 FUSSELMAN DOLOMITE WITH CORNER POST ON THE NORTHEAST CORNER OF MAG 19 CLAIM

Photo taken 10/28/2014

American Magnesium's 20 claims on Dolomite Mountain encompass 95% of the outcropping Fusselman Dolomite. The Dolomite Mountain is essentially 1,200 ft to 1,300 ft above the surrounding pediment plane and, in itself, is composed of 98% outcropping Fusselman Dolomite.

SAMPLING

There are no previous mine workings on the mountain and all sampling to date has been chip and chip channel both by the New Mexico Bureau of Mines in 1957 and American Magnesium in 2014 (Figure 8).

FIGURE 8 FUSSELMAN DOLOMITE DIAMOND CHANNEL SAMPLE SITE 1240

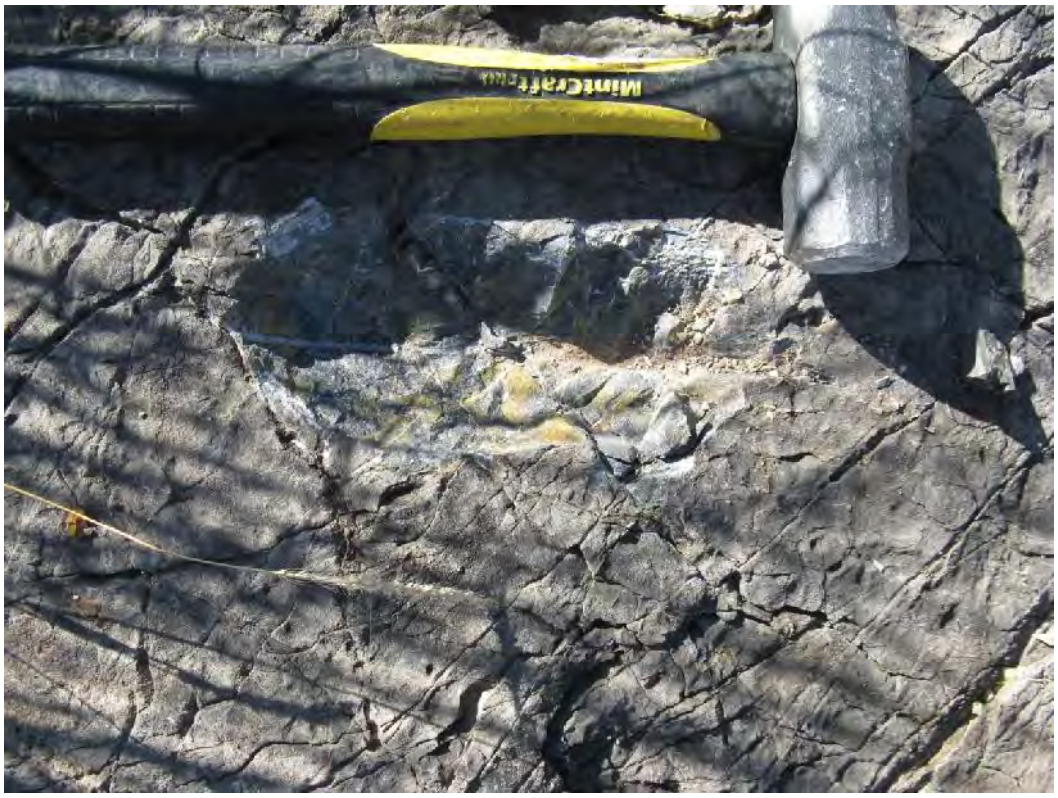
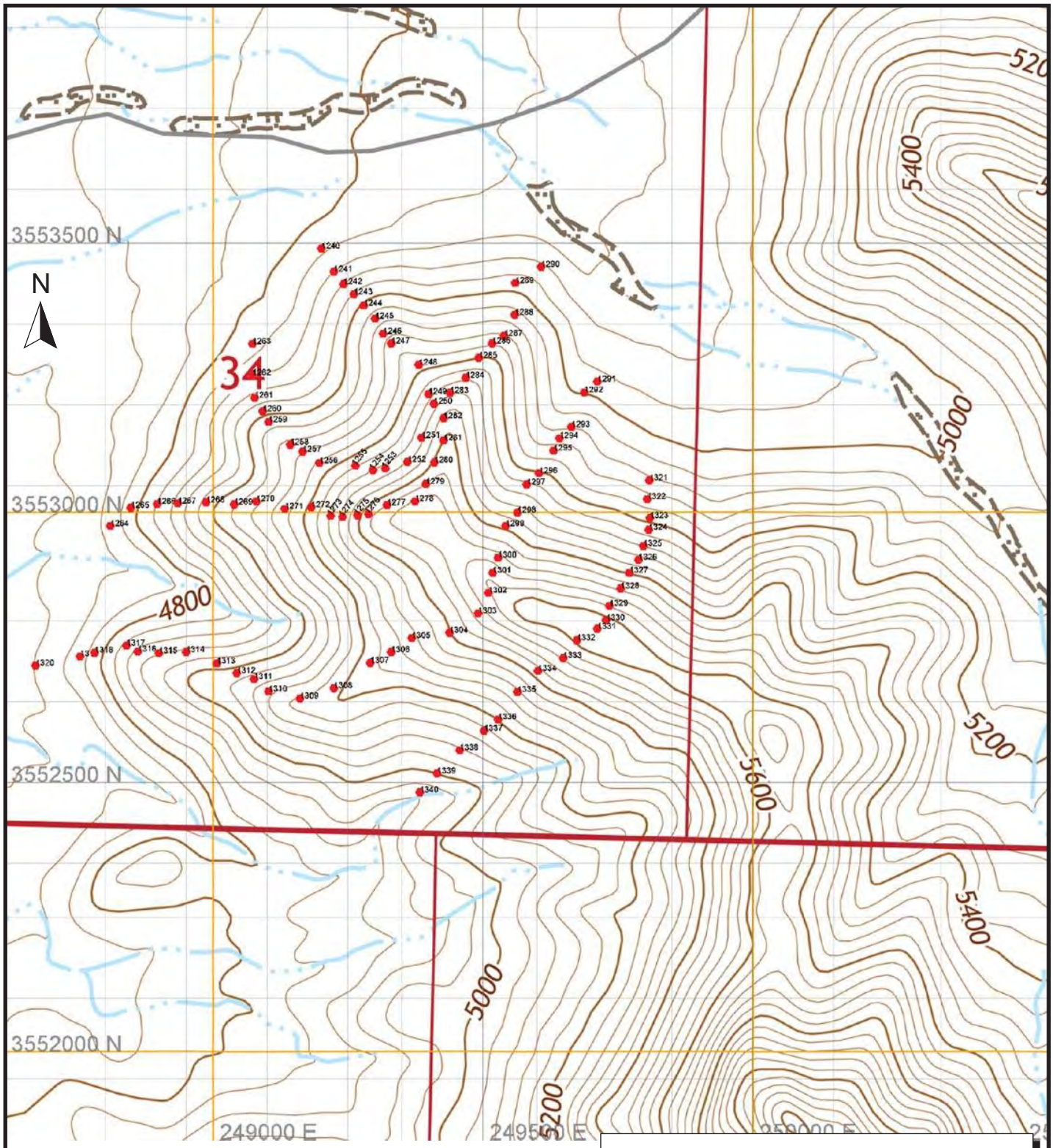


Photo taken 11/28/2014.

The historic sampling data was based upon approximately one sample per 44 acres. American Magnesium took one sample per four acres, and this provides a better estimate because of an order of magnitude larger sample population. The American Magnesium sample set as shown in their sample map is representative over the height of the mountain since samples were collected from the base to the top of the mountain by walking most of the significant ridges. The typical sample spacing in American Magnesium's sample set ranged between 34 m and 47 m on lines approximately 200 m apart, specifically by traversing along the more resistant ridge lines (Figure 9).



American Magnesium LLP

Dolomite Mountain Project

New Mexico, U.S.A.

Surface Sample Location Map
South Peak Quadrangle

November 2014

EXPLORATION POTENTIAL

There are no cover rocks or pediment over the mountain, so the true geologic thickness exposed is approximately 1,000 ft of Fusselman Dolomite (Figure 5). There is no vertical drill hole information for the deposit. All samples are surface chip only and cannot be used to verify the vertical and lateral continuity and grade. Additionally, the section has some stratigraphic thrust faulting within the Fusselman Dolomite which may have removed some of the dolomite section.

There is not sufficient 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 (2014).

RPA considers the "exploration potential" of the property to range from 490 million tons to 740 million tons at a grade of 15% MgO to 21% MgO. RPA estimated the exploration potential using Vulcan software to fit the topography and checked it with horizontal contour slices with a vertical range of 10 m. RPA considers the volume calculation to meet reasonable confidence levels for the estimate of exploration potential. The MgO grades are based upon nine historical samples of Fusselman Dolomite on the mountain and American Magnesium's 101 samples.

Table 1 shows sample statistics for 47 historical and 101 recent samples.

TABLE 1 SAMPLE STATISTICS
American Magnesium LLLP – Dolomite Mountain project

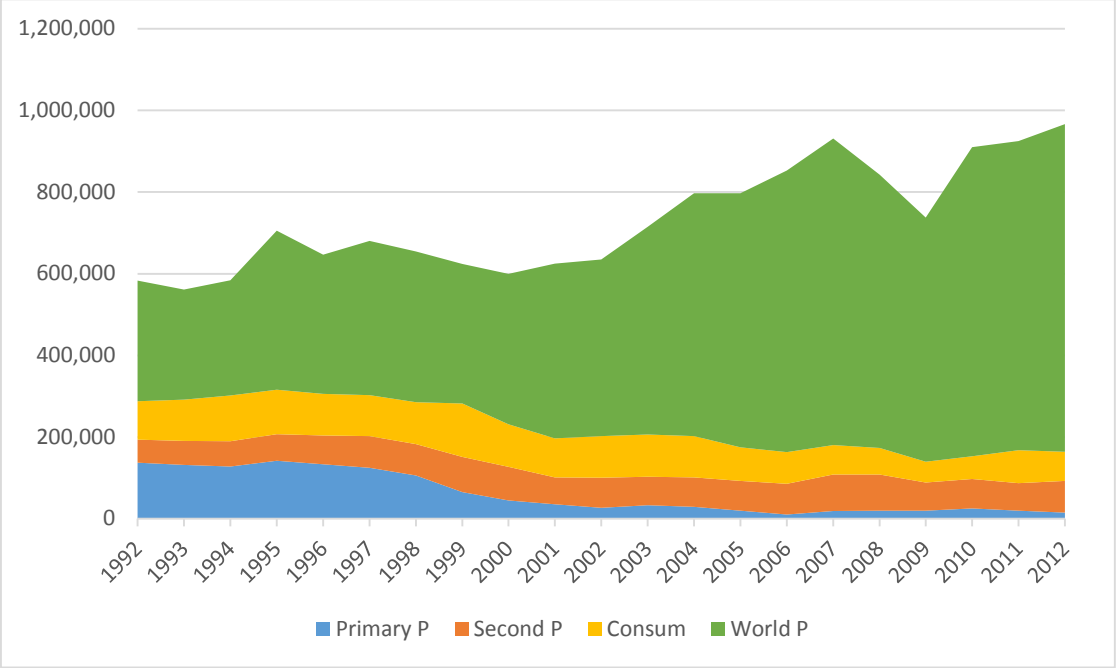
American Magnesium Samples, 2014 Field Samples													
Descriptive Statistics	**SiO_2**	**Al_2O_3**	**Fe_2O_3**	**CaO**	**MgO**	**Na_2O**	**K_2O**	**Cr_2O_3**	**TiO_2**	**MnO**	**P_2O_5**	**SrO**	**BaO**
Mean	1.132	0.124	0.141	32.871	19.171	0.039	0.007	0	0.005	0.028	0.016	0.007	0.004
Standard Error	0.225	0.014	0.008	0.508	0.503	0.001	0.002	0	0.001	0.002	0.002	0.001	0.001
Median	0.5	0.08	0.12	31.13	20.96	0.04	0	0	0	0.02	0.008	0	0
Mode	0.19	0.04	0.09	31.04	20.96	0.04	0	0	0	0.01	0.007	0	0
Standard Deviation	2.258	0.136	0.082	5.101	5.052	0.013	0.021	0	0.008	0.021	0.025	0.011	0.005
Sample Variance	5.097	0.018	0.007	26.019	25.518	0	0	0	0	0	0.001	0	0
Kurtosis	54.695	13.92	21.5	6.544	5.66	5.355	39.762	0	8.708	10.875	19.162	11.28	-0.556
Skewness	6.703	2.887	3.653	2.818	-2.686	0.359	5.651	0	2.492	2.657	4.291	2.958	0.791
Range	20.38	0.96	0.66	21.64	20.36	0.1	0.17	0	0.05	0.14	0.151	0.07	0.02
Minimum	0.08	0.01	0.04	30.15	1.41	0	0	0	0	0.01	0.005	0	0
Maximum	20.46	0.97	0.7	51.79	21.77	0.1	0.17	0	0.05	0.15	0.156	0.07	0.02
Sum	114.33	12.56	14.25	3,319.99	1,936.32	3.92	0.7	0	0.49	2.83	1.571	0.7	0.41
Count	101	101	101	101	101	101	101	101	101	101	101	101	101
Confidence Level (95%)	0.446	0.027	0.016	1.007	0.997	0.003	0.004	0	0.002	0.004	0.005	0.002	0.001
CV	1.994	1.093	0.581	0.155	0.263	0.338	2.983	0	1.715	0.757	1.589	1.642	1.312

1957 Historical Samples					
Descriptive Statistics	**CaO**	**MgO**	**Residue**	**$CaCO_3$**	**$MgCO_3$**
Mean	30.256	**21.689**	0.544	54.011	45.278
Standard Error	0.041	0.031	0.156	0.082	0.062
Median	30.300	21.700	0.300	54.100	45.300
Mode	30.300	21.700	0.300	54.100	45.300
Standard Deviation	0.124	0.093	0.469	0.247	0.186
Sample Variance	0.015	0.009	0.220	0.061	0.034
Kurtosis	1.522	1.354	2.736	1.522	1.354
Skewness	-1.439	-0.944	1.776	-1.439	-0.944
Range	0.400	0.300	1.400	0.800	0.600
Minimum	30.000	21.500	0.200	53.500	44.900
Maximum	30.400	21.800	1.600	54.300	45.500
Sum	272.300	195.200	4.900	486.100	407.500
Count	9	9	9	9	9
Confidence Level (95%)	0.095	0.071	0.361	0.190	0.143
CV	1.994	1.994	1.994	1.994	1.994

MARKETING

Approximately 85% of the world's magnesium metal is produced by the silico-thermic reduction of dolomite (the Pidgeon process). In 2012, the estimated world production of primary magnesium was 802,000 tons, with China accounting for 87% of the total. Currently, primary magnesium is only produced by one company in the USA, US Magnesium, which produces electrolytic magnesium from saline brines in the Great Salt Lake, so the bulk of the USA demand is met by imports. US Magnesium's plant has a 50,000 metric tonne annual capacity for production of metallic magnesium. Israel was the primary source of imported magnesium metal and alloys, and Canada accounted for 48% of the scrap imports (Figure 10).

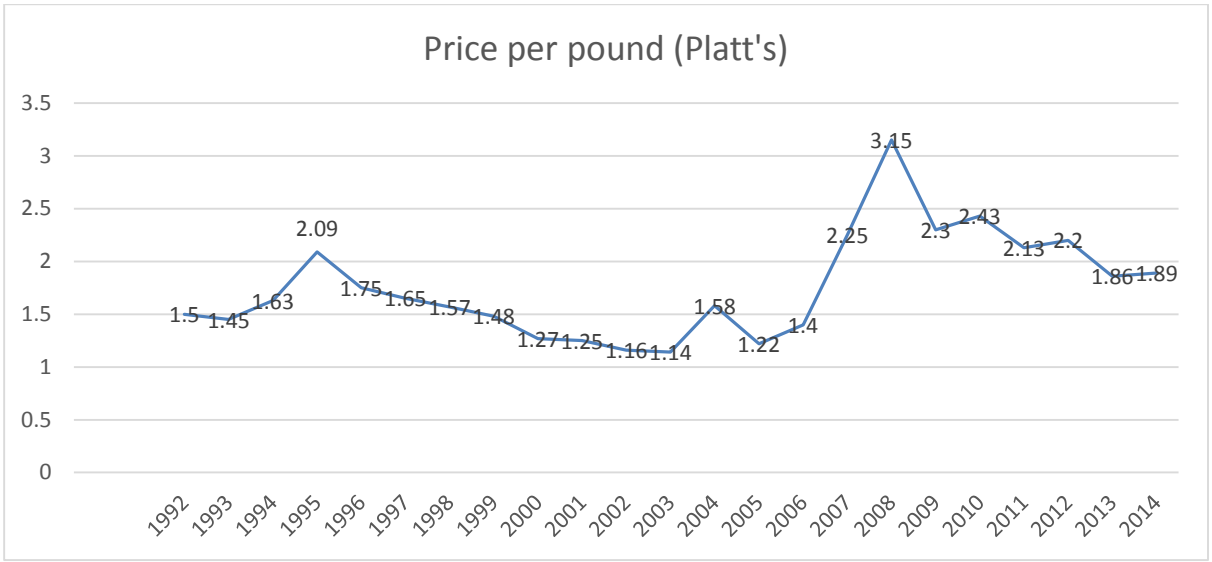
FIGURE 10 WORLD MAGNESIUM PRODUCTION (1992-2012)



Note: Primary P is primary USA production, Second P is USA production from secondary and scrap sources, Consum is USA Consumption, and World P is world production of metallic magnesium.

For the period of January 2014 through June 2014, the USA imported 27,110 tons of magnesium metal including scrap, and exported 8,490 tons. At the end of the second quarter, the USA spot price for magnesium metal ranged from $2.10 to $2.20 per pound. Similar prices have been in effect for the period from 2008 to 2013 (Figure 11).

FIGURE 11 ANNUAL PRICE PER POUND OF MAGNESIUM (1992-2014)



Aluminum alloying, die casting, iron, and steel desulfurization and metal reduction have been the primary applications for magnesium (USGS Minerals Yearbook 2013).

Most of the growth in demand for magnesium in the past 20 years has resulted from its increased use in automotive applications because of its light weight. Any increase in automobile manufacturing would be expected to result in an increase in the use of magnesium due to the improvements in robotics and the technology of merging magnesium with aluminum to allow lighter weight body panels and interior support systems. In the past, wars have been major consumers of magnesium for reducing weight in aircraft, weapons, and munitions. During World War II, the USA government supported the construction of 13 plants to produce magnesium metal, and the plants were evenly divided between electrolytic and silicothermic processes. The government studies showed that the most economical silicothermic plants had metal production costs 15% to 20% higher than electrolytic plants, and it would be expected to see similar ratios today with magnesium produced from dolomite.

Most of the world's magnesium producers have strong antidumping duties on magnesium imported from China which creates some opportunities for domestic USA development. The American Magnesium deposit has somewhere in the range of 490 million tons to 740 million tons of dolomite which opens opportunities for both magnesium metal production, railroad ballast, and a host of other products which may be developed from the dolomite. RPA suggests that virtually the entire mountain could be mined and sold with very minimal production of any waste products, provided that strong marketing efforts were made on behalf of American Magnesium to do so.

The site south of Deming has excellent logistical support including two railroads, a major interstate highway (I-10), a natural gas pipeline from El Paso, Texas, a potential industrial site from a former USA Air Force base, and sufficient water resources in the valley near the site. Production of metallic magnesium from dolomite is very energy intensive; as one ton of magnesium metal requires 11.6 tons of dolomite, 1.19 tons of ferrosilicon, and energy equivalent to 45 MWh/ton to 80 MWh/ton of Mg metal.

Magnesium is the eighth most abundant element in the earth's crust and the third most plentiful element dissolved in seawater. Magnesium is recovered from seawater and well and lake brines, as well as from such minerals as dolomite, magnesite, and carnallite.

Resources from which magnesium may be recovered range from large to virtually unlimited and are globally widespread. Resources of dolomite and magnesium-bearing evaporate minerals are enormous. Magnesium-bearing brines are estimated to constitute a resource in billions of tons, and magnesium can be recovered from seawater at places along world coastlines where salinity is high. Typically, the MgO content of brines is less than half the content in dolomites.

OBSERVATIONS AND CONCLUSIONS

American Magnesium's Dolomite Mountain Project has exploration potential ranging from 490 million to 740 million tons and a grade of 15% to 21% MgO. Dolomite is the primary feed material for 85% of the world's production of metallic magnesium, which amounted to 802,000 tons production in 2012. Worldwide demand is anticipated to grow at an annual rate of 2% to 3% per year (USGS).

Non-metallic magnesium products derived from dolomite include aggregate, crushed rock, agricultural lime, chemical and metallurgical feedstock, and environmental mitigation material. Seventy-five percent of the USA demand for crushed rock is derived from limestone and dolomite sources. These constitute additional market areas for American Magnesium's deposit.

RECOMMENDATIONS

RPA recommends that American Magnesium carry out further analysis of the Fusselman Dolomite by conducting a diamond drilling program to test the vertical and lateral continuity and grade.

RPA estimates that a diamond drilling program would yield sufficient information to qualify the MgO grade in Dolomite Mountain. A helicopter supported drill program would have the least amount of surficial impact, should American Magnesium not wish to pursue roads on the mountain at this stage of the evaluation.

RPA also recommends that American Magnesium determine the potential markets within reasonable distance of the deposit for aggregate, agricultural, highway, railroad ballast, and chemical dolomite.

RPA would like to thank American Magnesium for the opportunity to work on this project. Should you have any questions, please do not hesitate to contact us at any time.

Sincerely,
RPA (USA) Ltd.

Barton G. Stone, P.Geo.
Principal Geologist

Email: bart.stone@rpacan.com

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APPENDIX F

ALS Sample Report

February 20, 2018 Service Request No:T1800235

Eric Koenig
AMEC Foster Wheeler E&I (Wood PLC)
8519 Jefferson Street NE
Albuquerque, NM 87113

Laboratory Results for: American Magnesium

Dear Eric,

Enclosed are the results of the sample(s) submitted to our laboratory February 15, 2018
For your reference, these analyses have been assigned our service request number **T1800235.**

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results
apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 7102. You may also contact me via email at Wendy.Hyatt@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Wendy Hyatt
Client Services
Manager

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061 | FAX +1 520 573 1063
ALS Group USA, Corp.
dba ALS Environmental

Client: AMEC Foster Wheeler E & I (Albuquerque, NM) **Service Request:**T1800235
Project: American Magnesium/16-517-00037

SAMPLE CROSS-REFERENCE

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

T1800235 5

AMEC Foster Wheeler E&I (Wood PLC)

American Magnesium

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

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WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Amec Foster Wheeler E&I Inc.	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Albuquerque, NM		☒ Non Standard or urgent TAT (List due date): 19 Feb 2018	Custody Seal Intact? Yes No N/A
PROJECT: American Magnesium	ALS QUOTE NO.: 43672	COC SEQUENCE NUMBER (Circle)	Free Ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: (1) 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Saul Alanis	CONTACT PH: (505) 821-1801	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Eric Koenig	SAMPLER MOBILE: (505) 264-9211	RELINQUISHED BY: Eric D. Koenig	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME: 12 Feb 2018/16:00	DATE/TIME:
Email Reports to saul.alanis@amecfw.com		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to rosanne.klaus@amecfw.com		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: No special handling reqd

Note that expedited TAT is being requested to achieve the $150 minimum

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	Sobek Neutralization Potential								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	87	12-Feb-18	S	B	1	X								Sample wt 1 kg
														Cynthia Vaugh
				TOTAL	1	1								FEB 15 2018 0924

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

3860 S. Palo Verde Road, Suite 302
Tucson, AZ 85714
T: +1 520 573 1061
F: +1 520 573 1063

Sample Receipt Form

T1800235 5
AMEC Foster Wheeler E&I (Wood PLC)
American Magnesium

Client/Project: **Amec Foster Wheeler** Work Order Number:

Received by: Cynthia Vroegh Date & Time: 2/15/18 0924 Matrix: Solid

Samples were received via?: FedEx Samples were received in: Box

Were custody seals on containers? ○ Yes ◉ No ○ NA If yes, how many and where?

If present were custody seals intact? ○ Yes ◉ No If present, were they signed and dated? ○ Yes ◉ No

Arrival Temp C	Temp Blank C	Tracking Number
ambient	na	7714 6505 3769

Packing material used? Paper

Did all the bottles arrive in good condition (unbroken)? ○ Yes ○ No ◉ NA If No, record comments below

Did all sample labels and tags agree with COC? ◉ Yes ○ No ○ NA If No, record discrepancies below

Were all the appropriate containers and volumes received for the tests indicated? ◉ Yes ○ No ○ NA

Are samples received deemed acceptable? ◉ Yes ○ No

Comments:
1 - Qtsized ziploc with rock marked Sample 87

Notes, discrepancies, & resolutions:

As a part of ISO 17025 protocols, ALS must notify clients that the quoted analytical methods performed by ALS may have minor modifications from the methods as published. These modifications are written into our Standard Operating Procedures and do not impact the quality of the data. Receipt of this document will be considered an acceptance of the procedures used by the laboratory for analysis unless notified by the client.
Modifications may include, but are not limited to:

- The analysis of a sample matrix that differs from that stated in the published method (example - ASTM D5865 Standard Test Method for Gross Calorific Value of Coal and Coke is used for other matrices such as biomass, Tire Derived Fuel, etc.).
- Analyzing a sample mass that differs from those in the published method (example - to accommodate samples with high concentrations of analyte, samples of limited volume, or to comply with the instrument manufacturer's operating guidelines).
- Instruments used for the analysis may differ from those listed in the published method (example - using ICP- OES when the method references flame Atomic Absorption Spectroscopy)

Client: AMEC Foster Wheeler E & I (Albuquerque, NM)
8519 Jefferson Street NE
Albuquerque, NM 87113
Attn: Eric Koenig
Project: American Magnesium

Date Received: February 15, 2018

Certificate of Analysis

Sample ID:	Sample Date and Time:		Lab #:	Moisture, Total D2974 wt%			Neutralization Potential Sobek 3.2.3 t CaCO3/1000t		
87	2/12/18	n/a	T1800235-001	0.03			1,015		

Notes:
Sample was ground to < 60 mesh prior to analysis.