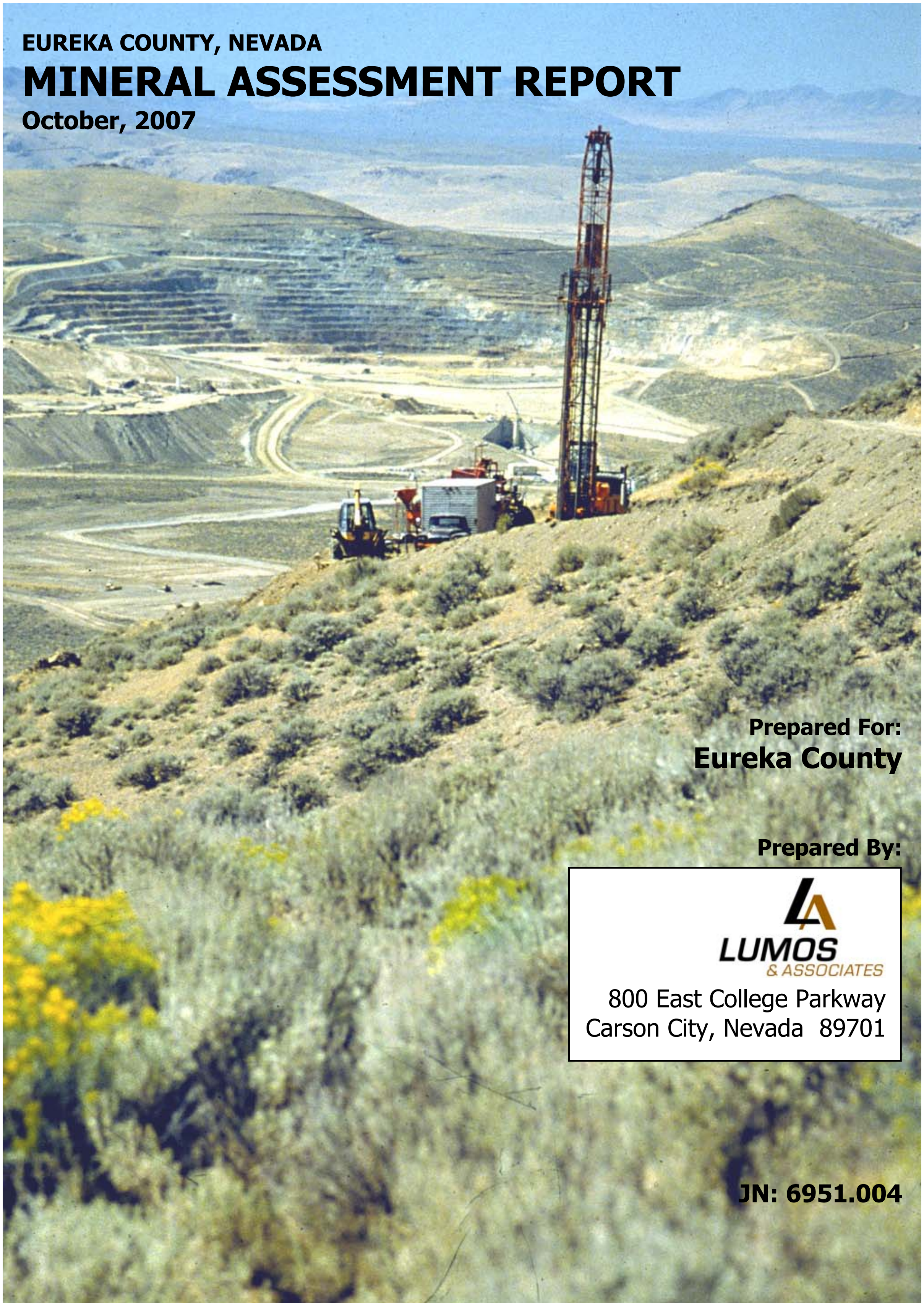
EUREKA COUNTY, NEVADA

MINERAL ASSESSMENT REPORT

October, 2007



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Exploration drilling at Newmont's Leeville deposit on the Carlin trend, Eureka County.

EUREKA COUNTY
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EXECUTIVE SUMMARY

The Department of Energy (DOE) has proposed to transport radioactive waste to the proposed repository at Yucca Mountain in Nye County using "mostly rail." The Department estimates that about 90 percent of shipments will be transported by rail, using a new corridor constructed through Nevada to the repository site. Ten percent of the waste will be shipped by truck, using the Interstate system.

One of the proposed rail corridors to transport the waste, the "Carlin corridor," originates in northern Eureka County and extends approximately 24 miles within the county near the towns of Beowawe and Crescent Valley. Interstate 80 runs east-west through the northern part of the county, roughly parallel to the Union Pacific mainline.

One of the potential impacts identified in the County's Impact Assessment Report was that activities of the Yucca Mountain repository project could impact mining, which is a major industry and economic driver in Eureka County. The County is preparing this mineral assessment report as an update to its Impact Assessment Report to gather baseline data and information related to the mineral activity and potential within Eureka County.

To prepare this report, research and review was conducted to gather information about the County's mineral resources. Geographical Information System (GIS) analysis was conducted on the data to allow overlay of mineral features on maps. The report first describes the geology of the County, then enumerates the County's mineral resources. Past and current mineral extraction activities are described. Mineral exploration activities and the number of active mining claims can help to forecast future mineral extraction, accordingly, these activities also are described in the report.

Mineral resources within Eureka County are classified into three major categories: locatable minerals (i.e., base metals, precious metals, and industrial minerals); leasable minerals (i.e., oil and gas, coal, phosphate and geothermal areas); and saleable minerals (e.g., common varieties of sand and gravel). There have also been significant paleontological discoveries in Eureka County: these are described in a separate section of the report.

Current Mineral Resources and Development

Locatable Minerals

Locatable minerals are minerals for which the right to explore, develop and extract mineral resources is established by the staking of mining claims as authorized under the General Mining Law of 1872. Examples of locatable minerals historically or currently mined within Eureka County include metallic minerals (i.e.: gold, silver copper, mercury, zinc, molybdenum, uranium, tungsten, etc) and non-metallic minerals (i.e.: limestone, barite, gypsum, diatomaceous earth, fluorspar and opals).

Today, gold is by far the most important mineral mined in Eureka County, and the county holds some of the state's most productive gold mines. Silver, in Eureka County a byproduct of gold production, also is produced from the same mines. Gold and silver mining is the principal economic engine of Eureka County. Between the years 1997 and 2003, Eureka County mines annually produced between $1.08 billion and $865 million of gold and silver. Over 90 percent of jobs in Eureka County are in gold and silver mining. County taxes on net proceeds of minerals are annually between $4.4 and $1.2 million, and mining companies are the principal taxpayers in the county.

Leasable Minerals

Leasable minerals are defined by the Mineral Leasing Act as leasable solid and leasable fluid minerals. Leasable solid minerals include coal, oil shale, native asphalt, phosphate, sodium, potash, potassium, and sulfur, while leasable fluid minerals include oil, gas and geothermal resources. The rights to explore for and produce these minerals on public land may only be acquired by competitive leasing.

Electrical power is produced in the Beowawe geothermal area at the Oxbow geothermal power plant, which came online in 1985. Although the plant itself is in adjacent Lander County, the geothermal resources used to power the plant come from both Eureka and Lander Counties. In 2005 electrical production from the Oxbow plant was 87,042 Megawatt hours.

There are three active oil fields in Eureka County. These active fields are the Blackburn Field, North Willow Creek Field, and Tomera Ranch Field, all of them located on the eastern side of Pine Valley.

Saleable Minerals

The primary saleable mineral commodity sold in Nevada is sand and gravel (construction aggregates). Nevada's construction aggregate production in 2005 was estimated at 46 million tons at a value of $207 million. While virtually all of Eureka County's valleys hold substantial sand and gravel deposits, the relatively low value of the resource combined with high transportation costs make extraction economically feasible only near transportation corridors or near the location of end use. Eureka County's estimated production of only 100,000 tons of aggregate in 2005 shows that it is relatively far from areas with great demand for construction materials.

Paleontological Resources

There are several valuable Paleontological resources are present within Eureka County along the Roberts Mountain Thrust. This classical geologic area provides paleontological specimens ranging from large to small used for display and scientific purposes.

Future Minerals Development

Locatable Minerals

Gold mining exploration and development continues strongly in Nevada. Because of Nevada's favorable geologic setting, its stringent but predictable regulatory climate and the political stability of the US, Nevada continues to receive a very large portion of worldwide exploration expenditures. Estimated Nevada gold reserves in the immediate vicinity of currently active mines at the end of 2003 were about 80.3 million troy ounces. Under current production rates this reserve would account for about 11 years of sustained gold production.

Mineral exploration, particularly for gold, is an ongoing enterprise in Nevada by both operators of existing mines and by outside exploration companies, and it is anticipated by industry experts that gold mining and exploration activity will gradually increase. Exploration has been extremely active recently (2007) as gold prices have sustained levels above $600/ounce.

In 2005, the last year for which detailed records are currently available, Eureka County had significant mineral exploration activity. It is important to note that the proposed Carlin rail corridor crosses several sections with currently active mining claims, and that the proposed rail corridor is in the general vicinity of two known precious metal mineral resources.

<u>Saleable Minerals</u>

There is good potential for development of aggregate deposits in Eureka County, and increasing mining activity, commercial development, recreation activities, and private property development in northern Nevada will increase demand for construction aggregates. The overall level of demand for Eureka County aggregates will to a great extent depend on the location of the projects requiring the products. If local demand exists, small scale operations would not have to sustain large transportation costs, thereby creating an economically feasible and desirable situation for Eureka County's sand and gravel development. If there is no local demand, only the larger quarries, particularly those near major transportation corridors and urban centers will be economically beneficial.

<u>Leasable Minerals</u>

Geothermal resource exploration and development operations are on the rise and are expected to increase in the future. Department of Energy and State of Nevada grants, tax incentives, and renewable portfolio standards are encouraging companies to develop geothermal and other renewable energy resources. In 2006, Beowawe Power, LLC signed a 29-year contract with Sierra Pacific Power Company. It is anticipated that this geothermal resource area will continue to be developed.

Increased usage of oil in the United States and worldwide, with the accompanying rising oil prices, will likely lead to continued exploration and future oil well development in

Eureka County. Eureka County's Pine Valley is currently the second largest producer of oil in Nevada, and the Pine Valley area accordingly has the largest future potential for additional oil production in Eureka County.

Conclusion

The geological history of Eureka County has resulted in an area rich in mineral resources. Gold is currently by far the most important of the county's minerals, both for the value of the product and for the effect of gold mining on the economy and employment of Eureka County and Nevada overall. Eureka County is one of Nevada's and indeed the world's principal gold producers, and exploration activity as well as estimated reserves indicate that gold mining will continue in the county for ten to twenty years, depending upon gold prices. Geothermal resources, oil and gas also are present in the county, with producing oil wells and a geothermal power plant. With increased global energy demand, energy exploration and production in Eureka County should continue. Various other mineral resources in the county including molybdenum, gemstones, and aggregates also are present in economic quantities, have been produced in the county in the past, and will be produced in the future as markets create demand for the products.

1. INTRODUCTION

1.1 Purpose and Scope

The Department of Energy (DOE) has proposed to transport radioactive waste to the proposed repository at Yucca Mountain in Nye County using "mostly rail." The Department estimates that about 90 percent of shipments will be transported by rail, using a new corridor constructed through Nevada to the repository site. Ten percent of the waste will be shipped by truck, using the Interstate system.

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One of the potential impacts identified in the County's Impact Assessment Report was that activities of the Yucca Mountain repository project could impact mining, which is a major industry and economic driver in Eureka County. The County is preparing this mineral assessment report as an update to its Impact Assessment Report to gather baseline data and information related to the mineral activity and potential within Eureka County.

To prepare this report, research and review was conducted to gather information and data. Geographical Information System (GIS) analysis was conducted on the data to allow overlay of mineral features. The GIS work allowed the creation of maps instrumental in the preparation of this report.

1.2 Geographic Setting

Eureka County (Figure 1.2) is located in east-central Nevada and encompasses 4,182 square miles. The county seat is Eureka, located in the southern part of the county.

Climate in Eureka County is typical of the high desert Great Basin with warm summer days combined with cool summer nights. Winter brings cold temperatures with many nights below freezing. Mean annual rainfall in the county is just under eight inches.

Interstate 80 crosses the northern portion of the county, while U.S. Highway 50 crosses the southern portion of the county. State Route 278 runs north-south along the eastern side of the county. A major rail line crosses the northern portion of the county, generally paralleling Interstate 80.

Figure 1.2 – Appendix A

2. DESCRIPTION OF GEOLOGY

2.1 Physiography

Eureka County is in the Basin and Range Physiographic Province. The ranges and basins were created by extensional forces that resulted in horst and graben structures. These large tilted fault blocks characterize the Basin and Range Physiographic Province.

Topography within Eureka County is comprised of north-south-trending mountain ranges typically 5-15 miles wide and intervening broad, alluvium-filled valleys or basins from 10 to 20 miles wide. The highest point in the county is Summit Mountain at 10,400 feet in the southern portion of the county, while the lowest point in the county is on the Humboldt River in the northwestern portion of the county.

The Humboldt River drains the northern portion of the county and the southern portion drains into Diamond Valley.

The major mountain ranges within the county are Sulfur Spring, Roberts, and Cortez. Other major mountain ranges that are partly within the county are Tuscarora, Shoshone, Diamond, Simpson Park, Antelope, Monitor, and Fish Creek. These are generally north–to-northeast trending ranges with faults on either side of the range.

2.2 General Geologic History and Setting

The geology of Eureka County represents a complex history of Paleozoic marine, and Mesozoic marine and non-marine sedimentary deposition in marginal continental accretionary, offshore marine basin settings. The deposition of these sediments was interspersed with periods of folding and thrust faulting as well as contemporaneous intrusive and extrusive activity. This was followed by Cenozoic and Tertiary crustal extension and the formation of horst and graben structures and large tilted fault-blocks that characterize the Basin and Range Physiography Province. This period of crustal extension was also accompanied by coeval (same age) magmatic and volcanic activity.

During Precambrian time and the early Paleozoic Era, marine sediments and volcanics were deposited in an accretionary offshore basin setting within the Cordilleran (ancestral Rocky Mountain) geocline. This geocline was an elongated trough that extended north to south in western North America and included the area that is now eastern Nevada. Sedimentation was marked by two periods of alternating clastic and carbonate deposition (Price, 2004).

These Precambrian and Paleozoic units were deformed in a series of tectonic events characterized by regional east-west compression and associated west-to-east imbricate thrust faulting that in general transported more distal offshore marine sedimentary facies and volcanic rocks over more marginal marine clastic units to the east. Several of these thrust faulting episodes occurred during the Paleozoic and are associated with periods of volcanism and the emplacement of plutons which are temporally and genetically related to major orogenic events.

By the end of the Paleozoic Era, active volcanoes existed in eastern California and western Nevada and volcanism continued throughout most of the Mesozoic Era. In addition, a number of shallow marine invasions inundated parts of the region during the early Mesozoic Era and marine sedimentary formations alternated and inter-tongue with non-marine deposits derived from erosion of rocks further east in the continental interior. During this time, a coastal strip up to 400 miles wide was formed by a combination of marine sedimentation and igneous activity, granitic intrusions, and volcanism. The early Mesozoic seas spread inland as far as central Utah and Wyoming but were blocked relatively early (Late Triassic period) by a narrow uplift in central Nevada. During the remainder of the Mesozoic Era, only intermittent sub-aerial deposition took place east of this uplift. West of the uplift, a thick sequence of Mesozoic marine and continental sediments was deposited, interspersed with lava flows, volcanic breccia, and tuff (Price, 2004).

The early Mesozoic Era culminated with the Sonoma Orogeny in the western part of North America. Mountain ranges rose and intense deformation of the older rocks occurred across most of Nevada. Late in the Mesozoic Era, the Pacific coastal region was again downwarped and the sea transgressed across the western portion of the Great Basin (Price, 2004).

During the Cenozoic Era, volcanic rocks and sedimentary deposits accumulated over wide areas of western Nevada. As a result, early in the Cenozoic Era, northwestern Nevada was comprised of a high mountain area with external drainage. During middle to late Cenozoic time, orogenic processes initiated the formation of large-scale block faulting structures that would result in the Basin and Range Physiographic Province. As described above, these structures generally are a sequence of alternating horsts and grabens or tilted fault blocks that trend north south and are reflected in the present-day topography.

In late Cenozoic time, the basins formed by the grabens of the Basin and Range Province were filled with continental deposits and minor predominantly basaltic lava flows.

Thick sequences of sediments eroded from the block faulted mountains accumulated in these basins, which were intermittently inundated by lakes. Volcanoes formed throughout the northern Nevada and frequently erupted flows of volcanic ash and lava. Today, much of the northeastern part of the state is covered with these volcanic rocks (Price, 2004).

The Sierra Nevada Mountains of California rose during the Tertiary, creating a rain shadow and arid desert conditions to the east in Nevada. During the Pleistocene, glaciers sculpted the highest peaks of the mountain ranges across Nevada, and tectonic processes continued the formation of Basin and Range physiography. Valleys continued to grow wider and fill with sediment. Volcanic eruptions continued throughout the state, depositing ash flows and lava (Nevada Paleontology, 2004). Quaternary deposits are present in many of the basin fill areas of Eureka County and consist predominantly of poorly consolidated to unconsolidated alluvial and lacustrine sediments.

The diverse and complex geology and geologic history of Eureka County is the basis for the genesis of the abundant mineral resources. The Mineral Resource Occurrence section provides description of the geology associated with each resource.

2.3 Geologic Map

A geologic map of Eureka County is presented in this mineral assessment report as Figure 2.3.

2.4 Geologic Time Scale

A Geologic Time Scale is presented as figure 2.4. – Appendix A

Figure 2.3 – Appendix A

Figure 2.4: Geologic Time

3. MINERAL RESOURCE OCCURRENCES

Mineral resources within Eureka County are classified into three major categories: locatable minerals (i.e., base metals, precious metals, and industrial minerals); leasable minerals (i.e., oil and gas, coal, phosphate and geothermal areas); and saleable minerals (e.g., common varieties of sand and gravel). Each of these categories is discussed separately below.

3.1 Locatable Mineral Resource Occurrences

3.1.1 Introduction

Locatable minerals are minerals for which the right to explore, develop and extract mineral resources on federal lands open to mineral entry is established by the location (or staking) of lode or placer mining claims as authorized under the General Mining Law (May of 1872) (as amended).

Examples of locatable minerals historically or currently mined within Eureka County include metallic minerals (i.e.: gold, silver, copper, mercury, zinc, molybdenum, uranium, tungsten, iron, etc) and non-metallic minerals (i.e.: limestone, barite, gypsum, diatomaceous earth, fluorspar and opals).

Nevada produced more gold, barite and gypsum than any other state in the nation in 2004 and was second in the production of silver, behind Alaska. Nevada is the world's third largest gold producer behind South Africa and Australia. Mining in Nevada also produces a variety of other mineral commodities including aggregates, copper, diatomite, dolomite, gemstone, limestone, lithium and magnesium compounds, perlite, potassium sulfate, salt, silica sand, specialty aggregates. In all, Nevada mineral production in 2004 was valued at about $3.3 billion (excluding oil and geothermal energy) and precious metals accounted for about $3.0 billion of that total.

3.1.2 Mining History and Districts

Silver was discovered in Eureka County in 1862 at the Cortez mining district. The Diamond and Eureka districts had discoveries soon after. Development of the discoveries was slow throughout the 1860's, until metallurgical problems were solved. Throughout the 1870's and into the late 1880's production was high until the high-grade ores began to be depleted. Aiding the high production was construction of the Central Pacific (currently Southern Pacific) railroad across Nevada in 1869 and the Eureka Palisade railroad to the town of Eureka in 1875.

As other districts were discovered, mining continued to play a very important part in Eureka County's history. Currently the Eureka, Lynn, and Maggie Creek mining districts are very active. Please refer to Figure 3.1.2 for a map showing the mining districts in Eureka County.

Figure 3.1.2 – Appendix A

3.1.3 Current Mining Activity

To gauge the current activity of the mining districts and surrounding areas, a comparison of sections with previously active (now closed claims) and currently active claims was performed. Figure 3.1.3 "Eureka Mining Claim Activity" illustrates this comparison. Note that the Carlin rail corridor crosses several sections with currently active mining claims.

Today, gold is by far the most important metallic mineral mined in Eureka County. Eureka County produces about 36 percent of all Nevada gold. Major active gold mines in the county are the Betze/Post, the Genesis and Post mines at the Carlin North complex, the Carlin and Gold Quarry mines at the Carlin South complex, Cortez, Meikle, and Ruby Hill mines. The Betze/Post, Genesis, Carlin, and Meikle mines are located in the Lynn mining district. The Gold Quarry mine is located in the Maggie Creek Mining District. The Ruby Hill mine is located in the Eureka mining district. In 2005, a new mining permit was approved for the East Archimedes within the Eureka mining district (Price and Meeuwig, 2006). For this new gold mine, mining was slated to start in 2006.

Gold mining is the principal economic engine of Eureka County. Between the years 1997 and 2003, Eureka County mines annually produced between $1.08 billion and $865 million of gold and silver. In 2005, there were 3,466 jobs in gold mining in Eureka County: this is over 90 percent of county jobs. County taxes on net proceeds of minerals are annually between $4.4 and $1.2 million, and mining companies are the principal taxpayers in the county.

Figure 3.1.3 - – Appendix A

3.1.4 Mineral Exploration

Mineral exploration, particularly for gold, is an ongoing enterprise in Nevada by both operators of existing mines and by outside exploration companies. Exploration has been extremely active recently (2007) as gold prices have sustained levels above $600/ounce.

Driesner and Coyner (2005) in their *Nevada Exploration Survey, 2004*, reported that 22 companies responding to their survey had spent $79.9 million on Nevada exploration activities in 2004.

In 2005, Eureka County had significant mineral exploration activity. The districts with significant exploration activity in 2005 were Antelope, Buckhorn, Cortez, Eureka, Lone Mountain, Lynn, Maggie Creek, and Roberts mining districts (Price and Meeuwig, 2006).

3.1.5 Precious Metals

The occurrences of precious metal deposits are discussed in this section. Figure 3.1.5a indicates the locations of precious metals throughout Eureka County. Figure 3.1.5b, 3.1.5c, and 3.1.5c present a closer view of the important mineral resource areas of Eureka County. The proposed rail corridor is in the general vicinity of two precious metal mineral resources. Table 3.1.5 presents the plants and producing Precious Metal Mines in Eureka County.

Table 3.1.5: Plants and Producing Precious Metal Mines in Eureka County

Name	Major Commodity	Minor Commodity	Operation
Blue Star Mine	Gold, Silver, Gemstone	Copper	Surface
Buckhorn Mine	Silver, Gold		Surface
Bullion-Monarch Open Pit Mine	Gold, Silver		Surface
Carlin East/Main/West Leeville	Silver, Gold		Underground
Carlin/Pete/Lantern Mine	Gold		Surface-Underground
Carlin-West Leeville Jv	Gold		Underground
Dean Ranch	Gold		Surface
Deep Star	Gold	Silver	Underground
Geddes & Bertrand Mine	Silver	Gold	Unknown
Genesis Mine	Gold, Silver		Unknown
Genesis/North Star/Gold	Gold		Surface
Glister Project	Gold, Silver		Underground
Gold Bar Mine	Gold	Silver	Surface
Gold Quarry Mine	Gold	Silver	Unknown
Gold Quarry/Tusc/Mac	Gold		Surface
Goldstrike Mine Betze-Post	Gold	Silver	Surface
Horse Canyon Pit Cortez Complex	Gold	Silver	Surface
Lantern	Gold	Silver	Surface
Locan Shaft	Gold		Underground
Maggie Creek Open Pit Gold Mine	Gold	Silver	Surface

Meikle Mine	Gold		Underground
Newmont Carlin Mill #1	Gold	Silver	Processing Plant
Newmont Carlin Mill #2	Silver, Gold	Mercury	Processing Plant
Newmont Carlin Mill #4	Gold	Silver	Processing Plant
Newmont Carlin Mill #5	Gold	Silver	Processing Plant
Newmont Refractory Plant Mill #6		Silver	Processing Plant
Newmont's Carlin Trend Operations	Gold	Silver	Surface-Underground
North Star	Gold	Silver	Surface
Pete	Gold	Silver	Surface
Post Deposit	Gold	Silver, Arsenic	Unknown
Post/Goldbug	Gold	Silver	Surface-Underground
Ratto Canyon Deposit	Gold		Unknown
Ruby Hill	Gold, Silver		Surface
Tonkin Springs	Gold	Silver	Surface
Tusc	Gold	Silver	Surface
West Sinter Deposit	Gold, Silver		Unknown
Windfall Mine	Silver, Gold		Surface
Zeke Deposit	Gold		Unknown

Gold

Nevada' gold production in 2004 was 6,942,000 troy ounces (Driesner and Coyer, 2005) and was valued at approximately $2.7 billion. Nevada is the third largest gold producer in the world, behind only the countries of South Africa and Australia. Estimated proven and probable gold reserves at currently active mines at the end of 2005 is estimated at 33 million troy ounces (Price and Meeuwig, 2006). Most of the precious metals and many of the other metals are currently being produced from recently developed (since 1982) open-pit mines of varying sizes (some open pits are as much as a kilometer in size). Note that some of the Carlin mines include underground mines.

The gold ore in Eureka is typically processed by a combination of oxide mills, refractory mills, and heap leach methods. Oxide mills leach the ores in agitating tanks in alkaline cyanide solution followed by absorption in a carbon pulp. Refractory mills fine grind the ore and oxidize it by roasting, thus freeing the gold particles for additional processing. Heap leaching is used for the high tonnage / low grade ore and it is crushed and placed on a large leach pad where it is irrigated with a cyanide solution. Refractory and oxide milling has become an important part of the ore processing as the large operations are relying on this newer technology.

Gold producers report increased costs of production, due mostly to energy costs. To address these rising costs, Newmont's Nevada operations are building a 203-megawatt coal-fired power plant near the Carlin operations at Dunphy. The company plans to sell excess capacity from the plant to local utility Sierra Pacific.

Figure 3.1.5a - – Appendix A

Figure 3.1.5b - – Appendix A

Figure 3.1.5c - – Appendix A

Figure 3.1.5d - – Appendix A

Betze/Post Mine

The Betze/Post Mine is an open pit gold mine, operated by Barrick Gold Corporation. The host rock consists of chert, shale, siltstone, and impure carbonates. Betze/Post mine is located in the Lynn mining district. In 2005, the Betze/Post mine produced 1,514,320 ounces of gold and 114,248 ounces of silver.

Carlin Mines

The Carlin mines are open pit and underground gold mines, operated by Newmont Mining Corporation. The host rock consists of limestone, argillite chert, and sedimentary rock. Carlin mines are located in the Lynn and Maggie Creek mining districts. In 2005, the Carlin mines produced 684,400 ounces of gold.

Ruby Hill Mine

The Ruby Hill Mine is an open pit gold mine, operated by Barrick Gold Corporation. The host rock consists of limestone. Ruby Hill mine is located in the Eureka mining district. In 2004, the Ruby Hill mine produced 8,057 ounces of gold and 1,888 ounces of silver.

Silver

Nevada' silver production in 2004 was 9,946,000 troy ounces making it Nevada's 5th leading mineral commodity, valued at $71 million (Price and Meeuwig, 2006). In Eureka County silver is a secondary precious metal in the existing gold mines, as previously indicated.

3.1.6 Other and Base Metals

Eureka County contains numerous other metal and base metallic deposits and a number of these have been exploited historically for their intrinsic non-precious metals value. Often these metals have been produced as a by-product of gold and silver mining. Figure 3.1.5 indicates the locations of base metal (copper, etc.) mineral resources. Table 3.1.6a presents the plants and producing Base Metal Mines in Eureka County. Table 3.1.6b presents the past producing Base Metal Mines in Eureka County.

Table 3.1.6a: Plants and Producing Base Metal Mines (Present)

Name	Major Commodity	Operation
Mount Hope Mine	Molybdenum	Surface
Beowawe Mine	Mercury	Unknown

Table 3.1.6b: Plants and Producing Base Metal Mines (Past)

Name	Major Commodity	Operation
Angelo Belli	Tungsten	Underground
Belmont	Zinc, Lead, Silver	Unknown
Beowawe Mine	Mercury	Unknown
Celia Mine	Lead	Underground
Champion Mine	Lead	Surface
Copper King Mine	Copper	Surface-Underground
Diamond Mine	Lead	Underground
Diamond-Excelsior Tunnel	Zinc	Underground
Distinction Tunnel	Copper, Silver, Gold	Unknown
Eagle Roost	Lead, Silver	Unknown
Elderado Mine	Lead	Unknown
Erwin	Lead, Silver	Unknown
Eureka Nevada Tunnel		Underground

Gordon Tunnel	Lead, Silver, Gold	Unknown
Gosson	Copper	Surface-Underground
July Mine	Zinc, Lead	Unknown
Keystone Mine	Lead	Surface-Underground
Lawton Shaft	Lead, Silver	Unknown
Lincoln Mine	Lead, Silver	Unknown
Lone Mtn Mine	Lead	Underground
Lord Byron Tunnel	Lead, Gold, Silver	Unknown
Mammoth Mine	Lead	Unknown
Mineral Hill	Zinc	Surface-Underground
Morning Glory	Antimony	Surface-Underground
Mount Hope Mine	Zinc, Lead	Unknown
Mountain View Extension	Lead, Zinc, Silver	Unknown
Mountain View Mine	Zinc	Underground
Nevada Star Mine	Lead	Underground
Old Whalen Mine	Copper, Lead	Unknown
Phillipsburg Mine	Lead	Surface-Underground
Red Devil Mine	Mercury	Underground
Reese And Berry	Beryllium, Fluorine-Fluorite	Unknown
Rogers Tunnel	Lead, Gold, Silver	Unknown
Rossi Mercury Prospect	Mercury	Surface-Underground
Ruby Claim	Copper, Barium-Barite	Unknown
September Morn	Copper, Silver, Gold	Unknown
Standard Copper	Copper	Unknown
Steel Galena Mine	Lead	Underground
T.L. Shaft	Lead	Underground
Union Hill Mines	Lead	Underground

Copper

Nevada produced 126 million pounds of copper in 2005 (Price and Meeuwig, 2006). Copper was Nevada's 4th leading mineral commodity in 2005, valued at $213.3 million. However, in Eureka County copper is a minor or trace commodity in the active precious metal mines.

Molybdenum

Idaho General Mines, Inc. has commenced (October, 2006) the permitting process to develop a molybdenum mine at Mount Hope in Eureka County. The Mount Hope Mine project is located near State Route 278 south of Garden Pass. Permitting is expected to take approximately two years following the submittal of a Plan of Operation to the U.S.

Bureau of Land Management (USBLM). Mine construction is expected to take approximately two additional years with initial production targeted for 2009. The mine is projected to have a 53-year life and produce approximately 1.3 billion pounds of molybdenum.

Uranium

Uranium resources are present in Eureka County. The occurrence of uranium mineral resources of Eureka County are presented in Figure 3.1.5. Table 3.1.6c presents the uranium resources in Eureka County.

Table 3.1.6c: Uranium Resources

Name	Major Commodity	Operation	Development Status
Unnamed Prospect #1	Uranium	Unknown	Occurrence
Eather Mine	Uranium	Unknown	Occurrence
James Bradshaw Claims	Uranium	Surface	Prospect

3.1.7 Gems and Semi-Precious Stones

Various gemstones are found in Eureka County. Turquoise mining takes place in Eureka County, but the activity is intermittent and largely unreported. Figure 3.1.5 indicate gemstone occurrences within Eureka County. Table 3.1.7 presents the past producing gemstone mines in Eureka County.

Table 3.1.7: Past Gemstone Mines

Name	Major Commodity
Black Matrix Claim	Gemstone
August Berning Mine	Gemstone
White Horse Turquoise Deposit	Gemstone

3.1.8 Industrial Minerals

Industrial mineral resources are present in Eureka County. The occurrence of locatable industrial rock and mineral resources of Eureka County are presented in Figure 3.1.5. At this time there is a limited number of active mines of industrial minerals in Eureka

County. Table 3.1.8a presents the producing Industrial Mineral Mines in Eureka County. Table 3.1.8b presents the past producing Industrial Mineral Mines in Eureka County.

Table 3.1.8a: Producing Industrial Mineral Mines

Name	Major Commodity	Operation
Dunphy Mill	Barium-Barite	Processing Plant
Queen Anne Mine	Barium-Barite	Surface
Lakes Barite Mill	Barium-Barite	Processing Plant

Table 3.1.8b: Past Industrial Mineral Mines

Name	Major Commodity
Bat And Bar Barite	Barium-Barite
Bear Mine	Barium-Barite
Bisoni Barite Mine	Barium-Barite
Firecracker Barite Mine	Barium-Barite
Lakes-Beacon Barite Mill	Barium-Barite
Maggie Creek Barite Mine	Barium-Barite
Nelson Barite Mine	Barium-Barite
Patsy Ann Jig Plant	Barium-Barite
Queen Ann Pit	Barium-Barite
Sansenina Mine	Barium-Barite
South End Of Good Hope Claims	Barium-Barite
Wild Flower	Barium-Barite
Barth Mine	Iron
Frenchy Canyon	Iron
Morderalli Iron Mine	Iron

3.2 Saleable Minerals

For saleable minerals, the primary commodity sold to the public is sand and gravel. A minor quantity of decorative and building stone, clay and decomposed granite is also sold to the public. Nevada's construction aggregate production in 2005 was estimated at 46 million tons at a value of $207 million (Price and Meeuwig, 2005). It is estimated that Eureka County produced less than 100,000 tons of aggregate (Price and Meeuwig, 2005). Table 3.2a presents the producing Saleable Mineral Mines and Table 3.2b presents the past producing Saleable Mineral Mines in Eureka County.

Table 3.2a: Producing Saleable Mineral Mines

Name	Major Commodity	Operation
Sr 278 Gravel Plant & Pit	Sand and Gravel	Surface

Table 3.2b: Past Saleable Mineral Mines

Name	Major Commodity
Unnamed Perlite Quarry	Perlite
Palisade	Pumice
Buckhorn S & G Pit	Sand and Gravel
Day Pit	Sand and Gravel
Palisade Pit	Sand and Gravel
Union Pass Pit	Sand and Gravel
Hoosie Mine	Silica
Palisades Quarry & Mill	Stone - Crushed/Broken

3.3 Leasable Minerals

Leasable minerals defined by the Mineral Leasing Act (February 1920; and 43 CFR 3000-3599, 1990) include the subsets leasable solid and leasable fluid minerals. Leasable solid minerals include: coal, oil shale, native asphalt, phosphate, sodium, potash, potassium, and sulfur. Leasable fluid minerals include oil, gas and geothermal resources. The rights to explore for and produce these minerals on public land may only be acquired by competitive leasing.

3.3.1 Geothermal Resources

Introduction

Green and sustainable power is becoming an increasingly important resource in the United States. In fact legislation is being passed at the State and Federal level mandating increased us of green energy. Large user states that lack resources for green energy look to other states with sustainable resources to purchase their power. A major source of green energy is geothermal resources.

Geothermal energy resources are underground reservoirs of heat usually associated with magmatic intrusions into subsurface rock layers. However, Eureka County is located in the Great Basin, where there are two types of recognized geothermal systems: Magmatically-induced systems as described above, and extensional fault systems associated with regionally high heat flow, and active faulting. Groundwater circulating at depth in rocks heated either by magma or by the stress and strain resulting from extensional systems can be used as a medium to transfer heat to the surface to be used either directly for heating buildings or converted into electricity. Geothermal energy resources are considered to be renewable.

Generating electricity with geothermal energy requires very hot water generally found at greater depths below the surface. The technology used to generate electricity from hydrothermal fluids depends on the state of the fluid (whether steam or water) and its temperature. There are three types of geothermal-powered electrical generation plants operating today, each of which ultimately employs steam to drive a turbine. Power plants within the Eureka County are all binary systems. In the binary system, the water from the geothermal reservoir is used to heat another "working fluid" which is vaporized and used to turn the turbine/generator units. The geothermal water and the "working fluid" are each confined in separate circulating systems or "closed loops" and never come in contact with each other. The advantage of the Binary Cycle plant is that they can operate with lower temperature waters (225° F - 360° F), by using working fluids that have an even lower boiling point than water. They also produce no air emissions.

Geothermal water that is not hot enough for electrical generation may be used for general building heating or for other purposes such as growing plants, dehydrating vegetables, fish farming, spas, recreational hot springs, swimming pools, etc.

Existing Fields and Development of Resources

Geothermal and hot spring occurrences are present in Figure 3.1.5. Electrical power is currently produced in the Beowawe geothermal area at the Oxbow geothermal power plant, which came online in 1985. Although the plant itself is immediately over the County line in adjacent Lander County, the geothermal resources used to power the plant come from both Eureka and Lander Counties. In 2005 electrical production from the Oxbow plant was 87,042 Megawatt hours. Table 3.3.1 presents the geothermal resources in Eureka County.

Table 3.3.1: Geothermal Resources

Name	Major Commodity	Operation	Development Status
Ash Springs Area	Geothermal	Geothermal	Occurrence
Bartholomae Hot Springs	Geothermal	Geothermal	Producer
Shipley Hot Springs	Geothermal	Well	Unknown
Walti Hot Springs	Geothermal	Surface	Unknown
Bartine Hot Springs	Geothermal	Well	Unknown
Hiko Spring	Geothermal	Well	Unknown
Crystal Springs	Geothermal	Well	Unknown
Siri Ranch Springs	Geothermal	Well	Unknown
Sulfur Springs	Geothermal	Well	Unknown
Hot Springs Point Crescent Valley	Geothermal	Surface	Unknown

3.3.2 Oil and Gas

Introduction

An oil and gas lease grants the right to explore, extract, remove, and dispose of oil and gas resources that may be found in the leased BLM lands. Lease rights are controlled by standard lease terms and may be subject to particular lease stipulations (restrictions to further protect other resources) and other permit approval requirements based on a NEPA analysis of proposed disturbances and cumulative impacts. Stipulations and permit requirements describe how lease rights are modified. The lease stipulations and permit conditions of approval allow for management of federal oil and gas resources while giving due consideration to other resources and land uses.

Exploration Drilling

Historically, there has been several exploratory wells drilled in Eureka County in the sedimentary formations. The most current information (Price and Meeuwig, 2006) indicates there was one oil exploration well drilled during 2005 in Eureka County at Tomera Ranch.

Leasing

Several oil and gas wells are present in Eureka County as shown on Figure 3.1.5. There are three active oil fields in Eureka County. These active fields are the Blackburn Field, North Willow Creek Field, and Tomera Ranch Field. These fields are near Nevada

Highway 278, located in Pine Valley. Table 3.3.2 presents the oil and gas resources in Eureka County.

Table 3.3.2: Oil and Gas Resources

Operator	Well	Permit Date	Status
Amoco Production Co.	Big Pole Creek No. 1	17 JUL 81	Oil Gas Show
Amoco Production Co.	Blackburn No. 10	06 MAY 83	Producer
Amoco Production Co.	Blackburn No. 14	23 MAY 85	Producer
Amoco Production Co.	Blackburn No. 16	13 NOV 85	Producer
Amoco Production Co.	Blackburn No. 17	11 MAY 87	Oil Show
Amoco Production Co.	Blackburn No. 3	17 JUL 81	Producer
Amoco Production Co.	Blackburn No. 4	13 MAY 82	Oil Show
Amoco Production Co.	East Bailey Ranch No. 1	1983	Oil Show
Amoco Production Co.	East Henderson Creek No. 1	11 DEC 84	Oil Show
Beyerback, Charles	(Moab Drilling Company) No. 1	03 MAY 60	Oil Show
Deerfield Production Corporation	Foreland-SP Land Co. No. 1-27	17 NOV 87	Producer
Deerfield Production Corporation	North Willow Creek No. 6-27	13 APR 92	Producer
Depco, Inc.	Willow Wash Federal No. 42-24	09 JUL 84	Oil Show
EP Operating Company	Stagecoach Federal 17-2 No. 1	11 OCT 91	Oil Show
EP Operating Company	Stagecoach Federal No. 17-1	19 MAR 92	Oil Show
Evans, David M.	Mary Kay Federal No. 1	06 APR 87	Oil Show
Foreland Corp.	Foreland-N. Blackburn Federal No. 1-34	03 AUG 87	Oil Show
Foreland Corp.	Foreland-SP Land Co. No. 1-5	25 JUN 87	Producer
Foreland Corp.	Foreland-Willow Creek Federal No. 1	16 JUL 87	Oil Show
Foreland Corp.	Pine Creek No. 1-7	19 JUL 96	Oil Show
Foreland Corp.	Southern Pacific Land Co. No. 2-27	28 JUN 88	Oil Show
Foreland Corp.	Southern Pacific Land Co. No. 2-5	02 MAY 88	Oil Show
Foreland Corporation	Foreland SP Land No. 1-27	30 OCT 91	Producer
Foreland Corporation	Hay Ranch No. 1-17	9 JUN 93	Oil Show
Foreland Corporation	Hot Creek Wash Federal No. 15-1	30 NOV 94	Oil Show
Foreland Corporation	Papoose Canyon No. 1-15	13 APR 92	Oil Show
Foreland Corporation	SP Land Company No. 1-5R	13 APR 92	Producer
Gary-Williams Company	N. Kobeh Valley Federal No. 13-10	13 DEC 88	Oil Show
Gary-Williams Company	Three Bar Federal No. 36-C	15 MAY 90	Oil Show
Getty Oil Company	Nost I No. 1	07 DEC 76	Oil Show
Hanagan Petroleum Corp.	Jackpot Federal No. 1	26 APR 90	Oil Gas Show
Hunt Oil Co.	Walter L. Plaskett No. 1	23 APR 80	Oil Gas Show
J.R. Bacon Drilling, Inc.	SP Land Co. No. 3-5	3 DEC 90	Oil Show
J.R. Bacon Drilling, Inc.	Tomera Ranch No. 32-1	28 SEP 90	Oil Show
J.R. Bacon Drilling, Inc.	Tomera Ranch No. 33-1	7 SEP 90	Oil Show
J.R. Bacon Drilling, Inc.	Tomera Ranch South No. 9-1	4 OCT 93	Oil Show
J.R. Bacon Drilling, Inc.	West Hay Ranch No. 12-1	11 OCT 91	Oil Show
Last Frontier Oil Co.	Damele No. 1	05 NOV 53	Oil Show
Mobil Oil Corporation	Table Mountain No. F-11X-6G	21 SEP 90	Oil Gas Show
Petroleum Corp. of Nevada	Blackburn No. 12	08 NOV 83	Oil Show
Petroleum Corporation of Nevada	Blackburn No. 20	14 NOV 95	Oil Show
Petroleum Corporation of Nevada	Blackburn No. 21	11 JUL 97	Producer
Petroleum Corporation of Nevada	Blackburn Unit No. 18	3 AUG 92	Producer
Petroleum Corporation of Nevada	Blackburn Unit No. 19	7 MAR 94	Producer
Shell Oil Co.	Diamond Valley Unit No. 1	02 AUG 56	Gas Show
Texaco Inc.	TPI S. D. Bucy No. 1	16 JUN 89	Oil Gas Show

The Gary-Williams Company	Three Bar Federal No. 25-A	30 AUG 89	Oil Show
Trail Mountain, Inc.	Three Bar Unit No. 4 and No. 5	11 MAY 93	Oil Show
True Oil Company	Bird Federal No. 13-14	06 JUN 91	Oil Show

3.4 Other Mineral Resources

3.4.1 Paleontological Resources

There are several valuable Paleontological resources are present within Eureka County. The Roberts Mountain Allochthon (or Thrust) extends north-south crossing Eureka County and contains windows (erosional holes in the allochthon) that allow viewing of the autochthon (rock beneath the allochthon). This classical geologic area provides paleontological specimens ranging from large to small used for display and scientific purposes. Locations of paleontological resources within Eureka County are indicated on Figure 3.1.5a.

The Roberts Mountain, Monitor Range, and Lone Mountain have been an important resource in the study of Late Ordovician period mass extinction according to Finney (1999). The Late Ordovician mass extinction was the second greatest of five large prehistoric mass extinctions. Eureka County contains an exceptional record of the Late Ordovician mass extinction in three sedimentary successions. This Eureka County records are uniquely complete compared to other locations in the world and include distinct sedimentological signals of sea-level changes, abundant fossils, and well preserved carbon profiles. This allows unparalleled opportunity for scientists to assess associations between glaciation, extinction and disruption of the carbon cycles.

The Simpson Park Range (Red Hill area) and Roberts Mountains has produced a number of Devonian period vertebrate fish fossils along with marine invertebrates. Turner (1988) states the fossil specimens discovered include dipnoans, acanthodians, arthrodires, antiarchs, and crossopterygians.

4. MINERAL RESOURCE POTENTIAL

4.1 Locatable Minerals

Nevada was the leading US gold, barite, and gypsum producer in 2005 and the second largest producer of silver.

The prospects for sustaining production rates for these three minerals in the short run are excellent and in the long run (15-20 years) also quite likely. Nevada Exploration Survey, 2004, indicated the 75 percent of responding mineral companies are optimist about domestic exploration (Driesner and Coyner, 2005). Commodity prices are currently high, as is demand for these products.

4.1.2 Precious Metals

Gold

The cumulative production of gold from Nevada since 1859 is estimated at about 149.5 million ounces of which 84% has been produced since mining began in the Carlin trend in 1965 and 52% of which has been produced in the last decade.

The price of gold has increased over the last few years from an average of $310/ounce in 2002 to $365/ounce in 2003, $460/ounce in August of 2005, and stands at over $600/ ounce today (June, 2007). This increase in gold price has initiated a shift in precious metal exploration from high grade, vein type targets to low grade, large tonnage deposit targets. Company dollars spent for exploration have been increasing since 2001 and were about $79.7 million in 2004 and are estimated to be about $111.9 million in 2005 (Driesner and Coyner, 2005). Because of Nevada's favorable geologic setting, its stringent but predictable regulatory climate and the political stability of the US, Nevada continues to receive a very large portion of worldwide exploration expenditures (Price and Meeuwig, 2006). Estimated gold reserves in the immediate vicinity of currently active mines at the end of 2003 were about 80.3 million troy ounces. Under current production rates this reserve would account for about 11 years of sustained gold production.

Reserves associated with major metal deposits are tabulated in a report by individual mining property (Tingley, 2004). In addition to new discoveries, the price of gold and the cost of production are the main reasons for fluctuations between reserves and sub-economic resources.

Based on mining industry projections it appears that market conditions for gold will remain relatively consistent, with gold priced in the $400 to $600/ounce range. It is anticipated that mining and exploration activity would also gradually increase. Within the next 10 years it is anticipated that 2-3 currently active mines will go into closure and be reclaimed. These mine closures would likely be offset with either new projects being developed and placed into production, or expansion of existing mines. Based on these estimates and projections, permitting demands for both hard rock exploration and mining would likely increase over time.

In Eureka County specifically, Barrick Gold Corporation is conducting further exploration in the vicinity of the company's existing mines, and reports on the company website that it is "confident that the property will continue to yield new discoveries in the future."

Barrick is developing the East Archimedes Mine at the old Ruby Hill Mine site near Eureka. The company website reports that "the project will be an open-pit, heap leach operation exploiting the East Archimedes deposit, a deeper continuation of the ore mined previously at Ruby Hill. Permitting has been secured and the two-year, approximately $75-million construction phase is underway. The project is expected to enter production in mid-2007 and has reserves of 1.0 million ounces at December 31, 2005."

Barrick also is a partner with Kennecott Minerals in the Cortez Joint Venture in Lander County close to Crescent Valley. This operation is described on the company website: "The Pipeline and South Pipeline deposits are being mined by conventional open-pit methods in nine stages. The first three stages of mining occurred in the Pipeline deposit over a period of ten years (1996 – 2005) and then mining of Pipeline/South Pipeline stages four through nine plus South GAP and Crossroads are scheduled to continue through 2018. All requisite permits for the development of the entire Pipeline/South Pipeline deposit have been issued."

Overall, it appears that with high and rising gold prices, gold production and exploration in Eureka County will continue to be important over at least the next ten to twenty years.

Silver

Most of Nevada's silver production in recent years was produced as a byproduct of gold mining. Like gold, the price of silver is gradually increasing. This may affect the expansion potential of the existing silver mines, would likely increase exploration activities for new silver deposits in other areas, and encourage greater recovery of silver produced as a byproduct of gold mining.

4.2 Saleable Minerals

Saleable mineral extraction and use will increase along with increasing mining activity, commercial development, recreation activities, and private property development, especially along the Interstate 80 and U.S. Highway 50 corridor within Eureka County. Saleable mineral sites with a priority for use will likely include sand, gravel, and rock quarries located along State, County, and BLM managed roads.

There is good potential for development of aggregate deposits in Eureka County. Virtually all of the basins/valleys in Eureka County have potential aggregate deposits. However, because the market value for sand and gravel is not very high and transportation costs are high, those deposits adjacent to their end uses or good transportation corridors will have the greatest development potential. High transportation cost and abundant resources also result in the dominance of small-scale local operations in the sand and gravel market. If local demand exists, small scale operations would not have to sustain large transportation costs, thereby creating an economically feasible and desirable situation for Eureka County's sand and gravel development. If there is no local demand, only the larger quarries, particularly those near major transportation corridors and urban centers will be economically beneficial.

4.3 Leasable Minerals

4.3.1 Geothermal Resources

Geothermal resource exploration and development operations are on the rise and are expected to increase in the future. Department of Energy and State of Nevada grants, tax incentives, and renewable portfolio standards are encouraging companies to develop geothermal and other renewable energy resources. In 2006, Beowawe Power, LLC signed a 29-year contract with Sierra Pacific Power Company. It is anticipated that this geothermal resource area will continue to be developed.

4.3.2 Oil and Gas

Eureka County's Pine Valley is the second largest producer of oil in Nevada. Pine Valley is the area in Eureka County known at this time to have the largest future potential for additional oil production.

With increase usage of oil in the United States and rising prices of oil, continued exploration and future additional development will be likely in Eureka County.

Over the past 25 years, oil prices have been highly volatile and it is expected that price volatility will remain into the future, due to unforeseen natural, political, and economic circumstances (EIA, 2007). For example, circumstances in the Middle East could create significant disruptions of normal oil production and trading patterns. Conversely, high oil prices may not be sustainable due to decreased consumption and creation of significant competition from marginal (and large) sources of oil and other energy supplies. Low oil prices would have the opposite effect.

Growth in global oil demand has outstripped supply in recent years, decreasing spare production and refining capacities. In addition, prices remain elevated due to surging demand in developing Asia and the situation in Iraq (EIA, 2007).

5. CONCLUSION

The geological history of Eureka County has resulted in an area rich in mineral resources. Gold is currently by far the most important of the county's minerals, both for the value of the product and for the effect of gold mining on the economy and employment of Eureka County and Nevada overall. Eureka County is one of Nevada's and indeed the world's principal gold producers, and exploration activity as well as estimated reserves indicate that gold mining will continue in the county for ten to twenty years, depending upon gold prices. Geothermal resources, oil and gas also are present in the county, with producing oil wells and a geothermal supply for a nearby power plant. With increased global energy demand, energy exploration and production in Eureka County should continue. Various other mineral resources in the county including molybdenum, gemstones, and aggregates also are present in economic quantities, have been produced in the county in the past or are currently mined, and will be produced in the future as markets create demand for the products.

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7. GLOSSARY

Aggregate: 1. A mass or body of rock particles, miner grains, or both. 2. Any of several hard, inert materials, such as sand, gravel, slag, or crushed stone, used for mixing with a cementing or bituminous material to form concrete, mortar, or plaster; or used alone, as in railroad ballast or graded fill.

Allochthon: Large block of rock which has been moved (usually long distances) from its original site of formation, usually by low angle thrust faulting (pushed on top of another block of rock).

Alluvial:1. Pertaining to or composed of alluvium, or deposited by a stream or running water. 2. Said of a placer formed by the action of running water, as in a stream channel or alluvial fan; also, said of the valuable mineral.

Alluvium: 1. Pertaining to or composed of alluvium, or deposited by a stream or running water. 2. Said of placer formed by the action of running water, as in a stream channel or alluvial fan; also, said of the valuable mineral.

Argillite: A compact rock, derived from mudstone or shale, more highly indurated than either of those rocks. It lacks the fissility of shale or the cleavage of slates. It is regarded as a product of weak metamorphism.

Barite: An orthorhombic mineral, BaSo4, with a specific gravity of 4.5. It is used in paint and drilling mud, as a filler for paper and textiles, and is the principal ore of barium.

Carbonate: A mineral compound characterized by a fundamental anionic structure. Calcite and aragonite are examples of carbonates. 2. A sediment formed of the carbonates of calcium, magnesium, and/or iron.

Cenozoic: The latest of the four eras into which geologic time is divided; it extends from the close of the Mesozoic Era, about 65 million years ago, to the present. The Cenozoic Era is subdivided into Tertiary and Quaternary periods, or, on a different basis, into Paleogene and Neogene periods.

Chert: A hard, dense microcrystalline or cryptocrystalline sedimentary rock, consisting chiefly of interlocking crystals of quartz less than about 30 um in diameter; it may contain amorphous silica. It has conchoidal fracture, and may be white or variously colored. Chert occurs principally as nodular or concretionary segregations, or nodules, in limestone and dolomite, and less commonly as layered deposits, or bedded chert; it may be an organic or inorganic precipitate or replacement product. The term flint is essentially synonymous.

Clastic: 1. Pertaining to a rock or sediment composed principally of fragments derived from pre-existing rocks or minerals and transported some distance from their places of origin; also said of the texture of such a rock. 2. Pyroclastic 3. Said of a bioclastic rock. 4. Pertaining to the fragments (clasts) composing a clastic rock.

Coal: A readily combustible rock containing more than 50% by weight and more than 70% by volume of carbonaceous material including inherent moisture, formed from compaction and indurations of variously altered plant remains similar to those in peat. Differences in the kinds of plant materials, in degree of metamorphism, and in the range of impurity are sued in classification.

Copper: A reddish or salmon-pink isometric mineral, the native metallic element Cu. It is ductile and malleable, a good conductor of heat and electricity, usually dull and tarnished, and formerly an important ore.

Deformation: 1. A general term for the processes of folding, faulting, shearing, compression, or extension of rocks as a result various earth forces. 2. Strain.
Deposition: 1. The laying-down of rock-forming material by any natural agent. 2. The precipitation of mineral matter from solution.

Devonian: The fourth period of the Paleozoic era. It began 390 million years ago and extended to 340 million years ago.

Diatomaceous Earth: A light colored soft siliceous sedimentary rock, consisting chiefly of opaline frustules of the diatom. Owing to it high surface area, absorptive capacity, and chemical stability, diatomite has a number of uses. The term is generally reserved for deposits of commercial value.

Diatomite: A light colored soft siliceous sedimentary rock, consisting chiefly of opaline frustules of the diatom. Owing to its high surface area, absorptive capacity and chemical stability, diatomite has a number of uses. The term is generally reserved for deposits of commercial value.

Dolomite: 1. A common rock-forming mineral. Part of the magnesium may be replaced by ferrous iron. Dolomite is white to light-colored and has perfect rhombohedral cleavage. 2. A sedimentary rock, of which more than 50% by weight consists of the mineral dolomite; specif. a rock containing more than 90% mineral dolomite and less than 10% calcite. Most dolomite is associated and often interbedded with limestone.

Extrusion: The emission of relatively viscous lava onto the earth's surface; also, the rock so formed.

Extrusive: Said of igneous rock that has been erupted onto the surface of the earth. Extrusive rocks include lava flows and pyroclastic material such as volcanic ash.

Facies: The aspect, appearance, and characteristics of a rock unit, usually reflecting, the conditions of its origin; esp. as differentiating it from adjacent or associated units.

Fault Block: A crustal unit bounded by faults, either completely or in part. It behaves as a unit during faulting and tectonic activity.

Fluorite: A clear to translucent mineral. It is commonly blue or purple, but occurs in many other colors; it is found in cubic crystals and has perfect basal cleavage. Fluorite is a common mineral in vein, is the ore of fluorine, and is used in glass and enamel and in the manufacture of hydrofluoric acid.

Fluorspar: Commercial name for flourite.

Fold: A bend or placation in bedding, foliation, cleavage, or other planar features in rocks. A fold is usually a product of deformation, but the definition does not specify manner of origin. 2. A broad median external undulation or plica on either the dorsal or the ventral valve of a brachiopod.

Formation: 1. A body of rock strata that consists dominantly of a certain lithologic type or combination of types. It is the fundamental lithostratigraphic unit. Formations may be combined into groups or subdivided into members. 2. A lithologicially distinct, mappable body of igneous or metamorphic rock.

Gemstone: A crystalline rock that can be cut and polished for use as a gem.

Geocline: A usually elongate, basinlike depression along the edge of a continent, in which a thick sequence of sediments and volcanic deposits has accumulated.

Geothermal: Pertaining to the heat of the interior of the earth.

Gold: A soft yellow mineral, the native metallic element Au. Specific gravity of pure gold is 19.3. It is often naturally alloyed with silver, copper, or other metals, and is found as nuggets and grains in gravels, and in veins associated with quartz.

Graben: An elongate, relatively depressed crustal unit or block that is bounded by faults on its long sides. It is a structural form, which may or may not be geomorphologically expressed as a rift valley.

Gypsum: A widely distributed mineral consisting of hydrous calcium sulfate. It is the commonest sulfate mineral, and if frequently associated with halite and anhydrite in evaporates, forming thick, extensive beds, esp. in rocks of Permian and Triassic age. Gypsum is used mainly as a retard in portland cement, and in making plaster of Paris.

Horst: An elongate, relatively uplifted crustal unit or block that is bounded by faults on its long sides. It is a structural from and may or may not be expressed geomorphologically.

Imbricate: Overlapping, as shingles or tiles on a roof.

Intrusion: 1. The process of emplacement of magma in pre-existing rock; magmatic activity. Also, the igneous rock mass so formed. 2. An injection of sedimentary material under abnormal pressure 3. Salt-water encroachment.

Intrusive: Of or pertaining to intrusion, both the process and the rock so formed.

Lacustrine: 1. Pertaining to, produced by, or inhabiting a lake or lakes. 2. Said of a region characterized by lakes.

Limestone: A sedimentary rock consisting chiefly of the mineral calcite (calcium carbonate) with or without magnesium carbonate. Common impurities include chert and clay. Limestone is the most important and widely distributed of the carbonate rocks and is the consolidated equivalent of limy mud, calcareous sand, and/or shell fragments. It yields lime on calcinations.

Lithium: 1. A soft, silvery, highly reactive metallic element that is used as a heat transfer medium and in various alloys, ceramics, and optical forms of glass. 2. Any of several salts of lithium, especially lithium carbonate.

Magma: Naturally occurring molten rock material, generated within the earth and capable of intrusion and extrusion, from which igneous rocks have been derived through solidification and related processes. It may or may not contain suspended solids (such as crystals and rock fragments) and/or gas phases.

Magmatic: Of , pertaining to, or derived from magma.

Magnesium: A light silver-white ductile bivalent metallic element; in pure form it burns with brilliant white flame; occurs naturally only in combination (as in magnesite and dolomite and carnallite and spinel and olivine)

Mercury: A heavy, silver-white to tine-white hexagonal mineral, the native metallic element Hg. It is the only metal that is liquid at ordinary temperatures. Native mercury is found as minute fluid globules disseminated through cinnabar (the principal ore of mercury) or deposited from the waters of certain hot springs, but it is unimportant as a source of the metal. It usually contains small amounts of silver. Mercury combines with most metals to form alloys or amalgams. It is highly toxic if breathed or ingested.
Mesozoic: An era of geologic time, from the end of the Paleozoic to the beginning of the Cenozoic, or from about 225 to 65 million years ago; also the rocks formed during that era. It includes the Triassic, Jurassic, and Cretaceous periods.

Metallic: 1. Pertaining to metal. 2. Said of a type of luster that is characteristic of metals.

Mineral: 1. A naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form, and physical properties. Those who include the requirement of crystalline form in the definition would consider and amorphous compound such as opal to be a mineraloid. 2. Any naturally formed inorganic material, i.e. a member of the mineral kingdom as opposed to the plan and animal kingdoms.

Molybdenum: A metallic element that resembles chromium and tungsten in many properties. It is used especially in strengthening and hardening steel, and is a trace element in plant and animal metabolism

Non-metal: 1. A naturally occurring substance that does not have metallic properties such as high luster, conductivity, opaqueness, and ductility. 2. In economic geology, and rock or mineral mined for its nonmetallic value, such as stone, sulfur, or salt.

Non-metallic: 1. Of or pertaining to a nonmetal. 2. Said in general of mineral lusters other than metallic.

Oil Shale: A kerogen-bearing, finely laminated brown or black sedimentary rock that will yield liquid or gaseous hydrocarbons on distillation.

Ordovician: The second period of the Paleozoic era. It began 480 million years ago and extended to 420 million years ago.

Orogeny: Literally, the process of formation of mountains. In present usage, orogeny is the process by which structures within fold-belt mountainous areas were formed, including thrusting, folding, and faulting in the outer and higher layers, and plastic folding, metamorphism, and plutonism in the inner and deeper layers. Only in the very youngest, late Cenozoic mountains is there any evident structure and surface landscape.

Paleontology: The study of life in past geologic time, based on fossil plants and animals in including phylogeny, their relationships to existing plants, animals, and environments, and the chronology of the earth's history.

Paleozoic: An era of geologic time, from the end of the Precambrian to the beginning of the Mesozoic, or from about 570 to about 225 million years ago. Also, the erathem of rocks deposited during the Paleozoic.

Perlite: A natural volcanic glass similar to obsidian but having distinctive concentric cracks and a relatively high water content. In a fluffy heat-expanded form perlite is used as a lightweight aggregate, in fire-resistant insulation, and in soil for potted plants.

Phosphate: A mineral compound containing tetrahedral groups. An example is pyromorphite. Phosphorus, arsenic, and vanadium may substitute for each other in the tetrahedron.

Physiographic Province: A region of which all parts are similar in geologic structure and climate and which has had a unified geomorphic history; its relief features differ significantly from those of adjacent regions.

Pleistocene: An epoch of the Quaternary period, after the Pliocene of the Tertiary and before the Holocene; also, the corresponding worldwide series of rocks. It began two to three million years ago and lasted until the start of the Holocene some 8,000 years ago. When the Quaternary is designated as an era, the Pleistocene is considered to be a period.

Pluton: 1. An igneous intrusion. 2. A body of rock formed by metasomatic replacement. - The term originally signified only deep-seated or plutonic bodies of granitoid texture.

Potash: 1. Potassium carbonate. A term loosely used for potassium oxide, potassium hydroxide, or even for potassium in such informal expressions as potash feldspar or potash spar.

Potassium: A soft, silver-white, highly or explosively reactive metallic element that occurs in nature only in compounds. It is obtained by electrolysis of its common hydroxide and found in, or converted to, a wide variety of salts used especially in fertilizers and soaps.

Precambrian: A geologic time, and it corresponding rocks, before the beginning of the Paleozoic; it is equivalent to about 90% of geologic time.

Quaternary: The second period of the Cenozoic era, following the Tertiary; also, the corresponding system of rocks. It began two to three million years ago and extends to the present. It consists of two grossly unequal epochs: the Pleistocene, up to about 8,000 years ago, and the Holocene since that time. The Quaternary may also be incorporated into the Neogene, when the Neogene is designated as a period of the Tertiary era.

Sediment: 1. Solid material that has settled down from a state of suspension in a liquid. 2. More generally, solid fragmental material transported and deposited by wind, water, or ice, chemically precipitated from solution, or secreted by organisms, and that forms in layers in loose unconsolidated from

Sedimentary: Pertaining to or containing sediment, or formed by its deposition.

Shale: A fine-grained detrital sedimentary rock, formed by the compaction of clay, silt, or mud. It has finely laminated structure, which gives it a fissility along which the rock splits readily, especially on weathered surfaces. Shale is well indurated, but not as hard argillite or slate. It may be red, brown, black, or gray.

Siltstone: An indurated silt having the texture and composition of shale but lacking it fine lamination or fissility; a massive mudstone in which silt predominates over clay. It tends to be flaggy, containing hard thin layers, and often showing primary current structures.

Silver: A soft white mineral, the native metallic element Ag. It is often alloyed with small amounts of gold and other elements. It occurs in stringers and veins and in the upper parts of silver-sulfide lodes.

Sodium: Soft, silver-white, metallic element that oxidizes rapidly in moist air, occurring in nature only in the combined state, and used in the synthesis of sodium peroxide, sodium cyanide, and tetraethyllead: a necessary element in the body for the maintenance of normal fluid balance and other physiological functions.

Sulfur: An orthorhombic mineral, the native nonmetallic element S. It occurs in yellow crystals at hot springs and fumaroles, and in masses or layers associated with limestone, gypsum, and anhydrite, esp. in salt-dome caprock and bedded deposits.

Tectonic: Pertaining to the forces involved in, or the resulting structures of, tectonics.

Tertiary: The first period of the Cenozoic era (after the Cretaceous of the Mesozoic era and before the Quaternary), thought to have covered the span of time between 65 million and 2 million years ago; also, the corresponding system of rocks. It is divided into five epochs: The Paleocene, Eocene, Oligocene, Miocene, and Pliocene. It was originally designated an era rather than a period; in this sense, it may be considered to have either five periods (Paleocene, Eocene, Oligocene, Miocene, Pliocene) or two (Paleogene and Neogene), with the Pleistocene and Holocene included in the Neogene.

Thrust Fault: A fault with a dip of 45° or less over much of its extent, on which the hanging wall appears to have moved upward relative to the footwall. Horizontal compression rather than vertical displacement is its characteristic feature.

Triassic: The first period of the Mesozoic era (after the Permian of the Paleozoic era, and before the Jurassic), thought to have covered the span of time between 225 and 190 million years ago; also, the corresponding system of rocks. The Triassic is so named because of its threefold division in the rocks of Germany.

Tungsten: A rare, metallic element having a bright-gray color, a metallic luster, and a high melting point, 3410° C, and found in wolframite, tungstite, and other minerals: used in alloys of high-speed cutting tools, electric-lamp filaments, etc.

Uranium: A white, lustrous, radioactive, metallic element, occurring in pitchblende, and having compounds that are used in photography and in coloring glass.

Volcanic Breccia: 1. A pyroclastic rock that consists of angular volcanic fragments that are larger than 64 mm in diameter and that may or may not have a matrix. 2. A rock composed of nonvolcanic fragments in a volcanic matrix.

Volcanic: 1. Pertaining to the activities, structures, or rock types of a volcano. 2. A syn. of extrusive.

Zinc: A ductile, bluish-white metallic element often used in making galvanized iron, brass, and other alloys, and as an element in voltaic cells.

APENDIX A

FIGURES Index (see pages below)

Figure 1.2 Eureka County Location Map

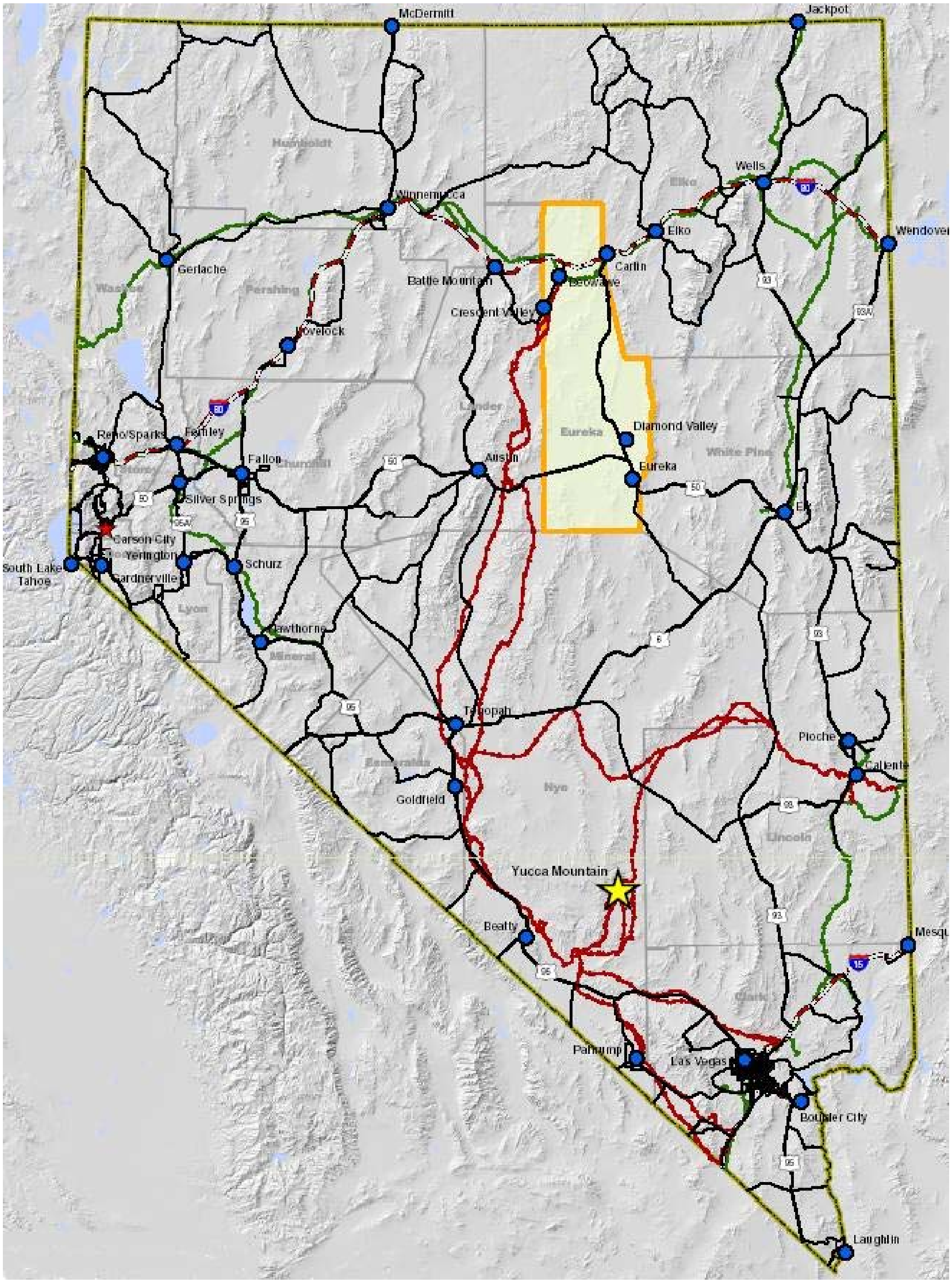

Figure2. 3. Eureka County Geology

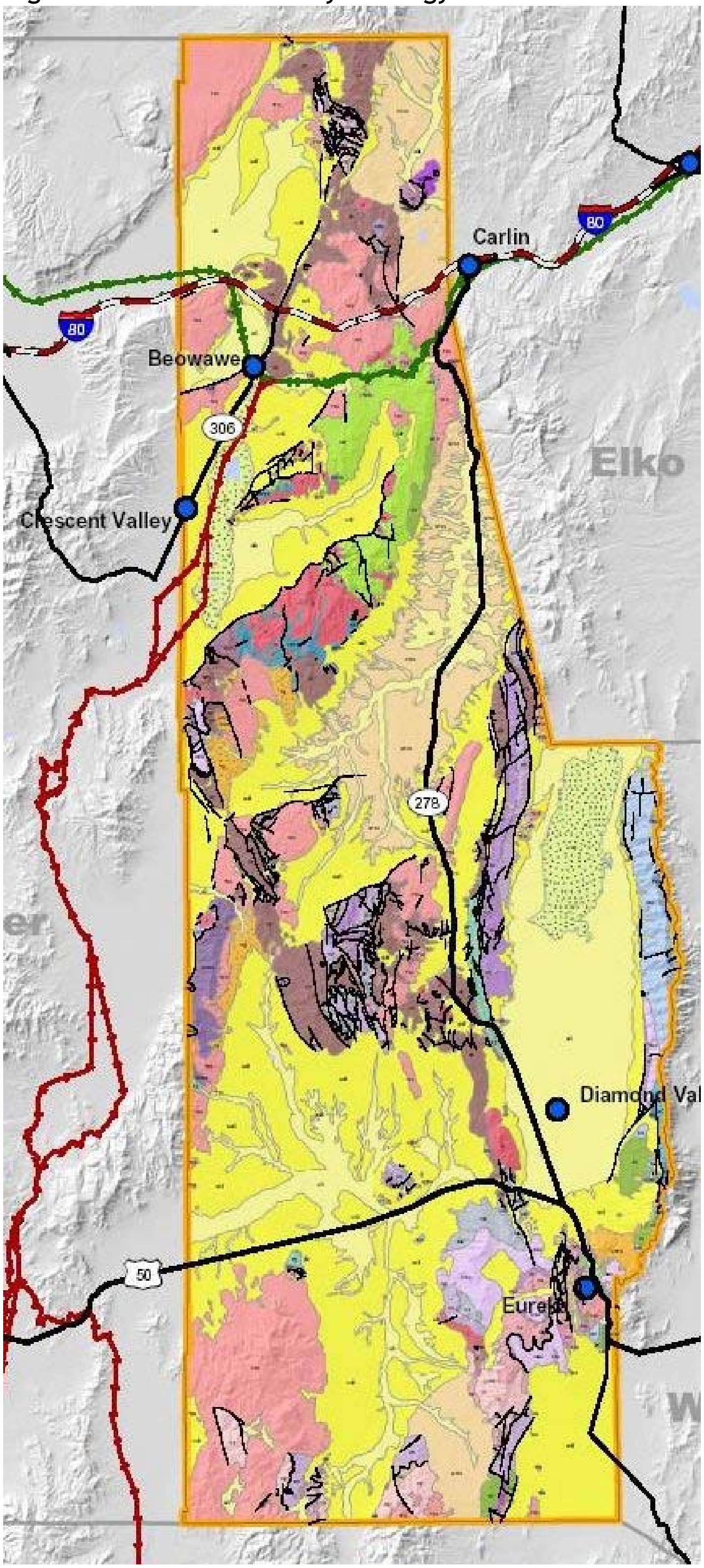

Figure 2.4 Eureka Time Scale

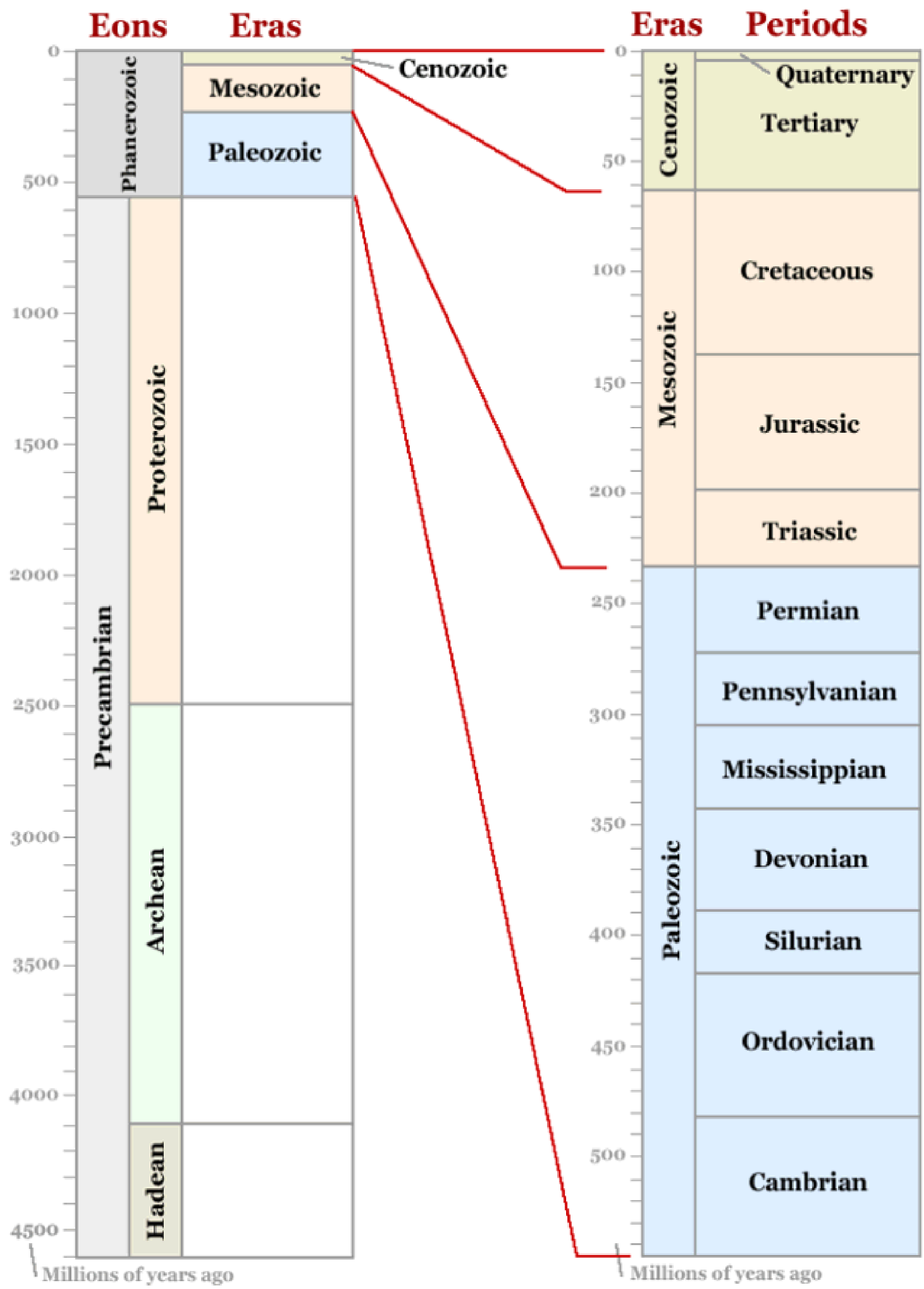

Figure 3.1.2 Eureka County Mining District

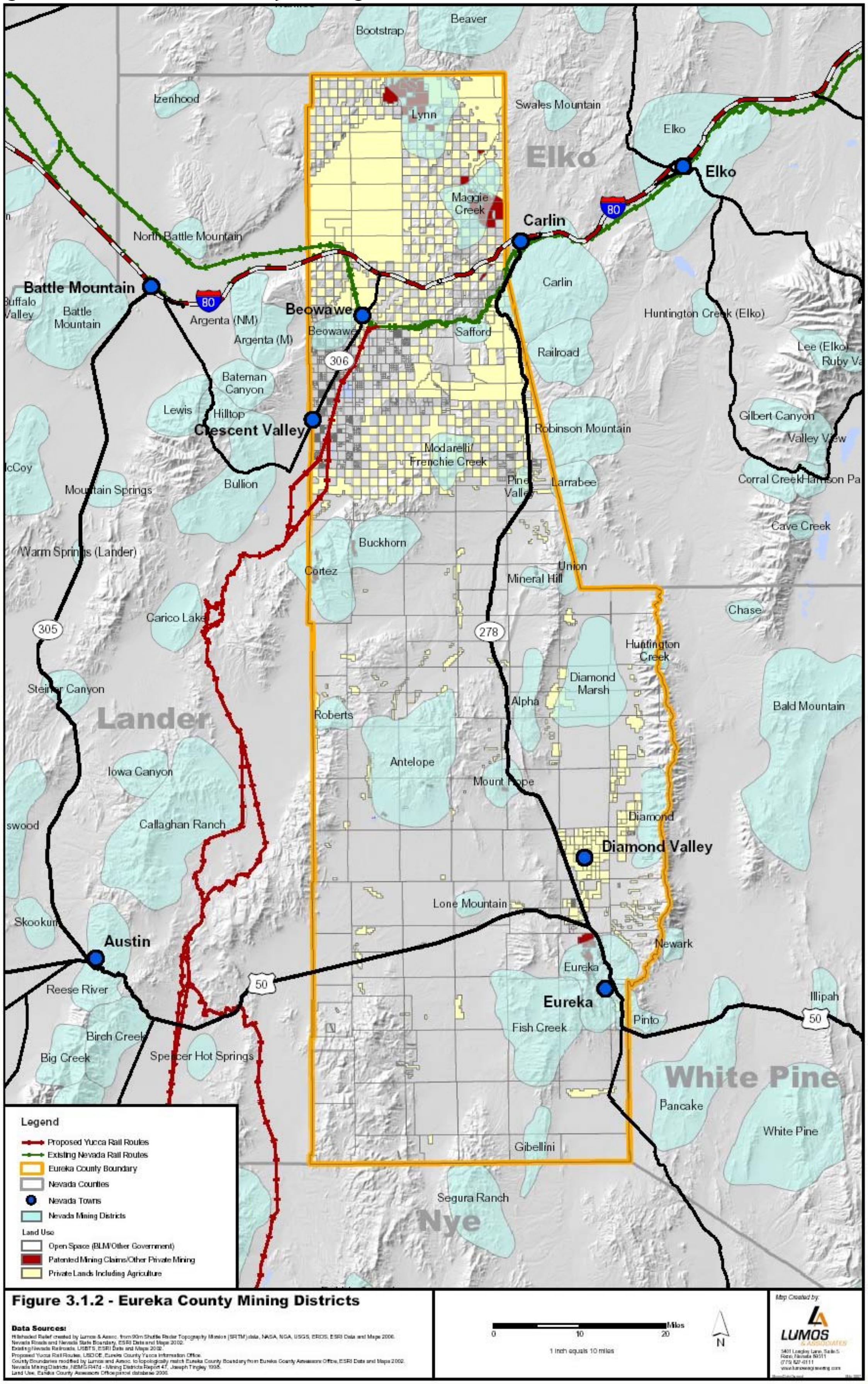

Figure 3.1.3 Eureka County Mining Claim Activity

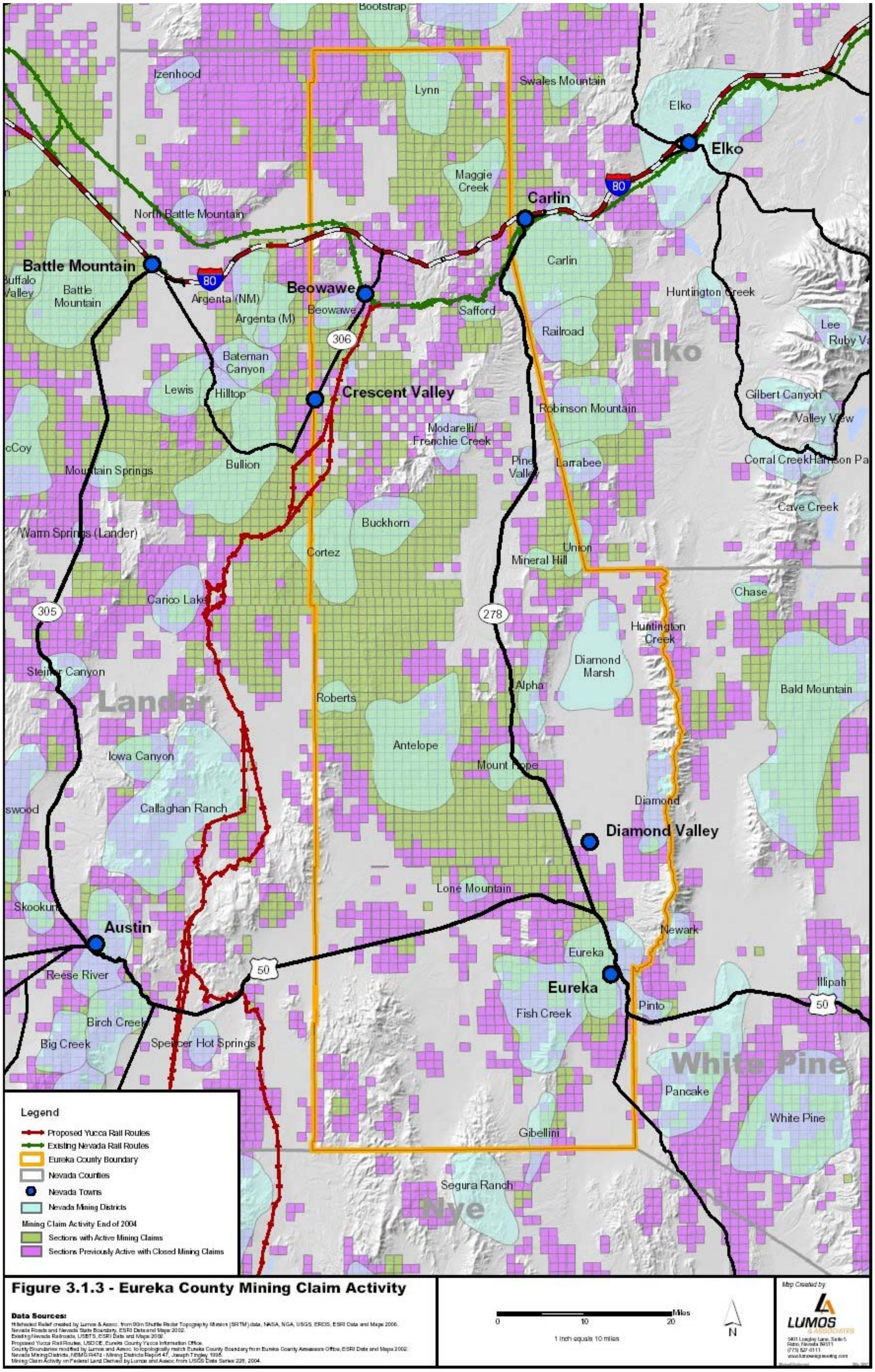

Figure 3.1.5a - Eureka County Mining Resources

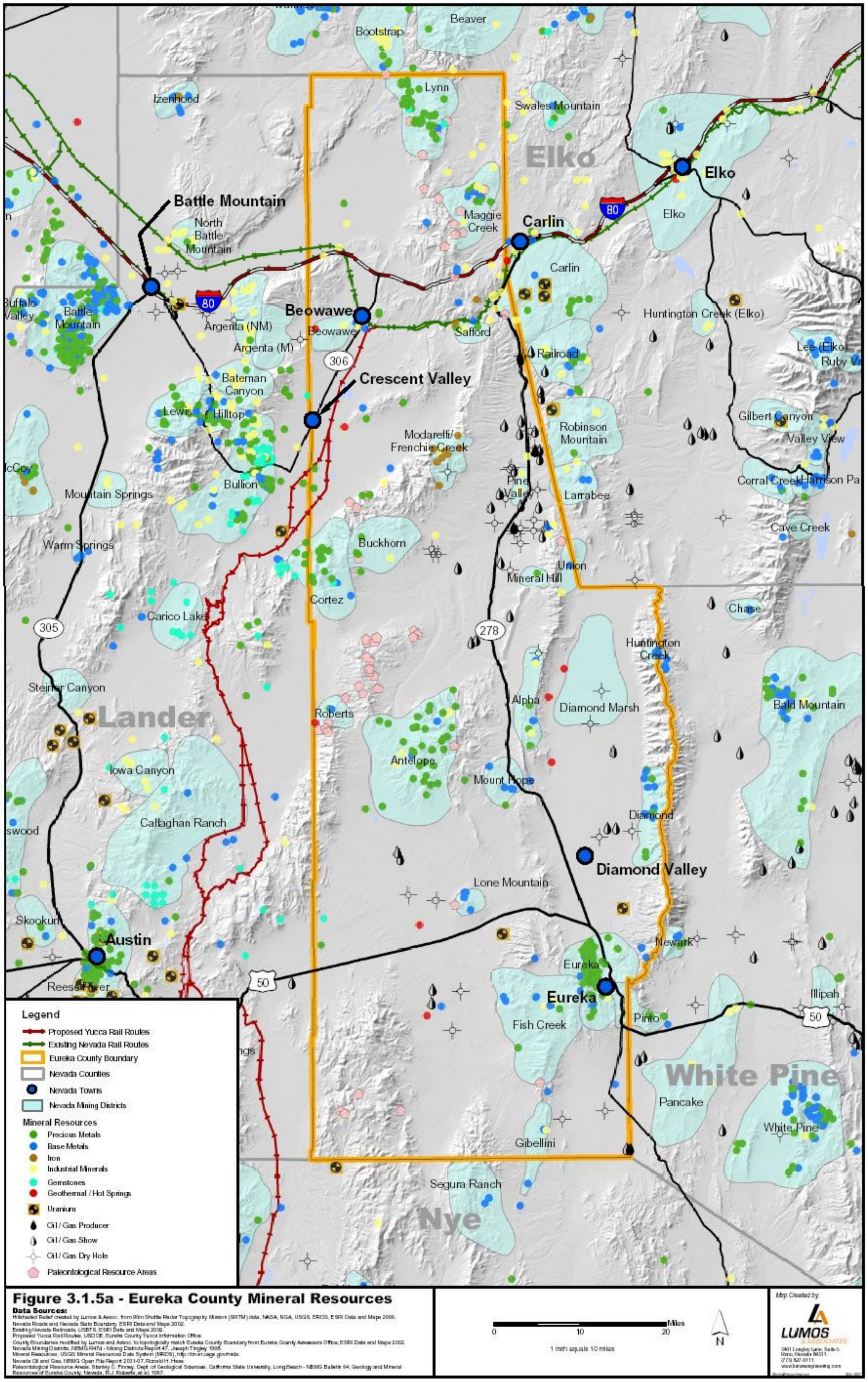

Figure 3.1.5a - Eureka County Mineral Resources

Data Sources:
Hillshaded Relief created by Lumos & Assoc. from 90m Shuttle Radar Topography Mission (SRTM) data, NASA, NGA, USGS, EROS, ESRI Data and Maps 2006.
Nevada Roads and Nevada State Boundary, ESRI Data and Maps 2002.
Existing Nevada Railroads, USBTS, ESRI Data and Maps 2002.
Proposed Yucca Rail Routes, USDOE, Eureka County Yucca Information Office.
County Boundaries modified by Lumos and Assoc. to topologically match Eureka County Boundary from Eureka County Assessors Office, ESRI Data and Maps 2002.
Nevada Mining Districts, NBMG R47d - Mining Districts Report 47, Joseph Tingley 1998.
Mineral Resources, USGS Mineral Resources Data System (MRDS), http://tin.er.usgs.gov/mrds.
Nevada Oil and Gas, NBMG Open File Report 2001-07, Ronald H. Hess.
Paleontological Resource Areas, Stanley C. Finney, Dept. of Geological Sciences, California State University, Long Beach - NBMG Bulletin 64, Geology and Mineral Resources of Eureka County, Nevada, R.J. Roberts, et al. 1967.

Figure 3.1.5b Carlin Area Mineral Resources

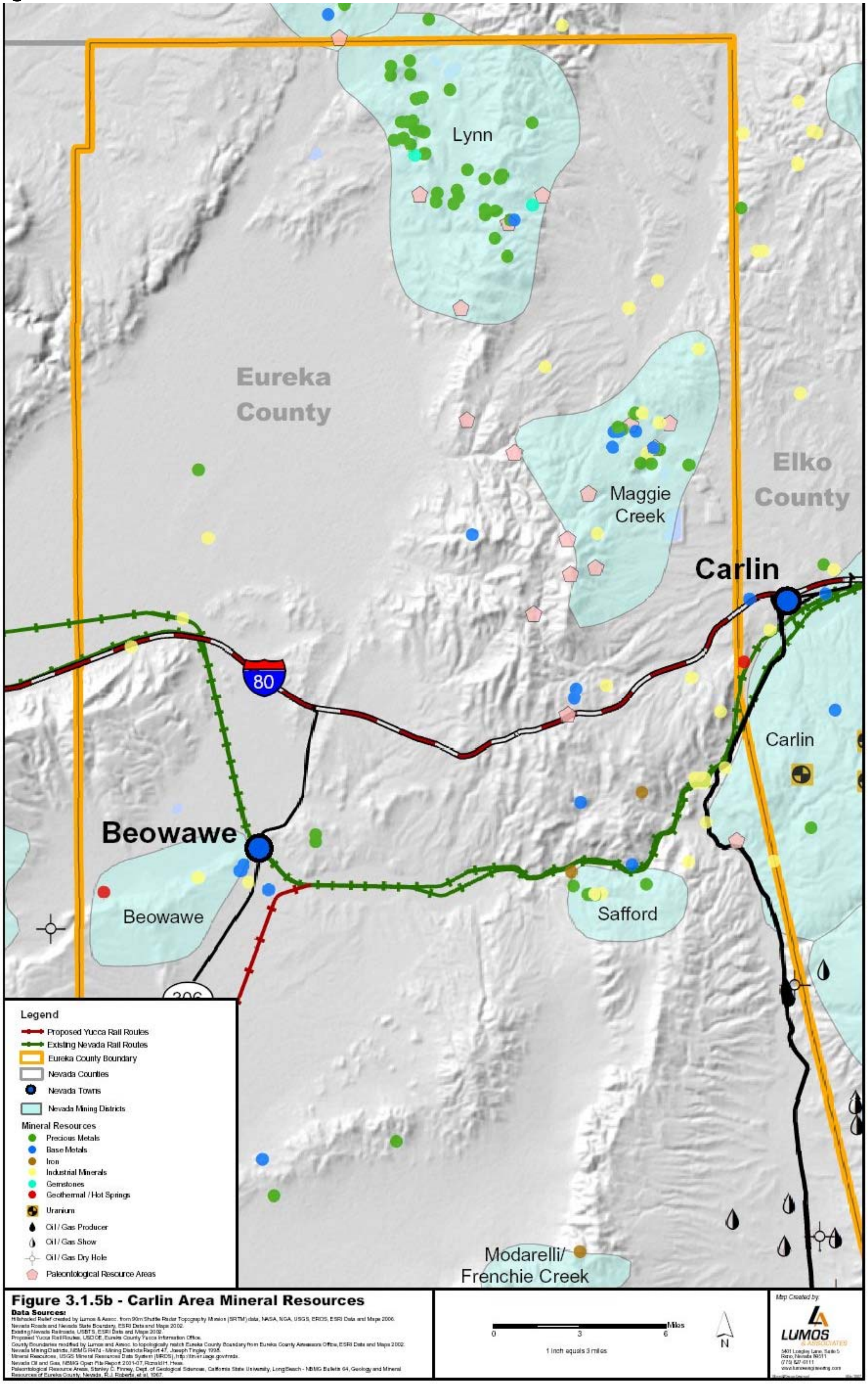

Figure 3.1.5c Crescent Valley Mineral Resources

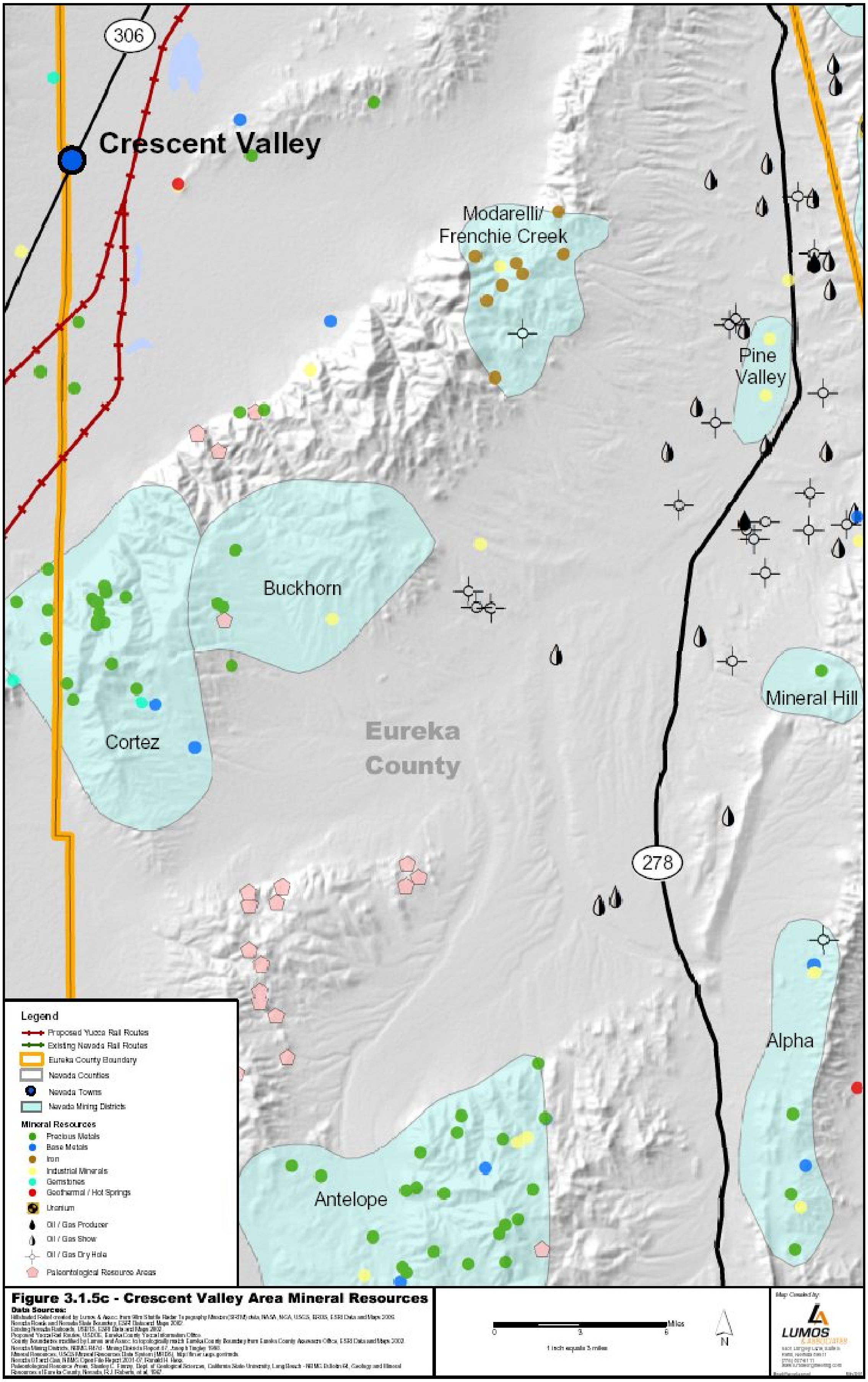

Figure 3.1.5d Eureka Area Mineral Resources